Role of word order and accusative case marking in sentence comprehension in 17- to 39-month-old Turkish children

by

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STATEMENT OF AUTHORSHIP

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ABSTRACT

The present research includes two experiments examining Turkish-speaking children's reliance on word order and case marking in the comprehension of simple transitive sentences describing reversible causative actions, using the intermodal preferential looking paradigm (IPL). The data come from a sample of 219 native Turkish-speaking children aged 17- to 39-months, organized into three age groups. The IPL is an experimental procedure which measures sentence comprehension by examining the visual preference of the videotaped scene described by a linguistic stimulus. In the first experiment, children are exposed to simple transitive sentences in the conventional word order in Turkish (SOV), in which the object was not marked with an accusative case marker (e.g. *at kuş it-iyor* 'the horse the bird push-PROG'). In the second experiment, the object featured an accusative case marker (e.g. *at kuş-u it-iyor* 'the horse the bird- ACC push-PROG'). Results indicated that children aged 24- to 39 months relied on word order to determine who-is-doing-what-to-whom in the described action. This result suggests that the canonical word order is an important cue in sentence comprehension in Turkish, which allows for different pragmatically-driven word orders as opposed to a fixed word order language such as English. Contrary to expectations, the presence of the accusative case marker did not facilitate comprehension to a better degree. Children reacted late to the presence of the accusative case marker in the auditory stimulus, displaying matching behavior towards the end of a given video. In addition, the presence of the accusative case marker was most influential in the older age group (39-month-olds). Results are discussed in terms of the additional processing that the accusative case marking could demand for younger children.

Keywords: language development, Turkish-speaking children, sentence comprehension, word order, accusative case marking

ÖZET

Bu araştırma, seçici izleme yöntemini (intermodal preferential looking paradigm) kullanarak, anadili Türkçe olan çocukların, ettirgen-geçişli cümleleri anlamada, söz dizimi ve nesne belirten eklerden (örneğin, ismin –i hali) ne derece faydalandıklarını incelemeyi amaçlayan iki deney içermektedir. Veriler, anadili Türkçe olan ve yaşları 17 ile 39 ay arasında 3 grup içinde incelenen, 219 çocuktan toplanmıştır. Seçici izleme yöntemi, film ikililerinden bir sözel uyaran tarafından tasvir edilen uygun olanına yönelik görsel seçiciliği incelemek yoluyla cümle algısını ölçen bir yöntemdir. İlk deneyde çocuklara verilen cümleler, Türkçedeki en yaygın söz dizimi olan Özne-Nesne-Yüklem diziminde olmakla beraber, nesne belirten ek içermemektedir (ö.r., *at kuş itiyor).* İkinci deneyde ise, aynı cümleler nesne belirten ek içermektedir (ö.r. *at kuş-u itiyor*). Analiz sonuçları, 24 ile 39 ay arasındaki çocukların, cümlede hangi öğenin hangisi üzerinde ne gibi bir etkisi olduğunu belirlemede, cümledeki söz diziminden faydalandıklarını göstermektedir. Sonuçlar, katı kurallara bağlı bir söz dizimine sahip olan İngilizcenin aksine, söz dizimin kullanım amacına bağlı olarak esneklik gösterdiği bir dil olan Türkçe'de, en yaygın söz diziminin cümle algısına önemli bir katkısı olduğunu desteklemektedir. Beklenilenin aksine, nesne belirten ekin varlığının cümle algısını kolaylaştırmadığı görülmüştür. Çocuklar, nesne belirten ekin varlığına geç tepki vermiş ve ancak filmin sonlarına doğru sözel uyaranla uyumlu olan tarafa bakmışlardır. Ayrıca, nesne belirten ekin varlığının, en çok 39 ay grubundaki çocuklarda etkili olduğu görülmüştür. Sonuçlar, cümlede söz dizimi ve nesne belirten ekin cümle algısı üzerindeki etkisi, yaş grupları açısından karşılaştırılarak tartışılacaktır.

Anahtar sözcükler: dil gelişimi, anadili Türkçe olan çocuklar, cümle algısı, söz dizimi, nesne belirten ek

DEDICATION

To my grandmother

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Chapter 1

INTRODUCTION

How and when linguistic principles are acquired by young children constitutes a basic inquiry in language development research. What children comprehend from spoken sentences illuminates what children know about their own language before they start to produce their own speech. The important question is whether young children possess an underlying understanding of grammatical structure before they even begin forming full sentences and whether such syntactic knowledge is used as a cue to infer the meaning of a given sentence.

Languages differ in grammatical principles which guide the arrangement of words in a sentence (Gertner, Fisher & Eisengart, 2006; Slobin, 1982). However, there are generalizations over different languages in terms of the basic elements of a sentential unit. All languages differentiate between subject-object roles to convey the core arguments of an observed event (Croft, 1990; Golinkoff & Hirsh-Pasek, 1995; Slobin, 1982). How these

roles are expressed and organized in sentences show crosslinguistic variation (Gertner et al., 2006; Golinkoff, Hirsh-Pasek, Cauley & Gordon, 1987).

Across languages, there are two major syntactic cues that guide children in inferring the relational functions of sentence elements: word order and inflections (Greenberg, 1963; Comrie, 1981; Hirsh-Pasek & Golinkoff, 1996; Slobin, 1982). Apart from syntactic cues, language comprehension also depends on non-linguistic factors such as physical and pragmatic cues in the conversational context. Children are shown to depend on situational cues, semantic plausibility and word specific knowledge to infer word meaning and sentential roles. Situational cues like the salience of possible candidates for the agent and the patient of a certain action, the pitch in voice, the stress on words and the eye-gaze cue along with emotional stressors such as children's motivation to attend to one thing over another are all considered important factors in language comprehension along with syntactic cues present in a sentence (Dittmar, Abboth-Smith, Lieven, & Tomasello, 2008b; Tomasello, 2001a; 2003).

In English, the typical word order is subject-verb-object (SVO) in which the subject precedes the verb and the object follows it (Golinkoff et al., 1987; Slobin & Bever, 1982). Word order is considered to be highly rigid in English and is used as an important cue for native speakers to figure out the meaning of a sentence (Bates, MacWhinney, Caselli,

Devescovi, Natale, & Venza, 1984; Hirsh-Pasek & Golinkoff, 1996; Gertner et al., 2006). Comprehension depends on word order mostly in situations where both the subject and the object of an action are animate. For example, in a sentence like 'Billy pushed Tommy', the order of words in the sentence helps us understand who did the 'pushing' action to whom. Simple transitive sentences are used as the common form in sentence comprehension tasks because they include two possible candidates for the doer or the undergoer of a specific action (Golinkoff & Hirsh-Pasek, 1995; Slobin, 1982). The task is to identify correctly the role of the participants of the actions. The question is how the knowledge about syntactic structure helps in this process. Studies investigating sentence comprehension examined structure-meaning relations and indicated that children who are at the two-word stage have some syntactic knowledge that helps them understand the meaning of a sentence (Dittmar, Abboth-Smith, Lieven & Tomasello, 2008a; Gertner et al, 2006; Golinkoff et al., 1987; Slobin & Bever, 1982). Several past studies found that word order is a salient and reliable cue used by young children in sentence comprehension (Bates et al. 1984; Gertner et al., 2006; Golinkoff & Hirsh-Pasek, 1995; Hirsh-Pasek & Golinkoff, 1996; Slobin & Bever, 1982).

Inflectional languages, on the other hand depend, mostly on morphological cues to mark the functions of sentence elements and allow for a much more flexible and pragmatically governed word order in sentences (Erguvanlı, 1984; Küntay & Slobin, 1996;

Slobin, 1982; Slobin & Bever, 1982). Turkish is one of the inflectional languages which differ from English in terms of how it marks subject-object relations in a sentence. Turkish allows for noun phrase (NP) ellipsis and mostly depends on inflectional cues; especially nominal morphology to signal the relations between sentence elements (Göksun, Küntay & Naigles, 2008; Küntay & Slobin, 1996). Between nominal inflections, the accusative case marker is the one that is accepted to be a very powerful indicator of the direct object role in the sentence (Slobin & Bever, 1982; Ural, Yüret, Ketrez, Koçbaş, & Küntay, in press). The presence of the accusative case marker also encodes the definitiveness of the object (Enç, 1991; Göksun et al., 2008). For indefinite objects, the accusative case marker is often omitted. The appearance of the accusative case marker is early in Turkish child language as it is shown to be used productively even by children as young as 24 months of age or earlier (some evidence even for 15 months) (Aksu-Koç & Slobin, 1985). See examples (1) and (2) for the illustration of the accusative case marker in two different word orders, SOV and OSV, respectively.

(1) Ahmet Ceylan-**ı** öp-tü. (SOV)

Ahmet Ceylan-**ACC** kiss-PAST

'Ahmet kissed Ceylan'

(2) Ceylan-**ı** Ahmet öp-tü. (OSV)

Ceylan-**ACC** Ahmet kiss-PAST

'Ahmet kissed Ceylan'

Turkish allows for all the possible word order combinations (Slobin & Bever, 1982; Küntay & Slobin, 1996). Word order combinations serve pragmatic functions to give different semantic nuances (i.e. stress) without changing the underlying core meaning of the sentence (Aksu-Koç & Slobin, 1985; Erguvanlı, 1984; Slobin & Bever, 1982). For example, the sentence *Ali kalem-i kırdı* 'Ali pen-ACC break-PAST' and the sentence *kalem-i Ali kırdı* 'pen-ACC Ali break-PAST' both give the same underlying meaning which is 'Ali broke the pen' but in the first sentence the stress is on the pen which is the word closest to the verb, emphasizing that it was the pen that Ali broke; but in the second sentence, the stess is on Ali, emphasizing that it was Ali who did the breaking action. 'Previous research showed that although Turkish operates as a free word order language, subject-object-verb (SOV) order appears to be the most frequently used one (48%) compared to other possible orders, but in child-directed speech, other word orders are certainly used (Küntay & Slobin, 1996; Slobin, 1982; Slobin & Bever, 1982). The question becomes whether the canonical, the most typical, word order also has a similar function as in English in sentence comprehension for inflectional languages like Turkish.

Two general accounts are given in terms of how grammatical relations are learned early in development. The 'usage-based' account emphasizes the importance of linguistic input and claims that learning of language rules develop step-by step by slowly abstracting learned frames through practice, experience and semantic analogy (Abboth-Smith & Tomasello, 2006; Ahtar, 2001; Bates & MacWhinney, 1987; Goldberg, 1999, 2006; Tomasello, 2003). Abstractions are seen as item-based which suggest that children acquire syntactic relations based on word-specific knowledge (Lieven, Pine & Baldwin, 1997; Tomasello, 2001b). The 'rule-based' account, on the other hand, emphasizes that children are equipped with abstract principles that guide them into acquiring syntactic knowledge early in the development. Within the rule-based account, some researchers adopt a more marginal view and claim that the mechanisms of language learning are genetically-driven and innate and these mechanisms operate under universal abstract rules (Chomsky, 1981; Pinker, 1989; Pinker & Jackendoff, 2005), while others are more open to the influence of early linguistic input in forming syntactic categories but they claim that there are a lot of language-universal generalizations which are hard to explain based on input alone, therefore children have to have an early abstract notion by which they represent the relations of words in a sentence (Fisher, 2002; Gertner et al., 2006; Lidz, Gleitman & Gleitman, 2003; Naigles, Gleitman & Gleitman, 1993).

Based on the 'usage-based' account, we can expect the acquisition of word order to be slow and late in the language development of Turkish-speaking children. This would result in younger children to rely less on word order compared to the older children due to the fact that the amount of input they are exposed to would be smaller to generate abstractions based on word order information. On the other hand, based on the 'rule-based' account, where word order is a much more basic construct, we can expect the canonical word order to be used more reliably in comprehension even for the youngest age group.

Early in development, before even forming two-word utterances, children start to be responsive to the language-specific markings of sentence roles in their own language. Cross-linguistic work therefore serves to illuminate the process of language acquisition in different languages to further investigate language-specific and language-universal strategies in language acquisition (Dittmar et al., 2008a, 2008b; Gertner et al., 2006; Slobin, 1982; Ural et al., in press).

Slobin, who is one of the pioneers in crosslinguistic research, emphasizes the existence of a certain cognitive readiness in acquiring a language and also stressed the role of external input in the form of language specific characteristics (Slobin, 1985). In Slobin's cognitivist theory (1985), the cognitive readiness underlying early syntactic abstractions and word learning operate on a more domain-general fashion, not being exclusive to

language development and linguistic input carries more weight compared to the classical accounts of rule-based theories of language acquisition. According to Slobin, children are equipped with underlying general cognitive principles used in all domains of learning and general mechanisms like representing concepts and relations constitute the basics for the acquisition of syntactic abstractions as opposed to the marginal view in the rule-based account, which proposes that the linguistic abstractions are innate and autonomous. Based on the cognitivist account, language-universal characteristics stem from language-specific input processed with a domain-general cognitive readiness for extracting regular patterns from rich socio-cognitive interactions in the physical world.

In line with Slobin's crosslinguistic work, the competition model of Bates and MacWhinney (1987) investigates the relative weight of different sentence cues in the comprehension process for different languages. In the competition model, the frequency of a cue represents its "availability", the consistency of a cue in signaling a function represents its "reliability" and the combination of those two give a cue's "validity". For example, word order is highly rigid in English in terms of signaling subject-object roles as opposed to Italian in which subject ellipsis is possible and word order is flexibleand reserved for conveying different pragmatic meanings. Therefore, word order is a more reliable cue in English compared to Italian (Bates, Devescovi, & Wulfeck, 2001). Also, word order is mostly available in German but not very reliable because case-marked

objects can appear at sentence-initial position making nominal inflections to be much more reliable compared to word order (Dittmar et al., 2008a). The competition model suggests that cue validity determines which cues are learned first and most relied on in comprehension and production (Bates & MacWhinney, 1987; Bates et al., 2001).

Previous experiments with preschool Turkish learners (Göksun, et al., 2008; Slobin & Bever, 1982) and analyses of Turkish child-directed speech (CDS) (Küntay & Slobin, 1996; Ural, et al., in press) showed that although word order is used as a cue in the interpretation of a sentence, the accusative case marker is a stronger and more reliable cue to argument relations. Presumably, we can expect the cue validity of the accusative case marking to be higher compared to word order and that children would depend more on the accusative case marking to assign sentential roles. According to Slobin's (1982) 'local cues' hypothesis, the accusative case marker can provide faster identification of the grammatical roles compared to word order which in contrast requires the processing of the whole sentence. Accordingly, Bates and MacWhinney (1987) proposed the 'coalition-as-prototypes' model which suggests that "prototypical" sentences which provide word order and case marking information simultaneously, should be acquired faster and understood better because the 'redundancy' of cues strengthen the chance of success in inference of meaning (Dittmar et. al., 2008a).

The present research intends to contribute to crosslinguistic research by examining how and when young Turkish-speaking children employ linguistic strategies based on grammatical cues to infer the relation between sentence elements in simple transitive sentences. The results are discussed in terms of the role of language-specific and language-general cues to sentence comprehension.

Chapter 2

LITERATURE REVIEW

2.1 The role of syntax in language comprehension

Research investigating the effect of syntax in language acquisition involves two types of studies: one, examining verb learning in different syntactic frames (e.g. number and arrangement of noun phrases) and the other, examining sentence comprehension by inferring the subject and object roles in a sentence using word order or morphological inflections. Before looking further into the syntactic influences on sentence comprehension in Turkish-speaking children, we can review the research history on syntactic supports in language comprehension starting with a quick glance on the main methodologies used in language comprehension research.

2.1.1 Methods in studying language comprehension

Considerable amount of information about children's language abilities is gathered through naturalistic studies of child-directed speech and recording mother-child or experimenter-child dyads. However comprehension studies have further advantages such as providing methodological control over the linguistic stimuli and showing how much children actually know about their own language that they still do not produce in their speech (Hirsh-Pasek & Golinkoff, 1996). Across studies, there have been three important procedures to assess the language comprehension in children: enactment studies, choice tasks using the picture-pointing behavior and studies using the Intermodal Preferential Looking Paradigm (IPL) which is the method employed in the present research. The IPL setup is developed to assess language comprehension in very young children for whom methods involving active cooperation and overt behavior can be demanding and may underestimate their language abilities (Golinkoff et al., 1987; Hirsh-Pasek & Golinkoff, 1996). IPL is an experimental procedure through which sentence comprehension is measured by examining the eye movements of children watching two videos presented simultaneously on two screens. In the IPL setup, children are seated in front of two screens which are located side by side, each showing a different scene. Each time a pair of videos is

presented on the screens, an auditory stimulus describing only one of the scenes is given from a speaker installed behind the screens. The children's faces are filmed while they watch the videos, and later coded for the direction and duration of looking to each screen. Children who look significantly longer at the matching screen are assumed to understand the linguistic stimulus (Hirsh-Pasek & Golinkoff, 1996; Gertner, Fisher, Eisengart, 2006; Golinkoff & Hirsh-Pasek, 1995; Naigles & Kako, 1993).

