DEVELOPMENTS IN SOURCE MONITORING

AND

LINGUISTIC ENCODING OF SOURCE

Thesis submitted to the

Institute for Graduate Studies in the Social Sciences

in partial fulfillment of the requirements for the degree of

Master of Arts
in
Psychology

by

Hale Ögel

Boğaziçi University

2007

Thesis Abstract

Developments in Source Monitoring and Linguistic Encoding of Source

by Hale Ögel

The present study examined Turkish-speaking children's source monitoring ability, and whether their ability to use evidentiality markers predicts their source monitoring abilities. Eighty-seven 3- to 6-year-old children participated over two sessions in two source monitoring tasks, (1) Mode of Knowledge Access Task, and (2) Source Identification Task; and three linguistic tasks, (1) Direct Experience Task, (2) Inferential (-mIş) Task, and (3) Reportative (-(I)mIş) Task.

In the immediate part of the Mode of Knowledge Access Task, 3-year-olds performed worse than older children. In the delayed part of this task, 3-year-olds' performance was lower than that of 6-year-olds. Identification of linguistic report was found to be more difficult than identification of other sources. On the Source Identification Task, 3-year-olds gave less correct responses, made more errors than 5- and 6-year-olds. All age groups' source responses were found to differ depending on the source. These findings support the hypothesis that children's source monitoring ability increases with age.

The second hypothesis that children's ability to use evidentiality markers to report indirect experience increases with age was also supported. On the Reportative Task, 3- and 4-year-olds performed worse than 5- and 6-year-olds, and on the Inferential Task, 3-year-olds performed worse than 6-year-olds.

The last hypothesis that children's performance on the linguistic tasks would predict their performance on the source monitoring tasks was partially supported. Performance on the Reportative Task was found to predict performance on the Source Identification Task.

Discussion of findings focuses on different definitions of source monitoring and relations between language and cognition.

Tez Özeti

Kaynak Belirleme Yetisinin ve Dildeki Kanıt Göstergelerinin Kullanımının Gelişimi

Hale Ögel

Bu çalışmada Türkçe konuşan çocukların kaynak belirleme yetileri ve bu yetilerin dildeki kanıt göstergelerinin kullanımı ile ilişkili olup olmadığı incelenmiştir. 3, 4, 5 ve 6 yaşlarındaki 80 çocuk iki kaynak belirleme (Bilgiye Ulaşım Biçimi Çalışması ve Kaynak Teşhis Etme Çalışması) ve üç kanıt göstergelerinin kullanımı çalışmasına (Dolaysız Yaşantı Çalışması, Çıkarımla Bilgi Edinimi Çalışması ve Sözel Bildiriyle Bilgi Edinimi Çalışması) katılmışlardır.

Bilgiye Ulaşım Biçimi Çalışması'nın ilk bölümünde bilgi ediniminin hemen arkasından kaynağın belirlenmesi istenmiştir. 3 yaşındaki çocuklar diğer yaş gruplarındaki çocuklardan daha düşük performans göstermiştir. Kaynağın bilgi ediniminden kısa bir süre sonra belirlenmesi gerektiğinde ise 3 yaşındaki çocukların performansı 6 yaşındakilerden daha düşük bulunmuştur. Sözel bildirinin kaynak olarak belirlenmesinin diğer kaynakların belirlenmesinden daha zor olduğu bulunmuştur. Kaynak Teşhis Etme Çalışması'nda, 3 yaşındaki çocuklar 5 ve 6 yaşındakilerden daha az kaynağı doğru olarak belirleyebilmiş ve daha çok hata yapmışlardır. Kaynak belirleme performansının kaynakla ilişkili olduğu bulunmuştur. Bu bulgular kaynak belirleme yetisinin yaşla artacağı hipotezini desteklemektedir.

Dolaylı yaşantı yoluyla edinilen bilgiyi kodlayan kanıt göstergelerinin kullanımının yaşla artacağı hipotezi de desteklenmiştir. Sözel Bildiriyle Bilgi Edinimi Çalışması'nda, 3 ve 4 yaşındaki çocuklar 5 ve 6 yaşındakilerden daha düşük

performans göstermiştir.Çıkarımla Bilgi Edinimi Çalışması'nda da 3 yaşındakilerin performansı 6 yaşındakilerden düşüktür.

Kaynak belirleme yetisinin dildeki kanıt göstergelerinin kullanımı ile ilişkili olduğu hipotezi kısmen desteklenmiştir. Çocukların Kaynak Teşhis Etme Çalışması'ndaki performanslarının Sözel Bildiriyle Bilgi Edinimi Çalışması'ndaki performanslarıyla ilişkili olduğu bulunmuştur.

Bu bulgular kaynak belirleme yetisinin farklı tanımları ve dil ile bilişsel yetiler arasındaki ilişkiler doğrultusunda tartışılmıştır.

ACKNOWLEDGEMENTS

In almost every day of the last two years of my life, I thought on my thesis. I want to thank ones who have been with me during this process.

I would like to express my deepest gratitude to my thesis advisor Prof. Ayhan Koç. During my undergraduate and graduate years, the courses given by her has been shaped my interest in language acquisition and the relationship between language and cognition. She has been more than a teacher and an advisor, and contributed immensely to my academic growth. Her knowledge, wisdom and inspiration made this thesis possible. I owe her a great deal for her valuable support, trust, encouragement and time.

I am also grateful to Assoc. Prof. İ.Ercan Alp. His invaluable ideas enriched this study and his feedback improved it. I want also to thank him for his trust in me. During my undergraduate years, participating in his studies had been provided me a lot of experience and knowledge. I am also grateful to Assoc. Prof. Ali İ. Tekcan for his interest and suggestions on my study. He tolerated my endless questions on statistics with great patience and his guidance made the data analysis process easier.

I would like to express my thanks to Assist. Prof. Hasan Bahçekapılı. His critical feedback improved my thesis. I would also like to thank to Assist. Prof. Esra Mungan for her support and encouragement. She motivated me a lot by expressing her invaluable comments on my thesis.

I also owe thanks to the directors of nurseries who agreed to take part in this study, the teachers in these nurseries for their help in administering some tasks, and the children who participated in this study. I also want to thank to Melodi Bağcı and Melis Güçlütekin for their contributions to this study through transcribing and coding some part of the data for reliability analysis.

I would also like to thank to the faculty members at İstanbul Bilgi University for their support. I owe also thanks to my assistant friends at İstanbul Bilgi University, especially to Başak Efe and Selin Müderrisoğlu. Since two years, they have supported and encouraged me when I need, and I can share easily my happiness and misery with them.

I also would like to thank all of my friends for being with me in my hard times.

I would like to express my thanks to Can Balaban for being a part of my life. For seven years, I can rely on him at my difficult times. His endless love, patience and support make everything possible.

I also wish to thank to my beloved deceased grandmother, Saniye Oran. Without her, I would not be the person who I am now. I believe that she observes and protects me from where she is now.

I would also like to express my love and thanks for my older brother, Kaan Ögel. He always supported me without questioning any of my decisions and actions. I feel very lucky that he is my brother and also my friend.

Finally, I would like to express my gratitude and love to my mother, Hacer Ögel, and my father, Lemi Ögel. They always believed in me and supported me with their unconditional love and patience. I would like to dedicate my thesis to both of them.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

CHAPTER 1

INTRODUCTION

Source monitoring, remembering where, when, how, from whom, and through which modalities and means the information is acquired (Schacter, Kautstall, & Norman, 1997; Lindsay, Johnson, & Kwon, 1991), is an important cognitive ability. Besides its contribution to cognition, it plays a significant role in effective communication. The present study examined the development of 3- to 6-year-old Turkish children's different source monitoring abilities: differentiating between sources in different modalities (visual perception, linguistic report, inference from a physical clue) immediately and a short delay after knowledge acquisition, and differentiating between two sources in the same modality (linguistic report) one-week after knowledge acquisition. In Turkish, the source of knowledge is specified with different evidentiality markers, -DI and –mIş/-(I)mIş. In addition to examining Turkish-speaking children's use of these evidentiality markers, whether children's ability to correctly and differentially use these markers would predict their source monitoring abilities was examined.

In everyday life, information is acquired through different modalities in contexts with different spatial, temporal and social conditions. The circumstances under which information is gained constitute the source of this knowledge (Johnson, Hashtroudi, & Lindsay, 1993). In some situations, individuals need to remember the source when they try to retrieve the encoded information (Riefer, Hu, & Batchelder, 1994). This ability to remember the source of information is referred to as source monitoring (Riefer et al., 1994) or source memory.

Source memory is not an all-or-none type of memory about past events (Dodson, Holland, & Shimamura, 1998; Johnson, Hashtroudi, & Lindsay, 1993). Individuals can remember all of the details relevant to their acquisition of some information, such as when, where, from whom, through which modality the information was learned. However, remembering only one of these details includes some degree of source information as well. If an individual can remember that s/he was informed about a situation on which day of the year, on which part of this particular day, where and through which of his/her friends, this individual has very specific memory for how the information was gained. On the other hand, remembering only where the information was learned without other details indicates partial source information, and constitutes partial source memory. In other words, source information is such that its specificity changes on a continuum and the specificity of source memory depends on the place of the related source information on this continuum (Dodson et al., 1998; Johnson et al., 1993).

Importance of Source Monitoring

Source monitoring is important since it is related to other cognitive abilities and contributes to their development. First, source monitoring is associated with autobiographical memory (Drummey & Newcombe, 2002). Autobiographical memory consists of conscious recollections of personal events that occur during the life time (Reisberg, 2001). It does not only include the knowledge of which events occurred in the past, but also perceptual details of these events such as when, where and with whom they were experienced (Drummey & Newcombe, 2002). Since these details are similar to the information that can be gained through source monitoring ability, source monitoring is claimed to be necessary for the formation of autobiographical memory (Drummey & Newcombe, 2002). In addition, since

encoding the source of an experience gives rise to long-lasting memory of events (Perner, 1993), childhood amnesia, the inability to remember accurately the events that occur between the ages of 2 and 6, is said to be linked to young children's lack of source monitoring ability (Drummey & Newcombe, 2002; Perner, 1993). Based on this view and the finding that 5- and 6-year-old children's memories are more accurate than those of younger children (Wetzler & Sweeney, 1986; as cited in Drummey & Newcombe, 2002), Drummey and Newcombe (2002) claimed that an improvement in children's source monitoring abilities over time can be an indicator of the relationship between this ability and the development of autobiographical memory. They examined the development of source monitoring ability over time to find some indications of this possible relationship. In this study, the fictitious fact paradigm developed by Schacter, Harbluk and McLachlan (1984) was adapted to be used with 4-, 6- and 8-year-olds. Children were taught ten novel facts by two different sources, an experimenter and a puppet, and a week later they were asked to remember these ten facts among others. If the children knew the answers of the questions regarding the facts, they were asked where they had learned this information from. If they could not recall the correct answers and the sources of information, they were presented with a forced choice presenting parents, teacher, experimenter and puppet as possible sources (Drummey & Newcombe, 2002). It was found that 8-year-old children's fact knowledge was better than that of 4- and 6-year-old children whereas 4- and 6-year-olds did not differ from each other (Drummey & Newcombe, 2002). Moreover, 6- and 8-year-old children's source judgments were found to be more accurate than those of 4-year-olds while 8-year-old children's source judgments were as correct as those of 6-year-olds (Drummey & Newcombe, 2002). Furthermore, 4-year-olds made more extra-experimental errors, i.e. claimed

that the information was acquired from a source external to the experimental setting (e.g., parents or teacher) despite the fact that it was learned during the experiment, than 6- and 8-year-olds. They also made less intra-experimental errors, i.e. they remembered that the information was learned during the experiment, but identified the source incorrectly, as compared to 6- and 8-year-olds whereas these two groups did not differ in terms of their source errors (Drummey & Newcombe, 2002). These findings indicate that an improvement in source monitoring ability occurs between the ages of 4 and 6, and thus support the relationship between autobiographical memory and source monitoring, and suggest that source memory turns a memory into autobiographical memory through providing the necessary details (Drummey & Newcombe, 2002; Johnson et al., 1993).

Source monitoring is furthermore necessary for the evaluation of the accuracy of the acquired information (Taylor, Esbensen, & Bennett, 1994). Knowing the source enables one to decide whether the information can be considered to be true or not depending on its reliability, and this decision is crucial for knowledge formation (Taylor et al., 1994). Moreover, through taking into account how trustworthy the source of a belief or an idea is, it is possible to consider whether this belief or idea can be justified or rejected (Gopnik & Graf, 1988; O'Neill & Gopnik, 1991). This plays a role in controlling thoughts (Johnson et al., 1993) and prevents errors that may lead to false interpretations and inaccurate impressions on others (Nisbett & Ross, 1980; as cited in O'Neill & Gopnik, 1991). Understanding the reliability of a source also depends on source monitoring ability: to identify the reliable source among several, individuals need to keep track of the information that they acquired through each of these sources and the accuracy of this information (Johnson et al., 1993), and this ability will in turn reduce suggestibility (Leichtman, Morse, Dixon, &

Spiegel, 2000; Quas, Schaaf, Alexander, Goodman, 2000; Thierry, Spence, & Memon, 2000; Welch-Ross, 2000).

Besides its contribution to cognition, source monitoring is an important ability for effective communication, because it helps one infer who else might have access to the same information (Hoch & Loewenstein, 1989; as cited in Taylor et al., 1994). If an individual does not remember how s/he acquired the information, s/he can tell it to someone else who is the real source (Johnson et al., 1993; Roberts, 2000a) or who already has access to it (Taylor et al., 1994), and this can lead to communication problems. In addition, reliability of information which depends on reliability of source is of significant importance for communication.

Due to its importance, source monitoring has been examined extensively (Riefer et al., 1994) and three types have been identified (Johnson et al., 1993). One is internal source monitoring, i.e. distinguishing between internally generated sources such as thought and speech (Johnson et al., 1993). Second is external source monitoring, that is, differentiating between two external sources such as different individuals (Johnson et al., 1993). The last one is internal-external source monitoring or reality monitoring. Reality monitoring refers to the ability to distinguish between an internally generated source, such as thought or imagination, from an externally generated source such as perception (Johnson et al., 1993). Based on this distinction between source monitoring types, different sources can be identified. Some of these sources are perception, inference and linguistic report.

Types of Source

Perception as a Source

It has been shown that perception functions as source of knowledge even in the first months of life (Olson & Sherman, 1983; as cited in Wimmer, Hogrefe, & Perner, 1988a). However, functioning of perception as a source is different from understanding perception as a source, and the latter is found to develop later than the former (Wimmer et al., 1988a). Wimmer et al. (1988) argued that understanding perception as a factor resulting in knowledge does not develop until 4 years of age. They assessed 3-, 4- and 5-year-old children's understanding of perception as a source for knowledge. In the first experiment of their study, pairs of children, one subject and one collaborator, were presented with different boxes containing different objects. In each trial, the collaborator looked inside a box and saw the object it contained. Then, the subject was asked to state whether or not the collaborator knew what was inside the box with a double-barreled question ("Does [the name of the other child] know what is in the box or does she [he] not know that?") and whether or not s/he her/himself knew the content of the box ("Do you know what is in the box or don't you know that?") (Wimmer et al., 1988a). It was found that most of the 3- and some of the 4-year-old children had difficulty in understanding the relationship between visual access and knowledge acquisition whereas 5-year-olds could correctly use this relationship to answer the questions. 3- and 4-year-olds were found to deny frequently the collaborator's knowledge. In their other two experiments, Wimmer et al. (1988) found that although the children had the same access to information as the collaborators and were able to realize that the collaborators had visual access, most of the 3- and 4-year-old children could not assess the collaborators' knowledge correctly. These findings supported the idea that

understanding of perception as a source is not acquired until 4 years of age (Wimmer et al., 1988a).

Some other studies, on the other hand, have found that understanding the relationship between visual access and knowledge acquisition is an earlier accomplishment. Pratt and Bryant (1990) conducted an experiment with 3- and 4-year-old children using a procedure similar to that of Wimmer et al.'s (1988) first experiment mentioned above; however, in this experiment, after the collaborators looked into the box, the experimenter asked the subjects two independent (single-barreled) questions, namely whether the collaborator knew the content of the box ("Does [name of the collaborator] know what is in the box?") and whether the subject him/herself knew what was in the box ("Do you know what is in the box?"). It was found that 3-year-old children could answer these questions correctly. This finding indicates that 3-year-olds' low performance in Wimmer et al.'s (1988) studies may not result from their inability to understand visual perception as a source, but from their confusion in understanding the double-barreled questions and children as young as 3 years old can understand the relationship between visual access and knowledge acquisition (Pratt & Bryant, 1990). This suggestion is supported by another experiment conducted with 3- and 4-year-old children. In each trial of this experiment, three children, one subject and two assistants of the experimenter, were presented with a box containing an object. One of the assistants looked inside the box whereas the other one picked up the box without looking into it. Then, the subject was asked to state who knew what was in the box or who could tell the content of the box. The 3- and 4-year-olds were found to answer these questions correctly (Pratt & Bryant, 1990).

Pillow (1989) further examined 3- and 4-year-old children's understanding of the relationship between visual access to information and the knowledge state for this information. The child was presented with a bag containing toy dinosaurs of different colors. On each trial, the experimenter took one dinosaur from the bag and put it into a container without letting the child see the dinosaur's color. Then, the child or a puppet looked inside the container and the child was asked two different types of questions. The percept question asked whether the child and the puppet saw the dinosaur and assessed the child's understanding of visual access, and the knowledge question asked whether the child and the puppet knew the color of the dinosaur and assessed the child's understanding of the relationship between visual access and knowledge acquisition (Pillow, 1989). It was found that children in both age groups could identify correctly who had visual access to the dinosaur and who knew the dinosaur's color. Moreover, in a similar experiment 3-year-old children were found to perform above chance in identifying which one of two puppets could tell the color of the dinosaur in the container when only one of them had visual access to this information (Pillow, 1989). These results suggest that children as young as 3 years old can understand the relationship between perceptual experience and knowledge acquisition.

Understanding of which kind of sensory experience provides which kind of information is another important aspect of having an insight into the relationship between perception and knowledge acquisition (O'Neill, Astington, & Flavell, 1992). This ability was studied in several experiments conducted by O'Neill et al. (1992). In one experiment, 3-, 4- and 5-year-old children were presented with pairs of objects in two different conditions. In the feel condition, the objects in the pairs differed from each other in characteristics that can be only perceived through touching while in the

see condition they differed from each other in characteristics that can be perceived only through visual perception. On each trial, the experimenter put one of the objects into a tunnel and asked the children what they had to do to identify either a visual or a tactile characteristic of the object (O'Neill et al., 1992). It was found that 3- and 4-year-olds performed worse than 5-year-olds; they had difficulty in finding out which modality of sensory experience is required for acquisition of a particular kind of information (O'Neill et al., 1992). In another experiment the participants were asked to evaluate two puppets' knowledge about objects that differed in some characteristics by considering these puppets' visual experiences such as looking into the tunnel to see the object or tactile experiences such as putting the hand into the tunnel to touch the object or putting the hand on the tunnel. It was found that although 3-year-olds understand the relationship between visual sensory experience and knowledge acquisition, they can not understand feeling as a source of knowledge (O'Neill et al., 1992). Four- and 5 ½ -year-old children were able to understand that putting the hand on the tunnel did not provide any information about the object in the tunnel whereas putting the hand into the tunnel gave tactile information. However, when they had to choose between looking into the tunnel and putting the hand into the tunnel as the source of tactile information they were found to prefer erroneously seeing over feeling (O'Neill et al., 1992). Through modifying this experiment, 3-, 4-, and 5-year-old children's understanding of the relationship between the modality of sensory experience and type of knowledge that is acquired through this experience was studied further. In this third experiment, a puppet felt one of the objects without seeing it and another puppet saw the same object without touching it. The children were asked to state whether these puppets could tell some tactile or visual characteristics of the presented object, and to tell the best way to discover a

characteristic (O'Neill et al., 1992). The results showed that 3-year-old children's performance in knowledge assessment questions was lower than those of 4- and 5-year-old children whose performance did not differ from each other (O'Neill et al., 1992). In addition, 3-year-old children were found to have a tendency to attribute knowledge to the puppet that looked at the object regardless of the sensory experience modality required to learn about the asked characteristic. Moreover, 3-year-old children performed worse than 4- and 5-year-old children in determining the best way to acquire a particular kind of knowledge. All of these findings show that 3-year-old children have difficulty in understanding that different modalities of sensory experiences provide different information whereas 4- and 5-year-olds can understand the relationship between different kinds of sensory experiences and knowledge acquisition (O'Neill et al., 1992). In general, O'Neill et al.'s studies indicate that understanding of the relationship between the modality of sensory experience and information acquired through this experience, an important ability for source monitoring, develops between 3 and 4 years of age.

Inference as a Source

Another important source for knowledge is inference. According to Piaget (1955; as cited in Sodian & Wimmer, 1987), inference can be used to establish knowledge in the second year of life. Piaget and Inhelder (1969) claimed that understanding of object permanence - that objects continue to exist even if they can not be perceived - requires an ability to make inferences. Children's sense of object permanence was assessed in classical experiments requiring the child to take into account invisible displacements (Piaget & Inhelder, 1969). Children older than 18 months were able to find the toy in the correct place presumably because of their ability to infer that the toy must be under cover A through using the premises that an

object can exist only in one place and that the toy is not under cover B (Piaget & Inhelder, 1969).

The understanding of inference as a source was found to develop later than using inference as a basis for knowledge. In a study by Sodian and Wimmer (1987), 4- and 6-year-olds were presented with a container including balls of one or two colors. On each trial of the experiment, one ball was taken from the container and put into a bag. On some trials, this transfer occurred in sight of the children whereas on other trials it occurred in sight of another participant. At the end of each trial, the children were asked to state whether they and the other participant knew the color of the ball which was in the bag (Sodian & Wimmer, 1987). It was found that children in both age groups could correctly assess their own knowledge. On the other hand, the 4-year-old children were found not to be able to assess the other participant's knowledge derived from inference when the other participant did not have visual access to the information whereas 6-year-old children could correctly tell whether the other participant knew the ball's color or not. In addition, the dominant error pattern in assessing the other participant's knowledge was neglect of inferential access, i.e. ignorance of the fact that knowledge is attainable through inference from what the experimenter told about the transfer process, and what was known about the color of balls in the container (Sodian & Wimmer, 1987). In another study conducted by Sodian and Wimmer (1987), similar results were obtained. Four-, 5-, and 6-year old children were asked to assess their own knowledge, knowledge of the doll who conducted the transfer, and knowledge of the other doll that could not observe the transfer but was told about it. In some trials, the child had the same perspective with the transformer doll while in the other trials they shared the information of the passive doll. It was found that half of the 4-year-old children and most of the 5- and

6-year-old children could state correctly whether they knew the content of the bag regardless of whether they observed the transfer or not whereas almost none of the 4-year-olds, few 5-year-olds and most of the 6-year-olds could assess correctly the dolls' knowledge; and sharing perspective with the dolls did not change the performance of children. Furthermore, the most frequent error in assessment of others' knowledge was found to be neglect of inferential access (Sodian & Wimmer, 1987). The findings of these two studies were extended in a third one in which children aged between 4 and 6 years were asked to state whether the dolls could answer a question about the content of the bag by using their knowledge about it or by mere guessing. The children were found to state that if the dolls did not observe the transfer, then they had to guess the content of the bag. This suggests that they can not understand how knowledge can be derived from relevant premises through inference (Sodian & Wimmer, 1987). Considering the findings of all these three studies, it can be claimed that although 4-year-old children can use inference to construct knowledge, they can not understand that inference can lead to knowledge, and this understanding begins to emerge in the fifth year of life and develops further in the sixth year (Sodian & Wimmer, 1987). However, in these studies, only a particular type of inference, logical inference, was used as a source. Sodian and Wimmer (1987) suggested that young children could be more successful in understanding the relationship between simpler types of inference and knowledge formation. Furthermore, realizing the association between knowledge state of another person and inference as the source of this knowledge was found to be more difficult than understanding the relationship between one's own knowledge and inference (Sodian & Schneider, 1990, as cited in O'Neill & Gopnik, 1991; Sodian & Wimmer, 1987, Wimmer et al., 1988a). Studying children's understanding of the relationship

between other types of inference and their own knowledge formed through these sources seems to be necessary.

Linguistic Report as a Source

Another important source of knowledge is linguistic report. Verbal communication provides a lot of information to children especially after the age of 2 (Wimmer et al., 1988a). However, understanding the relationship between linguistic report and knowledge acquisition develops in time (Wimmer et al., 1988a).

In a study conducted by Perner and Leekam (1986), it was found that 3-year-old children can inform another individual verbally about the details of a situation when they realize that this individual does not know the details (Perner & Leekam, 1986). This suggests that children can understand what others know or do not know and based on this understanding they can modify the content of verbal information which they give to others (Perner & Leekam, 1986). Children's ability to adjust information that will be told to another person on the basis of this person's mental state reflects an implicit understanding of linguistic report as a source of knowledge (Montgomery, 1992).

The explicit expression of this awareness seems to be acquired later (Montgomery, 1992; Wimmer et al., 1988a). Wimmer et al. (1988) assessed 3-, 4-, and 5-year-old children's understanding of linguistic access as a source. In this study, pairs of children, the collaborator and the subject, were presented with different boxes containing different objects. On each trial, the experimenter looked inside the box and told the collaborator the content of the box. Then, the subject was asked to state whether or not the collaborator child knew what was inside the box and whether or not s/he him/herself knew the content of the box (Wimmer et al., 1988a). 4- and 5-year-olds were able to attribute knowledge to the collaborator on the basis of the

collaborator's verbal experience whereas 3-year-olds were unable to understand that the collaborator knew the content of the box because the experimenter told him or her (Wimmer et al., 1988a). This finding suggests that understanding of the significance of verbal messages as sources for knowledge develops after these messages are used very often as sources.

Identification of the Source

Source monitoring ability requires the understanding that the sources like the ones mentioned above lead to knowledge and beliefs (O'Neill & Gopnik 1991). However, this awareness is not sufficient for the development of source monitoring ability. Another requirement is the ability to identify which one among the potential sources results in acquisition of knowledge or formation of belief (O'Neill & Gopnik 1991). The identification of the source makes demands on memory, because in addition to the information itself, the source also has to be encoded, stored and retrieved (Gopnik & Graf, 1988). According to the source monitoring framework proposed by Johnson et al. (1993), during source identification, memory records of the knowledge acquisition process is activated and this memory trace is attributed to a source through decision processes. The memory records consist of perceptual information such as sound and color, contextual information such as spatial and temporal context, semantic details, affective information such as emotional reactions, and types of cognitive operations used to identify the new information, connect it to previous knowledge, and retrieve it from reorganized memory. These characteristics provide cues when they become activated as the individual tries to recall or recognize an event and to attribute a source to it (Johnson et al., 1993). Which one of these characteristics will be encoded is determined by perceptual processes such as locating, identifying, examining and structuring; and reflective processes such as

reactivating, retrieving and rehearsing (Johnson, 1983, 1991; Johnson & Hirst, 1991; Johnson & Multhaup, 1992, as cited in Johnson et.al., 1993; Lorsbach, 2000). Encoding of cognitive processes seems to require also an understanding of the fact that each particular source gives rise to beliefs through a different process and this depends on metarepresentations of mental states reflecting how these models of perceived situations were constructed by the mind or the "representational medium" (Perner, 1988, p.151).