2.1.2 Verb learning via syntactic bootstrapping

Researchers have proposed syntactic bootstrapping hypothesis as a word learning mechanism used by young children (Gleitman 1990, Naigles 1990, Gillette, Gleitman, Gleitman & Lederer, 1999; Naigles & Kako 1993). The syntactic bootstrapping hypothesis proposes that children use the syntactic structure as a cue to single out or narrow down the possible meanings of a verb (Gleitman, 1990**;** Naigles 1990; Naigles & Swensen, 2007). Situational characteristics are viewed necessary, providing valuable information to the interpretation of a scene (Gleitman, 1990, Fisher, 1994), insufficient in singling out a specific verb's meaning on their own (Gilette et al. 1999). In this respect, syntactic information is seen as a crucial tool to narrow down word meanings. An example given by Naigles & Swensen (2007, p. 214) can be used to illustrate the importance of syntactic information when mere observation is not enough. Consider a child observing his/her

grandmother interacting with a dog and performing a series of actions. If s/he hears the word '*blicking*', the syntactic frame in which the verb is presented informs him/her to focus on the relevant action. If s/he hears for example '*Grandma's gonna blick the doggie',* s/he can infer that *'blick'* means something like *'take' or 'get',* or if s/he hears *'the doggie's blicking to Grandma',* s/he can infer that *'blick'* means *'go'* or *'move'*. Thus, the young learner is thought to use the syntactic frame (i.e. number and arrangement of arguments in a sentence) to infer the meaning of a certain verb.

Syntactic bootstrapping is especially used for deriving the transitivity of verb (Gleitman, 1990**;** Naigles 1990; Naigles & Kako, 1993). For example, if you say '*the boy brings the toy'*, rather than '*the boy comes'*, the verb is given in a transitive frame in which the presence of a direct object that represents the patient, makes the verb a causative one; as opposed to the one in the intransitive frame (single NP) which signals a non-causative action. In other words, the number of arguments in a sentence is assumed to give a cue to the lexical meaning of verb (Arunachalam & Waxman, 2008; Fisher, 2002; Gleitman, 1990**;** Naigles 1990; Naigles & Kako, 1993). Evidence for the syntactic bootstrapping hypothesis comes from studies that use different methodologies, i.e., IPL (Fisher, 2002; Naigles 1990, Naigles & Kako, 1993), and act-out paradigms (Göksun et al., 2008; Lee & Naigles, 2008; Naigles et al., 1993), which revealed that meanings of verbs are closely associated with syntactic frames in which they occur.

2.1.2.1 Verb learning in English

To investigate the importance of syntactic frames in verb meaning, Naigles (1990), using the IPL method, presented toddlers (mean age= 26 months) either with transitive or intransitive sentences using *novel* verbs (e.g. '*gorp*') accompanying *nonsense* actions in the form of '*the duck is gorping the bunny'* for the former and '*the duck and the bunny are gorping'* for the latter. While presenting either audio, the experimenter showed the children two simultaneous scenes, one of them presenting a causative action (the duck bends the bunny over) and the other presenting a synchronous activity in which both of the actors are performing an arm-circling action together. The study showed that children who heard the verb in a transitive frame looked more to the scene with the causative action (bending) when asked to find *'gorping'* while children who heard the verb in the intransitive frame looked more to the non-causative action (arm circling) . The results showed that children as young as 2 years of age can use the syntactic frame to interpret novel verbs.

Arunachalam and Waxman (2008) tested the same principle by adding a familiarization trial before showing videos. In this trial, 25- to 29-month-old children heard either one of two taped conversations; one presenting a novel verb *'moop'* in a transitive frame ('*the boy is going to moop the girl*'); the second presenting the same verb in an intransitive frame ('*the boy and the girl are going to moop together*'). Having heard the

conversation, children are then presented with two simultaneous scenes, one of which presented a causative action and the other a synchronized action. The children who previously heard the verb used in the transitive frame pointed more to the causative event when asked to find *'mooping'* and children who heard the verb used in the intransitive frame, pointed more to the non-causative event. The study demonstrated the effect of syntactic structures in inferring verb transitivity.

To research how specific the syntactic bootstrapping mechanism is to verb learning, Naigles and Kako (1993), using an IPL methodology, introduced 2-year-old children (mean age= 27 months) with transitive and intransitive sentences representing three different action patterns: one character performs a causative action on the other character, both characters do a synchronous action together, and lastly, they merely touch each other (contact situations). One of the questions that they asked was whether transitive frames can be used to derive non-causative relations among the participants of an action. They found that transitive frames led children to interpret the verb as an action in which a character has an impact on another (e.g. touching) rather than simply direct causation, but certainly not as a synchronous act. Naigles (1996) expanded those results in a more detailed study in which they showed that presenting a novel verb in multiple frames affected the attribution children made to that verb's meaning. Providing a novel verb in two different frames, in

one of them the direct object was omitted, did not result in a significant preference towards either a causative or a contact action.

To demonstrate further the reliance on syntactic frame in inferring verb meaning, Naigles, Gleitman and Gleitman (1993), in an act-out study, presented children with grammatically unconventional sentences with intransitive familiar verbs like *go, come* presented in transitive frames '*zebra goes the lion*', and transitive familiar verbs like *'bring'* presented in intransitive frames like *'the pig brings'*. They observed that 2- to 4-year-old children attached causative meanings to intransitive verbs presented in transitive frames and enacted them causatively; but when exposed to a transitive verb used in an intransitive frame, they enacted it non-causatively to reflect a meaning like 'the pig comes'.

Child-directed speech data also supports the syntactic bootstrapping hypothesis showing that verbs were observed to be uttered mostly with appropriate syntactic frames to signal their lexical meanings, i.e., transitive verbs appeared more with direct objects than intransitive verbs (80%) adult speech directed to 1- to 2-year-old English children (Naigles & Hoff-Ginsberg, 1995).

2.1.2.2 Crosslinguistic evidence for syntactic bootstrapping

Researchers also investigated whether and how the syntactic bootstrapping strategy operates in other languages which allows for pervasive NP ellipsis and which mostly depend on morphological cues to signal the relations between sentence elements.

In an act-out study, using animal figures, Göksun, Küntay and Naigles (2008) examined the role of syntactic frame, i.e., the number of noun phrases (NPs) in a sentence (1 NP vs. 2 NPs) and that of the accusative case marking in Turkish children's comprehension of verb meaning. They gave 2- to 5-year-old children and 16 adults 6 transitive (i.e. *it* 'push', *çek* 'pull', *getir* 'bring') and 6 intransitive verbs (i.e. *gel* 'come', *düş* 'fall', *koş* 'run') in four different frames: two of them contained 1 NP and the other two containing 2 NPs. One of each sentence type (1 NP or 2 NPs) featured an accusative case marking. The sentence *kedi-yi ge-tir-sin* 'cat-ACC bring-CAUS-OPT.3SG' can be given as an example of a transitive sentence with 1 NP in which the noun was marked with the accusative case. On the other hand, the sentence *ayı aslan gö-tür-sün* 'bear lion take away-CAUS-OPT.3SG' can be given as an example of a transitive sentence with 2 NPs in which neither of the nouns featured an accusative case marking.

Göksun et al. (2008) investigated whether children perceived the verb as describing an action that is causative or non-causative by examining their act-out responses. They found that verbs in sentences containing 2 NPs were enacted causatively more frequently than verbs in sentences containing 1 NP. Frame compliance, which means to comply with the information provided by the syntactic frame (i.e., number of noun phrases) to infer verb meaning, was more salient in children compared to adults. Most importantly, in sentences where accusative case marking was present, both transitive and intransitive verbs were enacted causatively more frequently compared to the sentences with non-marked objects. The results showed that in Turkish, while syntactic bootstrapping appears to operate via the argument structure (number of arguments in this case) of a sentence, the 'morphosyntactic' cues (nominal morphology, accusative case marker in this case) are also crucial in determining the transitivity of a verb. While frame compliance is present, it was used to a lesser degree compared to English learners from previous studies (Naigles, Küntay, Göksun & Lee, 2006).

Input data from child-directed speech gathered by Ural et al. (in press) also support the same trend indicating that number of NPs is important to some degree in signaling verb learning, but the accusative case marker has a stronger and more reliable function in identifying verb transitivity in Turkish child-directed speech.

Mandarin Chinese is another language in which dropping of NPs is pervasive. Lee and Naigles (2005) provided support for syntactic bootstrapping in adult speech directed to young children (mean age= 22.8 months) by demonstrating that transitive verbs are observed more frequently with postverbal NPs than intransitive verbs. To further investigate the syntactic bootstrapping mechanism in Mandarin Chinese, Lee and Naigles (2008) examined whether Mandarin children relied on syntax to infer verb meaning in an act-out study with familiar verbs. Although Mandarin Chinese is a language in which dropping of noun phrases (NPs) is pervasive, Lee and Naigles (2008) found that children interpreted intransitive verbs causatively when a NP was present after the verb and transitive verbs non-causatively when NP after the verb was omitted. This effect was stronger for two-year-olds compared to three-year-olds. This study provides additional evidence showing that the syntactic frame in which a verb is situated is informative in terms of the construction's meaning even in languages which allow for pervasive NP ellipsis.

2.1.3 Sentence comprehension through word order and case markers

2.1.3.1 Word order in English

In addition to verb learning, syntactic cues were also researched in terms of identifying correctly the subject and the object of a sentence. The SVO order which is the conventional word order in English, is considered to be highly rigid, therefore a useful cue for English-speakers to figure out the subject and object roles in a sentence (Bates et al., 2001; Hirsh-Pasek & Golinkoff, 1996; Slobin & Bever, 1982; Gertner et al., 2006).

Studies investigating the role of word order in sentence comprehension showed that the SVO order is a reliable cue for children younger than 2 for the comprehension of simple transitive sentences (Bates et al., 1984; Hirsh-Pasek, Golinkoff 1996; Gertner et al., 2006). Bates et al. (1984) also showed that the reliance on word order in 2-year-old English-speaking children was even stronger than an 'animacy' cue, when those cues conflicted in terms of the assignment of subject and object roles. This effect was not found in Italian, which does not rely so heavily on word order as in English.

How is word order used as a cue to sentence comprehension? Studies showed that children who are at the one-word stage understand that a sentence is more than a group of

words that co-occur randomly, but conveys a meaningful combination that expresses a qualitatively different meaning than the mere presence of the particular words in it; meaning that children understand that a sentence has an underlying structure and they do not map outside events randomly to sentences, but in a relational way by attributing differing meanings to different word combinations in a sentence (Hirsh-Pasek & Golinkoff, 1996; O'Grady, 2005). Hirsh-Pasek and Golinkoff (1996) conducted an IPL study to investigate sentence comprehension in very young children who do not yet produce word combinations. Using this method, Hirsh-Pasek and Golinkoff (1996) presented 13- to 15-month-old children two videos which depicted two different scenes simultaneously. The first scene showed a woman 'kissing keys and holding a ball', and the other showed the same woman 'kissing a ball and holding keys'. Both scenes had the same action and the same nouns in it, but the combination was different. While they watched these scenes simultaneously on two screens placed next to each other, children were given an auditory stimulus that described only one of the scenes, such as '*the woman is kissing the keys*'. Before presenting the directing audio, in order to control for stimulus salience, Hirsh-Pasek and Golinkoff introduced what they called as the 'simultaneous trial' in which children were presented with a neutral audio while viewing the trial videos simultaneously on the screen for the first time. Results indicated that children preferred to look at the scene that matched the auditory stimulus for a longer period than the other scene; suggesting that children just over 1 year of age, even if they only produce single words at a time, can

actually understand that sentences are more than the mere presence of words but a meaningful combination of them. These findings give rise to the following question: What are the mechanisms which makes sentence comprehension possible before the onset of sentence production?

Using the IPL method, Golinkoff, Hirsh-Pasek, Cauley and Gordon (1987) demonstrated that children between the age of 28 to 30 months are able to use word order as a cue to derive the meaning of a simple transitive sentence and understand who is doing a particular action to whom when both the agent and the patient of the action are animate and the action is a reversible one. The participants in this study were already producing word combinations. Hirsh-Pasek and Golinkoff (1996) have consequently investigated whether the same result can be found for children who do not yet produce word combinations. Therefore, they carried the same experimental procedure with 16- to 19-month-old children by showing them two simultaneous videos on two scenes placed next to each other. The scenes depicted two cartoon characters performing 'reversible actions' to one another. An auditory stimulus such as *'look, Big Bird is tickling the Cookie Monster'* which is given at the same time with the videos, describing only one of the scenes, and thus assigned one of the characters as the agent and the other as the patient of the same action. They found that, overall, children preferred to look at the matching scene 75% of the time compared to the non-matching scene. Results indicate that young English-speakers who are

at the beginning of two-word stage are capable of comprehending a transitive sentence in terms of its subject and object by using word order as a cue.

Swensen, Kelly, Fein and Naigles (2007) also investigated the use of word order in sentence comprehension of 2- and 3-year-old children with autistic spectrum disorder and 17- to 21-month-old typically developing children using the IPL method. Children were presented with transitive sentences involving familiar verbs depicting reversible actions in which the actor of the action in one scene was the patient in the other scene. They were expected to correctly infer the subject-object roles depending on the directing audio (*'look, the boy is tickling the girl'*). Results showed that both group of children interpreted subject-object relations correctly when heard SVO sentences and looked longer to the matching scene, controlling for stimulus salience.

Studies investigating word order as a cue to sentence comprehension have raised the following question: Do children possess a general underlying rule for sentence structure that they apply to all sentences or does this information come from the mastering of particular verb meanings and develop step by step? (Dittmar et al. , 2008b; Gertner et al., 2006). To address this issue, researchers began to use *novel* verbs describing *nonsense* actions in word order experiments and tried to control for the knowledge of verb meaning to separate it from the knowledge of sentence structure. In the nonsense paradigm,

researchers test whether children understand who does what to whom depending on word order knowledge or the lexical knowledge, their knowledge of a particular verb's meaning. In the case of English, the nonsense paradigm suggests that if children use word order as a cue to understand who does what to whom, they would apply the same technique to an unfamiliar verb and still would be able to identify correctly the agent and the patient of an action by assigning the role of the subject to the preverbal noun and the object to the post-verbal noun. For example, if we take the verb *'blick'* as an example of a nonsense verb, in the sentence *'the cat is blicking the mouse'*, the order of the words would suggest that the 'cat' is the agent and the 'mouse' is the patient of the suggested *'blicking'* action independent of their knowledge of the verb in question.

Gertner, Fisher and Eisengart (2006) conducted an experiment using the same IPL method as Hirsh-Pasek and Golinkoff (1987, 1996) and introduced 2-year-old (21- to 25 month-olds) children with nonsense, unusual actions that were labeled with a novel verb, i.e., *'gorping'*. The children were presented with two simultaneous scenes depicting the two novel actions: tipping someone in a rocking chair and wheeling someone back and forth in a wagon. In one of the scenes, a bunny was wheeling a duck back and forth in a wagon and in the other; the duck was tipping the bunny in a rocking chair. An auditory stimulus such as *'the bunny is gorping the duck'* was played while children were exposed to those two scenes that were shown simultaneously. Their eye movements were recorded to examine at

which video they looked longer. Gertner et al. (2006) found that the children preferred to look at the video that matched the auditory stimulus 'longer than expected by chance', meaning that they have identified the bunny as the subject and the duck as the object depending on the auditory stimulus. This finding suggests that children might possess general rules concerning sentence structure that they can apply to any sentence to infer its subject, even when they are not familiar with the verb in the sentence.

The above studies showed that knowledge of word order facilitates sentence comprehension and is used as a reliable cue to infer meaning in English before two years of age.

2.1.3.2 Crosslinguistic evidence on word order and case markers

In inflectional languages like Turkish, the cue validity of word order is not as pronounced as in English. Crosslinguistic studies indicate that, compared to English, the relative strength of word order and case markers differ in languages which rely mostly on word endings and other morphological cues, and allow for a much more flexible word order (Aksu-Koç & Slobin, 1985; Dittmar, Abboth-Smith, Lieven & Tomasello, 2008a; Hakuta, 1982; No, 2009; Slobin, 1982; Slobin & Bever, 1982).

Studies investigating sentence processing in Turkish relied on two types of studies: linguistic input and act-out studies. Research examining linguistic input generally focused on child-directed speech (CDS) to analyze language specific regularities. Slobin (1982) reported that adults used five different word orders in their speech to 2- to 3-year-old (2;3 to 3;8) Turkish children. Of the noun-noun-verb (NNV) sentences which are the most frequently used combination (56%) in child-directed speech; 86% were in the form of SOV. Overall, considering all noun-verb combinations (NNV, NVN, VNN), SOV order was reported to be the most frequently uttered order (48%) in adult speech to children. Although SOV order was the most frequent, its frequency was less than half of the time considering the whole input.

Küntay and Slobin (1996) investigated CDS in a longitudinal case study of a child in the one-word stage (ages 1;8-2;3). They examined the variation sets in the input, the parts of the speech in which the same core meaning was given in structurally different variations. According to those variation sets, neither the nouns nor the verb occurred in a fixed position in the sentence. They also reported that verbs may change position from one variation set to another and appear only 44% of the time at the sentence-final position. In addition, there was more nominal ellipsis compared to verb ellipsis in general: verbs (81%) are repeated more often in a variation set compared to nouns (53%). However, nouns mostly did not change form from one variation set to another, which could suggest nominal

inflections to be a reliable cue in sentence comprehension. Küntay and Slobin (1996) also observed that nouns mostly appear in inflected form.

Children are thought to operate through 'canonical' sentence schemas which they use to master comprehension and production skills in their language (Slobin, 1982; Slobin & Bever 1982). Canonical sentence schemas involve the prototypical sentence structure in one's own language. Slobin and Bever (1982) suggested that children use canonical sentence schemas to detect and differentiate through irregularities in the input. Reliance on canonical sentences reflects the presence of early linguistic generalizations based on word order or inflections. In order to compare Turkish and English children's relative dependence on word order, Slobin and Bever (1982) conducted an experiment with English and Turkish children aged 2 to 4. They also investigated language-specific morphological inflections, one of which is the accusative case marker. They asked them to act out sentences involving reversible actions such as patting, grabbing, licking or pinching in which both the agent and the patient of the action are animate characters such as a bird, a dog or a lamb represented by toy animals. The sentences were in the simple transitive form. The sentences introduced to Turkish children were constructed with the following 6 word orders: SVO, OVS, SOV, OSV, VSO and VOS (e.g. *ördek bebek öpsün,* 'duck baby kiss-let'). Half of the Turkish sentences in each type of word order contained the appropriate

accusative case marking. The remaining sentences were presented without any case marking on either the agent or the patient.

Slobin and Bever (1982) found that English speaking children depended mainly on the conventional word order which is SVO (subject-verb-object) to infer the meaning of a sentence, i.e., they acted out sentences by assigning the role of the subject to the first preverbal noun and that of the object to the second postverbal noun following the verb. Turkish children, on the other hand, depended heavily on the accusative case marking to assign the roles of the actor and the undergoer of the action. For the sentences in the NNV (noun-noun-verb) form in which the direct object was not marked with the accusative case marking, children showed an inclination towards acting them out using the most frequent word order in Turkish, which is the SOV (subject-object-verb), assigning the role of the subject to the first noun and that of the object to the second. Whenever the accusative case marker was present in the sentence, the order of the words in the sentence did not have a particular effect even for the very young Turkish children who were 24- to 28-months of age. They correctly assigned the role of the object to the inflected noun. These results indicate the importance and the early employment of the accusative case marking in Turkish, with less reliance on word order in Turkish compared to English as a cue to sentence comprehension. The word order was found to be important nonetheless for Turkish learners based on their tendency to act-out the first noun as the agent when the

accusative case marker was missing from the patient noun (Slobin & Bever, 1982). A close reading of the paper reveals, though, no descriptive statistics about this tendency.

As previously presented, the early comprehension of the accusative case marker also comes from the act-out study performed by Göksun et al. (2006). It was found that children enacted both transitive and intransitive verbs more causatively when an accusative case marker was present, indicating the active role of this inflection to signal a patient that is affected by an action.

Using a reaction time analysis, Demiral, Schlesewsky and Bornkessel- Schlesewsky (2008) investigated whether Turkish adults have a 'subject preference'. They found that the first element in the sentence had a high tendency to be assigned to the subject role when the initial argument was ambiguous, which means that the first argument had the possibility of being the unmarked object of the sentence such as in *dün adam gördüm* 'yesterday man see-Past-1st.Person.Sing'. This result was obtained for animate and inanimate participants. The results showed that even in Turkish, which allows for a flexible word order, the positioning of nouns is shown to be informative in assignment of grammatical relations.

The effect of word order was researched in other languages which also allow for flexible word order in a sentence and rely on nominal inflections. One of those languages is

German. In German, the most frequent order in a sentence is the SVO order and subjects possess nominal articles (before the subject) and objects possess accusative articles. Those change form depending on the gender of the noun (die, den, der) and sometimes nominal and accusative articles can take the same form (if the subject and the object are both feminine) causing ambiguity in signaling sentence roles. Differing from Turkish, case markers come before the noun, marking the articles, as opposed to suffixes attached to the end of nouns. Input studies showed word order to be quite often available but accusative case marker to be more reliable in German for detecting agent-patient relations (Dittmar, et al. 2008a).

Dittmar et al. (2008a) investigated the relative dependence on word order and inflections in understanding "who does what to whom" in a causative sentence using a pointing task. They introduced reversible transitive sentences involving novel verbs to 2- to 7-year-old children. The sentences varied in word order and case marker combinations. In one condition, both word order and accusative case marking were consistent in pointing to the same agent. In another condition, the word order cue conflicted with the case marking cue, i.e., accusative-marked nouns were placed sentence-initially. In the third condition, the articles did not differentiate nouns (i.e., both were feminine nouns) and word order was the only available cue. They found that 2-year-olds correctly understand only the sentences in the prototypical form where case markers and word order support each other and case

markers were unambiguous. Additionally, they showed that 4-year-olds understand also the word-order only condition but suffer in the cue-conflict condition. Only 7-year-olds used primarily case markers to identify agents and patients if the two cues do not conspire. For 4-year-olds, word order proved a more reliable cue on its own compared to case markers in 'conflict' sentences. Dittmar et al. (2008a) suggested that German children do not master the comprehension of the case markers alone until the age of seven.

Dittmar, Abboth-Smith, Lieven, & Tomasello (2008b) also investigated the usage of word order and inflections in 21-month-old German children, again with novel verbs describing nonsense reversible actions in the prototypical sentence format (SVO order with unambiguous case markers). Additionally, they altered the Gertner et al.'s (2006) procedure in that they used a training trial with familiar verbs either presenting them in the same syntactic structure as for the testing part (involving the same nouns) or in isolation like '*This is called washing'*. They intended to control for the training function of familiarization trials in terms of the relation between syntax and sentence meaning. In the experiment they gave children either the stimulus '*the frog is washing the monkey*' or *'this is called washing'* paired with two simultaneous scenes. In one the frog was washing the monkey and in the other, the monkey was washing the frog. They repeated the test trial twice, the first preceded by a blank screen while children heard a sentence in the future form like *'the frog is going to wash the monkey'* or *'you are going to see washing'*

depending on their condition and the second precede by a blank screen while children heard a sentence in the past form like *'the frog washed the monkey'* or *'you saw washing'* depending on their condition. A matching behavior between the directing audio and the relevant action was found only for the group that was exposed to the familiarization trial which presented a familiar verb in the same syntactic frame as the novel verb, thus showing a training effect. These results also showed that German children as young as 21-month-old relied on the prototypical sentence structure of their own language although German is a language which allows for relatively flexible word order.

Japanese is another language which uses extensive nominal morphology to indicate grammatical relations. Although Japanese allows for differing word orders, the most common one is the SOV order and sentential relations depend mostly on nominal inflections. In his research using an act-out procedure, Hakuta (1982) presented 2- to 6-year-old children with reversible transitive sentences in different word combinations (NNV, NVN, VNN) in which either nominal inflections were present or not on the NPs. He showed that children had problems interpreting the first noun as the agent if it is not marked with the inflection *–ga* which indicates the subject. They also confused actors in OSV sentences in which the second noun was marked with *–ga*. The study showed that for Japanese children, neither word order nor particles alone are perfect indicators of

grammatical relations but the accordance between those cues appears to be the guiding principle in comprehending sentences.

In Korean, the grammatical functions of NPs are also marked with case markers. SOV order is the most frequent word order in Korean as in Japanese (No, 2009; Jin & Song, 2008). Although case markers are used by young children, comprehension studies indicate that they do not fully master these inflections until the age of four (No, 2009). This may be due to the fact that case markers are not obligatory and can be dropped and also appear in ambiguous forms (No, 2009). Two studies illustrate the relative weight of word order and case markers in Korean language development. No (2009) using an act-out study, investigated the reliance on word order and case markers in 2- to 4 year-old children. Overall, the prototypical sentences were the ones with the highest correct performance and older children performed better than younger ones. The most relevant result was that younger children relied more on word order compared to case markers to identify the first noun as the subject. No (2009) suggested that children depend more on word order compared to case markers due to the higher cue validity of word order in the linguistic input.

Another study investigating the role of case markers in Korean comes from Jin & Song (2008) who employed a choice task instead of an act-out procedure in an attempt to

employ a less demanding task. They presented 3-year-olds with paired videos of reversible causal events, paired with directing audios either in canonical or non-canonical word order in which NPs are marked with appropriate nominative and accusative case markers. The results showed that 3-year-old Korean children performed higher than chance level in both conditions in this less demanding task, showing the usage of case marker knowledge in sentence comprehension.

2.2 Present study

Although less demanding comprehension studies are done in other inflectional languages (i.e. German, Korean), research on Turkish children's sentence comprehension so far involved the act-out methodology. The act-out methodology involves performing physical actions with dolls or animal figures in order to illustrate the comprehension of meaning conveyed in a sentence. Although act-out studies can reveal a child's knowledge of his language that he could not yet demonstrate in production, it is argued that act-out studies may still underestimate children's language comprehension (Dittmar, Abboth-Smith, Lieven, & Tomasello, 2008a; Hirsh-Pasek & Golinkoff, 1996). Researchers using the IPL mechanism have argued that acting out sentences can be bound with children's habitual play practices with the provided objects regardless of the sentences they are told to enact (Golinkoff & Hirsh-Pasek, 1995; Dittmar et al. 2008a). In addition, problems of

cooperation are observed more frequently with younger children in the act-out paradigm. Consequently, the IPL method, which is a passive procedure that does not require the child to either verbally or physically generate a behavior, can be a better method to employ when testing language comprehension with very young children.

The present research uses the IPL to investigate the relative reliance on word order and case marking in 17- to 39-month-old Turkish-speaking children's comprehension of simple transitive sentences describing reversible causative actions. The purpose is to investigate how much the canonical, most frequent word order (SOV) is informative in determining the roles of the participants of actions. We will also explore in a second experiment, whether and how much the presence of the accusative case marker facilitates the comprehension. The experimental setup in the present research is designed in a similar way as in previous studies using the IPL. We present the child with two simultaneous scenes in which the agent of an action in one scene is the patient of the same action in the other scene. The two experiments are carried out with different sets of participants. In the first experiment, the auditory stimuli are sentences in the word order of SOV with no accusative case marker present on the object (e.g. *at kuş çek-iyor* 'the horse the bird pull-PROG'). In the other experiment, an accusative case marking is provided on the NP referring to the patient of the action (e.g. *at kuş-u çek-iyor* 'the horse the bird-ACC pull-

PROG'). Detailed descriptions of the procedure and the stimuli are given in the method section.

2.2.1 Questions and hypotheses

Two types of questions are explored in the present research: the first one concerns the cue value of word order (SOV) and the accusative case marker in sentence comprehension for young Turkish children. The second one concerns the developmental process in terms of using those cues in terms of agent-patient identification by different age groups.

- Does word order on its own, without case markers, function as a reliable cue to language comprehension in Turkish, indicating the agent and patient roles in a sentence? Because Turkish, which is a language with flexible word order and with regular use of case markers in indicating grammatical functions, appears very differently than English, we might expect some differences between Turkish and English learners. On the other hand, some language-general strategies might be at work to make the two groups perform similarly.

1. One hypothesis is that grammatical strategies depend on language-specific rules of one's language. Because the flexible nature of word order and the well-established function of the accusative case marker, we expect that Turkish children would perform at chance levels in sentence comprehension when the only given cue is word order and would perform better than chance if the accusative case marker is present. Such a finding could reveal the low cue value of word order as opposed to the accusative case marker for sentence comprehension in Turkish.

2. On the other hand, in the absence of any other cues, Turkish children at young ages might rely on some notion of a canonical (i.e., most frequent) word order and show better than chance performance. Thus, the informative value of word order is yet to be determined by exploring its function in the absence of other grammatical cues with young children and using non-act-out methodologies.

- Are there age differences in the reliance on word order and accusative case marker cues in sentence comprehension? Do younger and older learners of Turkish look different?

  1. If word order is a language-general strategy in sentence interpretation, we can expect its acquisition to be early in development and therefore younger children (18- and 27-month-olds) would rely more on word order compared to older children who would rely more on the accusative case marking to interpret the meaning of a sentence.

  2. On the other hand, early production and comprehension data from previous studies show that the accusative case marker is a morpheme used in the production of Turkish from early age onwards and we might expect sentences without case markers could be problematic for 24-month-old and 36-month-old groups.

Chapter 3

METHOD

3.1 Experimental setup

The Intermodal Preferential Looking Paradigm (IPL)

In a typical IPL setup, children are seated in front of two video projectors that are located one next to the other, each showing a different scene simultaneously. A red light is positioned in the middle of the two monitors and starts blinking before the scenes change in order to attract a child's attention to the center and to make sure that he or she is looking at the center before the subsequent actions are presented on both screens. An auditory stimulus is given from a speaker positioned behind the middle of the screens each time the two new scenes are presented simultaneously and this auditory stimulus describes only one of the scenes (Gertner, Fisher & Eisengart, 2006, Hirsh-Pasek & Golinkoff, 1996).

A camera facing the child, placed in the middle of the two screens, records the eye movements of the child while he or she watches the videos. The recordings are later coded frame by frame to examine which screen the child looked at more to determine whether he or she understood the auditory stimulus (Gertner, Fisher,& Eisengart, 2006; Hirsh-Pasek & Golinkoff, 1996; Naigles & Kako, 1993) Children who look longer at the scene matching the auditory stimulus are considered to have understood the auditory stimulus.

The IPL setup in the present study is a portable one, which was practical in terms of widening the potential participant pool. In this way, it was possible to access more participants such as those in daycare centers and preschools in the pilot part. However, the main experiments took place in the Language and Communication laboratory in Koç University, Istanbul. The portable setup has a large projection screen that is placed in one corner of the room facing the projector and the computer. Two simultaneous videos, each describing a different scene, are presented side by side on this screen. Children are seated in a child-sized chair in front of the screen at a distance of approximately one meter. The child is made to seat at a close distance from the projection screen in order for his or her eye movements (looking at the left or looking at the right) to be as distinct as possible to lessen uncertainty while coding them. The idea is to have the optimal distance so the child is not able to view both scenes at once, and moves his/her eyes or sometimes head to watch

the preferred video. A speaker is placed centrally behind the projection screen and a video camera is positioned at the bottom of the screen facing the child.

3.2 Participants

Overall participants, included in both studies (accusative and word order), consisted of 219 native speakers of Turkish within the age range of 17 to 39 months divided into three age groups: 48 18-month-olds (23 female, 25 male, mean age M= 1;08.05 range= 1;05.00 to 1;07.29), 81 27-month-olds (41 female, 40 male, M=2;03.02 range= 2;01.00 to 2;05.17) and 90 36-month-olds (47 female, 43 male, M=3;01.03, range= 2;09.09 to 3;03.29). The sex distribution of the participants was about equally inclusive of both male and female children in each age group (see Table 3.1). There were fewer children in the 18-month-old group due to fact that they were the most recently studied group in our sample. More participants can be added to that group in subsequent work.

Table 3.1 The distributions of gender in each age group

	Female	**Male**	**Total**
18-month-olds	23	25	48
27-month-olds	41	40	81
36-month-olds	47	43	90
Total	111	108	219

An official letter (see Appendix A) was sent to the parents of the potential candidates acquired from daycare centers and preschools to invite them to the study and sometimes a follow-up phone call was also made. In addition, a participant pool was formed following the responses to a posting on a parenting website.