The development of the source identification ability was examined in some studies. Gopnik and Graf (1988) investigated whether children can identify the source of their knowledge immediately after exposure to the information, and after a brief delay. Three, 4- and 5-year-old children were presented with a set of six drawers containing different objects. In each of the six trials, children gained information about the content of one of the drawers, but in different ways. In two trials they were allowed to directly see what was in the drawers whereas the experimenter told the content of the drawers in the other two trials. In the remaining two trials, children were presented with a perceptual clue related to the object in the drawers and asked to infer their contents. For example, an egg carton or a crayon box was presented to the children and they were told that what belonged to these boxes was in the particular drawer. At the end of each trial, after the children were asked to state the content of the particular drawer, they were expected to identify the source of their knowledge by answering the question of whether they saw the content of the drawer, figured it out from the clue or were told about it (Gopnik & Graf, 1988). For the delayed identification of the source information, after the children were presented the six items, they were presented with each object and asked to state in which drawer it was during the study and to answer whether they knew the location of the

object because they saw it, were told about it, or figured it out from a clue (Gopnik & Graf, 1988). It was found that 3-year-old children performed worse than older children on the immediate identification task and 4-year-olds worse than 5-year-olds whose performance was almost perfect. Furthermore, children in all age groups were found to make errors on immediate source identification task, but 3-year-old children exhibited more source errors when the information had been gained through being told than when through direct perception or inference; the number of errors the other two age groups made did not vary depending on the source type (Gopnik & Graf, 1988). On the delayed source identification task, there was no difference between the age groups in remembering the location of the objects, but remembering the source of information about objects was more difficult for 3-year-old children than 5-year-old ones. In addition, 3-year-olds' performance was lower on the delayed task than on the immediate task whereas no such difference was found for the 5-year-old children (Gopnik & Graf, 1988). These findings suggest that 3-year-old children have difficulty in identifying the sources of their knowledge and this ability seems to develop between 3 and 5 years of age (Gopnik & Graf, 1988). Moreover, they indicate that while 3-year-old children can identify the source of knowledge to some extent immediately after its acquisition, they can not store it in their memory whereas the older children seem to be able to store source information (Gopnik & Graf, 1988). Another important conclusion is that source monitoring ability also depends on the type of source. This relationship between source type and source monitoring is examined in some other studies as well.

One of these studies was conducted by Woolley and Bruell (1996). They were interested in children's ability to distinguish between different types of sources immediately after information acquisition and after a short delay. Three-, 4- and 5-

year-old children had to differentiate an internal source, namely imagination, from two external sources, namely visual perception and being told. Children were presented with different boxes. The see and tell trials were similar to those in Gopnik and Graf's study (1988). In the imagination trials, an empty box was presented and children were asked to pretend that something they wanted was in the box (Woolley & Bruell, 1996). At the end of each trial, the content of the box and the source of this information were asked. On the delayed task that occurred 10 minutes after the end of the test trials, children were presented with the boxes, told about their seen, told or imagined content, and the source of this information was asked (Woolley & Bruell, 1996). Three-year-olds performed worse than 5-year-olds on the immediate and delayed source identification tasks whereas 4-year-olds did not differ from the other age groups. Moreover, it was found that children could identify visual perception as a source more successfully than linguistic report whereas identification of imagination as a source did not differ from identification of the other source types. Besides, 3-year-old children's performance in recognizing telling as a source was very low (Woolley & Bruell, 1996). These findings are similar to the findings of Gopnik and Graf (1988), and show clearly that source monitoring ability depends on the source type. Furthermore, no difference in performance between immediate and delayed tasks was found. This finding implies that young children are able to remember the sources of information if they encoded them initially. Finally, children were found to be able to distinguish an internal source, imagination, from two external sources, telling and seeing, to the same extent. Based on this last finding, Woolley and Bruell (1996) conducted another study similar to their first one to examine children's ability to distinguish between two internal sources, namely imagination and inference, and to differentiate between an external source, namely visual perception, and one of the

internal sources. Three-year-old children's overall performance was found to be worse than 4- and 5-year-old's performance. Moreover, children were found to perform worse in identifying inference as a source of information than identifying visual perception and imagination. In addition, children's performance on immediate task was found to be better than their performance on the delayed task (Woolley & Bruell, 1996). This finding contradicts with their finding in the first study and shows that in addition to encoding the source information retrieving it from memory is an important part of source monitoring ability. Besides, differentiating between two internal sources is found to be more difficult than differentiating between one internal and one external source (Woolley & Bruell, 1996). O'Neill and Gopnik (1991) claimed that low performance of young children on source identification tasks can result from the fact that some sources such as inference are very difficult for children to understand. Based on this claim, O'Neill and Gopnik (1991) carried out a study including visual perception, language, tactile perception and inference as possible sources for information. Three- and 4-year-old children were exposed to only two sources among four possible ones. The children's performance was found to be influenced by the source type in such a way that children in see-infer condition performed worse than those in the feel-infer condition while children in the feel-infer condition performed worse than those in the non-inference groups, namely see-feel, see-tell and feel-tell groups. These findings suggest that identifying inference as a source of knowledge is more difficult than identifying other types of sources (O'Neill & Gopnik, 1991). This finding supports the idea that source monitoring ability depends on the type of source (O'Neill & Gopnik, 1991) although it differs from Gopnik and Graf's (1988) results which show that identifying linguistic report as a source is more difficult than identifying other sources.

The results of these three studies by Gopnik and Graf (1988), Wooley and Bruell (1996), and O'Neill and Gopnik (1991) indicate that source identification ability depends on the age of children, the source type, and when it should be identified.

All in all, source monitoring depends on the abilities to understand the relationship between sources and knowledge formation, to consider that each particular source results in knowledge through a different process, and to identify the correct type of source given the knowledge. The first ability develops earlier than the other ones, especially if knowledge was formed through visual perception. Three-year-old children were found to understand the fact that seeing leads to knowledge formation. Understanding of the relationship between knowledge formation, and two other types of source, inference and linguistic report is a later accomplishment. According to Perner (1988), the second ability develops around the age of 4 when children can form meta-representations of their mental states and realize different processes leading to knowledge formation. The last ability develops later, and it depends on different factors such as the source type, and the amount of time passed after knowledge formation.

Language as a Tool Expressing Source

In addition to the function of linguistic report as a source, language can function as a tool to mark the source of information. In languages, modality refers to the grammatical category which codes the speaker's subjective attitudes toward the information that s/he is stating (Lyons, 1968, 1977; Palmer, 1986; as cited in Aksu-Koç, 1988). One subcategory of modality is epistemic modality which indicates the speaker's subjective judgment concerning the factual status (i.e., validity or the truth value) of his/her statement and another subcategory is evidential modality which

reflects the evidence for that judgment (Palmer, 2001, p. 24). Although it is not grammaticalized in most of the Indo-European languages including English, some South American Indian languages such as Quechua (Weber, 1996) and Jaqi languages (Hardman, 1986); North American Indian languages such as Maricopa (Gordon, 1986), Makah (Jacobsen, 1986), Wintu (Schlichter, 1986); South Asian languages like Sherpa (Givon, 1982; Woodbury, 1986) and Tibetan (DeLancey, 1986), and Turkic languages including Turkish (Aksu-Koç & Slobin, 1986) have grammatical forms that mark evidentiality (all cited in Aksu-Koç, 1988).

Evidentiality markers have three different functions (Aksu-Koç, 1988). First is to underline the source of information; in other words, to specify whether it is acquired directly or indirectly and (in some languages, through which sensory modality it is obtained). The second is to imply the speaker's certainty about the truth and validity of what s/he declares. A related function which is an extension of these is to qualify the speech-act in terms of the amount of responsibility the speaker takes for the validity of the information that s/he expresses. Considering these three functions of evidentiality markers, Turkish seems to be a very interesting language given the semantic distinctions marked by its grammatical forms (Aksu-Koç, 1988).

First, in Turkish the choice between two markers, – DI and –mIş/-(I)mIş, is obligatory when one is talking about past experiences (Aksu-Koç, 1988). These inflections of the verb differ in their use to express sources of experience or information such that –DI indicates the direct and conscious experience of the speaker such as perceiving whereas –mIş signifies indirect access to information through inference from physical evidence (Aksu-Koç,1988). For example, if an individual sees water on the floor of the kitchen, s/he will say *su dökülmüş* 'water was spilled' although s/he did not observe the process of how it was caused to be

there; given the evidence on the kitchen's floor s/he makes an inference. Similarly, a child who has not seen his father coming home, can say *baba gelmiş* 'dad has come' using the inferential -mIş when he sees his father's hat on the table, because he infers his presence from his hat.

A choice of whether or not to use –mIş inflection is also at issue when the speaker talks about nonpast events: If what is asserted is based on the speaker's direct experience, s/he uses the appropriate temporal marker. If, however, it is based on another person's report, then the –(I)mIş inflection has to be added to the temporal marker (Aksu-Koç, 1988; 2000). For example, the child who hears his/her mother says *Baba geliyor* 'father came' will report this to his/her sister saying *Baba gel-iyor-muş* by using the reportative –mIş.

Another function of –(I)mIş in Turkish language is narration; because this inflection is used in telling fictitious events and stories such as myths, folktales, fairytales, jokes and fantasy (Banguoğlu, 1974; Underhill, 1976; as cited in Aksu-Koç, 1988). It also has some pragmatic functions such as expressing surprise in face of directly experienced but unexpected events; or referring to situations of which the speaker becomes aware only after observing its consequences or reflecting on it despite the conscious and direct experience (Aksu-Koç, 1988).

These different functions of the two inflections, -mIş/-(I)mIş and –DI indicate that there is a complex temporal-modal system in Turkish. Aksu-Koç (1988) examined the acquisition of this complex system in several studies. In a longitudinal study, three middle class children aged between 21 and 24 months were studied for a period of six months until they were 27-30 months of age. The data indicated that use of –DI inflection is acquired earlier than use of the –mIş/-(I)mIş inflection. All of the children could use it when they were first seen at 21-24 months, and during this

developmental period -DI was used to express events that occur in the immediate context and to refer to transformations that lead to a change in state or location of the objects such as *kalktı* '(it) got up' or *kapattı* '(it) closed' (Aksu-Koç, 1988). In a few months, children used –DI to refer to events that took place in the past such as *Anne dikti* 'mother sewed'. Children at this period did not use –mIş to refer to events that can be inferred from the resultant states of objects but preferred –DI instead of –mIş. For example, after opening a bottle and finding it empty, a child says a*ktı* '(it) spilled)' instead of *akmış*, and responds to an adult question asked with –mIş "*(emziğin) ucu ne olmuş?* 'what happened to its (pacifier's) tip?'" using the preferred –DI or –Iyor, "*kopuyor* '(it) is breaking'" instead of *kopmuş*. The first occurrence of –mIş in children's language seems to be with stative verbs in reference to the present states of objects (e.g., looking at the picture of a donkey in book "*o durmuş orada* 'it stood there'" (Aksu-Koç, 1988)). Its use for story telling in a formulaic fashion occurs at the same time with its use to express existing states (Aksu-Koç, 1988). Use of –mIş to reflect inferred, not directly experienced past processes that result in changes in the objects is observed later. For example, seeing an empty bird-cage the child says *Uçmuş* '(it) flew' (Aksu-Koç, 1988). Thus, by 30 months the children can use –mIş for talking about inferred processes and –DI for talking about directly experienced ones. Lastly, the results of this longitudinal study suggests that children between 21 and 30 months do not use the –(I)mIş particle for its reportative function and cdo not form adjectives with it (Aksu-Koç, 1988). Another longitudinal study of Aksu-Koç (2000) conducted with four children between 15-30 months revealed the same developmental pattern.

Aksu-Koç (1988) also conducted experimental studies to examine the acquisition of Turkish's past tense with children between 36 and 76 months. Although these experimental studies yielded later ages for the competent use of these inflections than those found in the longitudinal study, they provided valuable information about the development of the different temporal and modal functions of the two forms. The task devised to assess children's production of the inferential function of –mIş, was presented like a puppet show where a box with a sliding panel was used as the stage. At the beginning of each trial, the children were presented with the initial state of an object in the box and the experimenter told this state as the beginning of a story. Then the box was closed. After the state of the object was changed by the experimenter through some transformation which was not observed by the children, the experimenter opened the box again and asked the children to tell the end of the presented story. Some of the sates resultant from these transformations were a broken plate, a popped balloon, an empty bird cage because the bird had escaped, and an empty plate because the cookies had been eaten (Aksu-Koç, 1988). The task devised to assess children's production of the –DI inflection was the process-perceived task which was similar to the inference task, but in this case children were able to observe all parts of the situation including the transformation that lead to a state change in the presented object (Aksu-Koç, 1988). The results showed that children's correct performance on the inferential task increased until age 5 whereas correct performance on the process perceived task was reached earlier. These findings support the longitudinal study of Aksu-Koç (1988) by showing that the correct use of the –DI inflection to indicate directly perceived events develops very early and the lack of difference between age groups suggests that it has been acquired fully at age of 3. Comparison of children's responses on the two tasks

showed that children's differentiated use of these two inflections increased gradually with age. These experimental assessments suggest that understanding the relationship between the two past inflections and the encoding of witnessed vs. non-witnessed processes develops over time, and mainly between 3;6 - 4;6 years (Aksu-Koç, 1988).

Children's comprehension of the use of past tense inflections to mention direct vs. indirect experience was assessed by presenting sets of pictures depicting three characters two of whom witnessed an event as it happened and one who did not. The experimenter told a story at the end of which she presented an utterance about the event with either –DI marker as a statement that could be produced by the character who witnessed the event, or –mIş marker as a statement that could be produced by the character who did not directly observe the event. The children were asked to identify the speaker of this statement and to justify their judgments (Aksu-Koç, 1988). In general, children were more successful in identifying the speaker of the utterances with the –DI inflection than with the –mIş inflection. Correct performance increased with age: 3- to-4-years could not differentiate the use of the two forms systematically; got better in identifying the speaker of –DI utterances between 4- to 5-years, whereas performance in identifying the speaker of the -mIş markers increased between the ages of 5 and five–and-one half. Children's justifications for their choice of speaker were also analyzed to find out whether their decisions were made according to some rules (Aksu-Koç, 1988). Young children were not able to provide any justification. 4-year olds claimed that the utterance belonged to the character that directly perceived or experienced the event. This suggests that young children base their judgments on the idea that knowledge can be acquired only through seeing directly (Aksu-Koç, 1988). On the other hand, 5- year-olds understood that the characters who did not witness the event directly could also

talk about it, but they could not consistently identify the linguistic form appropriate to do so, whereas 5-and-one-half year olds could, suggesting that they understood the relationship between the two past forms in Turkish and the source for knowledge (Aksu-Koç, 1988). In other words, they could connect the linguistic forms with their appropriate contexts and their correct conceptual meaning.

Whether children between the ages of 3 to 6 can produce and understand the reportative function of the –(I)mIş inflection was also examined experimentally by Aksu-Koç (1988). Three-year-olds were not able to transform the –DI past into the –(I)mIş past in their utterances re-producing information obtained from someone else, and they were not able to identify how a speaker using the –(I)mIş inflection had acquired this information. Four-year-olds could transform –DI into –(I)mIş past on most trials, providing evidence for production, but although they could state that the contents of an utterance with –(I)mIş had been acquired through someone else, they also claimed that the speaker had seen the event. This finding implies a contradiction and suggests that children in this developmental level base their judgments on the idea that only those who observe an event can talk about it. Older children with a mean age of 5 years were able to understand that one could talk about an event despite the fact that s/he did not witness it. This suggests that comprehension of the idea that one does not have to see an event in order to talk about it is a late development that occurs approximately at 5 years of age (Aksu-Koç, 1988).

These studies conducted by Aksu-Koç (1988, 2000) provide information about the developmental pattern of the acquisition of the –DI and –mIş/–(I)mIş suffixes as evidentials. Considering the differentiated use of these evidentiality markers and the comprehension of their functions, Turkish speaking children can be

said to be monitoring unconsciously their mental processes, mental representations and changes in these representations continuously to choose the correct markers when they speak (Alıcı, 1998; as cited in Aksu-Koç & Alıcı, 2000). In addition, as hearers, they pay attention to the markers in the speech of others, because these provide rich information about the others' mental states and representations (Aksu-Koç & Alıcı, 2000). It can therefore be argued that the syntactic distinction between direct and indirect experience can increase Turkish children's sensitivity to source of information at an earlier age compared to children speaking languages where there is no such obligatory distinction (Aksu-Koç & Slobin, 1985), and can facilitate the source monitoring abilities of children who can use these inflections in a differentiated manner compared to those who can not.

Relationship between Cognition and Language

The area of cognitive development and the field of language acquisition have developed separately (Bowerman & Levinson, 2001) and until the last fifteen years the relationship between these two inquiries was examined rarely in empirical studies (Lucy & Gaskins, 2001).

The course of language development is such that it does not begin until the end of the first year in human ontogeny (Brown, 1973; as cited in Langer, 2001), However, children are able to engage in classifying objects in two categories in logico-mathematical cognition and searching for hidden objects as a requirement of object permanence in physical cognition by this time (Langer, 2001). These facts suggest certain cognitive achievements precede language, and a cognitive foundation that aids the symbolic system is necessary for language acquisition (Langer, 2001). Moreover, in phylogeny, cognition precedes language as in ontogeny and the primates closest to human beings do not acquire language although they are able to

engage in similar classification activity (Spinozi, Natale, Langer, & Schlesinger, 1999; as cited in Langer, 2001). This suggests that cognition is the necessary, but not sufficient prerequisite for language acquisition. On the other hand, primates such as common chimpanzees and bonobo chimpanzees can not engage in cognitive processes such as three-category classifying (Spinozi et al., 1999; as cited in Langer, 2001) despite the fact that they can acquire proto-grammatical language (Savage-Rumbaugh, Murphy, Sevcik, Brakke, Williams, & Rumbaugh, 1993; as cited in Langer, 2001) on the basis of their classifying ability (Langer, 2001). This suggests that in humans language facilitates cognition and as language develops, the relationship between language and cognition becomes bidirectional (Langer, 2001).

The effect of language on cognition was stated first by Whorf, according to whom (1956; as cited in Gopnik & Choi, 1990; Gopnik, 2001), syntactic structures of a language represent some conceptual forms that shape the cognition of its speakers. Whorf's idea put in this weaker form is supported in many recent studies showing the relationship between language and cognition (Gopnik, 2001).

The development of several cognitive abilities between 15 and 21 months was found to be related to the use of some linguistic forms in English. Understanding object permanence was found to be related to the use of disappearance words such that English-speaking children began to search for hidden objects one or two weeks after they began to use "all gone" (Gopnik, 1982; 1984; Gopnik & Meltzoff, 1984; 1986; as cited in Gopnik, 2001). Similarly, the understanding of means-ends relations was found to be related to the use of words expressing success and failure (Gopnik & Meltzoff, 1984; 1986; as cited in Gopnik, 2001), and an increase in vocabulary was found to be related to ability to classify objects in normally developing, and Down's syndrome children (Gopnik & Meltzoff, 1987; 1992;

Mervis & Bertrand, 1994; as cited in Gopnik, 2001). Interestingly, although all of these three cognitive abilities occur around 18 months of age, they are independent of each other and the linguistic form related with one is not associated with the others. In addition, the temporal gap between the unrelated conceptual and linguistic abilities is larger than that between the related conceptual and linguistic abilities that take place very closely in time (Gopnik, 2001).

These findings showing the relationship between cognitive abilities and linguistic forms are extended in some crosslinguistic studies comparing their development in children speaking different languages. Korean differs from English in terms of its sentence structure and in having richer morphology (Hoff, 2001). It is a verb-final language and verb meanings can be modified by using different verb endings (Gopnik, 2001). These differences appear to result in different patterns of acquisition. In general, Korean children use verb morphology earlier than English children, but acquire fewer and less varied nouns, and their naming spurt occurs later than that of English children (Choi, 1986; 1991; Choi & Gopnik, 1995; Clancy, 1985; Gopnik & Choi, 1990; as cited in Gopnik, 2001). These linguistic differences were found to be related to differences in English- and Korean-speaking children's conceptual development (Gopnik & Choi, 1990; 1995; Gopnik, Choi, & Baumberger, 1996; as cited in Gopnik, 2001). On categorization tasks assumed to be related to naming spurt, the performance of Korean-speaking children was found to be lower than that of English-speaking children whereas Korean children exceeded the English children on the mean-ends tasks claimed to be related to success/ failure verbs (Gopnik et al., 1996; as cited in Gopnik, 2001). These findings point to a close relationship between language and cognition.

Korean and English differ in their coding of spatial information as well. In English, the relation between an object in contact with the surface of another object is coded with the preposition “on” (such as a lego on another one) and the relation between an object and an enclosed space such as a container is coded with the preposition “in” (such as an apple in a bowl or a cassette in its case) (Bowerman & Choi, 2001). In Korean, there is a linguistic distinction between putting objects into containers that will hold them tightly, coded with “kkita” (a cassette in its case), and putting things into containers that will hold them loosely, coded with “nehta” (an apple in a bowl) (Bowerman & Choi, 2001). Besides, Korean uses different verbs for different surface relations between objects (“Nohta” for putting an object on a horizontal surface such as a cup on a table, “pwuchita” for joining two flat surfaces such as a magnet on a refrigerator) and different verbs for putting clothes on different parts of the body (“ssuta” for putting a hat on head, “ipta” for putting socks on feet) (Bowerman & Choi, 2001). An examination of early spatial categories in children‘s spontaneous speech between the ages of 1 and 3 showed that Korean- and English speaking children classify similar events differently: English-speaking children attend to connectedness and containment whereas Korean-speaking ones attend to the tightness and looseness of the relationship between objects (Choi & Bowerman, 1991; as cited in Bowerman & Choi, 2001). Furthermore, an elicited production study conducted with children between 2;0-3;6 years revealed that the spatial categorizations of children are more similar to those of adults speaking the same language than to that of their peers speaking another language (Bowerman & Choi, 1994; Bowerman, 1996; Choi, 1997; as cited in Bowerman & Choi, 2001). In another study by Choi, McDonough, Bowerman and Mandler (1999; as cited in Bowerman & Choi, 2001), it was found that 18 and 23 months old Korean and English speaking

children could, through preferential looking, match the target spatial terms with the pictures depicting the appropriate relationship in the language they heard. All these findings suggest that linguistic coding of space is very salient in languages and is able to shape the cognitive domain of spatial categorization from early on, and provide support for the relationship between language and cognition.

Further evidence comes from the Mayan language Tzetzal with its uphill/downhill system of spatial descriptions instead of front, back, left and right: in Piagetian terms, the system is Euclidean, utilizing precise fixed angles and precise geometric constructions like "a specific angle around a fixed direction" (Brown, 2001, p. 516). Tzeltal-speaking 4-year-olds use this uphill/downhill Euclidean system appropriately at an advanced level (Brown, 2001) which, however, can not be used by children speaking Western languages that do not have the uphill/downhill system, until the age of 8 or 9 (Piaget, Inhelder, & Szeminska, 1960; Brown & Levinson, 2001; as cited in Brown, 2001). The early development of this system in Tzeltal suggests that language influences cognition.

Another cognitive domain claimed to be associated with language is the theory of mind ability, i.e. attributing beliefs, desires, intentions and emotions to people in social interaction (Astington, 1998; as cited in Astington & Jenkins, 1999). One view is that developments in language lead to developments in theory of mind (Astington & Jenkins, 1999). On the other hand, based on Piaget's (1954, 1980; as cited in Astington & Jenkins, 1999) idea that language follows cognition, it is claimed that developments in theory of mind lead to the development of means used in referring to mental states (Astington & Jenkins, 1999). In a longitudinal study conducted by Astington and Jenkins (1999), these two different ideas about the relationship between theory of mind and language were tested. Three-year-old

children's theory of mind abilities were examined three times over approximately one year with different tasks. In each of these sessions, the semantic and syntactic skills of children were assessed. It was hypothesized that if linguistic development leads to the development of theory of mind, then the children's semantic and syntactic skills in a session will predict performance in theory of mind tasks in subsequent sessions, but not vice versa. This hypothesis was supported by findings that suggest theory of mind depends on language. Moreover, it was found that the syntactic rather than the semantic competencies played a role in the development of theory of mind (Astington & Jenkins, 1999). Although this study can not provide a direct causal relationship due to its correlational design, it provides some additional support for Whorf's idea that the syntactic structures of a language shape thought.

Considering all the studies mentioned above, it seems that studying languages with special syntactic structures can shed more light on whether language influences cognition. Taking into account the complex evidential system of Turkish and considering the argument about the relationship between source monitoring and expression of information source in language, Aksu-Koç and Alp (2005), examined the relationship between children's ability to distinguish the pasts of direct and indirect experience, and their source monitoring abilities. Children between 2;10 and 5;4 participated on two linguistic tasks and one nonlinguistic task over a two week period. One of the linguistic tasks was the inference task that was developed by Aksu-Koç (1988) as mentioned above and used to assess children's ability to use –mIş inflection to express inference. The other linguistic task, the Reportative –mIş Task was developed by Alp (2005). On this task, one experimenter told a short story to the child using the –DI marker expressing direct experience, then left the room, and another experimenter came in and asked the child to tell him/her the story told by

the first experimenter (Aksu-Koç & Alp, 2005). The nonlinguistic cognitive task was an adapted version of the source task used by Drummey and Newcombe (2002). The results did not reveal a relationship between source monitoring ability and the linguistic encoding of source with the –mIş/-(I)mIş marker (Aksu-Koç & Alp, 2005). However, this lack of expected relationship could have resulted from the fact that the children's performance in remembering the facts on the source task was very low which suggests a methodological problem (Aksu-Koç & Alp, 2005).

Statement of Problem

As was previously stated, source monitoring is an important ability that consists of understanding different types of sources as means to knowledge acquisition and identifying the correct source among alternatives (O'Neill & Gopnik 1991). Different tasks were developed to assess source-monitoring in children. On one task used by Gopnik and Graf (1988), participants acquire knowledge through different modalities such as visual perception, linguistic report and inference, and are asked to identify the source of their knowledge immediately after the task. The ability to identify source over a longer time period seems to be more complicated and demanding, because it requires the long-term storage and retrieval of the source information in addition to differentiating it from other possible sources. This ability was assessed by Drummey and Newcombe (2002) with a task where participants are presented with several unfamiliar facts by different sources, an experimenter and a puppet, in a single modality, namely linguistic report, and asked to identify the correct source after a one-week delay. Based on the source monitoring framework of Johnson et al. (1993), it can be claimed that Drummey and Newcombe's (2002) task is more demanding than that of Gopnik and Graf (1988), because the former contrasts two similar sources in the same modality over a long time period where the

latter contrasts different modalitiesas source over a very short time period. In short, these two tasks assess different components of source monitoring and using these two tasks with different demands to assess source monitoring will provide more information about this important cognitive ability, and its development. Thus, the first aim of the present study is to examine preschool children's source monitoring ability with the adapted versions of these two different tasks. The Source Identification Task is an adapted version of Drummey and Newcombe's (2002) task, the Mode of Knowledge Access Task is similar to the task of Gopnik and Graf (1988).

The second aim is to study the development of preschool children's ability to use evidentials correctly and differentially. Their use of –DI to express direct experience,

–mIş to report an inference derived from a physical evidence, and –(I)mIş for the quotative function of this evidential is examined. The third aim is to study the relationship between source monitoring and the linguistic encoding of source. Aksu-Koç and Slobin's (1985) claim that the use of evidential forms may enhance ability for source monitoring was investigated by Aksu-Koç and Alp (2005) by adapting the task of Drummey and Newcombe (2002) for children. As noted earlier this expected relationship was not found; the authors suggest that this may be because the novel facts were not fully acquired by the children and therefore source knowledge could not be adequately tapped. Thus, a replication of this study will be informative. Furthermore, since –DI, and –(I)mIş inflections encode the different types of sources, namely direct perception and linguistic report respectively, that were included on the Gopnik and Graf (1988) task, assessing the relationship between the linguistic encoding of source and source monitoring abilities on Gopnik and Graf's (1988) task

seems to be appropriate and necessary. For this purpose, in the present study, the differentiated use of –DI and –mIş/-(I)mIş inflections by Turkish-speaking children between 3- and 6-years of age is investigated in relation to their performance on two source monitoring tasks.

Hypotheses

The hypotheses of the present study are:

A. Children's performance on the source monitoring tasks will increase with age.

A1. The ability to differentiate between sources in different modalities immediately after knowledge acquisition on the Mode of Knowledge Access Task will increase with age.

A2. The ability to differentiate between sources in different modalities a short delay (a few minutes) after knowledge acquisition on the Mode of Knowledge Access Task will increase with age.

A3. The ability to differentiate between sources in the same modality a long delay (one week) after knowledge acquisition on the Source Identification Task will increase with age.

B. Children's ability to use the evidential markers correctly on the linguistic tasks will increase with age.

B1. The ability to correctly use –DI inflection will have been acquired at the age of 3 and there will be no age differences on the Direct Experience Task.

B2. The ability to correctly use –mIş inflection to report inferences from a physical evidence on the Inferential (–mIş) Task will increase with age.

B3. The ability to correctly use –(I)mIş inflection for its quotative function to report indirect experience on the Reportative (–(I)mIş) Task will increase with age.

C. Children's performance on the linguistic tasks will predict their performance on the source monitoring tasks.

*C1.*Children's performance on the Reportative –(I)mIş and Inferential –mIş Tasks will predict their immediate and delayed source monitoring performance on the Mode of Knowledge Access Task.

C2. Children's performance on the Reportative –(I)mIş and Inferential –mIş Tasks will predict their delayed source monitoring performance on the Source Identification Task.

CHAPTER TWO

METHOD

Participants

One-hundred-eight children from 13 different nurseries participated in the first session of the present study. Twenty-one of these children could not be seen for the second session, because they were absent on the day of the second session a week later. Twenty-one 3-year-olds (*M*= 42.6 months, *SD*= 3.21, range= 36-46 months, 10 girls and 11 boys), 23 4-year-olds (*M*= 54.1 months, *SD*= 3.29, range= 47.5-58.5 months, 11 girls and 12 boys), 24 5-year-olds (*M*= 64.8 months, *SD*= 3.67, range=60-71 months, 11 girls and 13 boys), and 19 6-year-olds (*M*=76.1 months, *SD*= 3.35, range= 72-83.5 months, 9 girls and 10 boys) completed the study. All the children belonged to middle- and high socioeconomic status. Informed consent was obtained for all children from the parents or teachers. Information about whether the children had some developmental disabilities and whether their developmental level was in line with their ages were taken from their teachers, and children who were reported to have some developmental problems were not included in the study.

Instruments for Assessment

Source Monitoring Tasks

Mode of Knowledge Access Task

The source identification task used by Gopnik and Graf (1988) was adapted for the current study. The child was presented with a set of six canvas shelves in a three x two array (overall size was 30x30x35 cm). Each shelf was covered by a tissue in a different bright color. The picture of the shelves and the objects in the shelves is presented in Appendix Ia.

First, a training session was run to familiarize children with talking about different sources of information. The child was presented with four boxes in different colors and each box included an object. The child saw the content of one box, was told about the content of another box and was asked to infer the content of the remaining two boxes. After the child learned the content of a box, s/he was immediately asked to state what it was. Then, she was asked to identify the source of this information by answering a recognition question, *Nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin bir ipucundan mı anladın?* 'How did you find out, did you see it, did I tell you about it, or did you figure it out in some way?'. The alternatives of this question were counterbalanced across trials. If the child could not identify the source correctly, the correct source was stated by the experimenter. If s/he identified the source correctly, then a positive feedback such as *Aferin, iyi bildin!* 'Bravo, well done!' was provided. The objects and the procedure of this training session is given in Appendices Ia.

After the training session, the child was familiarized with the shelves. S/he was told that each shelf contained a different object and s/he had to find out the contents of the shelves one by one. The task consisted of six trials. Two were 'seeing' trials. On each of these two trials, the experimenter took off the cover of a shelf and the child saw the content of the shelf. Another two were 'telling' trials where the experimenter told the child that she could not open the shelf, but would tell him/her about the content of the shelf. The remaining two trials were 'inferring' trials where the child was told that the experimenter could not open the shelf, but would present a clue about the content of the particular shelf. The experimenter explained that the shelf contained something that belonged to the clue, and asked the child to figure out what was in the shelf. In the immediate source identification condition, for

each item the child was asked the content of the shelf immediately after s/he got the relevant information and then was asked about the source of this knowledge. If the child could not answer this recall question of *Nereden biliyorsun?* 'How do you know?', a forced-choice source-recognition question including three alternatives, *Nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin bir ipucundan mı anladın?* 'How do you know, did you see it, did I tell you about it, or did you figure it out in some way?' was presented. The order of the alternatives was counterbalanced. If the child did not answer immediately the content question and/or the source recognition question, then the question was repeated one more time. No positive or negative feedback was given.

Immediately after the six trials were completed, for the delayed source identification condition, the child was shown the objects that were in the shelves one by one in the order they were learned, and was asked first to state in which shelf the presented object was, *Bu hangi gözdeydi?* 'Which drawer was this in?'. Regardless of whether the child answered the location question correctly or not, his/her source memory for this location information was assessed. If the child could not correctly answer the source recall question, a forced choice source recognition question, namely *Nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin bir ipucundan mı anladın?* 'How do you know, did you see it, did I tell you about it, or did you figure it out in some way?' was given. The order of the source alternatives was counterbalanced across trials. If the child did not answer the location or source question immediately, the question was repeated one more time. No positive or negative feedback was given. The procedure for the Mode of Knowledge Access Task is presented in Appendix Ia.

To evaluate the reliability of scoring for the Mode of Knowledge Access Task and the other tasks that will be described, the inter-rater reliability was calculated. Two psychology students from Bogaziçi University were trained by the experimenter for transcribing and coding. They each transcribed and coded the data of 10 children from different age groups. Thus, a total of 20 children's data were entered into reliability computation. The inter-rater reliability between the experimenter's and the raters' coding based on consensus estimates method was found to be 95.12% for source knowledge (minimum= 75%, maximum= 100%, median= 100%).

Source Identification Task

The source task developed by Drummey and Newcombe (2002) on the basis of Schacter et al.'s fictitious fact paradigm (1984) was adapted for the current study. This task consisted of two parts separated with a one-week time interval: (1) Fact-teaching, (2) Source recall/recognition.

In the fact-teaching part, children were presented with five novel facts by the experimenter and five novel facts by the puppet which was introduced at the beginning of the session and acted out by the experimenter. The facts that constituted the items were determined in a pilot study where forty facts identified by the experimenter and six psychology undergraduates were tested. Twenty-four facts were determined to be unfamiliar and 16 familiar to the children. These were then classified into three categories, namely properties of animals, properties of objects and colors. These were then assigned to three groups which had seven or eight unfamiliar and five or six familiar facts. The order of the facts in each group was determined randomly. The groups of facts are presented in Appendix Ib.

In the pilot study, each group of facts was presented to a sample of 4- and 5-year-old children to determine which fact is really familiar or unfamiliar to these age groups and whether these facts can be learned and recalled over a one-week period. The pilot study was carried out according to the procedure of the Source Identification Task described below. The facts that were known by less than 35% of the children in the initial fact-teaching part were considered as unfamiliar facts. Among these facts, those that could not be recalled by more than 70% of the children in the recall/recognition part of the pilot study were eliminated from the list and were not used in the task. The facts that were known by at least 65% of the children in the fact-teaching part of the pilot study and were recalled by at least 70% of the children in the recall/recognition part were considered as familiar facts and included in the facts list as familiar items. The result of the pilot study and the list of the facts that were used in the Source Identification Task are presented in Appendix Ib.

To control for order of presentation and presenter effects, the order of the facts were counterbalanced. The facts were assigned into two sets. Half of the children received the facts on the first set before those in the second set and half of the children received the second set before the first one. In addition, half of the children received the first set from the experimenter, and the second set from the puppet, and half of the children received the first set from the puppet and the second from the experimenter. The facts in each set were given successively by the presenter. To find out whether the child knew the fact or not, each fact was presented in a question format such as *Hangi hayvanın burnu yoktur?* 'Which animal does not have a nose?'. If the child did not know the answer, then it was stated by the presenter, *Balığın burnu yoktur.* 'The fish has no nose', and the child was asked to repeat the answer together with the presenter, *Haydi gel birlikte söyleyelim.* 'Let's

say together'. Then, the child was asked to repeat the answer alone, *Haydi, şimdi sen söyle*. 'Now, you say it' or 'Let's say it' and was given a positive feedback such as *Evet. Çok güzel* 'Yes, very good'. If the child knew the fact, then the presenter gave a positive feedback such as *Evet. Çok güzel* 'Yes, very good' and moved on to a new fact. This procedure was followed until ten new facts were presented, 5 by the experimenter, and 5 by the puppet. Then, the experimenter and the puppet presented their set of novel facts in a random order through the same procedure. The exact procedure for the fact-teaching part of the task is presented in Appendix Ib.

The source recall/recognition part of the task took place one week later, in the second session of the study. In this part, the child was asked about twenty facts. On ten items, children's knowledge for the unfamiliar facts taught in the first session was assessed with the same question format. On five items, questions about those facts that were found to be familiar in the pilot study but were not asked in the first session were presented. The remaining five items were questions about five new facts that were found to be unfamiliar in the pilot study and had similar level of difficulty to those presented in the first session were asked. The order of these twenty facts was determined randomly and is presented in Appendix Ib. If the child could recall the fact correctly, then the source of his/her knowledge for that fact was asked, *Nereden öğrendin?* 'How did you learn about this?'. If s/he could not remember the correct fact, then a forced-choice fact-recognition question including the correct answer and three alternatives were given in random order. If s/he gave a correct answer, then s/he was asked the source question. If the child could not answer the source question correctly, then a forced-choice source-recognition question including four alternatives such as parents, teacher, experimenter and puppet were given in random order, asking which one of these sources the information was acquired from.

For example; *Nereden öğrendin? Anne-babandan mı, öğretmeninden mi, benden mi, kukladan mı öğrendin?* 'How do you know? Did you learn it from your parents, your teacher, me or the puppet?'. No feedback was provided in the second session. The procedure of the source monitoring part is presented in Appendix Ib.

The inter-rater reliability between the experimenter's and the raters' coding based on consensus estimates method was found to be 99.58% for fact knowledge (minimum= 95%, maximum= 100%, median= 100%), and 91.50% for source knowledge (minimum= 75%, maximum= 100%, median= 95%).

Language Tasks

Talk about Direct Experience: The Direct Experience Task

On this task, the experimenter enacted a scenario of 'taking a bath' with a doll and several toys (Appendix Ic presents the doll and the toys) where she took of the doll's bathrobe, put the doll into a bath-tub, washed it, shampooed its hair, took it out of the bath-tub, dried it, put on its bathrobe, combed its hair, and put it to bed. After the child watched this scenario, s/he was asked to tell it to the experimenter. If s/he could not tell the scenario, the experimenter presented it again and asked the child to tell it, once more.

The inter-rater reliability between the experimenter's and the raters' coding based on consensus estimates method was found to be 93.33% (minimum= 90%, maximum= 95%, median= 95%).

Talk about changed state of objects: The Inferential (–mIş) Task

This task consisted of two parts. The first part involved the familiarization of the child with 15 toys that were taken from a box by the experimenter one by one in a particular order and given to the child (see Appendix Id for the list of these toys). The experimenter structured the play by assigning roles and functions to the toys. A

summary of the structured play in the familiarization part is given in Appendix Id. After the child saw each toy and played with them, the experimenter said that they had to stop playing because another experimenter needed the toys to play with another child, but that they would resume playing with the toys after that. Then, the experimenter put the toys into the box with the child, and put it outside the room by the door.

Between the first and the second parts of the Inferential –mIş Task, the child participated in the second part of the Source Identification Task. Then she was told that they could play again with the toys presented earlier. The experimenter brought the box from outside the room. This box, identical to the one in the familiarization part, included the same toys, but seven of the toys were modified in such a way that the change of their state could be described by a verb inflected with –mIş to express inference from a changed state. The child took the toys out of the box one by one. If s/he recognized the modification and commented on it but did not use the –mIş marker, the experimenter encouraged him/her by asking what s/he thought about why the toy was in its new state. If the child did not recognize the change of state, the experimenter tried to direct his/her attention to the modified object. The pictures of the modified toy and the procedure of this recognizing the change of state part are presented in Appendix Id.

This task was piloted with eight children (mean age= 3:4) First, five children were tested with 18 toys in the familiarization part and 12 toys in the recognizing the change of state part. It was observed that children became disappointed when exposed to a large number of modified toys. Then, 3 children were tested with the number of toys in the familiarization part was reduced to 15, and the number of modified toys in the recognizing the change of state part were reduced to 7. The

children had no difficulty in recognizing the change in the modified toys, though there were individual differences in expressing this change with the –mIş marker.

The inter-rater reliability between the experimenter's and the raters' coding based on consensus estimates method was found to be 94.64% (minimum= 80%, maximum= 100%, median= 95%).

Talk about indirect experience: The Reportative (–(I)mIş) Task

The Reportative Task used by Aksu-Koç and Alp (2005) was administered by the experimenter and the child's teacher. The experimenter told a story to the child by using the –DI marker expressing direct experience and the child was asked to repeat the story to the experimenter immediately after s/he heard it. If s/he could not repeat it or failed to tell at least four points of the story, then the experimenter told the story again and asked the child once more to retell it. If s/he failed to repeat the story, then the experimenter retold it for the second time. When the child repeated the story and told at least four points of the story, then the experimenter left the room and the teacher of the child entered the room and asked the child to tell what the experimenter told him/her. The story and the procedure of this task are presented in Appendix Ie.

The inter-rater reliability between the experimenter's and the raters' coding based on consensus estimates method was found to be 86.67% (minimum= 85%, maximum= 90%, median= 85%).

Procedure

The data were collected in two sessions, with a week interval in between. Each session was conducted in a room in the nursery. All children participated individually in five different tasks over these two sessions. The order of tasks in Session I was as follows: (1) Fact-teaching part of the Source Identification Task, (2) the Direct Experience Task, (3) the Mode of Knowledge Access Task, (4) the Reportative (–(I)mIş) Task. In Session II, the order of tasks were: (1) the familiarization part of the Inferential (–mIş) Task, (2) the Source Recall/Recognition part of the Source Identification Task, (3) the Recognizing the Change of State Part of the Inferential (-mIş) Task. Each session was recorded with a camera or a tape recorder.

CHAPTER 3

RESULTS

First, results regarding the analyses of the two source monitoring tasks are presented. Then, analyses comparing children's performance on the two source monitoring tasks are given. Third, results regarding children's performance on the three linguistic tasks and their comparisons are given. Lastly, analyses examining the relationship between linguistic tasks and source monitoring tasks are presented.

Source Monitoring Tasks

Mode of Knowledge Access Task

For the analysis of children's immediate source monitoring performance on the Mode of Knowledge Access Task including perception, linguistic report and inference as knowledge source, the correct score (range 0-6) was computed by counting the number of trials in which the source of information was correctly identified by each child. A 4 (age) X 2 (gender) X 3 (source type) mixed model ANOVA with source type as the within-subjects factor, and age and gender as the between-subjects factors was applied. Results demonstrated that gender had no significant effect, $F(1,72)=.81$, $p=.373$, partial $\acute{\eta}^2= .01$, while age had a significant main effect, $F(3,72)=17.44$, $p<.001$, partial $\acute{\eta}^2= .42$, observed power=1.00. As Figure 1 shows, post hoc comparisons using Dunnett C tests indicated that 3-year-old children's source monitoring performance was significantly lower than the performance of 4-, 5- and 6-year-old children. Other comparisons were not significant.

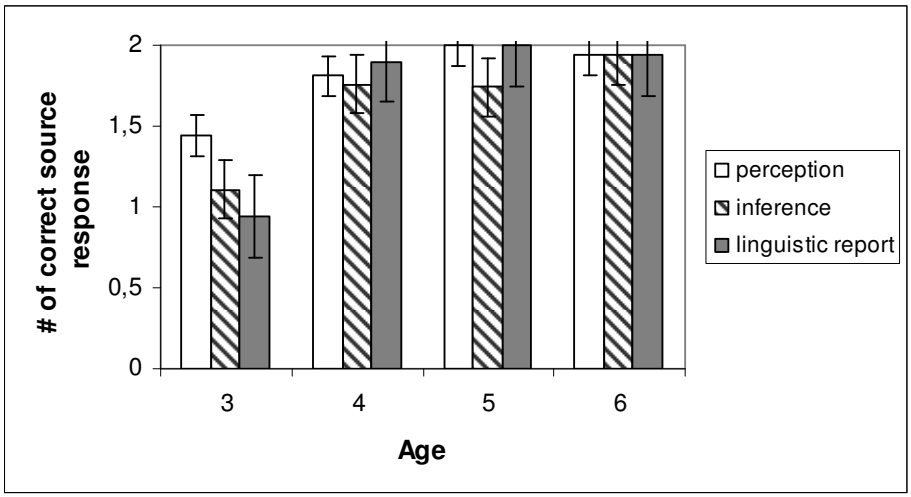


Figure 1. Distribution of correct responses for immediate source monitoring on the Mode of Knowledge Access Task by type of source and age.

The effect of source type was not significant, Wilks' Λ=.94, $F(2,71)= 2.26$, p=.112, partial $\acute{\eta}^2$=.06. The interaction between source type and age was almost significant, Wilks' Λ=.85, $F(6,142)= 2.04$, p= .065, partial $\acute{\eta}^2$=.08, observed power=.72. Paired samples t-tests indicated that 3-year-olds' performance in identifying linguistic report was lower than their performance in identifying direct perception, $t(18)=2.38$, p=.029 whereas their performance in identifying inference did not differ from their performance in identifying direct perception and linguistic report, $t(17)=1.30$, p=.210; and $t(19)=-1.45$, p=.163 respectively. Moreover, 5-year-olds' performance in identifying inference was lower than their performance in identifying direct perception and linguistic report, $t(22)=2.31$, p=.030 and $t(22)=-2.31$, p=.030. 4- and 6-year-olds' source identification performance did not differ depending on source type. The interaction between source type and gender, Wilks' Λ=1.00, $F(2,71)= .15$, p= .859. partial $\acute{\eta}^2$=.004; and the interaction between source type, age and gender, Wilks' Λ=.98, $F(6,142)= .24$, p= .963. partial $\acute{\eta}^2$=.01, were also not significant. Table 1 presents the mean number of correct source responses.

Table 1. *Means (standard deviations) for number of correct source responses out of 2 in immediate source monitoring part of the Mode of Knowledge Access Task by source type, age and gender.*

	3-year-old		4-year-old		5-year-old		6-year-old	
Source	Male (n=9)	Female (n=9)	Male (n=10)	Female (n=11)	Male (n=12)	Female (n=11)	Male (n=10)	Female (n=8)
Perception	1.44 (.88)	1.44 (.73)	2.00 (.00)	1.64 (.67)	2.00 (.00)	2.00 (.00)	2.00 (.00)	1.88 (.35)
Inference	1.11 (.93)	1.11 (1.05)	1.90 (.32)	1.64 (.67)	1.67 (.65)	1.82 (.40)	2.00 (.00)	1.88 (.35)
Linguistic Report	1.00 (.87)	0.89 (.93)	2.00 (.00)	1.82 (.60)	2.00 (.88)	2.00 (.00)	1.90 (.32)	2.00 (.00)
Total (out of 6)	3.55 (2.07)	3.44 (2.07)	5.90 (.32)	5.09 (1.37)	5.67 (.65)	5.82 (.40)	5.90 (.32)	5.75 (.71)

For the analysis of children's delayed source monitoring responses, only those items where correct source was remembered in the immediate condition were taken into account. A 4 (age) X 2 (gender) X 3 (source type) mixed model ANOVA with source type as the within-subjects factor, and age and gender as the between-subjects factors revealed that the effect of gender was not significant, $F(1,72)=1.17$, $p=.284$, partial $\acute{\eta}^2=.02$, while age had a significant effect, $F(3,72)=3.78$, $p=.014$, partial $\acute{\eta}^2=.14$, observed power=.79. Post-hoc Tukey HSD tests demonstrated that 3-year-old children's performance was significantly lower than the performance of 6-year-old children. Other age comparisons were not significant. In addition, results showed that source type had a significant effect on delayed source identification performance, Wilks' $\Lambda=.91$, $F(2,71)=3.36$, $p=.040$, partial $\acute{\eta}^2=.09$, observed power=.62, while the interactions between source type and age, Wilks' $\Lambda=.97$, $F(6,142)=.42$, $p=.866$, partial $\acute{\eta}^2=.02$; between source type and gender, Wilks' $\Lambda=1.00$, $F(2,71)=.08$, $p=.93$, partial $\acute{\eta}^2=.00$; and between these three variables, Wilks' $\Lambda=.97$, $F(6,142)=.34$, $p=.913$, partial $\acute{\eta}^2=.01$, were not significant. Table 2 shows the mean number of correct responses in the delayed condition.

As Figure 2 shows, paired-samples t-tests indicated that children's correct source responses were higher on trials in which knowledge was accessed through direct perception compared to trials on which the source was linguistic report, $t(82)=2.65$, $p=.010$. On the other hand, children's correct responses on trials in which knowledge was acquired through inference did not differ significantly from their responses on trials in which knowledge was accessed through linguistic report, $t(81)=.54$, $p=.59$, or through direct perception, $t(81)=1.35$, $p=.180$.

Table 2. *Means (standard deviations) for number of correct responses in the delayed condition of the Mode of Knowledge Access Task by source type, age and gender (based on trials where correct source was identified on the immediate condition).*

	3-year-old		4-year-old		5-year-old		6-year-old	
Source	Male (n=9)	Female (n=7)	Male (n=12)	Female (n=11)	Male (n=13)	Female (n=11)	Male (n=10)	Female (n=9)
Perception	1.13 (.99)	1.11 (.93)	1.5 (.85)	1.09 (.70)	1.42 (.90)	1.36 (.81)	1.6 (.84)	1.33 (.87)
Inference	0.63 (.74)	0.77 (.97)	1.4 (.84)	1.09 (.94)	1.08 (.79)	1.27 (.79)	1.5 (.71)	1.11 (.93)
Linguistic Report	0.63 (.92)	0.44 (.73)	1.4 (.84)	0.91 (.83)	1.17 (1.03)	1.09 (.94)	1.2 (.92)	1.44 (.89)
Total	2.38 (1.41)	2.33 (1.41)	4.3 (1.57)	3.09 (1.64)	3.67 (1.72)	3.73 (1.85)	4.3 (1.70)	3,89 (1.69)

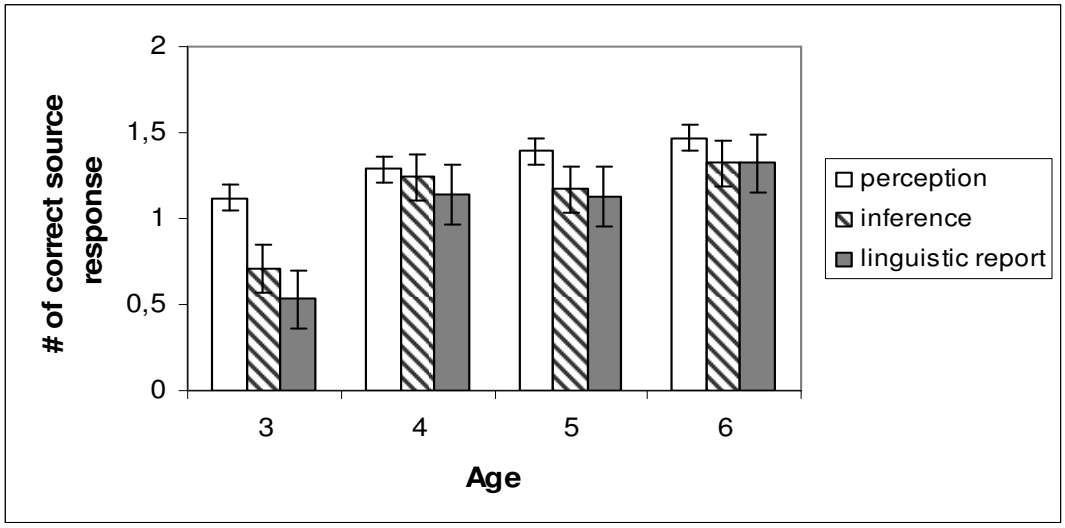


Figure 2. Distribution of correct responses for delayed source monitoring on the Mode of Knowledge Access Task by source type and age.

The procedure for obtaining delayed source monitoring responses on the Mode of Knowledge Access Task is based on the assumption that even if children do not remember the correct location of the toy, they may remember the source through which they acquired knowledge regarding its identity. The analyses reported above were conducted with this assumption in mind, but children's ability to identify the source of knowledge for those cases where they could remember the location of the objects can be informative since remembering the location may trigger the source. A univariate ANOVA with age and gender as the between-subjects independent variables, and the total number of correctly remembered location as the dependent variable revealed no effect of age, F (3, 72)= .30, p= .827, partial $\acute{\eta}^2$=.01, but a significant effect of gender, F(1, 72)= 4.03, p= .048, partial $\acute{\eta}^2$=.05. Boys (M=3.13, SD=1.42) were more successful in remembering the location of objects than girls (M=2.53, SD= 1.24). The effect of the interaction between age and gender was almost significant, F(3, 72)= 2.60, p= .058, partial $\acute{\eta}^2$=.10. One-way ANOVAs with gender as the independent variable and the

number of correctly remembered locations as the dependent variables were conducted for each age group. Results indicated a significant gender difference only in the 4-year-old group, $F(1,20)= 11.94$, $p=.003$, and boys ($M=3.70$, $SD=1.25$) performed better than girls ($M=2.00$, $SD=1.00$). To analyze children's source monitoring performance in those cases where they correctly remembered the location of the toys, the percentage of the correct sources given the correctly remembered locations were calculated. Figure 3 displays the percentage of correct response by age for those cases where the location of the objects was remembered.