A total of 87 participants (24 18-month-olds, 36 27-month-olds and 27 36-month-olds) were excluded from the final analyses due to the following reasons:

1. side preference, that is, watching one side more than 80% of the time, led to the exclusion of 6 18-month-olds, 6 27-month-olds and 1 36-month-old.

2. technical problems with the equipment led to the exclusion of 1 18-month-old, 3 27-month-olds, 6 36-month-olds.

3. experimenter error (recording or coding) led to the exclusion of 4 18-month-olds, 5 27-month-olds, 6 36-month-olds.

4. parent and/or child's noncompliance to instructions (e.g., child was engaged in activities other than watching the videos, specifically, not watching the video for least .6 seconds for any two test trials; parents' explicit leading of the child towards one video led to the exclusion of 11 18-month-olds, 13 27-month-olds, 6 36-month olds.

5. resisting the IPL or the developmental assessment led to the exclusion of 2 18-month-olds, 6 27-month-olds, 4 36-month-olds.

6. low scores on the administered developmental test (having a total score which is two standard deviations below the mean) led to the exclusion of 3 27-month-olds and 4 36-month-olds.

3.3 Study design

For this thesis, two studies were conducted: the word order study and the accusative study. Each child participated in only one of the studies (see Table 3.2 for the distribution of participants to each study). The testing layouts that represent the auditory stimuli that the children are exposed to in each study are provided in Appendix D and E. A detailed explanation of the auditory stimuli used for each study will be provided in the next section.

Table 3.2 The sample size, mean age, and range of age for each age group in the word order and the accusative studies

	18-month-olds	27-month-olds	36-month-olds	Total
Word order	24 M=1;06.05 (1;05.00-1;07.29)	41 M=2;03.16 (2;01.09-2;05.17)	44 M=3;01.07 (2;09.09-3;03.28)	109 M=2;05.29 (1;05.00-3;03.28)
Accusative	24 M=1;07.26 (1;05.00-1;07.29)	40 M=2;04.28 (2;01.00-2;05.17)	46 M=3;01.00 (2;09.16-3;03.29)	110 M=2;05.26 (1;05.00-3;03.29)
Total	48 M=1;08.05 (1;05.00-1;07.29)	81 M=2;03.02 (2;01.00-2;05.17)	90 M=3;01.03 (2;09.09-3;03.29)	219 M=2;05.27 (1;05.00-3;03.29)

The design had three counterbalancing conditions for each study which were: A video, B video and B audio conditions. Counterbalancing was done in order to control for any side preference due to the presentation of the experimental stimuli. In the counterbalancing condition “B”, the sides (right ‘R’ or left ‘L’) on which the scenes appear are the opposite of their equivalents in the counterbalancing condition “A”. In the counterbalancing condition “B audio”, the sides on which the scenes appear are the same as in the “A” condition, but the audio points to the opposite scene as being the right choice. Each child is exposed to only one counterbalancing condition in one study. Table 3.3

presents the distribution of participants in each age group into the three counterbalancing conditions.

Table 3.3 The distribution of participants into conditions (A, B and B audio) for each age group in each study (accusative, word order)

	A			B			B audio		
	18-m	**27-m**	**36-m**	**18-m**	**27-m**	**36-m**	**18-m**	**27-m**	**36-m**
W	8	17	17	8	16	19	8	8	8
A	8	16	18	8	16	19	8	8	9
T	16	33	35	16	32	38	16	16	17

3.4 Auditory and visual stimuli

To create the video stimuli, the films were shot while two adults dressed in costumes of a bird and a horse, were performing a set of selected actions (i.e., pulling, pushing, tickling and washing) on each other.

In the word order study, the auditory stimuli present simple transitive sentences without any accusative case marking on the object. The sentences are in the form of SOV (subject-object-verb), which is the default word order in Turkish sentences.

In the accusative study, however, the auditory stimuli consist of sentences in which the accusative case marking is marked on the undergoer noun. The sentences in this study also have the SOV word order.

Each study includes four familiar verbs, which are the following: *gıdıkla* 'to tickle', *yıka* 'to wash', *çek* 'to pull' and *it* 'to push'.

3.4.1 Word order study

The testing in the "word order" study begin with the introduction of the videotaped animate characters (performances of two adults wearing animal costumes), a horse and a bird, which will perform a series of selected actions to one another throughout the video. The auditory stimuli used for the introduction of the animals is given in Table 3.4 along with the relevant video scenes that are shown simultaneously, the length of these videos, and the matching side for the test trials. The sequentials (SQs) are the familiarization trials used for the introduction of the animal characters. The test trials (TTs) are the trials in which there is a directing audio that points the child towards one of the scenes (horse of the bird introduction). When both sides of the videos indicate "blank", a black screen which has a red blinking dot at the center appears to direct the child's attention to the center.

These blank trials precede each trial in the experiment, and are also used to attract the attention of the child towards the subsequent stimuli.

Table 3.4 Trials used for introducing the characters in the word order study

Type	Video 1	Audio	Video 2	Length (sec)	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Blank	*Bak bi at, işte at* / Look, a horse! See, the horse!	Horse	4	
	Blank	*Aa bak bi kuş* / Oh look, a bird!	Blank	3	
2 SQ	Bird	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Blank	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 TT	Bird	*Hadi ata bak* / Look at the horse!	Horse	4	R
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 TT	Bird	*Hadi kuşa bak* / Look at the bird!	Horse	4	L

After the animals are introduced, a total of four actions are presented consecutively in 4 test blocks. Each test block has 2 SQs, 1 CT and 1 TT (Previous piloting with six different verbs indicated that we needed to shorten the test to four actions because of young children's short attention-span). The sequentials (SQs) are the trials used for the familiarization of the action verbs. The control trials (CTs) are the trials in which there is a neutral audio that does not direct the participant towards either scene specifically. The test trials (TTs) are the trials in which there is a directing audio that points to one of the scenes.

Each time two videos are presented side by side on the screen, the actor of the action in one side is the undergoer of the action in the other. To describe in detail the auditory stimuli for the action verbs, we can examine the first event (i.e., pushing) as an example. The layout for "pushing" is given in Table 3.5. First, the action verb is introduced while the animals are shown while performing the "pushing" action on each other in two consecutive sequential (SQ) trials. "H" is used as an abbreviation for the horse character and "B" is used for the bird character.

Table 3.5 Trials for the "pushing" action in the word order study

Type	Video 1	Audio	Video 2	Length (sec)	Match
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* /They are on both screens!	H pushes B	6	
	Blank	*Kuş at it-iyor* /The bird is pushing the horse	Blank	3	
4 TT	B pushes H	*Bak işte kuş at it-iyor* / Look! The bird is pushing the horse	H pushes B	6	L

The video continues with the remaining 3 actions (*gıdıkla* 'tickle', *çek* 'pull' and *yıka* 'wash', in that order) in the same layout and without any interruptions. The full layout for the word order study is given in the Appendix D.

3.4.2 The accusative study

The auditory stimuli for the "accusative study" are the same as the word order study except that the direct object of each sentence (for each of the 4 familiar verbs) features an accusative case marking in the auditory stimuli. The familiarization phase for the animal characters and the subsequent 4 familiar verb blocks are presented in the same way as in the word order study. An example is given below in Table 3.6 using the verb *it* 'push' in order to present the details of the layout for each block. The full layout for the accusative study is given in the Appendix E.

Table 3.6 Trials for the "pushing" action in the accusative study

Type	Video 1	Audio	Video 2	Length (sec)	Match
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* / They are on both screens!	H pushes B	6	
	Blank	*Kuş at-ı it-iyor* / The bird is pushing the horse (Bird horse-ACC push)	Blank	3	
4 TT	B pushes H	*Bak işte kuş at-ı it-iyor* / Look! The bird is pushing the horse (Bird horse-ACC push)	H pushes B	6	L

3.5 Counterbalancing

3.5.1 A condition

In the A condition, the horse always appears as the actor in the right scene and the bird always appears as the actor in the left scene during the character introduction and for the testing of each action verb. The layout for this condition is exemplified in Table 3.5 and Table 3.6 for the verb "push" (Also see Table 6.1 in the Appendix D and Table 6.4 in the Appendix E for the whole template for the word order and accusative studies respectively).

3.5.2 B condition

In the B condition, the horse always appears as the actor in the left scene and the bird always appears as the actor in the right scene during the character introduction and each action verb. An example for this condition is given in Table 3.7 for the verb "push" in the accusative study (Also see Table 6.2 in the Appendix D and Table 6.5 in the Appendix E for the whole template for the word order and accusative studies respectively).

Table 3.7 Trials for the "pushing" action in the accusative study (B condition)

Type	Video 1	Audio	Video 2	Length (sec)	Match
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	H pushes B	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	B pushes H	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H pushes B	*Bak iki tarafta da var* / They are on both screens!	B pushes H	6	
	Blank	*Kuş at-ı it-iyor* / The bird is pushing the horse (Bird horse-ACC push)	Blank	3	
4 TT	H pushes B	*Bak işte kuş at-ı it-iyor* / Look! The bird is pushing the horse (Bird horse-ACC push)	B pushes H	6	R

3.5.3 B audio condition

In the B audio condition, the appearance of the characters is identical to the "A condition" but the right choice of scene indicated by the directing audio is different. An example for the layout in the condition is given in Table 3.8 for the verb "tickle" in the accusative study (Also see Table 6.3 in the Appendix D and Table 6.6 in the Appendix E for the whole template for the word order and accusative studies respectively).

Table 3.8 Trials for the "pushing" action in the accusative study (B audio condition)

Type	Video 1	Audio	Video 2	Length (sec)	Match
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* / They are on both screens!	H pushes B	6	
	Blank	*At kuş-u it-iyor* / The horse is pushing the bird (Horse bird-ACC push)	Blank	3	
4 TT	B pushes H	*Bak işte at kuş-u it-iyor* / Look! The horse is pushing the bird (Horse bird-ACC push)	H pushes B	6	L

3.6 Developmental assessment

Once they completed the IPL, all the participants were administered the "Mullen Scales of Early Learning" test (Mullen, 1995) which consists of five sub-scales (gross motor, visual reception, fine-motor, receptive language and expressive language). This particular test was chosen over others due to its emphasis on language development and its specific and detailed scales. The main aim of administering a developmental assessment in

this study is to investigate whether a participant's overall development is within the normal range indicated for his or her age and to detect the ones who may experience problems in all or some of the subscales. Administering this test was helpful in singling out developmental problems as the source of possible low scores.

3.7 Procedure

After a warm-up phase, each child, accompanied by his/her mother or father, was invited to the experimental room. The room contains a sitting area where the parent was first given a consent form in which all the necessary information about the purpose and the procedure of the study, the conditions of confidentiality, and the potential risks of the study were presented (see Appendix B). After that, the mother or the father was given a demographics form to fill out which asks for the necessary background information about the child including his/her age, gender, amount of exposure to other languages and about the educational and occupational status of both of the parents.

Once the forms were completed, the child was seated in a child-sized chair in front of the screen and his/her parent was seated behind him/her in an adult chair. The camera was rearranged to properly film the face of the child, and then the experimenter started playing the videos from the laptop to be projected on the projection screen. The child's

parent was seated behind the child all the time, but s/he was informed that s/he should not direct the child towards any of the scenes shown on the screen, and not to talk to him/her except when absolutely necessary and to encourage the child to keep looking at the screen whenever he or she gets distracted. The entire experiment lasts 3 minutes and 10 seconds.

After the completion of the experiment, another experimenter applied the "Mullen Scales of Early Learning" test, which lasts about 30-45 minutes. Only the last four scales (visual reception, fine-motor, receptive language and expressive language) were used in the present study, because the gross motor scale targets infants younger than those who are included in our participant pool. The items in each subscale are arranged so that the starting item for each subscale can be correctly identified based on the age of the participant.

For the 36-month-old group, the experimenter also applied a pointing-task before the developmental assessment. This task consists of showing the child a series of still pictures from the previously watched video, starting from the introduction section and going over each presented action. For each test trial, the child was shown a pair of still photographs of test trial scenes s/he watched and presented with the same testing question in the video and asked to point out to the right photograph. The results for the pointing task are not reported because the pointing procedure did not work properly for the 36-month-old

group and therefore did not yield valid results. It was not administered to the younger age groups.

After the developmental assessment, the parent and the child were thanked, and the child was given a children's book labelled to his/her name as a gift for participating in the study. The parent was given a pamphlet describing child language development in the relevant age range, providing some basic parenting tips in this area. (see Appendix C).

3.8 Coding and analysis

The recorded videos of the child's face were coded using coding software designed for this purpose. This software provides the opportunity to separate the recorded video into frames, which enables the coder to examine thoroughly each eye movement of the child. The eye movements were coded to quantify for how long (how many seconds) the child looks at a scene matching an auditory stimulus and for how long he or she looks at a non-matching scene. Then, the coded data were analyzed in a program implemented in MATLAB to assess how many seconds the child looked at each direction in each trial and the percentage of looking at the matching versus non matching scene in each trial (control and test). The linguistic stimulus in the control trial is neutral and does not match any of the scenes, so if the child looks at the side of the match longer than the other in the control

trial, this can reveal a side preference that can present itself also in the test trial. Therefore a significant difference is expected in looking percentages at the side of the match between the control and the test trials to conclude more clearly the effect of the directing audio.

The analysis software also gives the percentage of preference of looking at the left scene during the whole video. The purpose is to see whether the child looks at the matching scene longer than the non-matching scene and whether the percentage of looking at the matching scene in the test trial is different from the control trial. The side preference is analyzed to rule out the possibility that the child may look at the matching scene longer due to a possible side preference, not necessarily demonstrating language comprehension.

The analysis software was also used to calculate the latency of first look at the matching scene in each trial. Latency is used as a measure of reaction time and 'processing speed' (Fernald, Zangl, Portillo, & Marchman, 2008), examining time passing before the child looks from a certain distracter to the intended scene. The latency variable is measured in the seconds transpiring before the child looks at the side of the matching or the non-matching screen from the beginning of a certain trial. The purpose was to comparatively investigate the processing of a directing audio in the test trial compared to a neutral audio in the control trial. We questioned whether the presence of a directing audio speeds up the

inclination towards the intended screen. The aim was to get a clear picture of the time course involved in the processing of the stimulus sentence.

Thirdly, the analysis program also provides the number of switches (to any coded direction: right, left, center or away) made during each trial. A switch is defined as turning eye gaze to any of the four coded directions from another direction: left, right, center or away. The logic behind investigating switching behavior is to look more closely to the watching behavior of the child during a trial and examine how consistent the child behaves in his/her preference towards either side of the scene. The mean number of switches in the test trials is expected to be lower in the test trials compared to the control trials. Those data were used to understand the linguistic processing of the child during the course of trial in order to better interpret the results obtained from the percentages of looking measure.

Finally, a time course program (also implemented in MATLAB) was used to provide the matching behavior over the whole video plotted along a set of 6 second intervals. The graphs show the mean percentages of looking time at the matching the non-matching scenes along with center and away separately for the control and test trials. In that way, we have the opportunity to see in detail, in which parts of the overall testing audios, the child looked at the matching scene more than the non matching scene. This graphical analysis adds to the understanding of the matching behavior because the analysis software

only gives a total percentage of match score for the entire 6 seconds for each trial. With the time course program, we have the opportunity to see the distribution of that looking behavior over the course of the trial. If a child does not seem to look much at the matching scene depending on the total matching percentage given by the analysis software, we can look at the parts of the trial where this may not be the case using the time course program.

Chapter 4

RESULTS

Three major dependent variables were compared across the control and test trials of each study (the word order and the accusative): (1) percentage of match, (2) response latency and (3) switch. Percentage of match is defined as the mean percent of looking at the matching scene over the non-matching scene. Latency is defined as the mean number of seconds transpiring before the first look at the matching or the non-matching scene. Switch is defined as the mean number of eye gaze switches made to any direction (left, right, center and away). The percentage of match variable is calculated in two different ways: (1) division 1: over the entire test trial (6 seconds) (2) division 2: dividing the test trial into two equal 3- second segments to see how the looking behavior progresses over the course of each test trial. A child who understood the auditory stimuli is expected to look at the matching side significantly longer in the test trials compared to the control trials, look sooner to the matching scene compared to the non-matching scene and switch sides more often in the control trials compared to the test trials.

4.1 Word order study

4.1.1 Percentage of match

4.1.1.1 Division 1

We performed a two-way Repeated Measures Analysis of Variance (ANOVA) with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)]. The purpose was to see whether there is a significant difference between the control and test trials in terms of percentage of match and whether this difference is the same in the three age groups. We found a significant main effect for test type [($F(1,106)= 7.03$; $p<.05$] and no significant main effect for the age variable (see Figure 4.1 for the mean percentage of match scores in the test and control trials for the three age groups). Children looked significantly more at the matching side in the test trials compared to the control trials and this effect was similar in the three age groups (see Table 4.1 for the mean percentage of match scores for the three age groups). No significant interaction effect was observed. Interaction effects will be reported when siginificant throughout the thesis.