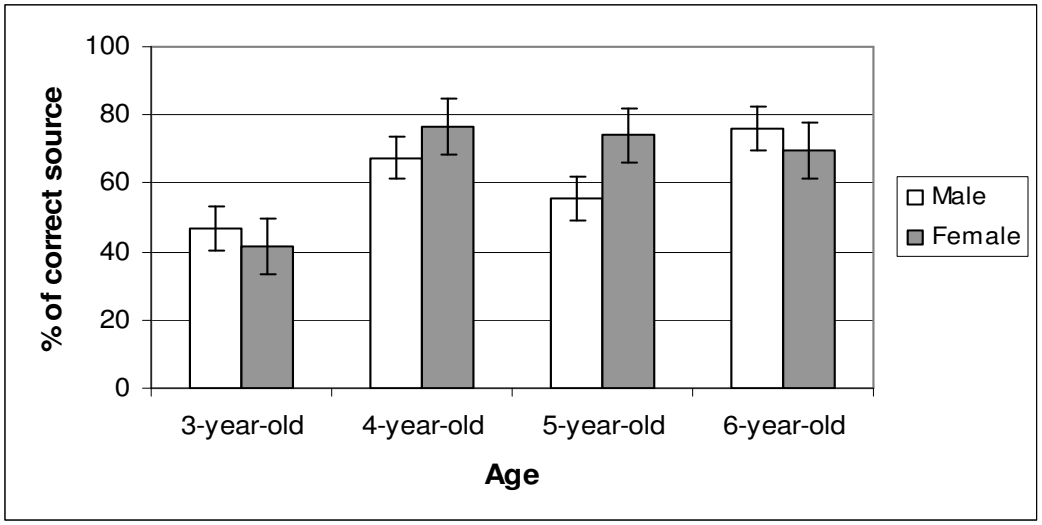


Figure 3. Distribution of correct source responses for cases where the location of objects were remembered for delayed source monitoring on the Mode of Knowledge Access Task.

Due to the fact that eliminating cases with incorrect location information reduces data further, children's performance was not analyzed for effects of different source types. A univariate ANOVA with age and gender as the between-subjects independent variables, and the total percentage of correct sources given correctly remembered location as the dependent variable was performed. Results showed that age, gender and the interaction between age and gender had no significant effect, $F(3,70)= 2.25$, $p= .090$,

partial $\acute{\eta}^2$=.09; $F(1,70)$= .23, p= .637, partial $\acute{\eta}^2$=.00; $F(3,70)$= .52, p= .672, partial $\acute{\eta}^2$=.02 respectively.

To analyze whether children's correct responses decreased over a time interval between acquisition of knowledge and remembering of source, a 4 (age) X 2 (gender) X 2 (time) mixed model ANOVA with time as the within-subjects factor, and age and gender as the between-subjects factors was conducted. The analysis revealed that the effect of gender was not significant, $F(1,71)$=.93, p=.338, partial $\acute{\eta}^2$= .01, while the effect of age was significant, $F(3,71)$=11.33, p<.001, partial $\acute{\eta}^2$= .32, observed power=1.00. In addition, results showed that time of source response (immediate versus delayed) had a significant effect on source identification performance, Wilks' Λ=.43, $F(1,71)$= 94.40, p= .000, partial $\acute{\eta}^2$= .57, observed power=1.00. Paired samples t-test indicated that there were more correct responses in the immediate condition (M= 5.19, SD= 1.45) compared to in the delayed condition (M= 3.52, SD= 1.72), $t(78)$= 10.20, p<.001. The interaction between time and age, Wilks' Λ=.94, $F(3,71)$= 1.54, p=.212, partial $\acute{\eta}^2$=.06; between time and gender, Wilks' Λ=1.00, $F(1,71)$= .22, p=.64, partial $\acute{\eta}^2$=.00; and between time, age and gender, Wilks' Λ=1.00, $F(3,71)$= .06, p=.979, partial $\acute{\eta}^2$=.00, were not significant.

To analyze whether the decrease over time in correct source responses was related to source type, the number of items where correct source was remembered in the delayed condition was subtracted from the number of items where correct source was remembered in the immediate condition, and a 4 (age) X 2 (gender) X 3 (source) mixed model ANOVA with source as the within-subjects factor, and age and gender as the between-subjects factors was conducted. The analysis revealed that the effect of gender

and the effect of age were not significant, $F(3,71)=1.54$, $p=.212$, partial $\acute{\eta}^2= .06$; and $F(1,71)=.22$, $p=.641$, partial $\acute{\eta}^2= .00$, respectively. The analysis revealed a trend approaching significance for source type, Wilks' $\Lambda=.93$, $F(2,70)= 2.51$, $p= .089$, partial $\acute{\eta}^2= .07$, observed power=.49. Paired-samples t-tests indicated that children's source responses decreased more when the source of their knowledge was linguistic report ($M=.67$, $SD=.85$) than when the source of their knowledge was direct perception ($M=.49$, $SD=.73$), $t(82)=-2.12$, $p=.037$. The decrease in source responses given to inference items ($M=.52$, $SD=.70$) did not differ from the decrease in source responses given to items where the source was either direct perception or linguistic report, $t(80)=-.109$, $p=.913$ and $t(80)=1.136$, $p=.259$, respectively.

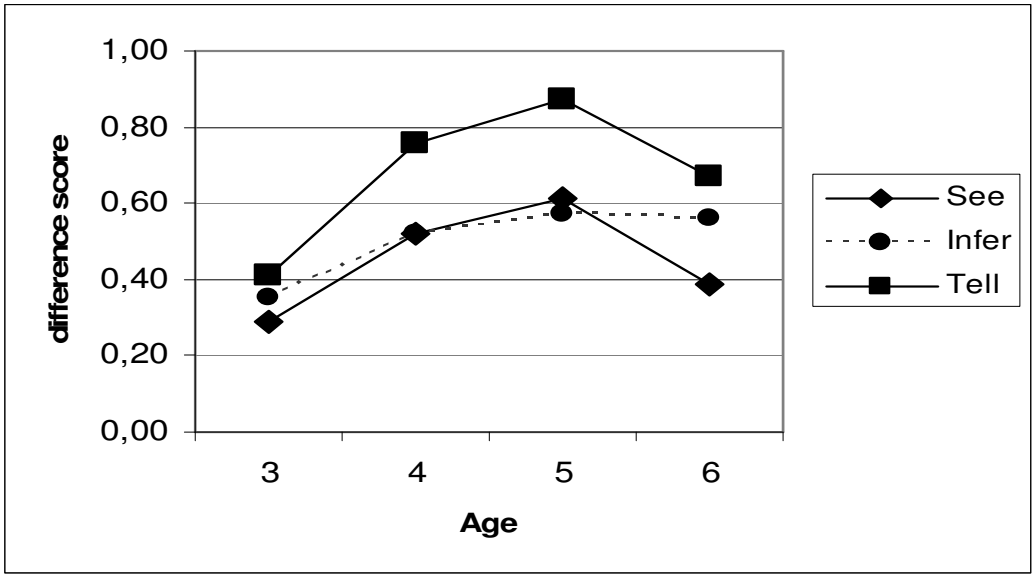


Figure 4. Distribution of difference scores for source between immediate and delayed conditions on the Mode of Knowledge Access Task by source type and age.

To summarize, the analyses of children's performance on the Mode of Knowledge Access Task supported the first hypothesis that the ability to differentiate between sources in different modalities would increase with age. In the immediate condition, 3-year-olds' performance was significantly lower than that of other age groups. 3-year-old children's source monitoring performance was significantly lower than that of 6-year-old children in the delayed condition as well. The correct source responses children produced in the delayed part of the Mode of Knowledge Access Task displayed a trend for lower performance for linguistic report as compared to other source types.

The Source Identification Task

To analyze whether children could remember the facts that they were taught in the fact teaching part of the Source Identification Task after a week's delay, the fact recall scores, i.e. the total number of facts that were recalled, and the fact knowledge scores, i.e. the total number of facts that were recalled or recognized, were calculated. A two-way ANOVA with age and gender as the between-subjects independent factors and fact recall as the dependent variable was performed. The results demonstrated that age had a significant main effect, $F(3, 75)= 2.90$, $p=.040$, partial $ή^2=.10$, observed power=.67, while there was neither a gender, $F(1, 75)= 0.08$, $p=.773$, partial $ή^2=.00$, nor an interaction effect, $F(3, 75)= 0.23$, $p=.877$, partial $ή^2=.01$. Results of Tukey HSD tests showed that the only significant difference was between 3- year-olds ($M= 6.33$, $SD= 2.11$) and 5-year-olds ($M= 7.91$, $SD= 1.69$). Other comparisons between age groups' fact recall responses were not significant. The means are presented in Table 3.

Another two-way ANOVA was conducted to analyze the effect of gender and age on fact knowledge. Results showed that age had a significant effect on fact knowledge, $F(3, 75)= 4.26$, $p=.008$, partial $ή^2=.15$, observed power=..84, whereas the effect of gender and the interaction between age and gender were not significant, $F(1, 75)= 0.024$, $p=.876$, partial $ή^2=.00$, and $F(3, 75)= 0.441$, $p=.725$, partial $ή^2=.02$ respectively. Dunnett C tests demonstrated a significant difference between 3-year-old ($M=8.62$, $SD=1.43$) and 5-year-old children's ($M=9.64$, $SD=.58$) fact knowledge, the older group performed better than the younger group. Other comparisons between age groups were not significant.

Table 3. *Means (standard deviations) of fact recall and fact knowledge scores out of 10 on the Source Identification Task by age and gender*

Age	Gender	Fact recall	Fact Knowledge
3-year-old	Male (n=11)	6.56 (2.02)	8.55 (1.04)
	Female (n=10)	6.1 (2.28)	8.7 (1.83)
4-year-old	Male (n=11)	7.27 (2.2)	9.73 (0.47)
	Female (n= 11)	7.18 (1.4)	9.27 (1.19)
5-year-old	Male (n= 12)	8.08 (1.73)	9.67 (0.49)
	Female (n= 10)	7.7 (1.7)	9.6 (0.7)
6-year-old	Male (n= 9)	7.44 (1.59)	9.44 (1.33)
	Female (n= 9)	7.89 (1.76)	9.67 (0.71)

For the analysis regarding children's source identification performance, the number of correct source responses, the number of intra-experimental errors and the number of extra-experimental errors over the total number of remembered facts were calculated.A two-way MANOVA with age and gender as the between-subjects variables, and percentages of correct response, intra-experimental error and extra-experimental error as dependent variables was conducted (See Table 4 for means). Results indicated that the main effect of age was significant, Wilks' Λ= .70, $F(9,178)$= 3.06, p=.002, partial $\acute{\eta}^2$=.11, observed power=.83, whereas gender had no significant effect, Wilks' Λ= .92, $F(3,73)$= 2.11, p=.106, partial $\acute{\eta}^2$=.08. The interaction between age and gender was also not significant, Wilks' Λ= .86, $F(9,178)$= 1.27, p=.257, partial $\acute{\eta}^2$=.05. Follow-up ANOVAs with age as the between-subjects independent variable were conducted separately for percentage of correct response, percentage of intra-experimental error, and percentage of extra-experimental error. Results indicated that age had a significant effect on children's correct responses, $F(3,75)$= 8.37, p= .000, partial $\acute{\eta}^2$=.25, observed power=.97, and extra-experimental errors, $F(3,75)$= 7.70, p= .000 partial $\acute{\eta}^2$=.24, observed power=.96, but not on intra-experimental-errors, $F(3,75)$= 2.42, p= .072 partial $\acute{\eta}^2$=.09. Figure 5 shows the relationship between these three types of responses and age.

Table 4. *Mean percentages (standard deviations) of correct source responses, intra-experimental errors and extra-experimental errors on the Source Identification Task by age and gender.*

Response	Age							
	3-year-old		4-year-old		5-year-old		6-year-old	
	Male (n:11)	Female (n:10)	Male (n:11)	Female (n:11)	Male (n:12)	Female (n:10)	Male (n:9)	Female (n:9)
correct response	17.37 (18.14)	37.81 (14.68)	39.19 (12.25)	41.40 (16.12)	44.81 (16.65)	49.72 (13.05)	44.57 (11.05)	49.10 (9.22)
intraexperimental-Error	23.23 (23.41)	34.03 (13.43)	38.08 (15.01)	31.65 (17.34)	41.30 (12.42)	39.06 (9.87)	35.06 (11.94)	42.99 (13.44)
extraexperimental-Error	58.38 (40.60)	28.17 (25.61)	21.72 (22.94)	23.32 (26.21)	12.13 (18.92)	10.22 (17.79)	16.67 (14.53)	7.90 (13.97)

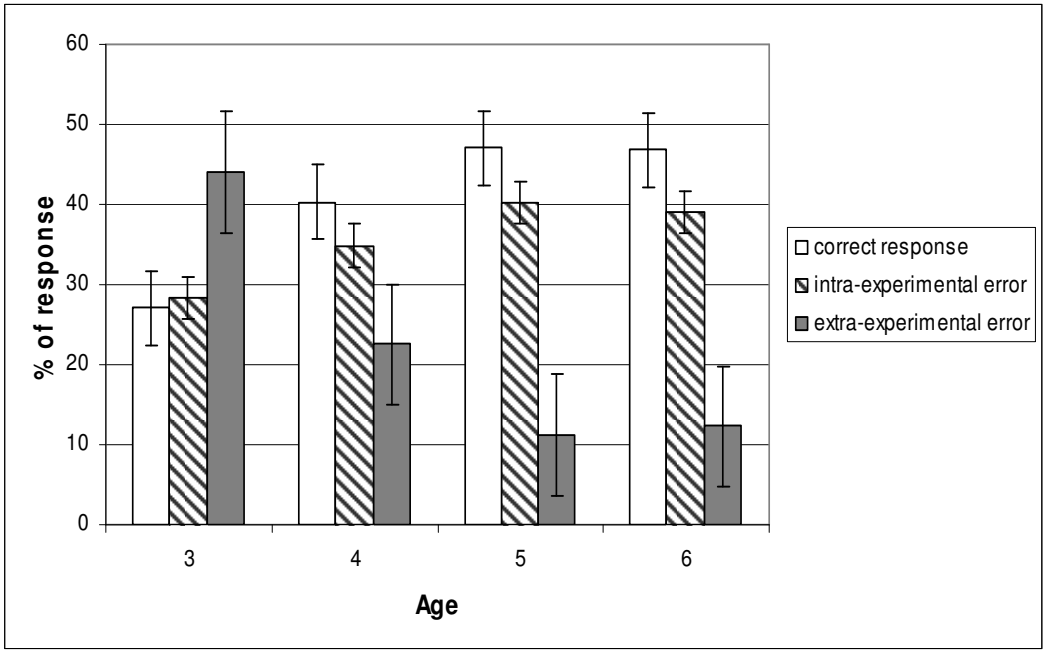


Figure 5. Distribution of responses on the Source Identification Task by age.

Post hoc analyses using the Bonferroni adjustment were computed for the correct source and extra-experimental error responses. Results showed that 3-year-old children's (*M*=27.10, *SD*= 19.26) correct source identification was significantly lower than that of 5-year-old (*M*=47.05, *SD*= 14.98) and 6-year-old children (*M*=46.84, *SD*= 10.14). In addition, extra-experimental errors were produced significantly more by 3-year-old children (*M*=43.99, *SD*= 36.86) compared to 5-year-old (*M*=11.26, *SD*= 18) and 6-year-old children (*M*=12.28, *SD*= 14.54). Other comparisons were not significant.

To see whether identification of source differed depending on whether the facts were taught by the experimenter or the puppet, separate analyses were performed. Table 5 presents means for these analyses.

Table 5. *Mean percentages (standard deviations) of correct source responses, intra-experimental errors and extra-experimental errors on the Source Identification Task by age, gender and source type (experimenter vs. puppet).*

		Experimenter			Puppet		
		Correct	Intra-experimental	Extra-experimental	Correct	Intra-experimental	Extra-experimental
3-year-old	Male	7.27 (13.48, n=11)	30.91 (39.36,n= 11)	60.00 (43.82, n= 11)	29.09 (40.11, n= 11)	14.55 (25.05, n= 11)	56.36 (39.31, n= 11)
	Female	40.00 (44.22, n= 10)	40.00 (34.57, n= 10)	20.00 (23.93, n= 10)	35.00 (34.96, n= 10)	31.50 (42.82, n= 10)	33.50 (33.75, n= 10)
4-year-old	Male	74.58 (29.65, n= 12)	3.33 (7.78, n= 12)	20.42 (22.61, n = 12)	5.91 (10.20, n= 11)	71.36 (31.94, n= 11)	22.73 (25.33, n= 11)
	Female	59,55 (35.53, n= 11)	16.82 (25.13, n= 11)	18.18 (26.01, n= 11)	18.64 (26.09, n= 11)	50.61 (37.38, n= 11)	28.94 (32.44, n= 11)
5-year-old	Male	76.54 (37.27, n= 13)	11.15 (15.83, n= 13)	9.23 (17.54, n= 13)	16.25 (24.23, n= 12)	70.00 (35.68, n= 12)	13.75 (21.65, n= 12)
	Female	89.09 (25.87, n= 11)	0 (0, n= 11)	10.91 (25.87, n= 11)	9.83 (13.20, n= 10)	81.17 (15.95, n= 10)	7.00 (16.36, n= 10)

Table 5. continued.

		Experimenter			Puppet		
		Correct	Intra-experimental	Extra-experimental	Correct	Intra-experimental	Extra-experimental
6-year-old	Male	87.33 (26.75, n= 10)	7.33 (15.54, n= 10)	2.00 (6.32, n= 10)	4.44 (13.33, n= 9)	61.48 (34.44, n= 9)	30.37 (24.52, n= 9)
	Female	95.56 (8.82, n= 9)	0 (0, n= 11)	4.44 (8.82, n= 11)	4.44 (13.33, n= 9)	84.44 (24.04, n= 9)	11.11 (22.61, n= 9)

A two-way MANOVA with age and gender as the between-subjects independent variables, and percentages of correct, extra-experimental error, and intra-experimental error responses as sources for facts taught by the experimenter as the dependent variables was conducted. Age had a significant main effect, Wilks' Λ= .46, $F(9, 188)= 7.91$, $p<.001$, partial $\acute{\eta}^2=.23$, observed power=1.00 while the effect of gender was not significant, Wilks' $\Lambda= .95$, $F(3, 77)= 1.25$, $p=.299$, partial $\acute{\eta}^2=.05$. The interaction between age and gender was also not significant, Wilks' $\Lambda= .814$, $F(9, 188)= 1.84$, $p=.063$, partial $\acute{\eta}^2=.07$.

Separate follow-up ANOVAs for each dependent variable with age as the sole independent variable. Results revealed a significant effect of age on all three types of responses given as source for facts taught by the experimenter, [$F(3, 79)= 20.67$, $p<.001$, partial $\acute{\eta}^2=.44$, observed power=1.00] for correct source responses, [$F(3, 79)= 9.39$, $p<001$, partial $\acute{\eta}^2=.26$, observed power=.99] for intra-experimental error responses, and [$F(3, 79)= 8.66$, $p<001$, partial $\acute{\eta}^2=.25$, observed power=.98] for extra-experimental error responses. Figure 6 shows this relationship between age and response types.

Post hoc analyses using the Bonferroni adjustment were computed for all three types of responses. Results indicated that 3-year-old children's correct responses ($M= 22.86$, $SD= 35.36$) were significantly less than the correct responses of 4-year-olds ($M= 67.39$, SD= 32.75), 5-year-olds ($M= 82.29$, $SD= 32.50$), and 6-year-olds ($M= 91.23$, $SD= 20.25$). Other pair-wise comparisons were not significant. In addition, 3-year-old children's intra-experimental error responses ($M= 35.24$, $SD= 36.52$) were significantly more than the same type of error response made by 4-year-old ($M= 9.78$, $SD= 19.10$), 5-year-old ($M= 6.04$, $SD= 12.77$) and 6-year-old children

(*M*= 3.86, *SD*= 11.61). Other pair-wise comparisons regarding intra-experimental errors were not significant.

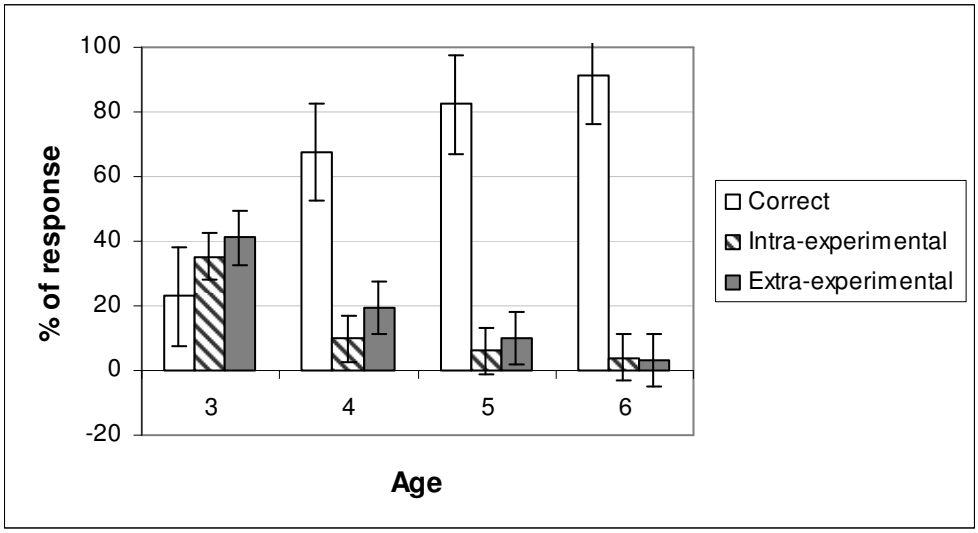


Figure 6. Distribution of responses given for facts taught by the experimenter on the Source Identification Task by age.

Moreover, analyses of extra-experimental error responses indicated no significant difference between 3-year-old (*M*=40.95, *SD*=40.46) and 4-year-old children (*M*= 19.35, *SD*= 23.76) whereas the former groups' error responses were significantly more than those of 5-year-old (*M*= 10, *SD*= 21.26) and 6-year-old children (*M*= 3.16, *SD*= 7.49). Other pair-wise comparisons were not significant.

Another two-way MANOVA with age and gender as the between-subjects independent variables, and percentages of correct, extra-experimental error, and intra-experimental error responses for the sources of facts taught by the puppet as the dependent variables was conducted. Age had a significant main effect, Wilks' Λ= .63, $F(9, 178)= 4.11$, $p<.001$, partial $\acute{\eta}^2=.14$,observed power=.95, while gender did not, Wilks' Λ= .96, $F(3, 73)= .98$, $p=.408$, partial $\acute{\eta}^2=.04$, and there was no interaction effect, Wilks' Λ= .875, $F(9, 177)= 1.12$, $p=.352$, partial $\acute{\eta}^2=.04$ respectively. Separate follow-up ANOVAs for correct source responses, intra-

experimental errors and extra-experimental errors revealed that age had a significant effect, [$F(3, 75)= 4.53$, $p=.006$, partial $\acute{\eta}^2=.15$, observed power=.75] for correct source responses, [$F(3, 75)= 11.83$, $p<.001$, partial $\acute{\eta}^2=.32$, observed power=1.00] for intra-experimental error responses, and [$F(3, 75)= 5.63$, $p=.002$, partial $\acute{\eta}^2=.18$, observed power=.96] for extra- experimental error responses. Figure 7 shows the relationship between age and types for source responses for facts taught by the puppet.

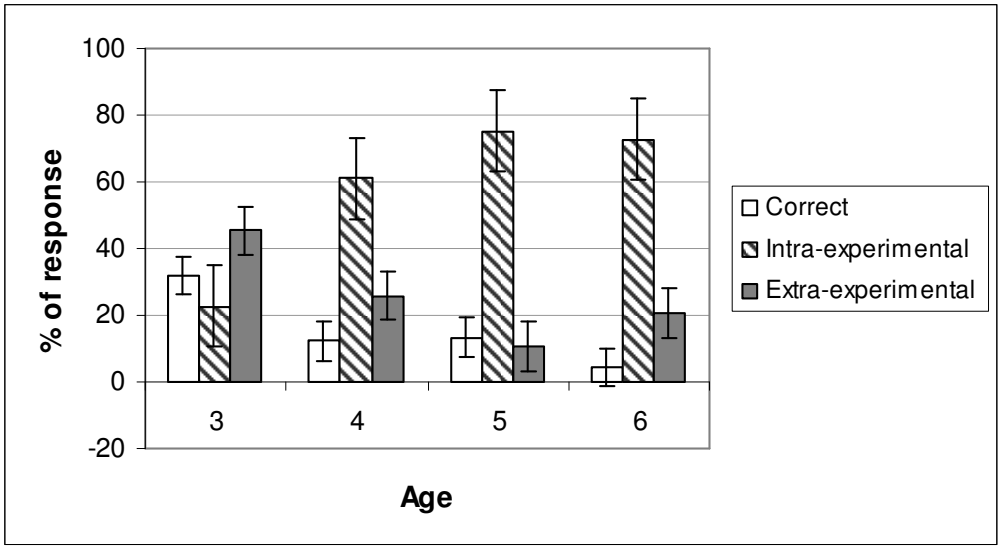


Figure 7. Distribution of responses given for facts taught by the puppet on the Source Identification Task by age.

Post hoc comparisons using the Bonferroni adjustment revealed that for the correct source responses, the only significant difference was between 3-year-olds and 6-year-olds; surprisingly 3-year-old children ($M= 31.90$, $SD= 36.93$) identified more sources of facts correctly than 6-year-old children ($M= 4.44$, $SD= 12.94$). Other pair-wise comparisons related to correct source identification of facts taught by the puppet was not significant. The analysis of group differences in intra-experimental error responses indicated that 3-year-old children ($M= 22.62$, $SD= 34.84$) engaged

less in intra-experimental errors compared to 4-year-old (*M*= 60.98, *SD*= 35.56), 5-year-old (*M*= 75.08, *SD*= 28.43) and 6-year old children (*M*= 72.96, *SD*= 31.14). Other comparisons were not significant. Regarding children's extra-experimental error responses, the only significant difference was seen between 3- and 5-year-old children. 3-year-old children's extra-experimental error responses (*M*= 45.48, *SD*= 37.71) were significantly more than 5-year-old children's same type of error responses (*M*= 10.68, *SD*= 19.29).

To analyze children's correct source responses given to facts that were not taught in the Mode of Knowledge Access Task, a 4 (age) x 2 (gender) between-subjects ANOVA was conducted. The results indicated no significant gender effect, $F(1,65)= .34$, $p=.563$, partial $\acute{\eta}^2= .00$, but a significant age effect, $F(3,65)= 6.75$, $p=.000$, partial $\acute{\eta}^2= .24$, observed power= .97. Post hoc Tukey HSD tests indicated that 3-year-old children's correct source identification performance was lower than performance of 4-, 5- and 6-year-old children. The interaction between age and gender was not significant, $F(3,65)= 1.46$, $p=.563$, partial $\acute{\eta}^2= .06$. Figure 7 displays the percentage of correct responses.

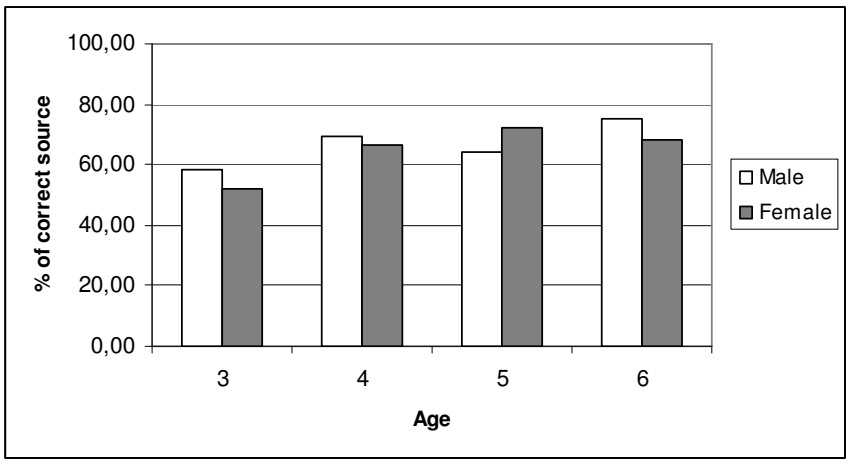


Figure 8. Distribution of correct source responses given for familiar and unfamiliar facts (that were not taught) on the Source Identification Task by age and gender.

To summarize, results for the Source Identification Task indicate that children's ability to differentiate between sources of information obtained through linguistic report a long delay after knowledge acquisition increased with age. 3-year-olds gave significantly less correct source responses than 5- and 6-year-old children, but made significantly more extra-experimental errors than these older age groups, and children's source responses differed depending on whether the experimenter or the puppet was the source of knowledge.

Language Tasks

Direct Experience Task

On this task, the correct response consists of descriptions using verbs marked with the –DI inflection, the form that marks direct experience. For each child, a percentage score was calculated by dividing the number of verbs produced with –DI with total number of verbs produced. The percentage of verbs inflected with the indirect experience marker -mIş/–(I)mIş, and the percentage of verbs with any other inflection were also calculated. A two-way ANCOVA with the total number of words uttered during the task as covariate, age and gender as independent between-subject variables, and the percentage of –DI responses as the dependent variable was computed to see if age and gender were related to performance. The effect of the covariate factor was not significant, $F(1,75)=.36$, $p= .552$, partial $\acute{\eta}^2= .01$. Results revealed no difference between the four age groups in the use of the –DI inflection, $F(3,75)= 2.18$, $p= .098$, partial $\acute{\eta}^2= .08$, whereas gender had a significant effect, $F(1,75)= 7.70$, $p=.007$, partial $\acute{\eta}^2= .09$, observed power=.78.

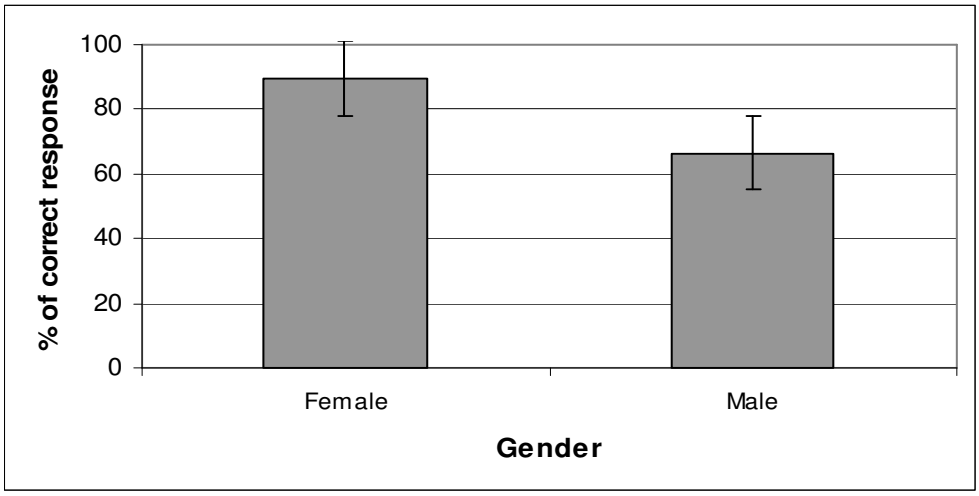


Figure 9. Mean percentages of correct responses on the Direct Experience Task by gender.

Table 6. *Mean percentages (standard deviations) of correct [–DI inflection], incorrect [–(I)mIş inflection], and other responses [any other inflection] on the Direct Experience Task by age and gender.*

Inflections	Age							
	3-year-old		4-year-old		5-year-old		6-year-old	
	Male (n:10)	Female (n:10)	Male (n:12)	Female (n:10)	Male (n:13)	Female (n:10)	Male (n:10)	Female (n:9)
Correct response (-DI)	49.82 (46.61)	80 (42.16)	83.13 (36.73)	90 (31.62)	80 (39.16)	100 (0.00)	52.86 (50.42)	87.65 (33.08)
Incorrect Response (-mIş)	1.43 (4.52)	3.33 (10.54)	0.00 (0.00)	0.00 (0.00)	7.69 (27.74)	0 (0.00)	0 (0.00)	11.11 (33.33)
Other response	48.75 (48.03)	16.67 (36.00)	16.88 (36.73)	10.00 (31.62)	12.31 (31.13)	0 (0.00)	47.14 (50.42)	1.23 (3.70)

Figure 9 shows that girls were more successful in giving event descriptions using the correct inflection for direct experience compared to boys. There was no significant interaction effect, $F(3, 75) = .63$, $p = .598$, partial $\acute{\eta}^2 = .03$. Table 6 provides the mean percentages of correct, incorrect, and other responses.

Talk about changed state of objects: the Inferential (–mIş) Task

The score for the Inferential (–mIş) Task consisted of the number of cases where the changed state of objects were referred to using a verb inflected with the -mIş inflection over total number of cases where the changed state of objects were talked about.

A two-way between-subjects ANOVA with age and gender as the independent variables and the number of objects whose modified state was identified as the dependent variable revealed that age and gender had no significant effect, $F(3,78)= 1.81$, $p=.153$, partial $ή^2= .07$, and $F(1,78)= 0.70$, $p=.406$, partial $ή^2= .01$, respectively. The interaction between age and gender was also not significant, $F(3,78)= 0.33$, $p=.806$, partial $ή^2= .01$. Table 7 presents the mean number of cases where the change in the objects' state was recognized. It is observed that children noticed the state change for almost all of the 7 items.

A two-way between-subjects ANOVA with age and gender as the independent variables, and the percentage of –mIş responses used to refer to the change in the state of objects as the dependent variable revealed no effect of gender, $F(1,78)= 0.04$, $p= .835$, partial $ή^2= 0.00$, whereas age had a significant effect, $F(3,78)= 3.71$, $p= .015$, partial $ή^2= .13$, observed power=.79. There was no interaction effect, $F(3,78)= 0.32$, $p= .810$, partial $ή^2= 0.01$. Table 8 presents the mean percentage of correct responses.

Table 7. *Means (standard deviations) for number of items for which the changed state of the object was noticed out of 7 on the Inferential (–mIş) Task by age and gender.*

	Age			
Gender	3-year-old	4-year-old	5-year-old	6-year-old
Male	6.73 (0.47, n:11)	6.91 (0.30, n:11)	6.92 (0.28, n:13)	7.00 (0.00, n:10)
Female	6.60 (0.97, n:10)	6.73 (0.65, n:11)	7.00 (0.00, n:10)	6.89 (0.33, n:9)

Table 8. *Mean percentages (standard deviations) of –mIş responses on the Inferential (–mIş) Task by age and gender.*

	Age			
Gender	3-year-old	4-year-old	5-year-old	6-year-old
Male	62.55 (31.01, n:11)	86.80 (21.65, n:11)	72.34 (37.94, n:13)	97.14 (9.04, n:10)
Female	69.64 (33.72, n:10)	78.48 (24.06, n:11)	74.03 (36.60, n:11)	91.53 (13.63, n:9)

Dunnett C tests indicated the only significant difference to be between 3-year-olds (*M*= 65.93, *SD*= 31.71) and 6-year-olds (*M*= 94.49, *SD*= 11.48), the latter group performed better than the former group. Other comparisons between age groups were not significant. Figure 10 presents the distribution of correct responses by age.

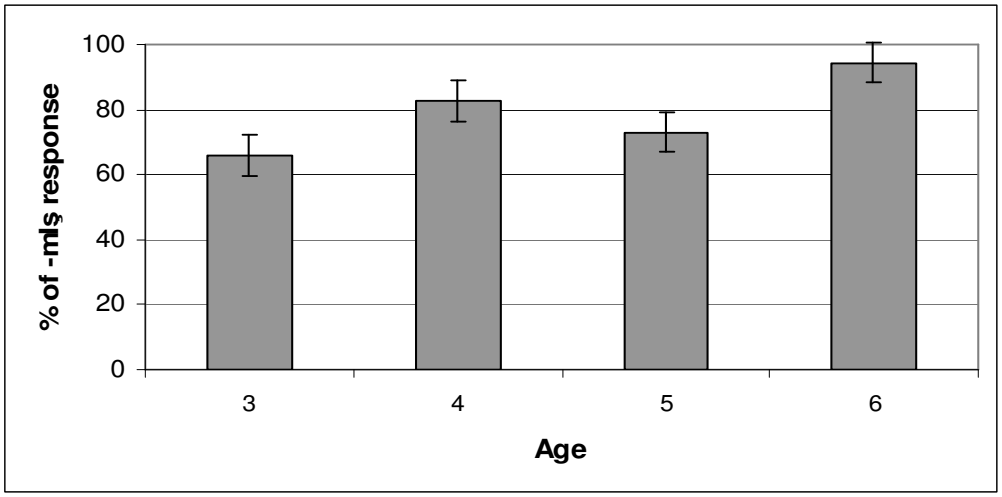


Figure 10. Distribution of –mIş responses on the Inferential (–mIş) Task by age.

Talk about indirect experience: the Reportative(–(I)mIş) Task

For the analysis of the Reportative Task, the number of verbs produced with the correct inflection, –(I)mIş, with the incorrect inflection, –DI, and with any other inflection over the total number of verbs produced were computed. A two-way ANCOVA with age and gender as the independent variables, the percentage of correct response as the dependent variable, and the number of total words uttered during the task as the covariate factor was performed. The effect of the covariate factor was significant, $F(1,65)=5.30$, $p=.025$, partial $\acute{\eta}^2=.08$, observed power=.62. On the production of the reportative –(I)mIş independent of the length of the reports, results indicated that age had a significant effect, $F(3,65)=6.47$, $p=.001$, partial $\acute{\eta}^2=.23$, observed power=.96. There was neither a gender, $F(1,65)=1.56$, $p=.216$, partial $\acute{\eta}^2=.02$, nor an interaction effect, $F(3,65)= .61$, $p=.611$, partial $\acute{\eta}^2=.03$. Table 9 presents the mean percentages of correct, incorrect and other responses by age and gender. The mean percentages of correct responses among the four age groups are also given in Figure 11. Results of Tukey HSD tests showed that the percentage of correct responses produced by 5- (*M*= 74.79, *SD*= 27.92) and 6-year-old childs (*M*= 81.53, *SD*= 24.65) were significantly higher than the percentage of correct responses of 3- (*M*= 37.20, *SD*= 36.82) and 4-year-olds (*M*= 40.33, *SD*= 40.30).

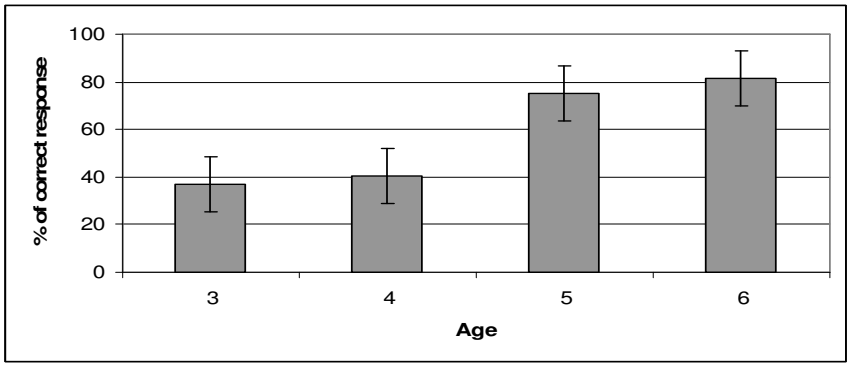


Figure 11. Distribution of –(I)mIş responses on the Reportative Task by age

Table 9. *Mean percentages and (standard deviations) of correct [–(I)mIş], incorrect [–DI], and other responses [any other inflection] on the Reportative Task by age and gender.*

Inflections	Age							
	3-year-old		4-year-old		5-year-old		6-year-old	
	Male (n:7)	Female (n:8)	Male (n:11)	Female (n:9)	Male (n:11)	Female (n:10)	Male (n:10)	Female (n:8)
Correct response -mIş	43.25 (39.54)	31.91 (36.09)	34.08 (38.92)	47.97 (42.93)	66.87 (34.14)	84.15 (15.89)	77.35 (29.31)	86.76 (17.74)
Incorrect response -DI	27.86 (42.02)	40.00 (45.36)	23.37 (38.37)	28.01 (40.41)	15.53 (28.27)	1.25 (3.95)	11.75 (26.72)	3.13 (8.84)
Other response	28.89 (36.63)	28,10 (28.03)	33.46 (35.85)	13,02 (17.37)	17.60 (14.63)	14.60 (13.17)	10.90 (12.15)	10.12 (11.42)

To summarize, children in all age groups were equally successful in using the –DI inflection to talk about a directly experienced event after its completion regardless of age. Results for the Inferential (–mIş) and Reportative (-(I)mIş) Tasks supported the hypothesis that the ability to correctly use -mIş/–(I)mIş inflection to report indirect experience would increase with age. On the Reportative (-(I)mIş) Task, 3- and 4-year-olds performed worse than 5- and 6-year-olds, and on the Inferential (–mIş) Task 3-year-olds performed worse than 6-year-olds.

Comparison of Performance on Language Tasks

To compare children's correct performance on the linguistic tasks, a 4 (age) X 3 (task) mixed model ANOVA with age as the between-subjects variable and task as the within-subjects variable was computed. Results showed that there was a main effect of age, $F(3,63)= 6.55$, $p= .001$, partial $\acute{\eta}^2=.24$, observed power=.96, and a main effect of task, Wilks' $\Lambda=.76$, $F(2,62)= 9.81$, $p= .000$, partial $\acute{\eta}^2=.24$, observed power=.98. The interaction between age and task was also significant, Wilks' $\Lambda= .76$, $F(6,124)= 3.01$, $p= .009$, partial $\acute{\eta}^2=.13$, observed power=.90. Three paired-samples t-tests were conducted for each age group to examine the differences between children's correct responses on the three language tasks. Three-year-old children's performance on the Direct Experience Task (M=70.71, SD= 44.69) was significantly higher than their performance on the Reportative –(I)mIş Task (M=37.20, SD= 36.82), $t(14)=2.34$, $p= .035$, but not different from their performance on the Inferential –mIş Task (M=63.97, SD=32.01), $t(19)=.26$, $p=.80$. In addition, this age group's performance on the Inferential –mIş Task was higher than their performance on the Reportative Task, $t(14)=2.64$, $p= .019$. Four-year-old children's performance on the Direct Experience Task (M=88.19, SD=32.22) was significantly higher than their performance on the Reportative –(I)mIş Task (M=41.03, SD=41.89), t(18)=3.68, p=.002, and their performance on the Inferential –mIş Task (M=81.96, SD=23.75) was significantly higher than their reportative –(I)mIş performance, $t(18)=3.26$, $p=.004$. Again there was no significant difference between 4-year-olds' performances on the Direct Experience versus the Inferential –mIş Tasks, $t(20)=.87$, $p=.396$. For the 5-year-olds, correct performance on the Direct Experience Task (M=90, SD=30.78) was significantly higher than that on the Reportative –(I)mIş

Task (*M*= 74.09, *SD*=28.46), *t*(19)=3.32, *p*=.004, but not from performance on the Inferential –mIş Task (*M*=78.45, *SD*=32.91), *t*(22)=1.71, *p*=.102. There was no difference between the Inferential and Reportative Tasks either, *t*(20)=.38, *p*= .71. Finally, 6-year-old children's correct inferential –mIş performance (*M*= 94.18, *SD*= 11.73) was significantly higher than their correct performance on the Direct Experience Task (*M*=67.64, *SD*=46.26), *t*(18)=2.24, *p*=.038, while the performance on the Reportative –(I)mIş Task (*M*=81.53, *SD*=24.65) did not differ from the performance on the Direct Experience Task, *t*(17)=1.02, *p*= .324, and the performance on the Inferential –mIş Task, *t*(17)= 1.77, *p*= .094. These relationships between the correct performances on three linguistic tasks were displayed in Figure 12.

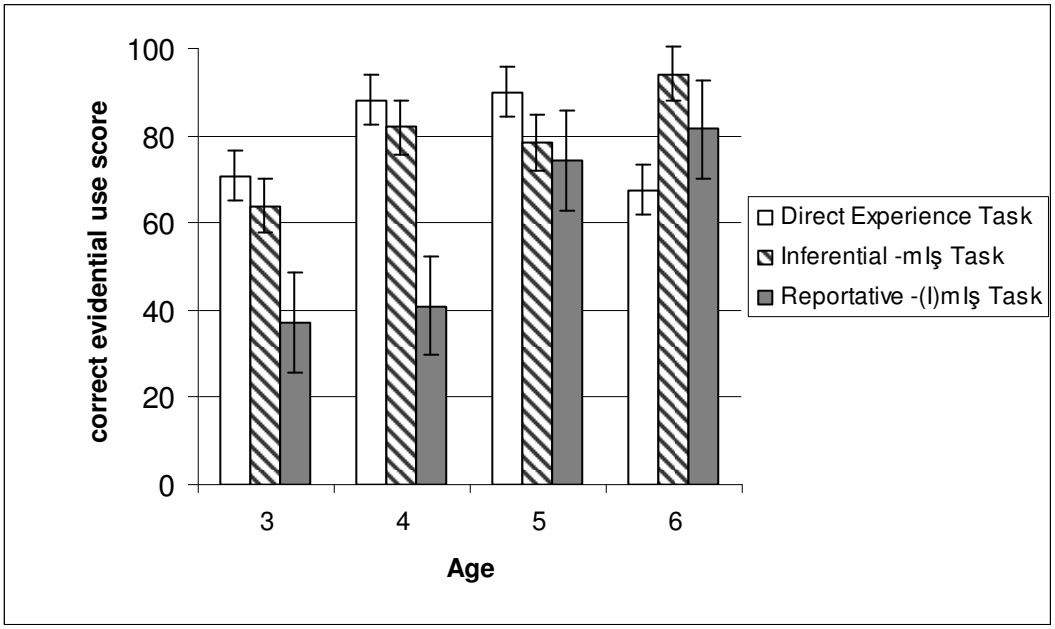


Figure 12. Distribution of correct responses on three linguistic tasks by age.

In summary, 3- and 4-year-old children's performance on the Direct Experience and Inferential –mIş Tasks was higher than their performance on the Reportative (–(I)mIş) Task. 5-year-old children's performance on the Direct Experience Task was higher than their performance on the Reportative –(I)mIş Task whereas 6-year-old children's performance on the Inferential (–mIş) Task was higher than their performance on the Direct Experience Task.

Relationship between Source Monitoring Tasks and Language Tasks

Whether performance on language tasks predicted performance on source monitoring tasks was analyzed through several regression analyses.

To test whether linguistic performance on the Reportative (–(I)mIş) and the Inferential (–mIş) Tasks predicted performance on the Source Identification Task, a multiple regression analysis was run. As the criterion, the percentage of correct source response was put into the analyses. Due to the fact that age was found to have a significant effect on children's source monitoring performance, it was included in the analyses with forced entry method as a predictor. Other predictors, namely percentage of correct response on the Reportative (–(I)mIş) and Inferential (–mIş) Tasks were included through the step-wise procedure. Children displayed ceiling performance and there were no age differences on the Direct Experience Task, therefore it was not included in this and the following analyses. Table 10 presents the Pearson correlation coefficients between the criterion and predictor variables.

Table 10. *Correlations between age, correct performance on the Source Identification Task, and performance on the Reportative (–(I)mIş) and Inferential(–mIş) Tasks.*

	Source Identification	Reportative –(I)mIş	Inferential –mIş
Age (months)	0.36*	0.50*	0.31**
Source Identification		0.46*	0.11
Reportative –(I)mIş			0.10

Note: *p<.001, **p=.004

Age was found to be a significant predictor, R^2=.13, Adjusted R^2= .12, $F(1,67)=10.25$, p=.002. After the scores on the linguistic tasks were added into the regression, the effect of age disappeared and correct performance on the Reportative –(I)mIş Task was found to be a significant predictor of source identification performance, R^2=.23, Adjusted R^2= .21, $F(1,66)= 8.67$, p=.004. On the other hand, performance on the Inferential –mIş Task was not a significant predictor. Table 11 provides details of regression models.

Table 11. *Results of regression analysis predicting children's correct performance on the Source Identification Task.*

		B	β	t	Sig.
Step 1	Constant	13.11		1.43	.156
	Age	0.48	0.36	3.2	0.002
Step 2	Constant	18.27		2.07	.04
	Age	0.24	0.18	1.47	0.147
	Reportative -(I)mIş	0.15	0.36	2.95	0.004
	Inferential -mIş		0.02	0.16	0.871

On the Source Identification Task, intra-experimental errors imply that children could remember that knowledge was gained during the first session they met the experimenter, but they could not differentiate by which source the fact was taught. This suggests that making intra-experimental errors includes partial source monitoring ability although the specific source is not correctly remembered. Combining correct source

responses and intra-experimental error responses another score was obtained and whether performance on language tasks predicted this score was analyzed through another hierarchical regression analysis. Age was again put as a predictor through forced entry method, and performance on the Reportative (–(I)mIş) and Inferential (–mIş) Tasks were put through the step-wise method. Table 12 presents the Pearson correlation coefficients between the criterion and predictor variables.

Table 12. *Correlations between age, partial source knowledge score (correct and intra-experimental error) on the Source Identification Task, and scores on the Reportative(–(I)mIş) and Inferential (–mIş) Tasks.*

	correct+intra-experimental	Reportative –(I)mIş	Inferential - mIş
Age (months)	0.37*	0.50*	0.31**
Correct+intra-experiemental		0.42*	0.11
Reportative –(I)mIş			0.10

Note: *p<.001, **p=.004

Results demonstrated that age was a significant predictor of remembering that the knowledge was gained in the experimental context, R^2=.13, Adjusted R^2= .12, $F(1,67)$= 10.32, p=.002. In addition, after children's performance on the linguistic tasks entered into regression, age's effect was removed, and performance on the Reportative –(I)mIş Task was a significant predictor, R^2=.21, Adjusted R^2= .19, $F(1,66)$= 6.35, p=.014, whereas performance on the Inferential –mIş Task did not explain any variance. Table 13 shows the details of the analysis. These results indicated that performance on the

Reportative –(I)mIş Task predicts partial source knowledge, i.e. the ability to identify the context of knowledge acquisition, as well as specific source of knowledge.

Table 13. *Results of regression analysis predicting children's performance in identifying the experimental context as the source of knowledge on the Source Identification Task.*

		B	β	T	Sig.
Step 1	Constant	28.82		1.85	0.068
	Age	0.82	0.37	3.21	0.002
Step 2	Constant	36.46		2.39	0.020
	Age	0.46	0.21	1.64	0.106
	Reportative -(I)mIş	0.23	0.32	2.52	0.014
	Inferential -mIş		0.01	0.1	0.925

Additional hierarchical regression analyses were conducted to test whether linguistic performance predicted source monitoring performance on the Mode of Knowledge Access Task both for the immediate and delayed condition. With the immediate source monitoring scores, age was put through forced entry method into the regression because of its effect on source monitoring ability while percentage of correct responses on the Reportative and Inferential Tasks were put through the step-wise method. Table 14 gives the Pearson correlation coefficients between immediate performance on the Mode of Knowledge Access Task, and performance on two linguistic tasks.

Table 14. *Correlations between age, correct performance on the immediate condition of the Mode of Knowledge Access Task, and performance on the Reportative (–(I)mIş) and Inferential(–mIş) Tasks.*

	Immediate correct performance	Reportative –(I)mIş	Inferential –mIş
Age (months)	0.49*	0.52*	0.31**
Immediate correct performance		0.37*	0.10
Reportative –(I)mIş			0.13

Note: *p<.001, **p=.005

Results indicated that age was a significant predictor of the immediate correct source monitoring performance on the Mode of Knowledge Access Task, R^2=.24, Adjusted R^2= .23, $F(1,66)$= 20.67, p<.000, however performance on the Reportative or on the Inferential Tasks were not found to be significant predictors. Table 15 shows the beta weights and the significance levels of all variables entered into the regression analysis.

Table 15. *Results of regression analysis predicting children's performance in the immediate condition of the Mode of Knowledge Access Task.*

	B	β	T	Sig.
Constant	2.70		4.43	0.000
Age	0.05	0.49	4.55	0.000
Reportative –(I)mIş		0.15	1.23	0.225
Inferential -mIş		-0.06	-0.49	0.623

For the regression analysis with delayed source monitoring scores as the dependent variable, again age was put into the analysis through forced-entry method, and correct performance on the Reportative and the Inferential Tasks were included through the step-wise method. Table 16 shows the Pearson coefficients for the correlation between the criterion and predictor variables.

Table 16. *Correlations between age, correct performance on the delayed condition of the Mode of Knowledge Access Task, and performance on the Reportative –(I)mIş and Inferential –mIş Tasks.*

	Delayed correct performance	Reportative -(I)mIş	Inferential –mIş
Age (months)	0.28***	0.52*	0.31**
Delayed correct performance		0.28***	-0,10
Reportative –(I)mIş			0.13

Note: *p=.000, **p=.005,***p=.010

The results of the regression analysis demonstrated that age was a significant predictor of delayed source monitoring performance on the Mode of Knowlefge Access Task, R^2=.08, Adjusted R^2= .07, $F(1,66)$= 5.75, p=.019. Other predictor variables, correct use of –(I)mIş for the reportative function, and of –mIş for the inferential function, could not enter into the regression equation, and they did not predict delayed source monitoring performance. Table 17 shows the beta weights and the significance levels of all variables entered into the regression analysis.

Table 17. *Results of regression analysis predicting children's performance in the delayed condition of the Mode of Knowledge Access Task.*

	B	β	T	Sig.
Constant	1.31		1.34	0.184
Age	0.04	0.28	2.40	0.019
Reportative –(I)mIş		0.18	1.33	0.188
Inferential -mIş		-0.20	-1.66	0.101

To summarize, children's performance on the Reportative –(I)mIş Task predicted their performance on the Source Identification Task. This finding supports the hypothesis that children's performance on the language tasks would predict their performance on the source monitoring tasks.