Table 4.1 Mean percentage of match scores in the test and control trials for the three age groups participating in the word order study

	18-month-olds	27-month-olds	36-month-olds	Total
Control	51.75	47.61	48.93	49.06
	(11.45)	(13.26)	(9.66)	(11.52)
Test	54.50	53.05	53.57	53.58
	(10.62)	(12.63)	(14.15)	(12.77)

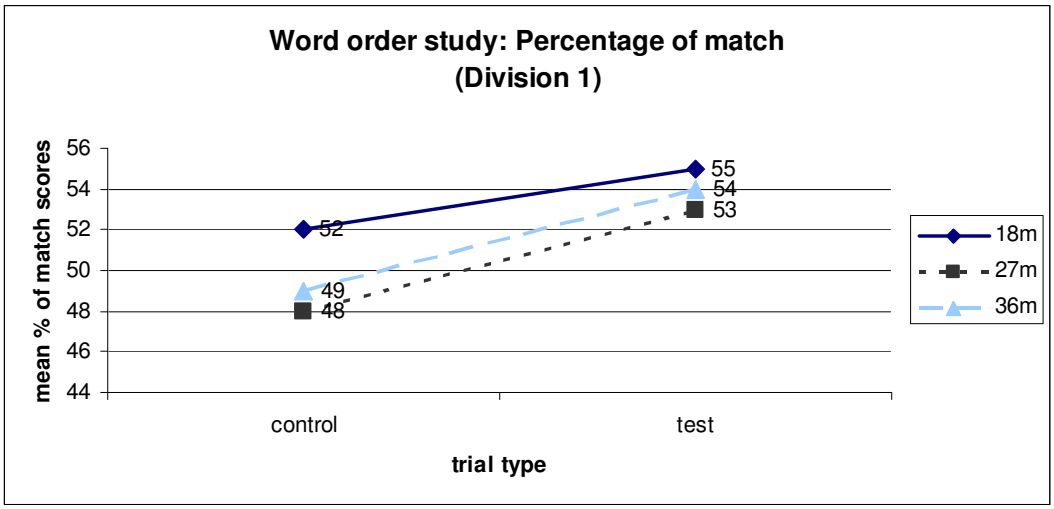

Figure 4.1 Mean percentage of match scores in the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the word order study

If we focus at different age group results, we see that, although we found an overall significant difference between the matching percentages in the control and test trials, this does not apply to the 18-month-old group. The age-specific control-test comparisons for the other two age groups were significant (27-month-olds: [$t(40)= 2.02$; $p=.05$], and 36-month-olds: [$t(43)= 2.09$; $p< .05$]). The non-significant effect for the 18-month-old group can be attributed to power issues due to low sample size (partial eta squared: .026).

Comparing the matching percentages in the test trials with the control trials may not always give us the best picture. To examine closely the matching behavior in the test trials, we also run a one-sample t-test to compare it to %50 baseline chance level. The overall results revealed that children looked at the matching video more than 50% of the time in the test trials [mean=.54, $t(108)= 2.93$; $p<.05$] and children looked equally often at either scene in the control trials [mean=.49 $t(108)= -.86$; $p>.05$]. Age-specific results showed that the mean percentage of match score in the test trials were significantly above chance level for only the 18-month-old group [mean=.55, $t(23)= 2.08$; $p<.05$]. In addition, in all three age groups, children did not look at either scene preferably during the control trials

4.1.1.2 Division 2

In the division 2 analyses, we compared the percentage of match scores in the first (T1) and the second (T2) half of the test trials with each other and with the overall percentage of match score for the control trials (computed over the entire length of the 6 second trial) (CT). We performed 3 consecutive two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable in the first two: [age (3 age groups) X test type (CT, T1); age (3 age groups) X test type (CT, T2)]. We used 'test order' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test order (T1, T2)] in the third one, where we were comparing the first half of the trial to the second. The purpose was to examine how similar was a child's watching behavior over the course of the test trials and see whether matching percentages were different for the first and the second half of the trials.

Results showed an almost significant result for the CT and T1 comparison [$F(1,106)=3.59$; $p=.06$] and a significant test type effect for the CT and T2 comparison [$F(1,106)= 4.77$; $p<.05$] but no significant main effect was observed for the test order (see Figure 4.2 for the mean percentage of match scores for the first (T1) and the second (T2) half of the test trials for the three age groups). Although the T1-T2 difference was in the opposite direction for the 36-month-old group, no significant interaction effect was

observed. These results indicated that in the word order study, children's matching behavior was similar over the entire length of the test trials. However, when we turn to the age-specific results, no significant difference was found between the CT and T1 for the 36-month-old group. A significant main effect for test type (CT, T2) was only observed for the second half of the test trials for that group [$F(1,43)=6.14$; $p<.05$] (see Table 4.2 for the descriptive figures for the T1 and T2 and CT).

Table 4.2 Mean percentage of match scores for the first (T1) and the second (T2) half of the test trials and the overall control trials (CT) for the three age groups participating in the word order study

	CT	T1	T2
18-month-olds	51.75	53	51.54
	(11.45)	(15.28)	(16.02)
27-month-olds	47.61	54.71	54.27
	(13.26)	(16.32)	(17.91)
36-month-olds	48.93	51.43	55.59
	(9.66)	(16.79)	(18.45)
Total	49.06	53.01	54.20
	(11.52)	(16.19)	(17.64)

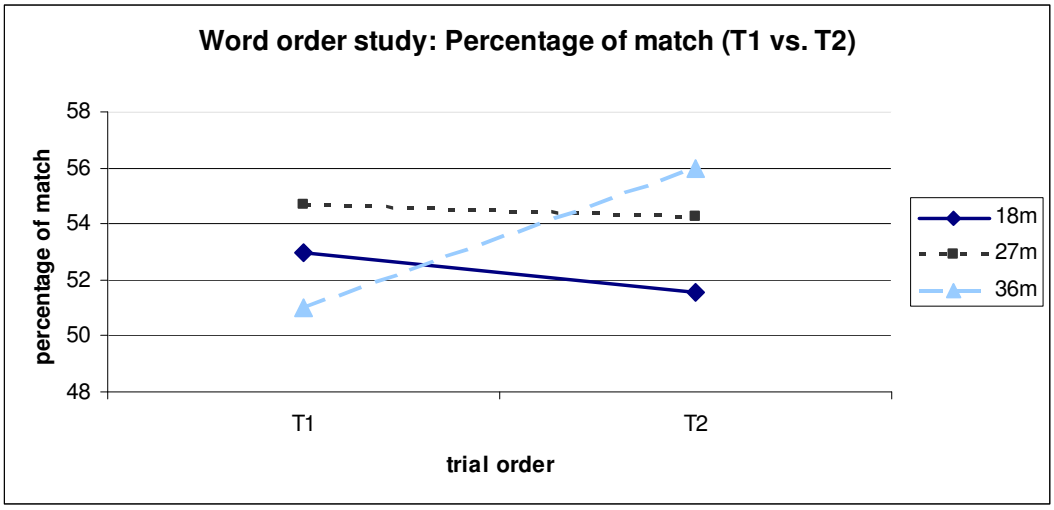

Figure 4.2 Mean percentage of match scores for the first (T1) and the second (T2) half of the test trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the word order study

We also examined the matching behavior using time-course graphs which show the mean percentage of match and non-match scores for the whole word order video plotted along a set of 6 second intervals, separately for the control and test trials. Time-course graphs also show the mean percentages of looking time at the center and away (see Figure 4.3 for the time-course graph showing the mean percentages of looking time at the matching scene, non-matching scene, center, and away plotted for 6 sec. intervals in the control and test trials for all ages combined). We notice that children look longer at the

matching side over the entire length of the test trials and they look almost equally at either the matching or the non-matching scenes in the control trials.

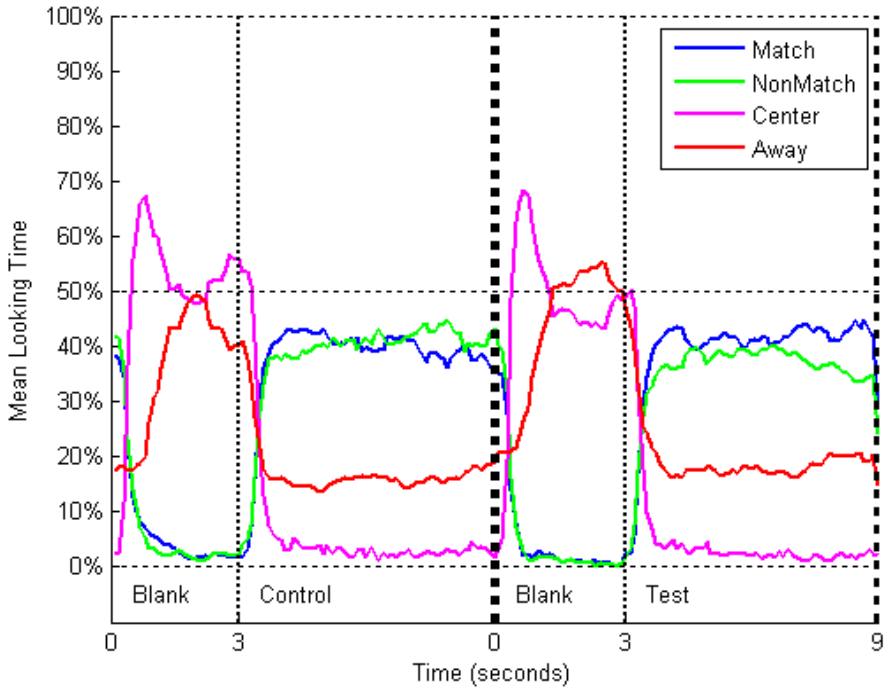

Figure 4.3 Time-course graph showing the mean percentages of looking time at the matching scene, non-matching scene, center and, away plotted for 6 sec. intervals in the overall control and test trials (three ages combined) for the word order study

4.1.2 Latency

Response latency is investigated in terms of two different variables: latency of the first look at the matching scene (MLatency) and to the non-matching scene (NMLatency). Regarding the MLatency, we performed a two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)]. The intention was to investigate whether the mean number of seconds passing before the first look at the matching side is different in the control versus test trials (see Table 4.3 for the mean latency scores for each age group).

Table 4.3 Mean response latency scores to the matching scene (MLatency) and non-matching scene (NMLatency) in the test and control trials for the three age groups participating in the word order study

	MLatency		NMLatency
	Control	**Test**	**Test**
18-month-olds	1.87	1.72	2.20
	(1.03)	(.85)	(.87)
27-month-olds	1.50	1.77	2.15
	(.94)	(.93)	(.77)
36-month-olds	1.47	1.72	1.83
	(.91)	(.82)	(.93)
Total	1.57	1.74	2.03
	(.95)	(.86)	(.87)

No significant main effects are observed for the test type and age. The latency of first look at the matching scene was similar across trial types (see Figure 4.4 for the mean response latency to the matching scene in the test and control trials for the three age groups). Although no significant interaction effect was found, the control-test trial difference was in the opposite direction for the 18-month-old group compared to the 27- and the 36-month-old group.

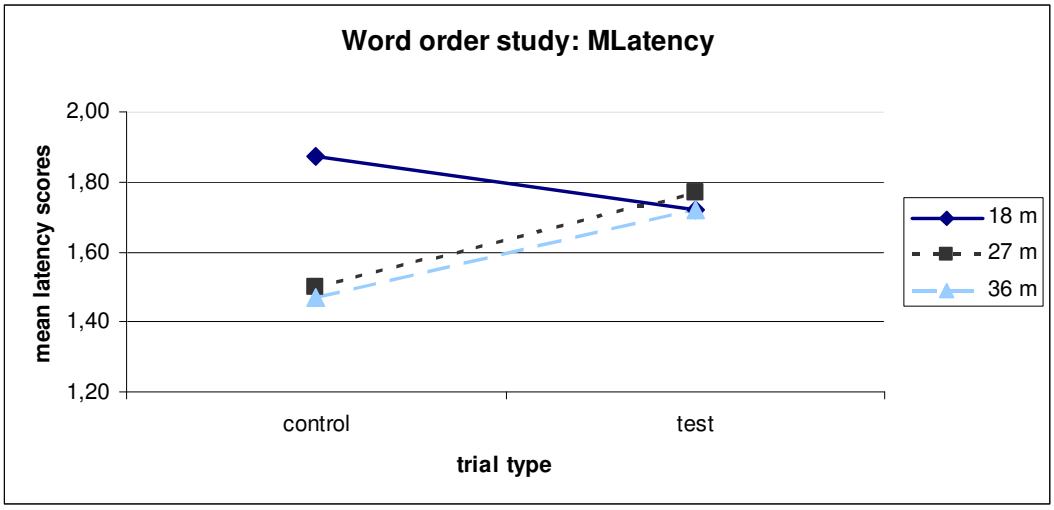

Figure 4.4 Mean response latency (in seconds) to the matching scene (Mlatency) in the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the word order study

To investigate the response latency to the non-matching scene (NMLatency), we explored the difference between MLatency and NMLatency in the test trials. We conducted a two-way Repeated Measures ANOVA with 'latency type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X latency type (MLatency, NMLatency)]. A significant main effect for latency type [$F(1,106)=6.90$; $p<.05$] was observed but no main effect for age was found (see Figure 4.5 mean latency scores to the matching scene and the non-matching scene in the test trials for the three age groups). In

the word order study, children looked at the matching scene sooner compared to the non-matching scene in the test trials.

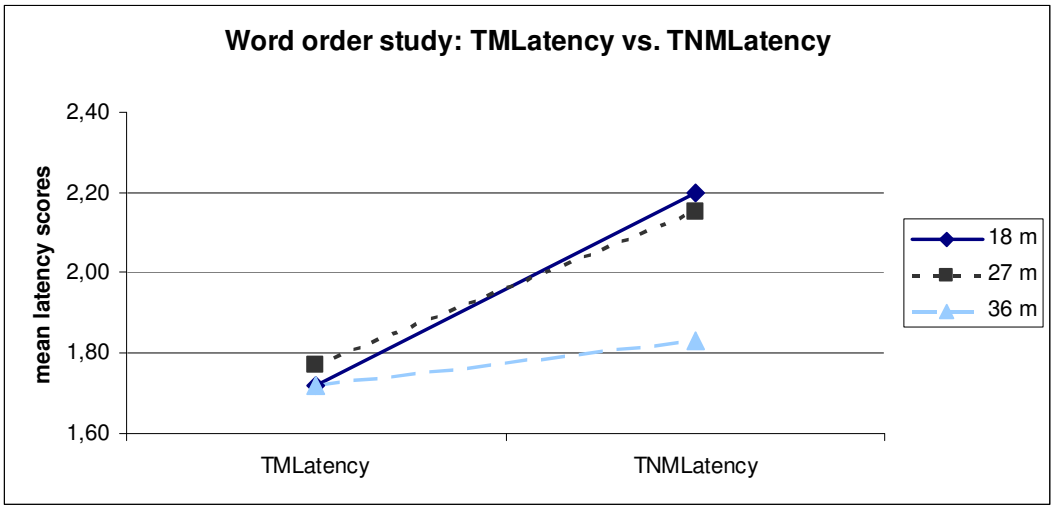

Figure 4.5 Mean latency scores (seconds) to the matching scene in the test trial (TMLatency) and to the non-matching scene in the test trial (TNMLatency) for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the word order study

4.1.3 Switches

We performed first a two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)]. We examined whether the frequency of switching is different in the control versus test trials and whether there is any age effect (see Table 4.4 for the mean number of switches for the test and control trials in the three age groups). We found a significant main effect for the test type variable [($F(1,106)=34.63$; $p<.05$], but no significant effect for the age variable (see Figure 4.6 for the mean number of switches during the test and control trials for the three age groups) .

Table 4.4 Mean number of switches for the test and control trials for the three age groups participating in the word order study

	18-month-olds	**27-month-olds**	**36-month-olds**	**Total**
Control	8.12	7.86	8.42	8.14
	(2.30)	(1.52)	(1.73)	(1.80)
Test	7.22	7.20	7.26	7.23
	(1.77)	(1.56)	(1.40)	(1.53)

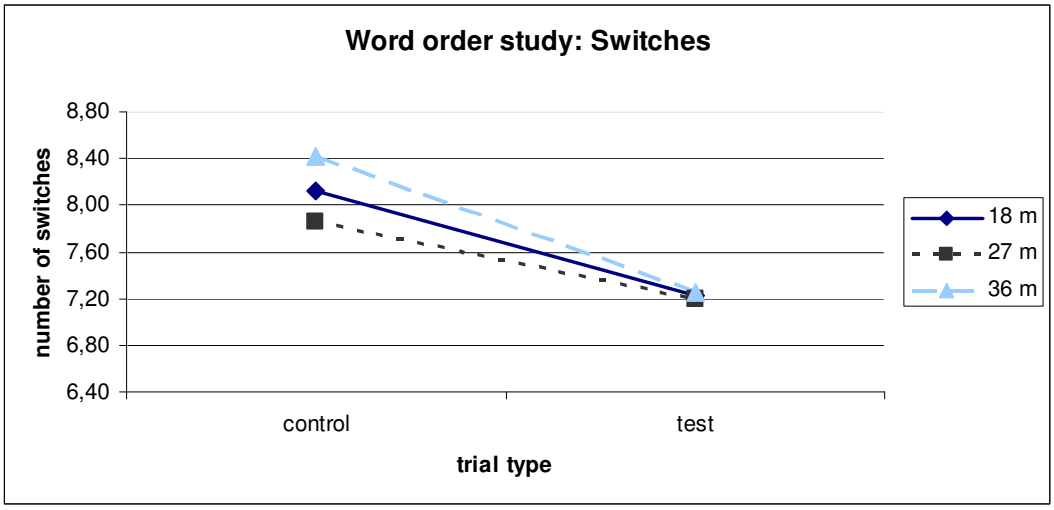

Figure 4.6 Mean number of switches for the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the word order study

Age-specific pairwise t-test results also indicated significant main effects for the test type for all three age groups: 18-month-olds [$t(23)=2.94$; $p<.05$], 27-month-olds [$t(40)=2.74$; $p<.05$] and 36-month-olds [$t(43)=4.84$; $p<.05$]. Results showed that children switched sides more often during the control trials than during the test trials.

In sum, children in the word order study looked at the matching side of the screen longer in the test trials compared to the control trials, they looked sooner at the matching

scene compared to the non-matching scene in the test trials and they switched sides more often in the control trials compared to the test trials.

4.1.4 Character identification

This is the first time the IPL method was administered with Turkish learners in Turkey. To make sure the method works as a research tool, we also analyzed the character identification scores (percentage of looking at the matching side in the character identification trials) in order to make sure looking is indicative of matching. We investigated whether the mean percentage of match scores for the horse and the bird identification trials are above chance level for the word order study. To examine that, we conducted one-sample t-tests for the horse and bird identification trials against %50 chance level. Overall results showed that children looked at the matching video more than 50% of the time in the trials that introduced the horse [mean=.54, $t(105)=3.09$; $p<.05$] and the bird [mean=.68, $t(104)=10.11$; $p<.05$].

Age-specific results also showed that the mean percentage of match in the character identification trials was significantly different than chance level for only the bird identification for the 18 and 27-month-old groups [18-month-olds: $t(22)=2.19$; $p<.05$; 27-month-olds: $t(37)=6.34$; $p<.05$] and for both the horse and the bird identification for the 36-

month-old group [(horse: $t(43)=2.53$; $p<.05$; bird: $t(43)=8.82$; $p<.05$)] (see Table 4.5 for the mean percentage of match scores for the character identification trials for the three age groups).

Table 4.5 Mean percentage of match scores for the horse and bird identification trials for the three age groups participating in the word order study

	18-month-olds	27-month-olds	36-month-olds	Total
Horse intro	52.22 (10.88)	53.10 (12.78)	56.05 (15.83)	54.13 (13.76)
Bird intro	57.70 (16.82)	69.76 (19.20)	72.20 (16.69)	68.14 (18.40)

To examine whether there is a difference between the age groups in terms of the matching behavior in character identification trials, one-way ANOVA results showed that there was no age effect for the horse introduction trials but there was a significant main effect for age for the bird introduction trials [$F(2,103)= 5.20$; $p<.05$]. Post hoc pairwise comparisons using Scheffe test showed that the significant main effect reflects a significant difference between the 18-month-old group and the other two age groups (27-month-old group and the 36-month-old group), but not between the 27-month-old group and the 36-month-old group. Descriptive figures show that 27-month-old and 36-month-old groups

look significantly longer at the matching side in the trial that introduces the bird compared to the 18-month-old group.

4.1.5 Looking time

The overall mean looking time at the screen throughout the video was also investigated in order to better understand the amount of involvement on the part of the child and to examine whether the mean number of seconds children looked at the screen in the control and test trials differs for the three age groups. One-way ANOVA results showed a significant main effect for age [$F(2,106)=5.75$; $p< .05$] for the test trials and no significant age effect for the control trials (see table 4.6 for the mean number of seconds children looked at the screen for the test and control trials). Further post hoc Scheffe tests showed that the significant age effect in the test trials resulted from the difference between the 18-month-old group and the 36-month-old group: 18-month-olds spent less time watching the test trial videos compared to the 36-month-olds.

Table 4.6 Mean number of seconds children looked at the screen for the test and control trials for the three age groups participating in the word order study

	18-month-olds	27-month-olds	36-month-olds	Total
Control	4.40	4.69	4.86	4.70
	(1.15)	(.89)	(.96)	(.99)
Test	4.24	4.37	4.92	4.56
	(1.11)	(1.03)	(.62)	(.94)

4.1.6 Mullen scores

The Mullen Scales of Early Learning administration provided scores on 4 subscales of visual reception, fine motor, receptive language and expressive language. Overall, the expressive language stands out as the subscale in which there was the most variation among participants. Table 4.7 shows the age-specific raw scores for each sub-scale for the Mullen test.

Table 4.7 Mean scores for each subscale (visual reception, fine motor, receptive language and expressive language) of the Mullen Scales of Early Learning test for the three age groups participating in the word order study

	Visual	Fine motor	Recept. Lang.	Express. Lang.	Total
18-m-olds	22	19.80	19.33	16.33	77.46
	(3.73)	(2.98)	(4)	(3.46)	(11.38)
27-m-olds	31.44	26.30	28.15	27.02	112.15
	(3.49)	(2.24)	(2.91)	(5.48)	(11.75)
36-m-olds	36.60	32.60	32.93	34.82	136.93
	(3.30)	(4.59)	(2.77)	(5.41)	(12.32)

4.1.7 Demographic scores

We coded seven demographic variables into numeric values which were the following: years of education of the father, years of education of the mother, hours spent in a week outside of the home environment, hours spent in a week watching television, hours spent in a week watching educational programs on television and hours in a week spent on joint reading (see Table 4.8 for the mean figures for the relevant variables stated above).

Table 4.8 Means for the father's education (years), mother's education (years),hours spent outdoors in a week, hours spent in week watching television, hours spent in a week watching educational programs on television and hours in a week spent on joint reading for the word order study

	F. educ.	M. educ.	Outdoor	Tv time	Tv educ.	Reading
18m	13.55	13.36	10.21	4.71	4.45	7
	(3.07)	(2.06)	(8.64)	(4.57)	(4.34)	(6.43)
27m	14.08	13.70	10.47	8.70	7.20	5.71
	(1.94)	(2.18)	(18.51)	(6.63)	(6.82)	(5.28)
36m	13.95	14.26	15.59	10.18	8.18	6.14
	(3.24)	(2.45)	(13.33)	(10.53)	(10.46)	(4.85)
Total	13.91	13.85	12.62	8.45	6.95	6.15
	(2.76)	(2.27)	(14.65)	(8.35)	(8.10)	(5.32)

The descriptive results for the word order study indicate that the average education levels of the mother and the father are both past high school (high school education level is accepted as 11 years). There is a trend towards watching more television than engaging in reading activity.

4.2 The accusative study

In the accusative study, children were exposed to simple transitive sentences in the SOV order, featuring an accusative case marker on the direct object. The sentences were practically the same as in the word order study, presenting the same four actions; the only difference was now the patient was marked with the accusative case marker.

4.2.1 Percentage of match

4.2.1.1 Division 1

A two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)] was performed to investigate whether there is a significant difference between the control and test trials in terms of the percentage of match scores and whether this difference is the same in the three age groups. The percentage of match scores were computed over the entire length of the test and the control trials. No significant main effect was found for the test type [($F(1,107)= .826$; $p>.05$] and age variables [$F(2,107)=.526$; $p>.05$] and no significant interaction effect was observed (see Figure 4.7 for the mean percentage of match scores in the test and control trials in the three age groups). Children's matching

behavior was similar across the control and test trials and across the age groups (see Table 4.9 for the mean percentage of match scores for the three age groups).

Table 4.9 Mean percentage of match scores in the test and control trials for the three age groups participating in the accusative study

	18-month-olds	**27-month-olds**	**36-month-olds**	**Total**
Control	52.63 (11.66)	48.68 (9.40)	49.85 (7.21)	50.39 (9.12)
Test	47.88 (17.88)	47.80 (16.24)	51.65 (14)	49.43 (15.70)

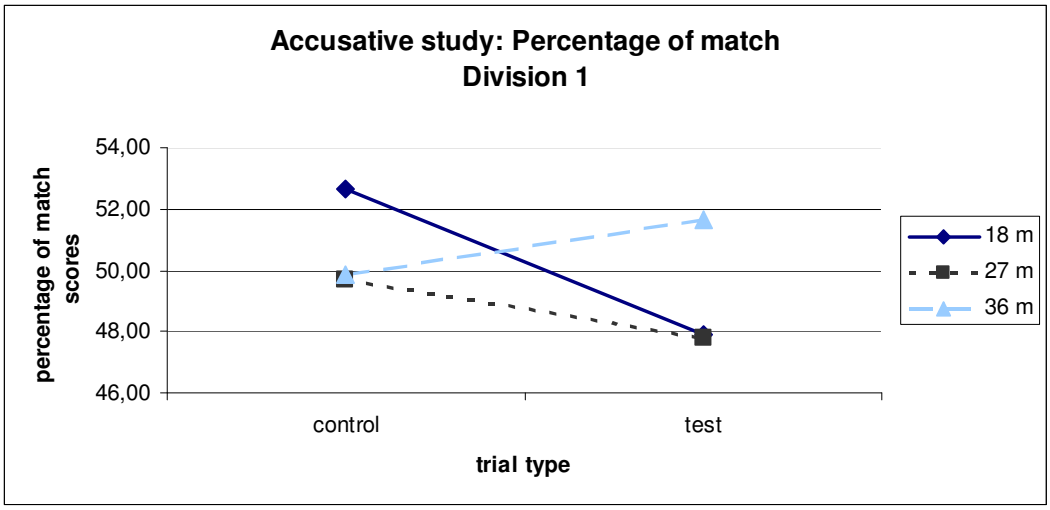

Figure 4.7 Mean percentage of match scores in the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

Although no significant main effect was found for the test type, the descriptive figures showed that the percentage of match difference between the control and test trials was in the expected direction for the 36-month-old group. To investigate whether there is a significant test type effect for the 36-month-old group, a pairwise t-test was conducted, which yielded non-significant results.

Depending on the overall results for the accusative study computed over the entire length of the trials, children did not seem to behave differently on the control versus test trials. This result was contrary to the initial expectations. To explore in detail the matching behavior of the children over the course of the testing trials, we conducted further analyses of the data by dividing the test trials into two equal 3-second intervals to examine how the looking behavior progresses through the trial.

4.2.1.2 Division 2

In the division 2 analyses, we compared the percentage of match scores in the first (T1) and the second (T2) half of the test trials by performing a two-way Repeated Measures ANOVA with 'test order' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test order (T1, T2)].

We found a significant main effect for the test order [$F(1,107)=4.31$; $p<.05$] which showed that the matching behavior was different between the first and the second half of the test trials and this effect was similar for the three age groups (see Figure 4.8 for the mean percentage of match scores for the first (T1) and the second (T2) half of the test trials for the three age groups). Descriptive figures indicated that children looked more at the

matching side in the second half of the test trial compared to the first one (see Table 4.10 for the mean percentage of match scores for the CT, T1 and T2).

Table 4.10 Mean percentage of match scores for the overall control trials (CT) and the first (T1) and the second (T2) half of the test trials for the three age groups participating in the accusative study

	CT*	**T1**	**T2**
18-month-olds	52.63	45.58	52.33
	(11.66)	(16.42)	(22.83)
27-month-olds	49.68	46.10	48.58
	(9.40)	(21.68)	(22.37)
36-month-olds	49.85	45.63	53.54
	(7.22)	(20.06)	(21.57)
Total	50.39	45.79	51.47
	(9.12)	(19.78)	(22.05)

***** Mean percentage of match score for the overall control trials (entire trial: 6 sec)

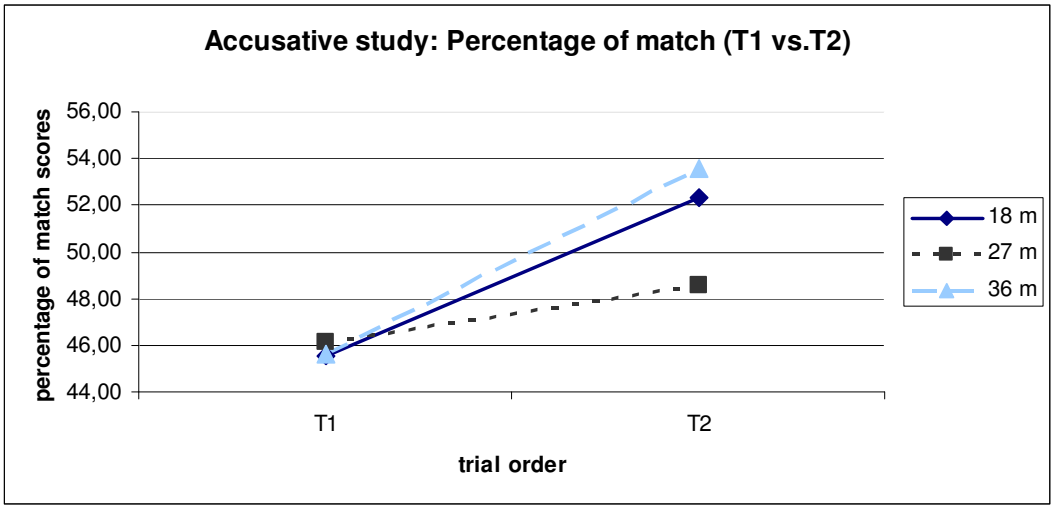

Figure 4.8 Mean percentage of match scores for the first (T1) and the second (T2) half of the test trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

The matching behavior is also examined using the time-course graphs for the whole accusative video plotted along a set of 6 second intervals, separately for the control and test trials. We include two types of time-course graphs: the first one shows only the mean percentage of looking time at the matching and the non-matching scenes, disregarding the amount spent looking at the center and away (see Figure 4.9 for the time-course graph for the mean percentages of looking time at the matching and the non-matching scene plotted for 6 sec. intervals in the overall test and control trials). The second one includes all the

coded directions of looking (see Figure 4.10 for the time-course for the mean percentages of looking time at the matching scene, the non-matching scene, the center and away plotted for 6 sec. intervals in the overall test and control trials). We notice that children look more at the matching side during the second half of the test trials and they look almost equally at either the matching or the non-matching scenes in the control trials.