CHAPTER 4

DISCUSSION

The present study was conducted to examine the development of source monitoring abilities in Turkish children and whether their ability to use Turkish evidentiality markers encoding source is related to development of this cognitive ability.

Development of Source Monitoring

The first hypothesis of the study stated that children's performance on the source monitoring tasks would increase with age. One of the two source monitoring tasks, the Mode of Knowledge Access Task, assessed children's ability to identify the modalities or mental processes through which knowledge is acquired. Children's performance on both the immediate and delayed source monitoring conditions supported the hypothesis that source monitoring ability increases with age.

On the immediate condition, 3-year-old children's overall source monitoring performance was lower than that of 4-, 5-, and 6-year-olds. Their performance was slightly above chance level whereas the older groups' performance was almost perfect. These findings are similar to those of Gopnik and Graf (1988) and O'Neill and Gopnik (1991). Gopnik and Graf (1988) used the same task and found that 3-year-olds performed worse than 4- and 5-year-olds in differentiating between perception, inference and linguistic report immediately after acquiring information. Similarly, O'Neill and Gopnik (1991) found that 3-year-olds were less successful than 4-year-olds in distinguishing seeing from inferring and telling. Another study conducted by Woolley and Bruell (1996) also showed 3-year-old children's incompetence in discriminating between visual perception and inference compared to 4- and 5-year-olds whose source

identification performance did not differ from each other. These findings suggest that 3-year-old children have difficulty in identifying the modality through which they acquired information, and this cognitive ability develops around the fourth year of life. Further support for this suggestion comes from O'Neill and Gopnik (1991) who found that distinguishing tactile perception from visual perception, inference, and linguistic report was easier for 4-year-old children than for 3-year-old children, and from Woolley and Bruell (1996) who showed that 3-year-old children's ability to differentiate between direct perception, linguistic report and imagination was lower than that of 4- and 5-year-olds.

The analysis of children's overall delayed source identification performance on the Mode of Knowledge Access Task regardless of memory for location of objects revealed a difference between 3- and 6-year-olds. This finding is consistent with Gopnik and Graf's (1988) finding showing a gradual increase across 3-, 4- and 5- years of age in the same task, as well as Wooley and Bruell's (1996) finding that delayed identification of sources such as visual perception, linguistic report, imagination and inference increases with age. On the other hand, the analysis conducted only on those source responses where the location had been correctly identified showed no significant effect of age, but a trend in the expected direction (44.27% for 3-year-old children, 72.08% for 4-year-olds, 64.85% for 5-year-olds, and 72.64% for 6-year-olds). Although the means show that children's ability to identify the source of their knowledge a short delay after its acquisition improves with age, they also indicate that location, if encoded in the first place, serves as a cue, facilitating source recall regardless of age.

Understanding that knowledge and beliefs arise from different sources is an important part of the ability to identify the origins of mental representations (O'Neill & Gopnik, 1991). It has been claimed that this understanding does not develop until the fourth year of life (Wimmer, Hogrefe, & Sodian, 1988) and younger children "have no 'theory' that specifies the epistemic effects of sources of information" in spite of the fact that different sources carry out their functions very early in life and provide a lot of knowledge to children (Wimmer et al., 1988b, p. 174). For instance, visual perception functions as a source of knowledge even in the infants' first months (Olson & Sherman, as cited in Wimmer et al., 1988a), however; 3-year-olds seem not to understand that visual perception leads to knowledge formation whereas 4-year-old children realize this relationship (Marvin, Greenberg, & Mossler, 1976, as cited in Wimmer et al., 1988a; Mossler, Marvin, & Greenberg, 1976; Taylor, 1988). Moreover, although verbal communication functions as a source starting around the second year of life, 3-year-olds appear not to understand that knowledge can be acquired through language while older children are aware that linguistic report from a knowledgeable individual can result in the formation of new knowledge (Aksu-Koç, 1988; Wimmer et al., 1988a). Moreover, although children older than 18 months can acquire knowledge through inference (Piaget & Inhelder, 1969), understanding of this source as the origin of knowledge seems to be a later accomplishment (Sodian & Wimmer, 1987). The finding in the present study showing 3-year-old children's inability to differentiate the sources of their mental representations is consistent with the findings of previous studies and supports the claim that children of this age have difficulties to understand the fact that different sources

result in different types of mental representations. This understanding seems to depend on meta-representational abilities.

According to Perner (1988, also Nelson, 1996), very young infants construct knowledge on the basis of their perceptual experiences of the external world; that is, they have a knowledge base constituted by the perceived situation. After this presentational stage, children begin to be able to form representations of reality. These representations are constructed by reflecting on the elements of the knowledge base, manipulating these elements and reorganizing them. They can compare their representations or alternative models with external reality as a consequence of which they can interpret and evaluate their mental representations and use them in activities such as pretend play. Around 4-years of age, children enter a third stage in which they are able to understand that their mental models are models of the perceived situations constructed by the mind and begin to figure out how this construction process works (Perner, 1988). In other words, they are able to form meta-representations of their mental states. Based on Perner's theory, it can be claimed that for correct source identification on the Mode of Knowledge Access Task, children have to represent the content information on the one hand, and reflect on the source, i.e. the process of acquisition of this knowledge, relying on their meta-representations. The younger children's low performance in identifying the sources in different modalities in the present study can be said to reflect their inability to construct meta-representations whereas older children's successful source attributions can be said to indicate their meta-representational models.

The inability of 3-year-olds to understand the causal relationship between the external world and its representation mediated by different sources and processes has also been reported in other studies carried out in relation to other theory of mind abilities such as the ability to recognize representational diversity in false-belief tasks (Perner, Leekman, & Wimmer, 1987; Wimmer & Perner, 1983, as cited in Forguson & Gopnik, 1988), the ability to distinguish between appearance and reality (Flavell, 1986, as cited in Flavell, 1988), and the ability to recognize representational change (Gopnik & Astington, 1988; Astington & Gopnik, 1988, as cited in Forguson & Gopnik, 1988). These findings indicate that source monitoring ability develops at the same time with other theory of mind abilities which are also presumed to rest on the emergence of meta-representational capacities.

In addition to understanding the relationship between knowledge and modes of its acquisition, in order to identify source of information, one has to encode source relevant information during knowledge acquisition and then use it during source differentiation. Wooley and Bruell (1996; O'Neill & Gopnik, 1991) claimed that immediate source monitoring tasks assess children's ability to encode source information and children's low source identification performance indicates their encoding difficulty. If so, the increase in the immediate source identification performance with age observed in the present study reflects an improvement in children's encoding ability. On the other hand, the decrease in the source identification performance in the delay condition of the present study suggests difficulties in recall since the decrease was observed across all ages. Decrease in source monitoring performance over time was also found in other studies (Gopnik & Graf, 1988; Wooley &

Bruell, 1996). These findings indicate that source memory is subject to forgetting like other types of memory, and although young children can access source information for their immediate decisions, they may not be able to store it for further use or to use retrieval processes effectively (Gopnik & Graf, 1988; Wooley & Bruell, 1996). According to Johnson et al.'s source monitoring framework (1993), some perceptual and reflective processes are active during construction of memory traces including source information. Younger children's difficulty in identifying the source of their knowledge may be a sign of the lack of efficiency in the use of these processes early in development and the more effective source monitoring of older children may be an indicator of the improvement of these processes with age (Johnson et al., 1993).

Children's source identification performance was found to be influenced by source type. In general, children at all ages were more successful in identifying visual perception as a knowledge source compared to linguistic report. Allmost all studies (O'Neill et al., 1992; Pillow, 1989; Pratt & Bryant, 1990; Sodian & Wimmer, 1987) have found that the function of visual perception in knowledge acquisition is understood earlier than the function of other sources. Children's superior performance in identifying visual perception as the source of their knowledge indicates "their special attunement to visual information" (Woolley & Bruell, 1996, p. 342) which enables the early grasp of the relationship between direct perception and knowledge formation.

Moreover, although for 5-year-old children immediate identification of inference was found to be more difficult than identification of other sources, generally the present study suggests that for 3 to 6-year-old children, identification of inference is slightly more difficult than identification of direct perception, but easier than identification of

linguistic report. Wooley and Bruell (1996) claimed that inference is an internal source. Previous research indicated that memories formed through external sources such as perception and linguistic report contain more temporal, spatial and affective details compared to the memories constructed by internal sources such as inference, whereas the latter includes more information about cognitive operations used during knowledge formation (Roberts, 2000; Wooley & Bruell, 1996). Children's mental representations constructed through inference could therefore have different characteristics than those constructed on the basis of external sources. This difference in the characteristics of the mental processes involved could have a bearing on children's differentiation of the different types of sources. However, in the present as well as in Gopnik and Graf's (1988) study, a perceptual clue was provided to children to enable them to make inferences about the content of the shelves, thus inference was a semi-internal, semi-perceptual (semi-external) source. In the inference trials, the clue, an egg carton or a candy box, was shown to the children and the experimenter told them that the content of the shelf belonged to the clue object. In the delayed source monitoring condition, seeing the egg or the candies could have facilitated source recall due to the fact that these objects triggered the image of the clues (the egg carton and the candy box) from which the inferences were made. This idea suggests that perceptual clues help children to identify the source of their mental representations. Younger children's ability to identify inference as the origin of their knowledge in the present study appears to contradict Sodian and Wimmer's (1987) finding that understanding of the relationship between inference and knowledge acquisition is a late accomplishment that develops between fifth and sixth years of life (Sodian & Wimmer, 1987). However, this difference can be

explained by the fact that Sodian and Wimmer's (1987) task was a logical inference task where the source was internal whereas the present task involved physical inference where a perceptual clue was provided to children to base their inferences on. The present finding thus supports the claim that young children can successfully identify inference as the source of knowledge if it is simpler than logical inference (Sodian & Wimmer, 1987).

Linguistic report seems to be the most difficult source type to identify. Identification of this source immediately after knowledge acquisition was found to be more difficult than identification of direct perception for only 3-year-old children while a difference in ease of identification of these two sources was observed across all ages in the delayed source identification condition. Children's difficulty in identifying others' linguistic report as the source of their knowledge was also observed in other studies. For example, Gopnik and Graf (1988) found that 3-year-old children have difficulty in identifying this modality as source immediately after knowledge acquisition on the same task. Wooley and Bruell (1996) found that children between 3 to 5 years of age were less successful in identifying linguistic report as source than visual perception or imagination both in the immediate and delayed parts of a task similar to the present one. Remembering the fact that some information was learned through language requires the ability to hold in mind the representation of the linguistic report in addition to its propositional content. In the case of direct perception and of inference from physical evidence, however, the nature of the source cue is perceptual, and therefore less abstract.

Nelson (1996), in her discussion of the development of mental representations in infancy and early childhood, mentions four levels for the development of the

representational system. At the first level, through direct interaction with the external, immediate environment shaped by culture, the infant builds mental representations of events. Language forms used by adults within events in which the infant participates become parts of these representations. In the second year of life when conversational skills begin to develop, the child becomes able to engage in mimetic activities, such as imitation and play, and to use language to express his/her mental event representations in talk about past, present, future, and pretense activities. The source of his/her mental representations is still his/her direct experiences. At the next level, the child is able to participate in discourse interpreting linguistic representations of others which are not supported by the situational context. However, these linguistic representations appear to be assimilated to the child's own mental representations and the child may, therefore, not be able to make a distinction between those parts of his/her mental representations built on direct experiences and those parts constructed on the basis of linguistic representations of others. At the last level, the child finally becomes able to simultaneously hold the other's linguistic input as a mental representation separate from his/her representations of the world (Nelson, 1996). It would seem that it is this level four ability that underlies the capacity for source monitoring in general; and for information obtained from linguistic report in particular, since awareness of a source different from direct experience requires holding the other's linguistic representation in mind. According to Nelson (1996), this ability occurs around the fourth year of life and develops further for many years. The findings of the present and previous studies that show young children's difficulty in identifying the linguistic report as the source of their knowledge support Nelson's (1996) claim that the ability to linguistically represent the

others' linguistic representations and hold them in mind develops in time. Further support for this claim was obtained from the present study's findings regarding children's performance on the other source monitoring task, the Source Identification Task.

The Source Identification Task assessed children's ability to remember and identify the source of knowledge acquired through linguistic report from one of two external sources after a week's delay. It was found that 5-year-old children were more competent than 3-year-old children in remembering (both recalling and recognizing) knowledge of facts acquired a week earlier. That is, older children were more successful in storing new information in semantic memory, connecting it with previous knowledge and retrieving it from their long-term memory when needed. The fact that even the 3-year-olds could recall more than half of the facts despite the one-week delay between learning and remembering shows that the novel facts that were taught could be easily learned by children between 3- and 6-years of age (number of recalled facts out of 10: 6.33 for 3-year-olds, 7.23 for 4-year-olds, 7.91 for 5-year-olds, and 7.67 for 6-year-olds). Children's performance in remembering the source of these remembered facts supported the first hypothesis that children's performance on the source monitoring ability would increase with age: 5- and 6-year olds were more successful in identifying the correct source of acquired knowledge than 3-year-olds. Furthermore, the youngest group made more source attributions to a factor outside of the experimental context, that is, more extra-experimental errors, compared to 5- and 6-year-olds. These results confirm those obtained on the Mode of Knowledge Access Task as they also show children's difficulty in understanding the relationship between the others' linguistic

report and knowledge formation, and in identifying it as the source of their own mental representations. Moreover, they indicate that a developmental change in identifying the source of information acquired through language occurs sometime between 3- to 5-years of age.

The present findings are also consistent with those of Drummey and Newcombe (2002) who, using the same task, showed that 4-year-old children made less correct source attributions, but more extra-and intra-experimental errors than 6- and 8-year-olds. However, an interesting pattern of errors were observed in the present study. Children's memory for source was found to be influenced by the make-believe nature of one of the sources. Four-, 5-, and 6-year-olds remembered the source of facts taught by the experimenter better than the source of facts taught by the puppet. For facts taught by the puppet, they identified the experimenter as the source producing intra-experimental errors indicating that they could do partial source identification. On the other hand, 3-year-olds made high proportions of both intra- and extra-experimental errors when facts were taught by the experimenter, but made more correct identifications of source when facts were taught by the puppet relative to older children. These findings suggest that 3-year-old children were easily convinced of the puppet's reality status, accepted its animistic qualities such as thinking and knowing, and disregarded the fact that it was acted out by the experimenter. As a result, in the first part of the Source Identification Task, they had no problems in encoding the puppet and the experimenter as two different sources, and in the second part of the task, they could identify the source of facts taught by the puppet correctly. The clear distinction between the two sources helped them detect sources of facts taught by the experimenter as well. Animistic

thinking is claimed to decrease with age and the ability to differentiate things which have lifelike qualities from those which do not increases with age (Buggle, 1988; Margand, 1977). In the present study, it appears that in contrast to 3-year-olds, older children did not attribute animacy to the puppet, realized that it was acted out by the experimenter and did not make a distinction between these two sources. This recognition of the identity of the two sources in reality might have led them to disregard the symbolic identity of the puppet and operate in terms of reality, reducing all the sources to the experimenter. Thus, while accepting the symbolic identity of the puppet helped the 3-year-olds to keep the two sources apart, recognizing its pretense nature led to many intra-experimental errors in the second part of the task for older children.

It has been suggested in the literature that source memory is not an all-or-none type of memory, but has different levels of specificity depending on the details included about the context of knowledge acquisition (Dodson et al., 1998; Johnson et al., 1993).Viewed from this perspective, the present Source Identification Task can be said to tap two levels of source memory. Retaining correct information about whether the remembered fact was taught by the experimenter or the puppet constitutes specific source memory whereas retaining information that the remembered fact was learned in the experimental context of the study, but failing to identify exactly who provided this information (intra-experimental errors) constitutes partial source information. In the present study, specific source performance was found to increase with age, however the percentages were rather low (27.10% for 3-year-olds, 40.30% for 4-year-olds, 47.05% for 5-year-olds, and 46.84% for 6-year-olds). This demonstrates that 3- to 6-year-old children have difficulty in accessing specific source information. In comparison, 4-, 5-,

and 6-year-old children's performance in remembering specific plus partial source information was high, 74.86%, 87.33% and 85.87% respectively. This indicates that children older than 3-years could remember partial source information, that is, where or in which context information was learned. On the other hand, 3-year-old children had difficulty in retrieving partial source information as well (correct source (27.10%) and intra-experimental error (28.37%): 55.47%), and their high extra-experimental errors (44%) shows that they had difficulty in remembering the context of the study as the context of learning. Moreover, the difficulty of younger children in identifying the specific source of knowledge over a one week period can be an indicator of the low efficiency of their perceptual and reflective processes which are used during encoding as has already been noted, or during retrieval a long time period after its acquisition.

Schacter et al. (1984) made a distinction between source amnesia and source forgetting. Source amnesia was defined as not remembering even the context in which information was acquired. On the other hand, source forgetting occurs when an individual can remember the context of information acquisition, but misidentifies the specific source in this context. Considering children's overall performance, in Schacter et al.'s (1984) terms, the present study indicates that 3-year-old children experience source amnesia whereas the older children suffered from source forgetting.

On the basis of studies showing the difficulty of patients with prefrontal damage in source monitoring (Janowsky et al., 1989; Shimamura & Squire, 1987; as cited in Drummey & Newcombe, 2002; Schacter et al., 1984), young children's source monitoring difficulty is argued to be related to the fact that "the prefrontal cortex is still developing in the first decade of life (Schacter, Kagan, Leichtman, 1995; as cited in

Drummey & Newcombe, 2002, p. 504.). Drummey and Newcombe's (2002) comparison of children's performance on the source monitoring task with their performance on tasks examining prefrontal functioning supported this claim by showing the correlation between 4- and 8-year-old children's source monitoring performance with their performance on some prefrontal tasks. This relationship may account for the children's general inability in source monitoring in the present study. Moreover, Drummey and Newcombe (2002) claim that an improvement in source monitoring ability between 2 and 6 years of age, the time period over which childhood amnesia extends, shows the relationship between source monitoring and the recollection of autobiographical memories. On the basis of this claim, the present study's findings showing an increase in source monitoring between third and fifth years supports the relationship between source monitoring and formation of autobiographical memories.

All things considered, children's source monitoring performance on the Mode of Knowledge Access Task and the Source Identification Task indicates that the ability to identify source of knowledge increases with age. Furthermore, they suggest that children's source monitoring ability depends on some factors such as age, type of source and time of identification. The next question is whether the development of this ability is affected by the linguistic encoding of source for children acquiring languages grammaticizing this function. The following section discusses the findings regarding Turkish-speaking children's differentiated use of evidentiality markers and whether this ability is related to their source monitoring ability.

Use of Turkish Evidentiality Markers Encoding Source

Turkish children's use of two evidentiality markers, namely –DI and –mIş/ –(I)mIş, were examined through three linguistic tasks, the Direct Experience Task, the Inferential (–mIş) Task and the Reportative (–(I)mIş) Task. The hypothesis regarding performance in these three tasks stated that children's performance on the Reportative and Inferential Tasks would increase with age.

Children's performance on the Direct Experience Task revealed that at all ages they used –DI inflection correctly to report their direct experiences. Very few instances of the use of the –mIş inflection that encodes indirect experience was observed only among the 3-year-old children. These findings are not surprising, since –DI is the first form that children acquire (Aksu-Koç, 1988) and direct experience has primacy over indirect experience. They also support Aksu-Koç's (1988; 2000) findings indicating that using –DI to report directly experienced past events is fully established by the age of 3.

The aim of the Inferential Task was to examine children's use of the–mIş inflection to express inferences derived from some available perceptual evidence such as changed states of an object. Children in all age groups were found to notice the changed state of almost all objects, however, their ability to refer to the processes inferred from these changed states with the appropriate linguistic form increased with age as revealed by the higher performance of 6-year-olds compared to 3-year-olds. This finding confirms the hypothesis stating that children's performance in linguistic tasks would increase with age. Similar findings were reported in other studies by Aksu-Koç (1988) and Aksu-Koç and Alp (2005). For example, Aksu-Koç (1988) found that children's ability to produce –mIş on the basis of inference from the resultant states increased until

5 years of age, and 3-year-old children could use –mIş correctly almost half of the time. In another study, Aksu-Koç and Alp (2005) found that 3-year-old children were able to refer to changed state of objects with –mIş again more than half of the time. The findings of the present study together with these suggest that what develops with age is the "appropriate use in context or the underlying critical variables that govern the choice of a given form in a given context" (Aksu-Koç, 1988, p. 134).

The third linguistic task used in the present study was the Reportative Task assessing children's use of –(I)mIş to convey information acquired through someone else's report. Three- and 4-year-olds performed worse than 5- and 6-year-olds in retelling a story which they heard with –DI by using the –(I)mIş inflection to indicate that it is based on another's report. They used –DI which constitutes the inappropriate form in this context more than 5- and 6-year-olds (34.33% for 3-year-olds, 25.46% for 4-year-olds, 8.73% for 5-year-olds, and 7.92% for 6-year-olds). These findings support the hypothesis that the correct use of the linguistic forms will increase with age. They indicate that the use of –(I)mIş for its reportative function is consolidated between fourth and fifth years of life. A similar developmental pattern was found by Aksu-Koç (1988).

Comparison of children's performance on these three linguistic tasks revealed that 3- and 4-year-olds performed worse on the Reportative Task compared to the Direct Experience and Inferential Tasks where their performance did not differ. This finding supports previous findings (Aksu-Koç, 1988) indicating that using –(I)mIş for its reportative function is a complex ability that develops later than its use for inference. In fact, even 5-year-olds displayed higher performance on the Direct Experience Task than on the Reportative –(I)mIş Task, whereas their performance on the Inferential Task did

not differ from their performance on other linguistic tasks. The 5-year-old children's performance on the reportative and inferential tasks suggests that at this age children can differentiate between different functions of the evidentiality marker –mIş/-(I)mIş. Six-year-old children's performance on the Inferential –mIş Task was better than their performance on the Direct Experience Task. However, this difference did not result from their inability to use –DI to report their direct experience, but from their increased competence for using different linguistic forms such as the present progressive inflection –Iyor for discourse organizational purposes (Aksu-Koç, 1988). Some examples of children's narratives in Direct Experience Task are presented in Appendix IIa.

In addition, children's performance on the Reportative –(I)mış and Inferential –mIş Tasks was found not to be correlated. These two tasks call for the use of different mental processes and representations. On the Inferential -mIş Task, the change in the state of objects was unexpected information for children's state of knowledge. They were expected to infer the processes that caused the changes from the observed states of the objects which constituted perceptual representations that allowed the making of inferences. However, on the Reportative –(I)mIş task, there was no perceptual information, and performance on this task depended on the ability to manipulate linguistic representations. This differences account for the dissociation between children's performance on the two language tasks.

Relationship between Source Monitoring and Use of Turkish Evidentiality Markers

The Turkish evidentiality markers, -DI and -mIş/–(I)mIş, code past experiences differently for source (Aksu-Koç, 1988; 1995). Based on the idea that the use of evidentiality markers can improve source monitoring ability (Aksu-Koç & Slobin, 1985), it was hypothesized that children's linguistic competence in marking direct versus inferred versus reported information would predict their source monitoring performance. This hypothesis was partially supported.

Children's correct performance on the Reportative –(I)mIş Task was found to predict their performance on the Source Identification Task (identification of both the specific source, and of the partial source) whereas their correct use of inferential –mIş did not do so. This finding is not surprising since the reportative –(I)mIş is used to convey information that has been obtained through linguistic means and source monitoring as assessed by the Source Identification Task requires the differentiation of two sources in the linguistic modality. Performance on both tasks depends on memory for purely linguistic representations and the mental processes required on both tasks are similar in that sense.

Owing to the fact that the use of Turkish evidentiality markers is obligatory, speakers have to choose between two evidential forms when they talk about a past experience (Aksu-Koç, 1988). This choice reflects their mental representations for the source of the propositional content of their utterances. Since Turkish children are exposed to the differentiated use of these markers in everyday interactions with their caregivers, the conceptual distinctions these forms make become salient for them. Children encounter these markers in specific contexts of use: –DI in contexts where the

speaker has directly experienced an event, -mIş/(I)mIş in situations where the speaker has some indirect evidence such as perceptual clue or a linguistic report. Through repetitive exposure to these linguistic forms and using them, children acquire an implicit understanding of their functions. In other words, use of the evidentiality markers in discourse (both interpreting and producing them) make the differentiated coding of direct and indirect experience salient, create an implicit awareness about the different sources of information (direct perception, inference from perceptual evidence, or linguistic report), help track these sources across different mental representations and shape the linguistic expressions of these representations.

Performance on the Reportative (-(I)mIş) Task required children to report linguistically received information by reformulating utterances inflected in –DI to utterances inflected in –(I)mIş thereby indicating that its source was a linguistic representation (Aksu-Koç & Alp, 2005). The ability to make this transformation reflects an implicit understanding of the function of these inflections. Moreover, encoding information received from the other in a form (-(I)mIş) that is different from the form in which it was received (-DI) may foster children's ability to hold different representations separately in mind, as in the fourth level of Nelson's representational system. As mentioned before, this fourth meta-representational level is seen to underly children's source monitoring ability, especially for sources in the linguistic modality. It can, therefore, be said that children's ability to use –(I)mIş for its reportative function facilitates source monitoring ability, because use of this linguistic form provides means to hold different representations separately.

The Source Identification Task was an adapted version of Drummey and Newcombe's (2002) source task used to study source monitoring ability in children speaking English where there are no grammaticized evidentiality markers. A comparison of Turkish- and English-speaking children's performances in the two studies indicates that 4-year-old Turkish-speaking children's correct source identification performance (40.30%) was superior to that of English-speaking children of the same age (24.1%). In addition, when correct responses and intra-experimental errors are considered together, it is observed that Turkish-speaking 4-year-olds (75.16%) outperform English-speaking peers (35.2%). Moreover, the Turkish-speaking group (22.52%) engaged less in extra-experimental errors than the English-speaking group (59.2%). However, the difference between Turkish- and English-speaking children disappears when performance of 6-year-old children in both language groups is considered (Turkish-speaking children: 46.83% for correct source, 12.29% for extra-experimental error, 39.03% for intra-experimental error; English-speaking children: 46.80% for correct source, 12.70% for extra-experimental error, 39.20% for intra-experimental error). These findings strongly suggest that during the early stages of development, presence of linguistic forms for encoding source may be facilitating source monitoring ability.

On the other hand, no predictive relationship was found between children's use of the reportative -(I)mIş and inferential -mIş forms and their performance on the immediate and delayed parts of the Mode of Knowledge Access Task which required children to differentiate between perception, linguistic report and inference from a physical cue. The fact that Turkish has specific lingusitic forms to mark perception (-DI), inference from physical evidence (-mIş) and linguistic report (-(I)mIş) as source

lead to the expectation that correct use of these forms would facilitate the differentiation of different source types. This expectation was not confirmed. However, children's level of performance on the three linguistic tasks and their ability to differentiate between the three source types after a short delay shows close parallels: the identification of perception is easier than the identification of inference which is easier than the identification of linguistic report, and correspondingly mastery of –DI to report direct experiences precedes that of –mIş to report inferences which precedes using –(I)mIş to report linguistically acquired information. On the other hand, although there are some similarities between the linguistic report condition of the Mode of Knowledge Access Task and the Reportative –(I)mIş, and between direct perception condition of the Mode of Knowledge Access Task and the –DI Task in terms of required mental representations, the inference condition of the Mode of Knowledge Access Task was not similar to any of the language tasks. In this condition, a perceptual clue (candy box) was presented saying "this drawer has the typical contents of this box in it"). This clue provided a means to access the knowledge of what would constitute the first premise of a logical inference ("this kind of box always contains candy") which then leads to inference of a conclusion ("therefore the drawer must contain candy"). This process thus requires a logical inference which, however, is triggered by a perceptual cue. On the Inferential –mIş Task, the evidentiality marker, -mIş, was used to refer to the unexpected changes in the state of objects that resulted from processes that were not directly experienced. Thus, the processes underlying performance on the Inferential –mIş Task and in the inference condition of the Mode of Knowledge Access Task were from each other. Another evidentiality form in Turkish, -DIR, is used to express inferences derived

from already known premises as in the inference condition. Further research examining the relationship between identification of inference derived from already known premises and the use of –DIR can provide more information about the relationship between source monitoring and linguistic abilities.

The relationship between source monitoring and linguistic encoding of source was also studied by Papafragou, Li, Choi, and Han (2007) in Korean, another language with evidentiality markers coding source. Like in Turkish, in Korean there is an evidentiality marker, -e, to code direct experience, and another marker, -tay, to code indirect experience acquired through linguistic report (Papafragou et al., 2007). Papafragou et al. (2007) examined whether the competence to use these markers is related to 3-, 4-, and 5-year-old Korean children's performance in a source monitoring task where children played a treasure hunt game in two different conditions. In the Self condition, the children learned the content of hiding places either through direct visual perception or the linguistic report of the experimenter, and then they were asked to report how they learned this information. This part of the task was similar to the immediate part of the Mode of Knowledge Access Task in the present study. In the Other condition, there were two puppets and only one of them got information about the content of the hiding places through linguistic report or visual perception in each trial. At the end of each trial, the children were asked to state which one of these puppets knew the content. That is, they were asked to identify the possessor of information not the source of information which appears to call for additional step in encoding. The linguistic task they used was similar to the Reportative –(I)mIş Task of the present study. A puppet told the children what he did one day ago using direct experience

marker –e, and the children were expected to retell to the experimenter with the indirect experience marker –tay what the puppet told them. Children's competence on the linguistic task was found to be correlated with their performance on the source monitoring task, especially on the Other condition. To examine the direction of causality in this relationship, Papafragou et al. (2007) conducted another study, and compared Korean- and English-speaking children's performances on the source monitoring task mentioned above. It was found that English-speaking children could perform as well as Korean-speaking children although evidentiality is not grammatically denoted in English. Papafragou et al. (2007) considered this finding as a support for the idea that linguistic abilities do not trigger cognitive abilities. The discrepancy between this conclusion and the one arrived in the present study that linguistic encoding of evidentiality has a facilitating effect on children's source monitoring abilities can be explained by reference to the differences in the nature of the tasks used and thus to the nature of the types of source-monitoring abilities involved. In the present study, children's competence in the use of the evidential inflection that marks linguistic report as source was found to be predictive of their long-term source monitoring ability in the linguistic mode as measured by the Source Identification Task. Results implying no relation between cognitive and linguistic abilities in the same line as Papafrougou et al. (2007), on the other hand, were obtained in relation to the Mode of Knowledge Access task which is similar to the source-monitoring tasks they used.

As discussed earlier, the present Mode of Knowledge Access Task was adapted from the task used by Gopnik and Graf (1988) who examined the source monitoring capacity of 3-, 4-, and 5-year-old English-speaking children. Comparison of findings

from the English-speaking children with the findings of the present study showed that performance of both groups was similar on the immediate parts of the task whereas English-speaking children's performance was better than Turkish-speaking children's performance on the delayed parts (The mean number of correct source responses of English-speaking children in the Gopnik and Graf's (1988) study is displayed in Appendix IIb). This seems to be parallel to the findings of Papafragou et al.'s cross-linguistic study. However, it may not necessarily imply Papafragou et al.'s (2007) claim that cognitive abilities are not related to linguistic abilities, because there are some procedural differences between the present study and that of Gopnik and Graf (1988). On the task of Gopnik and Graf (1988), after children learned the content of the boxes in the immediate condition and after they mentioned the location of toys in the delayed condition, they were presented a forced-choice source recognition question. This question included the three different source types as the alternatives which were presented in the same order in every trial without counterbalancing. If the children could not respond to the forced-choice question, each of the alternatives was presented separately to the children. This methodology has been criticized by many researchers. Drummey and Newcombe (2002) claimed that presenting only forced-choice questions makes the task easier and consequently an overestimation of children's source monitoring abilities, especially that of younger children. In addition, O'Neill and Gopnik (1991) argued that presenting the alternatives in the same order in each trial directs children's responses. In Gopnik and Graf's (1988) forced-choice questions, the alternative of inference was presented last and according to O'Neill and Gopnik (1991), this could have resulted in an overestimation of children's ability to identify inference as

a source, because when children were in doubt, they may have chosen the alternative they heard last. Considering these criticisms of the Gopnik and Graf's (1988) source monitoring task, in the present study, children were first presented with a recall question, and then if they could not answer the recall question correctly they were given a forced-choice recognition question in which the three alternatives were counterbalanced. This procedural difference between the present Mode of Knowledge Access Task and Gopnik and Graf's (1988) task might have resulted in the difference between Turkish- and English-speaking children's performances in the two studies. Further cross-linguistic research to compare source monitoring ability of Turkish-speaking monolingual children with the source monitoring ability of children speaking a language without an obligatory evidentiality system by using the same tasks without any procedural differences will shed more light on the relationship between source monitoring and linguistic encoding of source.

Limitations

There are several limitations of the present study. On the Source Identification Task, there was a lack of clear distinction between the two sources as for nearly all children except for 3-year-olds; the puppet was reduced to the experimenter. Similarity between two external sources is found to be a factor affecting the discrimination of sources and thereby, individuals' source monitoring (Ferguson, Hashtrodi, & Johnson, 1992, as cited in Johnson, 1993; Lindsay et al., 1991; Thierry, Goh, Pipe, & Murray, 2005). Lindsay et al. (1991) found that when a list of words were read by two experimenters of the same gender, 4-year-olds had difficulty in identifying source compared to when it was read by a male and a female experimenter. On the present

Source Identification Task, although the experimenter and the puppet were different from each other, their voice was the same since the experimenter acted out the puppet. If the puppet had been acted out by a male experimenter or if the facts had been presented by a male and a female experimenter, then the children could have performed better on this task.

Similarity between the content of information revealed by different sources has also been reported to influence source identification (Thierry et al., 2005; Johnson et al., 1993; Lindsay et al., 1991). For example, Lindsay et al. (1991) found that preschool children's performance in identifying sources of information similar in semantic content was lower than their performance in identifying sources of dissimilar information. In the present study, most of the facts taught to children were facts about animals. Although each fact was about a different animal, their categorical similarity might have influenced children's source performance negatively. Controlling the content of the facts taught by the two sources might have improved children's source monitoring. For instance, if one of the sources had taught facts only about animals and the other only about objects, children might have performed better.

Temporal similarity is another factor influencing children's source monitoring. The closer the temporal distance between presentation of information by two sources, the worse children's source monitoring performance (Roberts & Blades, 1998, as cited in Thierry et al., 2005). In the present study, immediately after one of the sources presented the facts, the other source introduced other facts, which might have affected children's performance negatively. If, for example, children had participated in another

task between the facts taught by each source, they might have performed better in source identification.

In a study by Aksu-Koç and Alp (2005), the same Reportative Task was used with a different story and with the participation of two experimenters: one told the story to the child and after s/he left the room, the other came and asked the child to tell what the first experimenter told. Thus, every participant was asked to report the story in the same way. The children's performance in their study was superior compared to children's performance in the present study. However, in the present study, the tasks were administered by only one experimenter, and the nursery teachers took on the role of the second experimenter. Although the teachers were given training about what they should say and not say to children, there were differences in their interaction patterns. Although the cases in which the teacher was thought to influence children's story telling were eliminated from the data, teachers' different interaction patterns could have affected children's performance in general.

Moreover, the developmental level of the participant children was not assessed independently at the beginning of the study. Assessing children's abilities with a verbal or nonverbal intelligence test would have made the control of the effects of this potentially confounding variable possible.

Lastly, the relationship between language and different cognitive domains was examined mostly with cross-linguistic studies as conducted by Bowerman and Choi (2001), Choi et al. (1996; as cited in Bowerman & Choi, 2001), Gopnik and Choi (1990; as cited in Gopnik, 2001) and Gopnik et al. (1996; as cited in Gopnik, 2001). Cross-linguistic studies comparing the source monitoring abilities of Turkish-speaking mono-

lingual children with other mono-lingual children who speak a language where evidentiality is not grammatically encoded will provide a better understanding of the relationship between source monitoring and linguistic encoding of source.

Summary and Conclusion

The ability to identify source of knowledge is a cognitive ability related to the development of autobiographical memory and individuals' suggestibility, and is necessary for effective communication. The present study investigated the development of this important ability in relation to Turkish-speaking children's competence in using specific source markers in language. As the first study examining Turkish children's source monitoring abilities, it indicates a developmental pattern similar to those found in earlier studies. A developmental change in source monitoring ability was observed generally between third and fifth years of life. Moreover, this ability was found to depend on type of source and time of identification. Immediate source identification was found to be easier for 3- to 6-year-old children than delayed source identification in which identification of linguistic report of others as the source of knowledge was found to be difficult for children in all age groups. The present study's findings regarding children's linguistic competences were similar to those of previous studies. They showed that the ability to use the –DI evidentiality marker to indicate directly perceived events develops very early and it has been acquired fully at age of 3. Furthermore, they indicate that the ability to use the –mIş evidential to report inferences from perceived evidence develops earlier than the ability to use –(I)mIş to talk about information acquired through others' linguistic report. Most importantly, in the present study, an interaction between Turkish-speaking children's source monitoring abilities and their

use of evidentiality markers coding source was found. Correct use of –(I)mIş for its reportative function was found to predict the ability to identify the source of information acquired through linguistic report. Moreover, when Turkish-speaking children's source monitoring performance on the present study was compared with the performance of English-speaking children in a task similar to the present one, Turkish-speaking children were found to outperform English-speaking peers at the early stages of the development of this cognitive ability. These findings support the idea that language facilitates cognition, and suggests that –(I)mIş in Turkish language provides means to hold mental representations and sensitize children to sources of their knowledge. Comparing source monitoring abilities of Turkish-speaking children with those of children speaking a language in which source information is not coded grammatically in a cross-linguistic study will shed more light specifically on the relationship between source monitoring and linguistic encoding of source, and generally on the relationship between cognition and language.

REFERENCES

Aksu-Koç, A. (1988). *The acquisition of aspect and modality: The case of past reference in Turkish.* Cambridge: Cambridge University Press.

Aksu-Koç,A., & Alıcı, D.M. (2000). Understanding sources of beliefs and marking of uncertainty: The child's theory of evidentiality. In E.V. Clark (Ed.), *Proceedings of the 30th annual child language conference* (pp. 123-130). Papers and Reports of Child Development, Stanford University, Stanford.

Aksu-Koç, A., & Alp, I.E. (2005). Relations between source monitoring and linguistic encoding of evidentiality. Paper presented at the biennial meeting of the Society for Research in Child Development, Atlanta, GA.

Aksu-Koç, A., & Slobin, D.I. (1985). The acquisition of Turkish. In D.I. Slobin (Ed.), *The crosslinguistic study of language acquisition, Vol.1: The data* (pp. 839-878). Hillsdale, NJ: Lawrence Erlbaum.

Astington, J.W., & Jenkins, J.M. (1999). A longitudinal study of the relation between language and theory of mind development. *Developmental Psychology, 35*, 1311-1320.

Bowerman, M., & Choi, S. (2001). Shaping meanings for language: Universal and language-specific in the acquisition of spatial semantic categories. In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp.475-511). Cambridge: Cambridge University Press.

Bowerman, M., & Levinson, S.C. (2001). Introduction. In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp.1-16). Cambridge: Cambridge University Press.

Brown, P. (2001). Learning to talk about motion UP and DOWN in Tzeltal: is there a language-specific bias for verb learning? In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 512- 543). Cambridge: Cambridge University Press.

Buggle, F. (1988). Study of animistic thinking in 5 8-year-old children. *Zeitschrift für Entwicklungspsychologie und Paedagogische Psychologie, 20(1)*, 3-14.

Dodson, C.S., Holland, P.W., & Shimamura, A.P. (1998). On the recollection of specific- and partial-source information. *Journal of Experimental Psychology: Learning, Memory and Cognition, 24(5)*, 1121-1136.

Drummey, A.B., & Newcombe, N.S. (2002). Developmental changes in source memory. *Developmental Science, 5*, 502-513.

Flavell, J. H. (1988). The development of children's knowledge about the mind: From cognitive connections to mental representations. In J.W. Astington, P.L. Harris, & D.R. Olson (Eds.), *Developing theories of mind* (pp. 244-267).New York: Cambridge University Press.

Forguson, L., & Gopnik, A. (1988). The ontogeny of common sense. In J.W. Astington, P.L. Harris, & D.R. Olson (Eds.), *Developing theories of mind* (pp. 226-243).New York: Cambridge University Press.

Gopnik, A. (2001). Theories, language, and culture: Whorf without wincing. In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp.45-69). Cambridge: Cambridge University Press.

Gopnik, A., & Graf, P. (1988). Knowing how you know: Young children's ability to identify and remember the sources of their beliefs. *Child Development, 59*, 1366-1371.

Gopnik, A., & Choi, S. (1990). Do linguistic differences lead to cognitive differences? A cross-linguistic study of sematic and cognitive development. *First Language, 10*, 199-215.

Hoff, E. (2001). *Language acquisition*. Stanford: Wadswoth.

Johnson, M.K., Hashtroudi, S., & Lindsay, D.S. (1993). Source monitoring. *Psychological Bulletin, 114*, 3-28.

Langer, J. (2001). The mosaic evolution of cognitive and linguistic ontogeny. In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp.19-44). Cambridge: Cambridge University Press.

Leichtman, M.D., Morse, M.B., Dixon, A., & Spiegel, R. (2000). Source Monitoring and Suggestibility: An individual differences approach. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 257-287). New Jersey: Lawrence Erlbaum Associates, Inc.

Lindsay, D.S., Johnson, M.K., & Kwon, P. (1991). Developmental changes in memory source monitoring. *Journal of Experimental Child Psychology, 52*, 297-318.

Lorsbach, T.C. (2000). Source Monitoring as a framework for conceptualizing the nature of memory difficulties in children with learning disabilities. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 115-145). New Jersey: Lawrence Erlbaum Associates, Inc.

Lucy, J.A., & Gaskins, S. (2001). Grammatical categories and the development of classification preferences: a comparative approach. In M. Bowerman& S.C. Levinson (Eds.), *Language acquisition and conceptual development* (pp.257-283). Cambridge: Cambridge University Press.

Margand, N.A. (1977). Perceptual and semantic features in children's use of the animate concept. *Developmental Psychology, 13*, 572-576.

Montgomery, D. E. (1992). Young children's theory of knowing: The development of a folk epistemology. *Developmental Review, 12*, 410-430.

Nelson, K. (1996). *Language in cognitive development: The emergence of the mediated mind*. New York: Cambridge University Press.

O'Neill, D.K., & Gopnik, A. (1991). Young children's ability to identify the sources of their beliefs. *Developmental Psychology, 27*, 390-397.

O'Neill, D.K., Astington, J.W., & Flavell, J.H. (1992). Young children's understanding of the role that sensory experiences play in knowledge acquisition. *Child Development, 63*, 474-490.

Palmer, F.(2001). *Mood and modality* (2nd ed.). Cambridge: Cambridge University Press.

Papafragou, A., Li, P., Choi, Y., & Han, C. (2007). Evidentiality in language and cognition. *Cognition, 103*, 253-299.

Perner, J. (1988). Developing semantics for theories of mind: From propositional attitudes to mental representation. In J.W. Astington, P.L. Harris, & D.R. Olson (Eds.), *Developing theories of mind* (pp. 141-172).New York: Cambridge University Press.

Perner, J. (1993). *Understanding the representational mind.* Cambridge: The MIT Press.

Perner, J., & Leekam, S.R. (1986). Belief and quantity: Three-year-olds' adaptation to listener's knowledge. *Journal of Child Language, 13*, 305-315.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child.* New York: Basic Books.

Pillow, B.H. (1989). Early understanding of perception as a source of knowledge. *Journal of experimental Child Psychology, 47*, 116-129.

Pratt, C., & Bryant, P. (1990). Young children understand that looking leads to knowing(So long as they are looking into a single barrel). *Child Development, 61*, 973-982.

Quas, J. A., Schaaf, J.M., Alexander, K.W.i Goodman, G.S. (2000). Do you reaaly remember it happening or do you only remember being asked about it happening? Children's source monitoring in forensic contexts. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 197-226). New Jersey: Lawrence Erlbaum Associates, Inc.

Reisberg, D. (2001). *Cognition: Exploring the science of the mind*. New York: Norton and Company.

Riefer, D.M., Hu, X., & Batchelder, W.H. (1994). Response strategies in source monitoring. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*, 680-693.

Roberts, K.P. (2000). An overview of theory and research on children's source monitoring. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 11-57). New Jersey: Lawrence Erlbaum Associates, Inc.

Schacter, D.L., Harbluk, J.L., & McLachlan, D.R. (1984). Retrieval without recollection: An experimental analysis of source amnesia. *Journal of verbal learning and verbal behavior, 23*, 593-611.

Schacter, D.L., Kautsaal, W., & Norman, K.A. (1997). False memories and aging. *Trends in Cognitive Sciences, 6*, 229-236.

Sodian, B. , & Wimmer, H. (1987). Children's understanding of inference as a source of knowledge. *Child Development, 58*, 424-433.

Taylor, M., Esbensen, B.M., & Bennett, R.T. (1994). Children's understanding of knowledge acquisition: The tendency for children to report that they have always known what they have just learned. *Child Development, 65*, 1581-1604.

Thierry, K.L., Spence, M.J., & Memon, A. (2000). A comparison between fuzzy-trace theory and source-monitoring theory: Evidence from an eyewitness suggestibility study. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 171-196). New Jersey: Lawrence Erlbaum Associates, Inc.

Thierry, K.L., Goh, C.L., Pipe, M., & Murray, J. (2005). Source recall enhances children's discrimination of seen and heard events. *Journal of Experimental Psychology: Applied, 11*, 33-44.

Welch-Ross, M. (2000). A mental-state reasoning model of suggestibility and memory source monitoring. In K.P. Roberts, & M. Blades (Eds.), *Children's source monitoring* (pp. 227-255). New Jersey: Lawrence Erlbaum Associates, Inc.

Wimmer, H., Hogrefe, J., & Perner, J. (1988a). Children's understanding of informational access as source of knowledge. *Child Development, 59*, 386-396.

Wimmer, H., Hogrefe, J. & Sodian, B. (1988b). A second stage in children's conception of mental life: Understanding informational accesses as origins of knowledge and beliefs. In J.W. Astington, P.L. Harris, & D.R. Olson (Eds.), *Developing theories of mind* (pp. 173-192).New York: Cambridge University Press.

Woolley, J.D., & Bruell, M.J. (1996). Young children's awareness of the origins of their mental representations. *Developmental Psychology, 32*, 335-346.

APPENDIX I

APPENDIX Ia. Illustration of canvas shelves and objects in the shelves used on the Mode of Knowledge Access Task

Canvas shelves

A grey airplane (seeing trial)

A plastic dinosaur (seeing trial)

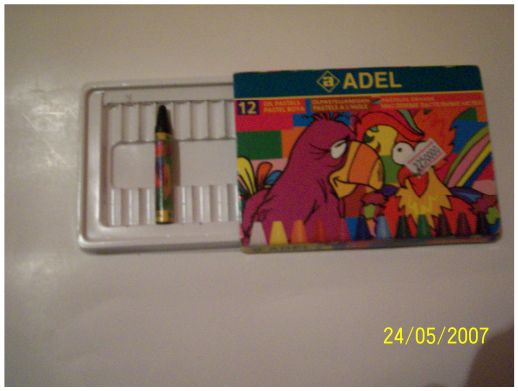
A plastic pink-white telephone (telling trial)

A colored hair buckle (telling trial)

An egg carton with an egg (inferring trial)

A candy box with candies (inferring trial)

APPENDIX Ia. Illustration of objects used in the training session of the Mode of Knowledge Access Task



A crayon box with a crayon (inferring trial)

A bird (telling trial)

A mirror (seeing trial)

A CD box with CD

APPENDIX Ia. Procedure of the Mode of Knowledge Access Task

Training session

E: Ayşe, bak burada dört tane kutumuz var. Her kutunun içinde güzel bir oyuncak var. Beraber kutularda ne olduğunu keşfedeceğiz. Bak şimdi bu kutuyu açalım, içine bakalım (kapağı açarak). İçinde ne var görüyor musun? (kapağı kapatarak) Ne gördün Ayşe kutunun içinde?

A: Ayna.

E: Ne var Ayşe bu kutunun içinde?

A: Ayna.

E: Peki, bu kutunun içinde ayna olduğunu nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin mi bir yerden anladın?

A: Gördüm.

E: Evet doğru, gördün ayna olduğunu. Aferin sana. Peki, şimdi bu kutuyu açamıyoruz, ama içinde ne olduğunu ben sana söyleyeceğim. Bu kutuda aoyuncak kuş var. Bu kutuda ne olduğunu söyledim ben sana Ayşeciğim?

A: Kuş.

E: Ne var peki bu kutuda?

A: Kuş.

E: Nereden biliyorsun bu kutuda kuş olduğunu, gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Ben gördüm

E: Yok sen görmedin. Ben sana söyledim "kuş var" diye, değil mi? Peki, Ayşe şimdi bu kutuda ne olduğunu sen kendin anlayacaksın. Ben ipucu vereceğim, sen kendin

anlayacaksın. Bu kutuda hep bu kutuda (boya kutusu veya CD kutusunu göstererek) olan birşey var. Ne var Ayşecim bu kutuda?

A: Hiç / Bilmiyorum

E: Bak, sence bu kutuda ne var? Aynı ondan bu kutuda da var. Şimdi bul bakalım ne var?

A: Kalem (CD)

E: Nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Sen söyledin. (Ben anladım)

E: Yok ben söylemedim. Ben sana bu ipucunu gösterdim, sen de bu ipucundan kendin anladın kutuda ne olduğunu. (Aferin, iyi bildin).

Immediate Condition

E: Ayşe bak, şimdi burada da bizim bir dolabımız var. 6 tane kutusu var. Her kutunun da renkli bir kapağı var. Ayşeciğim, her kutuda farklı oyuncak var. Şimdi beraber her kutuda ne var onu keşfedeceğiz.

E: Haydi gel bu kutuyu açalım. Aaa, ne var Ayşe bu kutuda?

A: Uçak.

E: (kapağı kapattıktan sonra) Ne var Ayşe bu kutuda?

A: Uçak.

E: Peki, nereden biliyorsun?

A: Gördüm.

E: Peki. Bu gözü açamıyoruz. Ama bu gözde bir telefon var. Ne var Ayşe içeride?

A: Telefon.

E: Nereden biliyorsun?

A: Ben gördüm.

E: Bak şöyle sorayım. Nereden biliyorsun , gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Sen söyledin

E: Şimdi bu gözü de açamıyoruz, fakat. bu gözün içinde her zaman bu kutuda (bonibon kutusu veya yumurta kartonu) olan şeylerden var. Ne var bu kutuda?

A: Bilmiyorum

E: Bak, sence bu kutuda ne var? Aynı ondan bu kutuda da var. Ne var bu kutuda Ayşe?

A: Şeker (yumurta)

E: Nereden biliyorsun?

A: Bilmiyorum.

E: Hadi, bir daha düşün Ayşe.Nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Sen söyledin.

…….

Delayed Condition

E: Şimdi bak ne yapacağız Ayşe. Ben sana oyuncakları tek tek göstereceğim, demin hangi kutudaydı gösterdiğim oyuncak sen söyleyeceksin. (Nesneleraynı sıra ile verilecek). Bu uçak hangi kutudaydı Ayşe?

A: Yeşil (Doğru)

E: Nereden biliyorsun?

A: Sen söyledin.

E: Ayşecim, nereden biliyorsun uçağın o kutuda olduğunu, gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Sen söyledin

E: Peki,bu telefon hangi kutudaydı?

A: Mavi (yanlış)

E: Nereden biliyorsun?

A: Sen söyledin.

E: Peki Ayşe, bu şekerler hangi kutudaydı?

A: Bilmiyorum.

E: Hadi Ayşe iyi düşün. Hangi kutudaydı bu şekerler?

A: Sarı

E: Nereden biliyorsun?

A:……

E: Ayşecim,hadi bir daha düşün, nereden biliyorsun, gördün mü, ben mi söyledim, yoksa sen kendin mi bir ipucundan mı anladın?

A: Sen söyledin.

APPENDIX Ib. Facts identified for the pretest of the Source IdentificationTask

GROUP 1

1. Kelebekler nereleri ile tat alır?

a. Kanatları b. Sırtları c. Ayakları d. Burunları *e. Dilleri*[1]

2. Hayvanlar yavrularını nasıl temizler?

a. Kaşıyarak b. Öperek c. Yalayarak d.Tarayarak *e. Yıkayarak*

3. Yağmurda ne kullanılır?

a. Eldiven b.Çanta c. Gömlek d. Şemsiye *e. Gözlük*

4. Hangi hayvan ses çıkartamaz?

a. Ördek b. Zürafa c.Eşek d. Kedi *e. Karga*

5. Ruj nereye sürülür?

a. Ele b. Göze c. Dudağa d. Kulağa *e. Yanağa*

6. Hangi hayvan evini sırtında taşır?

a. Zebra b. Kaplumbağa c. At d. Boğa *e. İnek*

7. Cam neden yapılır?

a. Yağ b. Kum c. Su d. Kağıt *e. Ağaç*

8. Hangi hayvan zehirlidir?

a. Kuş b. Kedi c. Ayı d. Akrep/yılan/böcek *e. Tavuk*

9. Hangi hayvan gözleri açık uyur?

a. Güvercin/Balık b. Koyun c. Tilki d. Eşek *e. Maymun*

10. Çimenler ne renktir?

a. Sarı b. Mavi c. Yeşil d. Kırmızı *e. Mor*

11. Hangi hayvan suda yaşar?

a. Kaplan b. Papağan c. Deve d. Balık/yengeç/akrep *e. Köpek*

12. Kurbağalar ne yer?

a. Ot b. Sinek c. Et d. Ekmek *e. Çikolata*

13. Hastalanınca kime gideriz?

a. Bahçıvan b.Doktor c. Aşçı d. Şoför *e. Bakkal*

[1] Considering the possibility that one of the alternatives can be given by the children as the incorrect response to the knowledge questions, five alternatives are included in the recognition items.