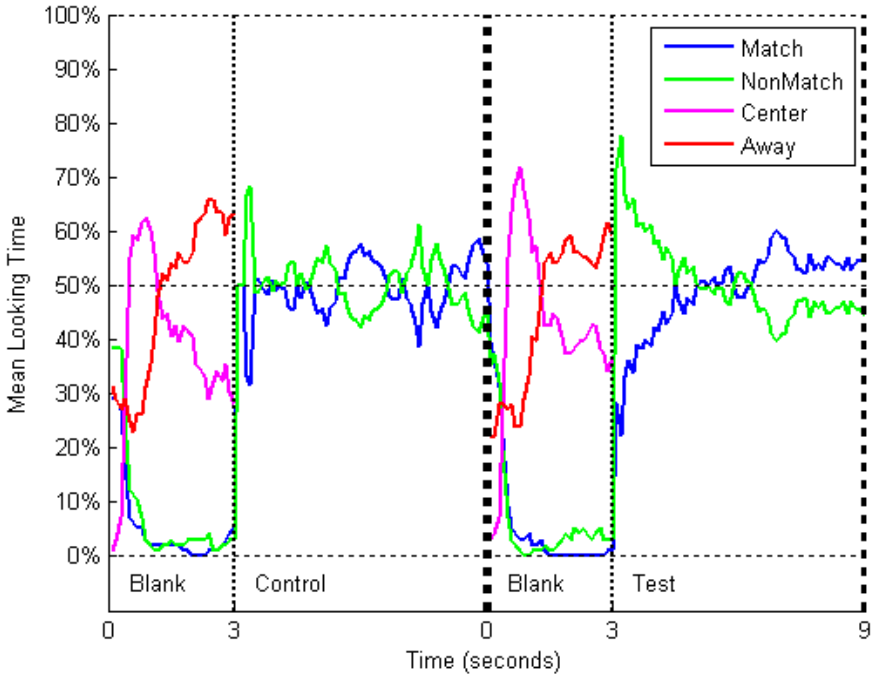

Figure 4.9 Time-course graph showing the mean percentages of looking time at the matching scene, the non-matching scene (excluding center and away) plotted for 6 sec. intervals in the overall test and control trials (three ages combined) for the accusative study

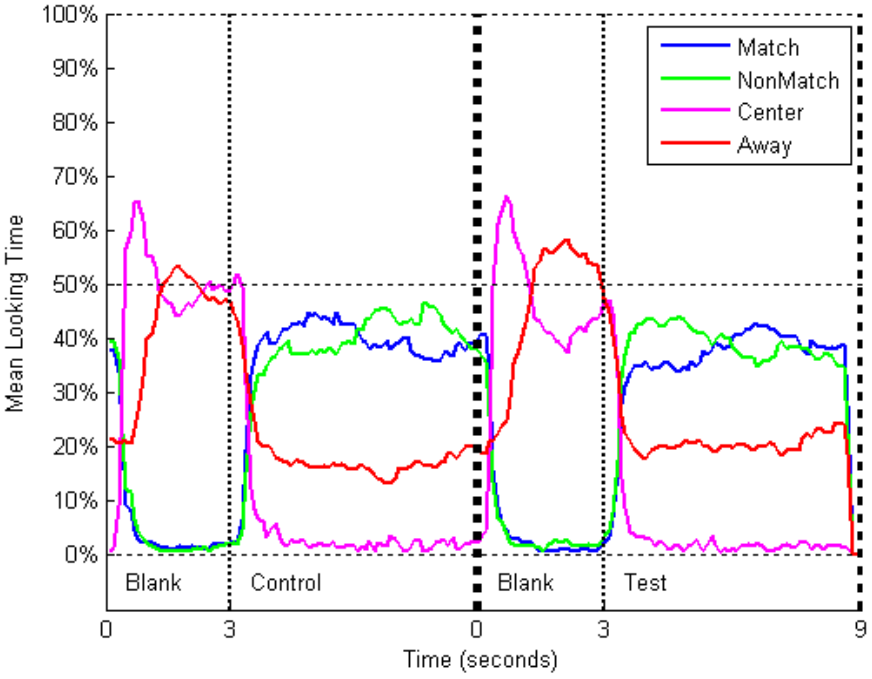

Figure 4.10 Time-course graph showing the mean percentages of looking time at the matching scene, the non-matching scene, the center and away plotted for 6 sec. intervals in the overall test and control trials (three ages combined) for the accusative study

We performed a two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [(3 age groups) X test type (CT, T2)] to investigate whether the mean percentage of match score for the T2 is different from the overall percentage of match score for the control trials (CT). The results showed no main effect for the test type and age variables and no interaction effect was

observed (see Figure 4.11 for the mean percentage of match scores for the CT and T2 for the three age groups). Descriptive figures showed that the 36-month-old group was again the only group in which the control and test trial difference was in the expected direction in the second half of the test trials. But this difference still did not reach significance (see Figure 4.12 and 4.13 for the time course graphs showing the looking behavior of the 36-month-old group for the test and control trials)

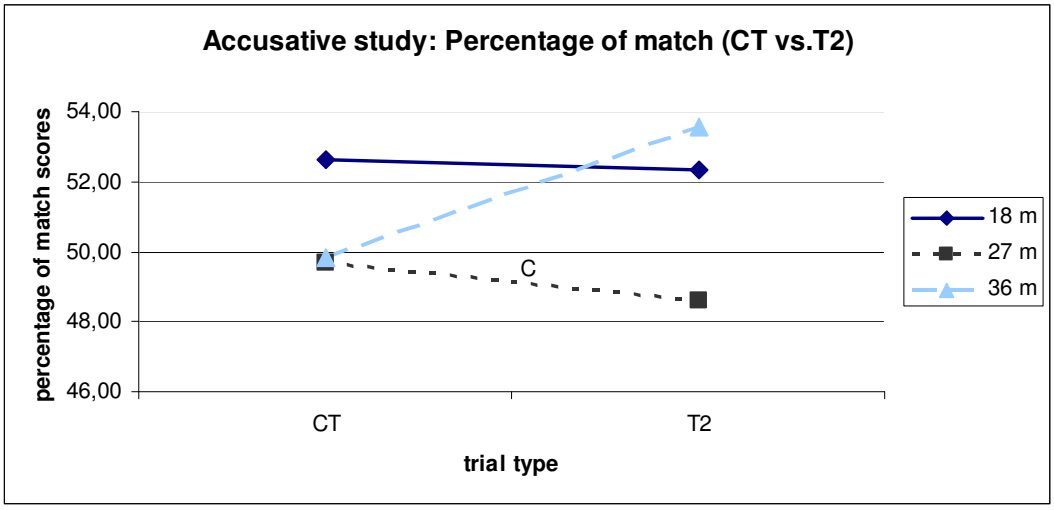

Figure 4.11 Mean percentage of match scores for the overall control trials (CT) and the second (T2) half of the test trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

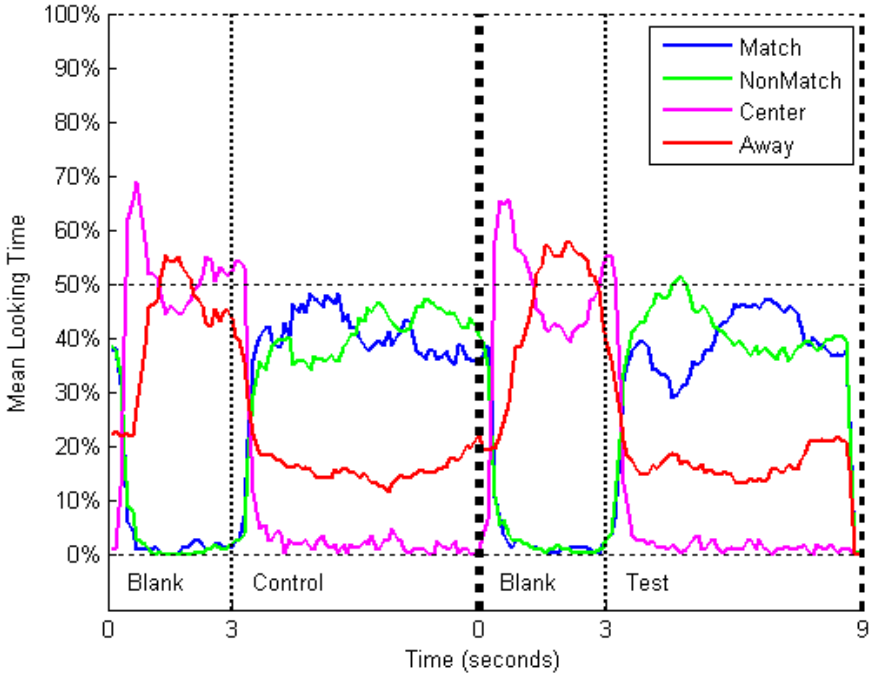

Figure 4.12 Time-course graph showing the mean percentages of looking time at the matching scene, the non-matching scene, center and away plotted for 6 sec. intervals in the overall test and control trials (36-month-olds) for the accusative study

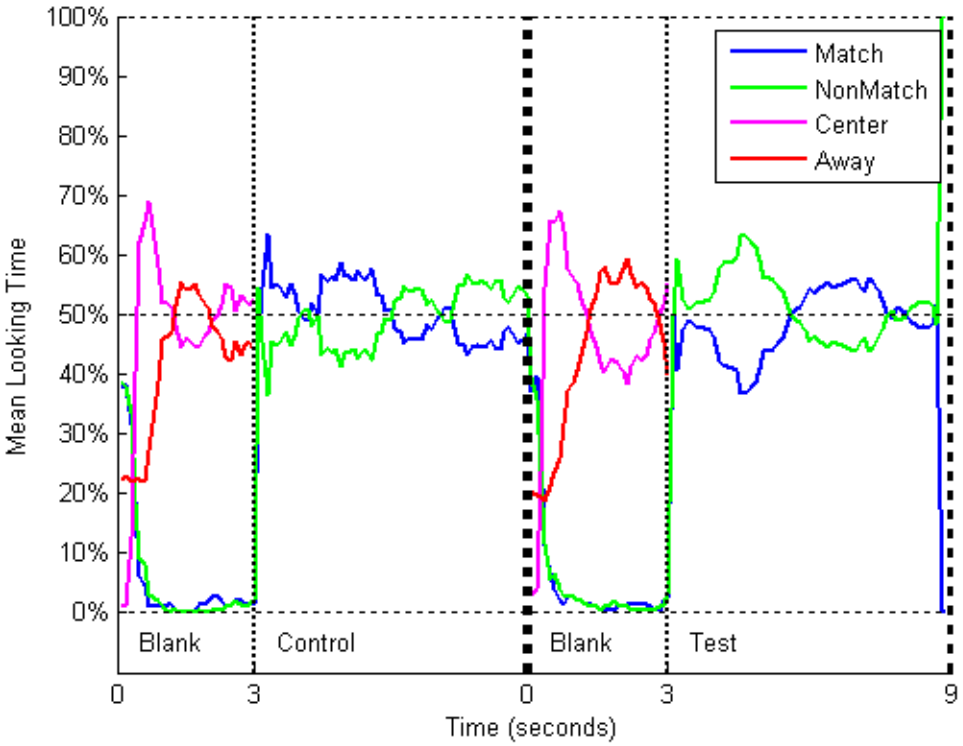

Figure 4.13 Time-course graph showing the mean percentages of looking at the matching scene, the non-matching scene (excluding center and away) plotted for 6 sec. intervals in the overall test and control trials (36-month-olds) for the accusative study

4.2.2 Latency

As in the word order study, response latency is investigated in terms of latency to the matching scene (MLatency) and latency to the non-matching scene (NMLatency). We performed a two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)] in order to examine whether there is a significant difference between the latency of first look at the matching scene in the control versus test trials. A significant main effect for the test type [$F(1,107)=37.88$; $p<.05$] and age [$F(2,107)=3.31$; $p<.05$] is observed. Children looked at the matching scene significantly later in the test than control trials (see Figure 4.14 for the mean response latency to the matching scene in the test and control trials in the three age groups). The significant age effect reflected the difference between the 18-month-old group and the 36-month-old group, though one-way ANOVA results for the test trial did not yield a significant main effect for age (see Table 4.11 for the descriptive figures for the MLatency and NMLatency variables for each age group).

Table 4.11 Mean response latency scores to the matching scene (MLatency) and the non-matching scene (NMLatency) in the test and control trials for the three age groups participating in the accusative study

	MLatency		**NMLatency**	
	Control	**Test**	**Control**	**Test**
18-month-olds	1.80	2.41	1.81	1.95
	(.80)	(.96)	(.87)	(1.11)
27-month-olds	1.35	2.19	1.66	1.83
	(.67)	(1.09)	(.71)	(1.08)
36-month-olds	1.35	1.95	1.51	1.81
	(.72)	(1.04)	(.67)	(1.08)
Total	1.45	2.14	1.63	1.85
	(.74)	(1.05)	(.74)	(1.08)

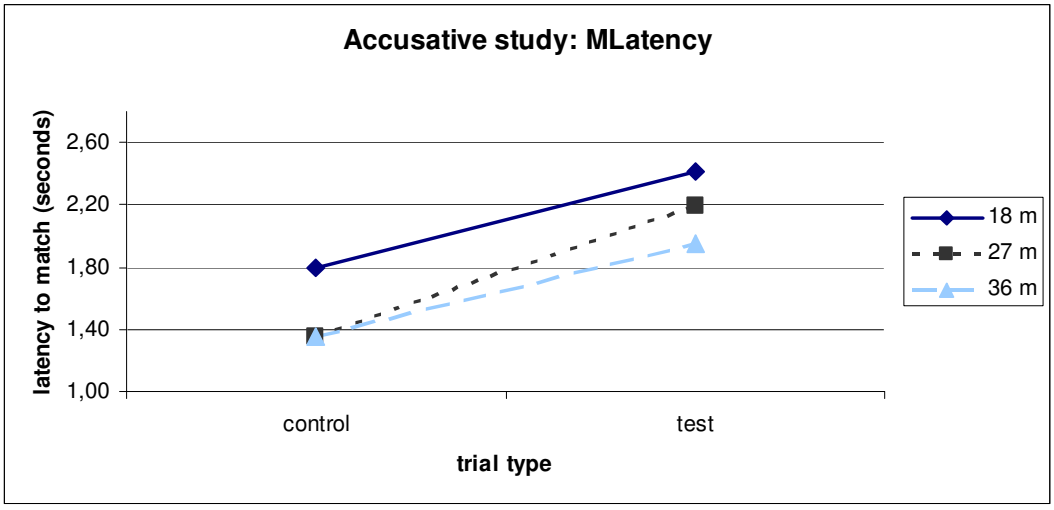

Figure 4.14 Mean response latency to the matching scene (Mlatency) (in seconds) in the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

To investigate the response latency to the non-matching scene (NMLatency), we explored the difference between MLatency and NMLatency in the test trials. We conducted a two-way Repeated Measures ANOVA with 'latency type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X latency type (MLatency, NMLatency)]. A significant main effect was found for the latency type [$F(1,107)=3.99$; $p<.05$] but not for the age variable. Children looked at the matching scene significantly

later compared to the non-matching scene in the test trials (see Figure 4.15 for the mean latency scores to the matching and the non-matching scene in the test trials for the three age groups).

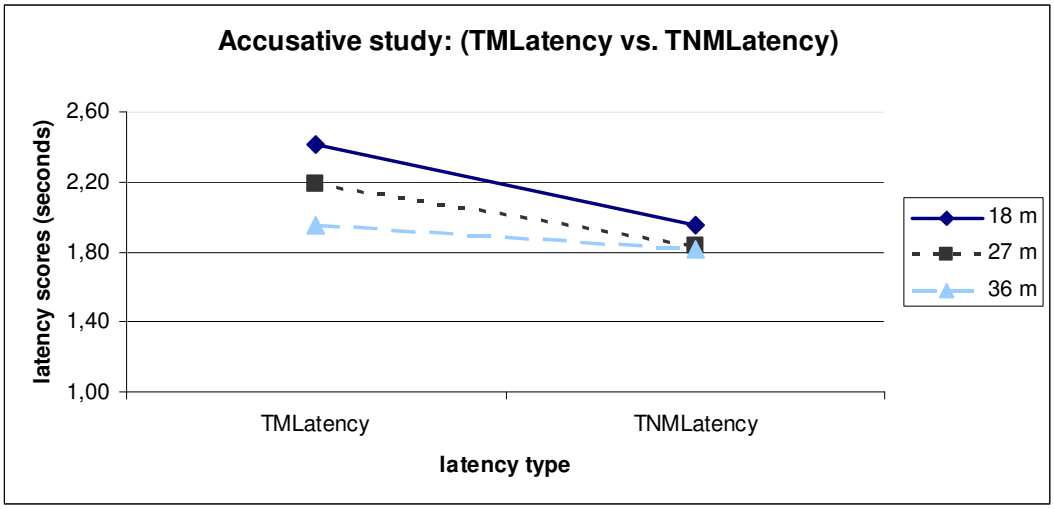

Figure 4.15 Mean latency scores (in seconds) to the matching scene in the test trial (TMLatency) and to the non-matching scene in the test trial (TNMLatency) for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

4.2.3 Switches

A two-way Repeated Measures ANOVA with 'test type' as the within-subjects variable and 'age' as the between-subjects variable [age (3 age groups) X test type (control, test)] was performed to examine whether the mean number of switches made to either direction is different in the control versus test trials for the accusative study. We also examined whether there is an age effect for the switching behavior. A significant main effect was observed for the test type [($F(1,107)= 51$; $p<.05$] but no main effect was found for the age variable (see Figure 4.16 for the mean number of switches in the test and control trials in the three age groups). Results showed that children in the accusative study switched sides more often during the control trials compared to the test trials (see Table 4.12 for the mean number of switches for the three age groups)

Table 4.12 Mean number of switches in the test and control trials for the three age groups participating in the accusative study