GROUP 2

1. Hangi hayvan çok kötü kokar?

a.Köpek b. Horoz c. Kokarca d. Maymun *e. Sincap*

2. Kağıt neden yapılır?

a. Topraktan b. Yağdan c. Deriden d. Ağaçtan *e. Sudan*

3. Muz ne renktir?

a. Yeşil b. Sarı c. Siyah d. Kırmızı *e. Beyaz*

4. Kanguru yavrusunu nerede taşır?

a. Sırtında b. Başında c. Elinde d. Karnındaki cepte *e. Çantada*

5. Hangi kuş uçamaz?

a. Devekuşu b. Kanarya c. Karga d. Güvercin *e. Serçe*

6. Hangi hayvanın hortumu vardır?

a. Fil b. Tavşan c. Karga d. İnek *e. Eşek*

7. Kar ne renktir?

a. Kırmızı b. Sarı c. Beyaz d.Yeşil *e. Mavi*

8. Fil ne yer?

a. Ot b. Et c. Şeker d. Ekmek *e. Meyve*

9. Hangi hayvan sadece bir gün yaşar?

a. Ayı b. Kelebek c. Koyun d. Ördek *e.Kaplan*

10. Ormanın kralı kimdir?

a. Maymun b. Aslan c. Baykuş d. Timsah *e. Yarasa*

11. Arabalar ne ile çalışır?

a. Benzin b.Su c.Ayran d. Kömür *e. Gazoz*

12. Kavun nerede yetişir?

a. Ağaçta b. Denizde c. Tarlada d. Kumda *e. Bataklıkta*

13. Vapurları kim kullanır/yürütür?

a. Makinist b. Kaptan c. Şoför d. Vatman *e. Pilot*

GROUP 3

1. Hangi hayvan susuzluğa dayanır?

a. Tavuk b. Deve c. Aslan d. At *e. Kuş*

2. Hangi hayvan gündüzleri göremez?

a. Köpek b. At c.Yarasa d. Ayı *e. Leylek*

3. Treni kim kullanır?

a. Şoför b. Kaptan c. Makinist d. Pilot *e. Hostes*

4. Tavşan ne sever?

a. Şeker b. Havuç c. Et d.Ekmek *e.Domates*

5. Yeni doğan bebeğin gözü ne renktir?

a. Mavi b. Kırmızı c. Sarı d. Siyah *e. Yeşil*

6. Hangi hayvanın burnu yoktur?

a. Kedi b. Tavşan c. Fare d. Balık *e. Tilki*

7. Çikolata neden yapılır?

a. Et b. Kakao c. Hamur d. Toprak *e. Ot*

8. Atın yavrusuna ne denir?

a. Buzağı b. Sıpa c. Bit d. Tay *e. Enik*

9. Yolda giderken ne renk ışıkta durulur?

a. Kırmızı b. Beyaz c. Yeşil d. Sarı *e.Turuncu*

10. Tramvayı kim kullanır/ götürür?

a. Şöfor b. Kaptan c. Makinist d. Vatman *e. Pilot*

11. Süt hangi hayvandan elde edilir?

a. At b. Kedi c. İnek d. Hindi *e. Eşek*

12. Penguen yavrusunu nerede taşır?

a. Sırtında b. Ayağının üstünde c.Kanadının altında d. Gagasında *e. Karnında*

13. Kar ne zaman yağar?

a. Yazın b. Sonbaharda c. İlkbaharda d. Kışın *e.Tüm yıl*

14. Hangi hayvan bal yapar?

a. Balık b. Baykuş c.Arı d. Tavuk *e. Domuz*

APPENDIX Ib. Results of the pretest for facts - UNFAMILIAR FACTS

1. Kelebekler nereleri ile tat alır?

a. Kanatları	b. Sırtları	c. <u>Ayakları</u>	d. Burunları	*e. Dilleri*
4-year-olds: 0/6	0% [2]	------	6/6	100%[3]
5-year-olds: 0/6	0%	------	6/6	100%

2.Cam neden yapılır?

a. Yağ	b. <u>Kum</u>	c. Su	d. Kağıt	*e. Ağaç*
4-year-olds: 0/6	0%	------	5/6	83%
5-year-olds: 0/6	0%	------	5/6	83%

3. Kağıt neden yapılır?

a. Topraktan	b. Yağdan	c. Deriden	d. <u>Ağaçtan</u>	*e.Sudan*
4-year-olds: 2/8	25%	------	7/8	87,5%
5-year-olds: 1/4	25 %	------	4/4	100%

4. Hangi kuş uçamaz?

a. <u>Devekuşu</u>	b. Kanarya	c. Karga	d. Güvercin	*e.Serçe*
4-year-olds: 0/8	0%	------	6/8	75%
5-year-olds: 1/4	25 %	------	3/4	75%

5. Fil ne yer?

a. <u>Ot</u>	b. Et	c. Şeker	d. Ekmek	*e.Meyve*
4-year-olds: 1/8	12,5%	------	7/8	87,5%
5-year-olds: 0/4	50 %	------	3/4	75%

6. Hangi hayvan sadece bir gün yaşar?

a. Ayı	b. <u>Kelebek</u>	c. Koyun	d. Ördek	*e.Kaplan*
4-year-olds: 1/8	12,5%	------	7/8	87,5%
5-year-olds: 0/4	0 %	------	3/4	75%

[2] The first percentages in each line indicate the percentage of knowing the fact when the fact question was asked for the first time in the fact teaching part.

[3] the second percentages in each line indicate the percentage of knowing the fact one week after the fact teaching part.

7. Hangi hayvan gündüzleri göremez?

a. Köpek	b. At	c.<u>Yarasa</u>	d. Ayı		*e.Leylek*
4-year-olds: 3/14	21,4%	------	11/14	79%	
5-year-olds: 1/7	14,2 %	------	7/7	100%	

8. Treni kim kullanır?

a. Şoför	b. Kaptan	c. <u>Makinist</u>	d. Pilot		*e.Hostes*
4-year-olds: 0/14	0%	------	10/14	71,4%	
5-year-olds: 0/7	0 %	------	6/6	100%[4]	

9. Yeni doğan bebeğin gözü ne renktir?

a<u>. Mavi</u>	b. Kırmızı	c. Sarı	d. Siyah		*e.Yeşil*
4-year-olds: 3/14	21,4%	------	14/14	100%	
5-year-olds: 1/7	14,2%	------	7/7	100%	

10. Hangi hayvanın burnu yoktur?

a. Kedi	b. Tavşan	c. Fare	d. <u>Balık</u>		*e.Tilki*
4-year-olds: 1/14	7,1%	------	14/14	100%	
5-year-olds: 1/7	14,2 %	------	7/7	100%	

11. Çikolata neden yapılır?

a. Et	b. <u>Kakao</u>	c. Hamur	d. Toprak		*e.Ot*
4-year-olds: 0/14	0%	------	14/14	100%	
5-year-olds: 2/7	28,6 %	------	7/7	100%	

12. Atın yavrusuna ne denir?

a. Buzağı	b. Sıpa	c. Bit	d. <u>Tay</u>		*e. Enik*
4-year-olds: 1/14	7,1%	------	13/14	92,3%	
5-year-olds: 1/7	14,2%	------	7/7	100%	

13. Tramvayı kim kullanır/ götürür?

a. Şöfor	b. Kaptan	c. Makinist	d. <u>Vatman</u>		*e. Pilot*
4-year-olds: 0/14	0%	------	10/12	83,3%	
5-year-olds: 0/7	0 %	------	6/ 7	85,7%	

14. Penguen yavrusunu nerede taşır?

a. Sırtında b. Ayağının üstünde c.Kanadının altında d. Gagasında *e.Karnında*

4-year-olds:	0/14	0%	------	12/13	85%
5-year-olds:	1/7	14,2 %	------	6/7	85,7%

Secondary Choices

15. Hayvanlar yavrularını nasıl temizler?

a. Kaşıyarak b. Öperek c. Yalayarak d.Tarayarak *e. Yıkayarak*

4-year-olds:	2/6	33.3%	------	6/6	100%
5-year-olds:	2/6	33,3%	------	6/6	100%

16. Hangi hayvan ses çıkartamaz?

a. Ördek b. Zürafa c.Eşek d. Kedi *e. Karga*

4-year-olds:	1/6	16,7%	------	6/6	100%
5-year-olds:	1/6	16,7%	------	5/6	66,7%

APPENDIX Ib. Results of the pretest for facts - FAMILIAR FACTS

1. Yağmurda ne kullanılır?

a. Eldiven b.Çanta c. Gömlek d. Şemsiye *e. Gözlük*

4-year-olds: 6/6 100% ------ 6/6 100%

5-year-olds: 5/6 83% ------ 6/6 100%

2. Ruj nereye sürülür?

a. Ele b. Gözde c. Dudağa d. Kulağa *e. Yanağa*

4-year-olds: 6/6 100% ------ 6/6 100%

5-year-olds: 6/6 100% ------ 6/6 100%

3. Çimenler ne renktir?

a. Sarı b. Mavi c. Yeşil d. Kırmızı *e. Mor*

4-year-olds: 6/6 100% ------ 6/6 100 %

5-year-olds: 5/6 83% ------ 6/6 100 %

4. Hangi hayvan suda yaşar?

a. Kaplan b. Papağan c. Deve d. Balık/yengeç/akrep *e. Köpek*

4-year-olds: 6/6 100% ------ 6/6 100%

5-year-olds: 6/6 100% ------ 6/6 100%

5. Hastalanınca kime gideriz?

a. Bahçıvan b.Doktor c. Aşçı d. Şoför *e. Bakkal*

4-year-olds: 6/6 100% ------ 6/6 100%

5-year-olds: 6/6 100% ------ 6/6 100%

6. Muz ne renktir?

a. Yeşil b. Sarı c. Siyah d. Kırmızı *e. Beyaz*

4-year-olds: 8/8 100% ------ 8/8 100%

5-year-olds: 4/4 100 % ------ 4/4 100%

7. Hangi hayvanın hortumu vardır?

a. Fil b. Tavşan c. Karga d. İnek *e. Eşek*

4-year-olds: 8/8 100% ------ 8/8 100%

5-year-olds: 3/4 75 % ------ 4/4 100%

8. Tavşan ne sever?

a. Şeker b. Havuç c. Et d.Ekmek *e.Domates*

4-year-olds: 14/14 100% ------ 14/14 100%

5-year-olds: 7/7 100% ------ 7/7 100%

9. Yolda giderken ne renk ışıkta durulur?

a. Kırmızı b. Beyaz c. Yeşil d. Sarı *e.Turuncu*

4-year-olds: 13/14 92,8% ------ 14/14 100%

5-year-olds: 7/7 100 % ------ 7/7 100%

Secondary Choices

10. Ormanın kralı kimdir?

a. Maymun b. Aslan c. Baykuş d. Timsah *e. Yarasa*

4-year-olds: 7/8 87,5% ------ 8/8 100%

5-year-olds: 3/4 75 % ------ 4/4 100%

11. Süt hangi hayvandan elde edilir?

a. At b. Kedi c. İnek d. Hindi *e. Eşek*

4-year-olds: 13 /14 93% ------ 13/14 93%

5-year-olds: 5/7 71,4% ------ 7/7 100%

12. Kanguru yavrusunu nerede taşır?

a. Sırtında b. Başında c. Elinde d. Karnındaki cepte *e. Çantada*

4-year-olds: 6/8 75% ------ 8/8 100%

5-year-olds: 3/4 75 % ------ 4/4 100%

13. Kar ne zaman yağar?

a. Yazın b. Sonbaharda c. İlkbaharda d. Kışın *e.Tüm yıl*

4-year-olds: 10/14 71,4% ------ 13/14 93%

5-year-olds: 5/7 71,4% ------ 7/7 100%

14. Hangi hayvan zehirlidir?

a. Kuş b. Kedi c. Ayı d. Akrep/yılan/böcek *e. Tavuk*

4-year-olds: 4/6 66,7% ------ 6/6 100%

5-year-olds: 4/6 66,7% ------ 6/6 100%

APPENDIX Ib. Facts that were used on the Source Monitoring Task

First group:

1. Hangi hayvanın hortumu vardır?	Familiar
2. Kelebekler nereleri ile tat alır?	Unfamiliar
3.Cam neden yapılır?	Unfamiliar
4. Yeni doğan bebeğin gözü ne renktir?	Unfamiliar
5. Kar ne zaman yağar?	Familiar
6. Hangi hayvan gündüzleri göremez?	Unfamiliar
7. Hangi hayvan zehirlidir?	Familiar
8. Treni kim kullanır?	Unfamiliar

Spare unfamiliar facts

1. Hangi kuş uçamaz?
2. Fil ne yer?
3. Hangi hayvan ses çıkartamaz?

Second group:

1. Hangi hayvanın burnu yoktur?	Unfamiliar
2. Süt hangi hayvandan elde edilir?	Familiar
3. Çikolata neden yapılır?	Unfamiliar
4. Atın yavrusuna ne denir?	Unfamiliar
5. Yolda giderken ne renk ışıkta durulur?	Familiar
6. Penguen yavrusunu nerede taşır?	Unfamiliar
7. Ormanın kralı kimdir?	Familiar
8. Hayvanlar yavrularını nasıl temizler?	Unfamiliar

Spare unfamiliar facts

1. Hangi hayvan sadece bir gün yaşar?
2. Tramvayı kim kullanır/ götürür?
3. Kağıt neden yapılır?

APPENDIX Ib. Procedure of Fact-Teaching Part of the Source Identification Task

E: Merhaba Ayşe. Benim adım Hale. Nasılsın?

A: iyiyim.

E (puppet): Merhaba Ayşe. Benim adımMinik. Nasılsın?

A: İyiyim.

E: Biz bugün seninle çok güzel oyunlar oynamaya geldik Ayşe. İlk oyunumuza başlayalım mı?

A: ….

E: Bu oyunda ben ve Minik sana bazı sorular soracağız. Eğer cevaplarını biliyorsan hemen söyle. Bilmiyorsan biz sana öğreteceğiz. Sonra beraber tekrar edeceğiz. Daha sonra da sen tek başına söyleyeceksin. Tamam mı?

A: Tamam.

E: İşte ilk sorumu soruyorum. Kelebekler nereleri ile tat alır?

A: … Bilmiyorum.

E: Kelebekler ayakları ile tat alır. Hadi beraber söyleyelim Ayşe.

A+ E: Kelebekler ayakları ile tat alır.

E: Evet. Çok güzel. Şimdi sen söyler misin Ayşe?

A: Kelebekler ayakları ile tat alır.

E: Çok güzel.

E: Peki. Hangi hayvan ses çıkartamaz?

A: ... Fare

E: Fareler ses çıkartırlar Ayşe. Vick vick vick yaparlar değil mi? Zürafa ses çıkartamaz. Hadi gel birlikte söyleyelim.

A:….

E: Hadi, Ayşe. Gel beraber söyleyelim.

A+E: Zürafa ses çıkartamaz.

E: Evet, çok güzel. Sen söyler misin şimdi tek başına?

A: Zürafa ….

E: Evet. Zürafa ses çıkartamaz. Çok güzel.

After the experimenter presented 5 new facts to the child,

E (puppet): Şimdi sıra bende. Ben sorumu soruyorum. Yağmurda ne kullanılır?

A: Şemsiye.

E (puppet): Evet, çok güzel.

E (puppet): Peki. Kurbağalar ne yerler Ayşe?

A: Bilmiyorum.

E (puppet): Kurbağalar sinek yerler. Hadi gel beraber söyleyelim.

A+ E (puppet): Kurbağalar sinek yerler

E (puppet): Evet, çok güzel. Sen söyler misin tek başına şimdi?

A: Kurbağalar sinek yerler.

E (puppet): Çok güzel.

……..

E (puppet): Treni kim kullanır, Ayşe?

A: Şoför kullanır.

E (puppet): Şoför arabayı kullanır, değil mi? Treni makinist kullanır. Hadi gel beraber söyleyelim.

A+ E (puppet): Treni makinist kullanır.

E (puppet): Evet, çok güzel. Hadi sıra sende.Sen söyle bakalım tek başına.

A: Treni makinist kullanır.

E (puppet): Çok güzel.

After the puppet presented five new facts, first the experimenter then the puppet asked the taught facts again in the presented order.

…….

E: Gerçekten çok güzel oynadın Ayşe. Şimdi diğer oyunumuza geçelim mi?

APPENDIX Ib. The order of taught, familiar and unfamiliar facts in the Source Recall/Recognition Part of the Source Identification Task.

1. Fact taught by the experimenter
2. Familiar fact
3. Fact taught by the puppet
4. Unfamiliar fact
5. Fact taught by the puppet
6. Fact taught by the experimenter
7. Fact taught by the experimenter
8. Familiar fact
9. Familiar fact
10. Unfamiliar fact
11. Familiar fact
12. Fact taught by the experimenter
13. Fact taught by the puppet
14. Unfamiliar fact
15. Fact taught by the experimenter
16. Familiar fact
17. Unfamiliar fact
18. Fact taught by the puppet
19. Fact taught by the puppet
20. Unfamiliar fact

APPENDIX Ib. Procedure of Source Recall/Recognition Part of the Source Identification Task

E: Hatırlıyor musun, geçen hafta bir oyun oynamıştık. Ben sana sorular sormuştum, bazı bilgiler öğretmiştim. Bu gün o oyunu tekrar oynayacağız. Tamam mı?

A: Tamam

E: Başlayalım mı oyunumuza?

A: Hıı Hıı.

E: İlk sorumu soruyorum Ayşe. Kelebekler nereleri ile tat alırlar?

A: Ayakları ile.

E: Nereden öğrendin?

A: Sen öğretmiştin ya.

….

E: Peki. Şimdi başka bir soru geliyor? Yağmurda ne kullanılır?

A: Şemsiye.

E: Nereden öğrendin?

A: Annem söylemişti.

E: Hangi hayvan ses çıkartamaz, Ayşe?

A: Bilmiyorum.

E: Bak başka bir şekilde sorayım sana: hangi hayvan ses çıkartamaz, ördek mi, zürafa mı, eşek mi, kedi mi ?

A: Eşek.

E: Şimdi başka bir soru geliyor. Ruj nereye sürülür?

A: Dudağa.

E: Nereden öğrendin?

A:…..

E: Nereden öğrendin? Anne-babandan mı, öğretmeninden mi, benden mi, kukladan (Minik'dan) mı öğrendin?

A: Kukladan.

…..

E: Peki, Ayşe. Tramvayı kim kullanır?

A: Kaptan.

E: Gel bir daha sorayım Ayşeciğim. Tramvayı kim kullanır? Şoför mü, makinist mi, vatman mı, pilot mu?

A: Vatman

E: Nereden öğrendin?

A: …..

E: Nereden öğrendin? Anne-babandan mı, öğretmeninden mi, benden mi, kukladan (Minik'den) mı?

A: Babam söyledi.

E: Bu oyun bitti Ayşe ve sen yine çok güzel oynadın. Artık tekrar oyuncaklarımızla oynayabiliriz.

APPENDIX Ic. Illustration of toys used on the Direct Experience Task to enact the bathroom scenario.

APPENDIX Id. List of toys in the Inferential (–mIş) Task

- A plastic doll with pink hair and pink dress.
- A soft doll with a colorful T-shirt, a colorful hat and blue-yelow socks
- A plastic orange dog
- A soft red teddy bear
- A plastic pink toaster with a slice of plastic bread
- A green-white tanker
- A fire-engine
- A plastic oven (cooker)
- A plastic yellow saucepan with a red cover and blue handles
- A plastic red cup
- A plastic silver-grey fork
- A plastic red-yellow spoon
- A plastic yellow plate
- A plastic red pot
- A plastic yellow-red tea-cattle with a yellow handle and a green cover

APPENDIX Id. Procedure of the Inferential (–mIş) Task – Familiarization Part

E: Bak Ayşe (Kırmızı ayıcığı kutudan çıkarark). Bu Bambi. (Ayşe'ye uzatarak, vererek).

A: …

E: Sen sabahları kahvaltı ediyor musun Ayşe?

A: Evet..

E: Bu gün Bambi'nin arkadaşları ona kahvaltıya gelecek. Seninle beraber onlara kahvaltı hazırlayalım mı?

A: Olur.

E: Bakalım bu torbada kahvaltı hazırlamak için neler var? Aaa,(Ocağı çıkarark) Bu ne Ayşe?

A: Ocak.

E: Ne yapacak Bambi ocak ile?

A: Yemek pişirecek.

E: Eveeet. Bakalım başka ne eşyası varmış Bambi'nin. Aaa, bu ne böyle (çaydanlığı çıkarark)

A: …..

E: Çaydanlık Ayşe. Ne yapacak Bambi çaydanlığı?

A: Bilmem.

E: Çay yapacak onunla misafirine, değil mi? Bakalım, Bambi'nin başka nesi var?

…..

E: Aaaa, bak burada ne var? Ne yapsın Bambi bununla? (Tost makinesini uzatarak çocuğa)

A: Ekmek kızartacak bununla.

E: Eeveet. Tüm eşyası bu kadar Bambi'nin galiba. Hadi hazırlasın mı kahvaltıyı Bambi artık?

…..

E: Din don. Aaaa Ayşe, kim geldi acaba? Bambi kapıya baksın mı? Aaa kim bu?

A: Bebek.

E: İsmi ne olsun bu bebeğin?

A: Fatoş.

A: (Kırmızı ayıcığı oynatarak) Hoşgeldin Fatoş. Nasılsın? (bebeği oynatarak) İyiyim ama çok acım, kahvaltı hazır mı? Hazır mı Ayşe kahvaltı?

A: Hazır.

E: (Bebeği oynatarak) Hazır hadi gel yiyelim.

……

E: Din don. Aaaa Ayşe, bu sefer kim geldi acaba? (kahverengi ayıcık ve kamyonu kutudan çıkarıp çocuğa göstererek).

A:..

E: Bambi'nin başka arkadaşı geldi, değil mi? O da yemek yesin mi?

A: Yesin.

E: O ne yesisn peki? Ona ne pişirelim?

……..

E: Aaa, bak bir de kopek(at) geldi. Bu kimin köpeği (Atı) olsun?

A: Bambi'nin

E: O da mı acıkmış?

A: Hı hıı.

……..

E: Aaa, torbada bu araba(itfaiye) kaldı Ayşecim. Bu kimin arabası olsun?

A: Fatoş'un.

E: Sen bu arabayı da park eder misin?

A: Tabii.

……

E: Çok güzel oynadın Ayşe. Aferin sana. Ama benim şimdi bu oyuncakları toplamam gerekiyor. Yan odada başka bir abla bir arkadaşına götürecek bu oyuncakları. Ben onları kapını önüne koyacağım. O da gelip alacak. Ama işi bitince bize geri getirecek. Biz de bu arada başka bir oyun oynayalım. Ne dersin?

APPENDIX Id. Illustration of toys modified for the Inferential (–mIş) Task

- The broken yellow plate.

- The green-white tanker without its two wheels.

- The broken red pot.

- The broken silver-grey fork

- The wet soft doll with a colorful T-shirt, a colorful hat and blue-yellow socks.

- The plastic yellow-red tea-cattle without its yellow handle and its green cover

- The plastic doll with pink hair and its torn pink dress.

APPENDIX Id. Procedure of the Inferential (–mIş) Task – Recognition of the Change of State Part

E: Bakalım geldi mi oyuncaklarımız? (kapıya gider ve kapının önündeki kutuyu alır). Hadi sen çıkar oyuncaklarımızı kutudan da oynayalım (kutuyu çocuğun önüne veya yanına koyar)

A: Aaaa, merdiveni yok bu itfaiye aracının.

E: Aaa, evet. Neden yok sence?

A: Bilmem.

E: Ben de bilmiyorum. Gel bir düşünelim, acaba neden yok merdiveni?

A: Kırılmış herhalde.

E: Aa, evet. Başka ne var kutumuzda?

A: Bebek

E:Aaa, Baksana Fatoş'un elbisesine.

A: aaa, yırtılmış. Kim yırtmış?

E: Bilmiyorum. Sence?

A: Ben de bilmiyorum. (Kutuya bakar tekrar, sarı tabağı çıkarır) Aaa, bu tabak kırık.

E: Neden böyle sence?

A: Bilmiyorum.

E: Bir düşünür müsün Ayşe, neden böyle?

A:…

A: (çaydanlığı çıkarır)

E: Aaa. Ayşe. Çaydanlığa bak.

A: Aaa, sapı kopmuş.

APPENDIX Ie. The story in the Reportative (-(I)mIş) Task.

Biliyor musun, benim bir kedim var. Adı Minnoş. O her akşam benim odamda uyuyor, sabah kalktığımda da yatağımın yanında oluyor. Dün sabah kalktığımda yoktu yerinde Minnoş. Evin odalarında aradım Minnoş'u. Sonra bir baktım evin kapısı açık. Dışarıya çıktım. Minnoş bir ağacın üstünde uyuyordu.

APPENDIX II

APPENDIX IIa. Examples of children's narratives in the Direct Experience Task.

72-months-old boy:

Bebek banyo yapıyor. Sonra çıkıyor. Üstünü kuruluyor. Sonra gidiyor, üstünü giyiyor, yatıyor.

76-months-old boy:

Oyunda bir bebek var. Küvet var. Bebek küvete girmek için soyunuyor. Küvete girip yıkanıyor. Sabunluyor annesi onu. Çıkıp kurulanıp uyuyor.

76,5-months-old boy:

Bebeğe banyo yaptırıyorsun. Saçını tarayıp yatırıyorsun.

83-months-old girl:

Şimdi bebek geliyordu. Banyo yapıyordu. ….Sonra oturmuştu bebek. Şampuan koyuyorduk, yıkıyorduk…. Yıkanmıştı bebek. Sonra buraya gelmişti. Sen onu kurulamıştın. Sonra da bebek böyle kollarını açtı, sen onu giydirdin. Sonra geldi, yattı. Sen de örtüyü örttün.

83,5-months-old boy:

Bebeğini yıkıyorsun. Sonra başını şampuanlıyorsun. Başını yıkıyorsun. Sonra bebeğini banyodan çıkartıyorsun. Kuruluyorsun. Bornozunu giydiriyorsun. Saçını tarıyorsun. Götürüyorsun, yatağına yatırıyorsun.

APPENDIX IIb. Mean number of correct source responses of Turkish- and English-speaking children in the immediate part of the present Source Identification Task and of the Gopnik and Graf's (1988) task.

	Present Study				Gopnik & Graf		
	3-year-old	4-year-old	5-year-old	6-year-old	3-year-old	4-year-old	5-year-old
See	1.44	1.82	2	1.94	1.38	1.88	1.94
Infer	1.11	1.77	1.75	1.94	1.54	1.52	1.84
Tell	0.95	1.91	2	1.95	1.04	1.72	1.88
Total	3.5	5.5	5.75	5.83	3.96	5.12	5.66

APPENDIX IIb. Mean number of correct source responses of Turkish- and English-speaking children in the delayed part of the present Source Identification Task and of the Gopnik and Graf's (1988) task.

	Present Study				Gopnik & Graf		
	3-year-old	4-year-old	5-year-old	6-year-old	3-year-old	4-year-old	5-year-old
Total	2.36	3.67	3.69	4.11	3.4	4.7	5.1