	18-month-olds	**27-month-olds**	**36-month-olds**	**Total**
Control	8.31	8.05	8.15	8.15
	(2.52)	(1.39)	(1.53)	(1.74)
Test	7.20	6.85	6.88	6.94
	(2.24)	(1.56)	(1.51)	(1.70)

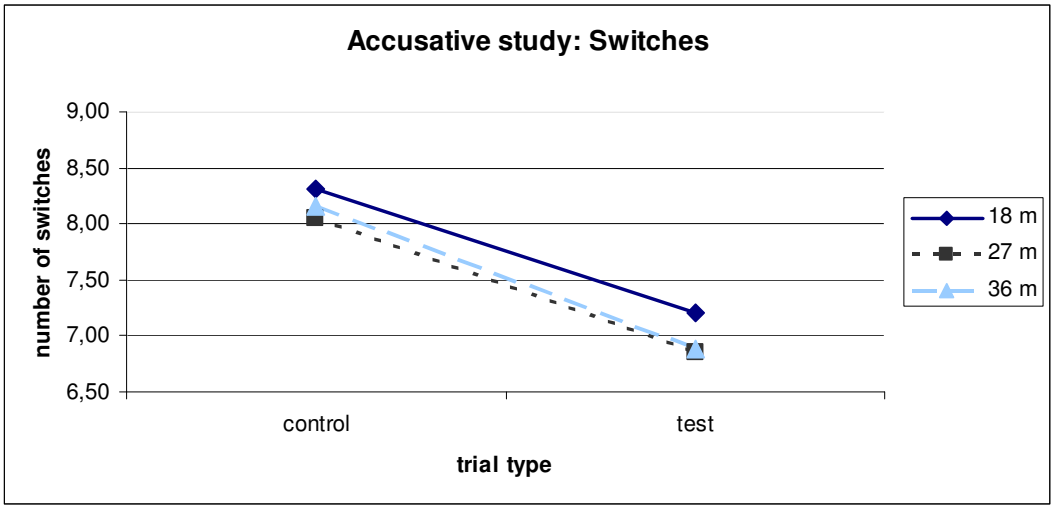

Figure 4.16 Mean number of switches in the test and control trials for the three age groups (18-month-olds, 27-month-olds, 36-month-olds) participating in the accusative study

Age-specific pairwise t-test results for this variable again gave significant results for the three age groups: 18-month-olds [$t(23)= 3.01$; $p<.05$], 27-month-olds [$t(39)= 4.83$; $p<.05$] and 36-month-olds [$t(45)= 5.01$; $p<.05$]. For all age groups, children made more switches in the control trials compared to the test trials.

4.2.4 Character identification

We investigated whether the mean percentage of match scores for the horse and bird identification trials are above chance level (%50) for the accusative study. Overall one-sample t-test results showed that children looked at the matching video more than 50% of the time in the horse [mean= .61 $t(108)= 8.22$; $p<.05$] and bird [mean=.68, $t(107)= 9.92$; $p<.05$] introduction trials. We also investigated age-specific scores in detail by performing one-sample t-tests which showed that the mean percentage of match scores were significantly above chance for the horse and the bird identification trials in the 27-month-old group [(horse: $t(39)=5.06$; $p<.05$; bird: $t(38)=6.57$; $p<.05$)] and the 36-month-old group [(horse: $t(44)=5.80$; $p<.05$; bird: $t(44)=11.16$; $p<.05$)] and for only the horse identification trial in the 18-month-old group [$t(23)=2.95$; $p<.05$] (see Table 4.13 for the mean percentage of match scores for the character identification trials for the three age groups).

Table 4.13 Mean percentage of match scores for the horse and bird identification trials for the three age groups participating in the accusative study

	18-month-olds	27-month-olds	36-month-olds	Total
Horse intro	58.42	61.40	62.78	61.47
	(13.96)	(14.24)	(14.77)	(14.33)
Bird intro	54.04	68.74	74.04	67.56
	(19.97)	(17.81)	(14.45)	(18.58)

One-way ANOVA results showed that there was a significant main effect for age variable for the bird introduction trials [$F(2,106)= 10.62$; $p<.05$]. Post hoc Scheffe tests indicated a significant difference between the 18-month-old group and the other two age groups (27-month-old group and the 36-month-old group). The mean percentage of match scores in the introduction trials were smaller for the 18-month-old group compared to the 27-month-old and 36-month-old groups.

4.2.5 Looking time

A one-way ANOVA test is performed to investigate whether the mean number of seconds spent looking at the screen during the control and test trials is different for the three age groups (see Table 4.14 for the mean number of seconds children looked at the

screen for the test and control trials). Results showed a significant main effect for age for the test [$F(2,107)=3.93$; $p< .05$] and control trials [$F(2,109)=5.59$; $p< .05$] . To examine further the age effect, we performed a post hoc Scheffe tests which revealed that the significant age effect in the test trials reflects the difference in looking time between the 18-month-old group and the 36-month-old group: 36-month-olds spent more time looking at the test trial videos compared to the 18-month-old group; and the significant age effect in the control trials stems from the difference in mean looking time for the 18-month-old group and the other two age groups: 27-month-ols and the 36-month-olds. 18-month-olds spent significantly less time watching the control videos than the older age groups.

Table 4.14 Mean number of seconds children looked at the screen for the test and control trials for the three age groups participating in the accusative study

	18-month-olds	**27-month-olds**	**36-month-olds**	**Total**
Control	4.22	4.82	4.88	4.72
	(.93)	(.73)	(.85)	(.86)
Test	4.19	4.53	4.83	4.58
	(1.10)	(.86)	(.87)	(.94)

4.2.6 Mullen scores

Age-specific mean scores for each subscale of the Mullen Scales of Early Learning test (visual reception, fine motor, receptive language and expressive language) is presented in the Table 4.15.

Table 4.15 Mean scores for each subscale (visual reception, fine motor, receptive language and expressive language) of the Mullen Scales of Early Learning test for the three age groups participating in the accusative study

	Visual	Fine motor	Recept. Lang.	Express. Lang.	Total
18-m-olds	21.96	20.50	19.54	15.74	77.96
	(3.98)	(1.47)	(3.84)	(2.09)	(8.90)
27-m-olds	31.18	26.17	27.63	25.92	109.92
	(3.75)	(2.88)	(3.46)	(5.91)	(13.32)
36-m-olds	37.07	32.61	32.93	34.04	114.33
	(2.76)	(3.86)	(3.63)	(4.25)	(25.45)

4.2.7 Demographic scores

Mean figures for the demographic variables [father's education (years), mother's education (years), time spent outdoors in a week (hours), time spent watching television in a week (hours), time spent watching educational programs on television in a week (hours), time spent on joint reading in a week (hours)] are displayed in Table 4.16.

Table 4.16 Means for the father's education (years), mother's education (years), hours spent outdoors in a week, hours spent in week watching television, hours spent in a week watching educational programs on television and hours in a week spent on joint reading for the accusative study

	F. educ.	M. educ.	Outdoor	Tv time	Tv educ.	Reading
18m	14.68	15.05	12.93	5.49	4.25	4.45
	(2.61)	(2.08)	(9.86)	(4.78)	(4.63)	(3.10)
27m	14	14.13	13.90	10.63	8.76	5.57
	(2.16)	(2.10)	(15.48)	(7.62)	(7.65)	(4.96)
36m	14.63	14.13	19.40	10.94	9.23	5.76
	(3.07)	(3.02)	(25.21)	(7.43)	(6.94)	(4.01)
Total	14.41	14.31	15.96	9.69	8.06	5.40
	(2.66)	(2.53)	(19.35)	(7.31)	(7.04)	(4.21)

The descriptive figures for the accusative study showed that the average education levels of the mother and the father are both at the university level (university education level is accepted as 15 years); there is a lot of variability for time spent outdoors; there is a trend towards watching more television compared to engaging in reading activity and younger children watch less television compared to the older children.

4.3 Comparison of accusative and word order studies

4.3.1 Percentage of match

Looking behavior in the overall test trials showed differences for the word order and the accusative study:

First of all, one-way ANOVA test revealed that the overall mean percentage of match score for the test trials was significantly different for the word order and the accusative studies [$F(1,218)= 5.19$; $p< .05$]. Children looked significantly longer at the side of the match in the word order study compared to the accusative study. Furthermore, a two-way Repeated Measures ANOVA with 'test order' as the within subjects variable and 'study' as the between subjects variable [study (word order, accusative) X test order (T1, T2)] is performed to see whether the difference between the mean percentage of match

scores in the first (T1) and the second (T2) half of the test trials is similar for the word order and the accusative studies. Results indicated a significant main effect for study [$F(1,218)= 6.66$; $p< .05$]. While the matching behavior in the first and the second half of the test trials was similar for the word order study, it was different for the accusative study. In the accusative study, children looked more at the matching side during the second half of the test trials compared to the first half.

Secondly, a two-way Repeated Measures ANOVA with 'test type' as the within subjects variable and 'study' as the between subjects variable [study (word order, accusative) X test order (CT, T1)] is performed to see whether the difference between the mean percentage of match scores in the overall control trials (CT) and the first half (T1) of the test trials is similar for the word order and the accusative studies. A significant main effect for study [$F(1,218)=4.15$; $p< .05$] and a significant interaction effect between study and test order [$F(1,218)=9.7$; $p< .05$] were found. The direction of the difference between the percentage of match scores in the control and test trial was in the opposite direction for the word order and the accusative study. While, children in the word order study looked more at the side of the match during the first half of the test trials, children in the accusative study looked less at the matching side during the first half of the test trials.

Thirdly, to examine the looking behavior in the second half (T2) of the test trials, we performed a two-way Repeated Measures ANOVA with 'test type' as the within subjects variable and 'study' as the between subjects variable [study (word order, accusative) X test order (CT, T2)]. No significant main effect for study variable [$F(1,218)=.20$; $p>.05$] was observed. Children's looking behavior at the matching side was similar for both the word order and the accusative study in the second half of the test trials and the direction of difference between the percentage of match scores in the control and test trials was in the same direction.

4.3.2 Latency

Two studies also displayed differences concerning response latency to the matching and the non-matching scene. One-way ANOVA test revealed that the overall mean number of seconds passed before looking at the matching scene in the test trials was significantly different for the word order and the accusative studies [$F(1,218)= 7.08$; $p< .05$]. Children looked significantly later at the side of the match during the test trials of the accusative study compared to the word order study.

Chapter 5

DISCUSSION

5.1 Introduction

The present study examined the reliance on word order and accusative case marking as cues in sentence comprehension in young Turkish-learning children. The aim was to investigate language-specific effects on sentence comprehension in order to contribute to a crosslinguistic understanding of language development. Examining a language like Turkish which relies mostly on nominal inflections to signal subject-object marking, we investigated the effect of the canonical word order SOV alone without morphological cues i.e., accusative case marker, to determine the cue validity of word order in sentence comprehension. In addition, we examined whether accusative case marker is a better cue in identifying 'who does what to whom' compared to word order alone and whether it further enhances comprehension. Another goal was to investigate the developmental course of the usage of those cues in Turkish sentence comprehension by examining its differential effects in three age groups: 18-month-olds, 27-month-olds and 36-month-olds.

The IPL method was chosen due to its suitability to work with very young children, revealing early emerging language abilities which may not be observable otherwise. Such a nonverbal technique requires little explicit performance on the part of children, enriching our knowledge about the level of language knowledge in young children. The IPL method is intended to overcome many difficulties that production and act-out studies have created in the past, demanding only active viewing behavior from the participant.

5.2 Summary and discussion of the results

5.2.1 Word order study

For the word order study, the results showed that the children looked significantly more at the matching side in the test trials compared to the control trials, which were administered to give a baseline measure of the stimulus salience. The mean matching percentage for the test trials was significantly higher than chance. The difference in the matching behavior between the control and test trials was similar across the age groups. When we examine the age-specific results in focus, we see that children looked longer at the side of the match during the test trials in all age groups. However, this difference reached significance only for the 27-month-old and the 36-month-old group. Concerning the 18-month-old group, although we did not find a significant difference between the

control versus the test trials in terms of the matching behavior, the mean percentage of match score in the test trials was higher than the chance level.

Because calculating match over non-match percentage on the basis of entire 6 second trials may not capture the details of the process of the looking behavior, we divided the test trials into two equal 3-second segments. This analysis method was first pioneered by Fernald, Pinto, Swingley, Weinberg, and McRoberts (1988). They adopted a division of time frame approach to look further at different parts of the test trial in detail. When they divided the test trial duration in 2s measurement segments, this division gave a clear picture of the looking behavior of children which could be lost while analyzing aggregate results from the entire 6-second trial period.

Our analysis of the word order data showed that the children looked almost equally in the first and the second half of the test and the control trials. The difference between the trial types (i.e., test vs. control) was significant for both halves. When we look at age-specific results, we see that children in the 36-month-old group looked significantly longer at the side of the match only during the second half of the test trials. Children in the 36-month-old group took their time to consistently look at the matching scene. The time-course graphs indicate an opposite pattern for the 36-month-old group compared to the younger age groups: the matching behavior based on the word order cue was quick in the

18-month-old and the 27-month-old group, fading towards the end of the trial. This trend may be due to a possible boredom effect or the feeling of already having accomplished the task. The late matching behavior observed in the 36-month-old group can be interpreted by suggesting that word order is not an absolute cue in Turkish without the accusative case marker (Aksu-Koç & Slobin, 1985; Göksun et al., 2008; Slobin & Bever, 1982; Ural et al., in press). Older children, having been exposed to the different pragmatic usage of word order and the usage of the accusative case marker in the input for longer, may be more confused and taking more time to use the SOV order alone to interpret sentence roles compared to the younger groups.

Overall, these results indicate that the canonical word order (SOV) alone is used as an informative cue by young Turkish-speaking children to determine the relationship between sentence elements. The reliance on word order was not so pronounced for the youngest age group compared to the older groups. Results can be related to some other previous work investigating word order in sentence comprehension. The study of Demiral, Schlesewsky and Bornkessel- Schlesewsky (2008) also showed that in a language like Turkish, which relies mostly on morphology and inflections, the first element in the sentence has more likelihood to be assigned to the subject role. Slobin and Bever (1982) also showed that in the absence of the accusative case marker, 24-month-old children preferred to act-out reversible actions assigning the subject role to the first element in the

sentence supporting further the usage of word order in sentence comprehension. However, the effect of word order might not be as robust as in English (Cheung, Küntay, Wagner, Candan, Yeh, Li & Naigles, 2009).

In terms of response latency to the matching scene, no significant difference was found between the control and the test trials for the word order data. A non-significant trend was observed in terms of the first look to the matching scene to be later in the test trial compared to the control trial except for the 18-month-old group. The fact that the directing audio did not shorten the reaction time in the test trials compared to the control trials suggesting that children might have taken their time to process the directing audio before looking at the relevant direction compared to the totally random look to that direction in the control trial, suggesting that children differentiated between the neutral and the testing audios. We also compared the response latency to the matching and the non-matching scenes in the test trials to get a better picture of the looking behavior during the test trials. We saw that children looked sooner to the matching screen compared to the non-matching screen in the test trials suggesting that the directing audio had an effect of directing children towards the intended screen.

Thirdly, we investigated the switches in the looking preference. The number of switches to be high in a trial could suggest one of two possibilities. Distraction while

watching the video can result in high switch scores. If a child is distracted during a trial, some of the information in the directing audio may be lost or the amount of time s/he attends to the video may not reflect well his/her preference accurately. Another reason for a high switch score would be the uncertainty to choose between sides in the light of the directing audio. Alternatively, a high switch score would also result from boredom or curiosity provided that the child already knows the side they should look at and once they do so, they can turn to the other scene and switch between scenes out of boredom or curiosity.

Results for the switching behavior in the word order study indicated that children switched sides more often during the control trials compared to the test trials which was the expected result and this effect was significant for each age group. This suggests that the directing audio actually had an effect of channeling children towards one scene and stabilizing their attention compared to a neutral audio given during the control trials. Although children preferred to switch sides less often in the test trials compared to the control trials, previous work showed that prototypical sentences in English resulted in less switches compared to simple transitive sentences in Turkish (Cheung, Küntay, Wagner, Candan, Yeh, Li & Naigles, 2009). This suggests that although children in our study looked more often at the side of the match and switched sides less in the test trials compared to the

control trials, word order cue may not have induced much confidence and certainty in Turkish-speaking children as in their English-speaking counterparts.

Lastly, the overall percentage of match scores for the character identification trials in the word order study indicated that children looked more than expected by chance at the matching side of the screen during the introductory trials for the horse and the bird. This result suggested that the IPL procedure works in principle for the present group. We also examined that the matching behavior was different for age groups in the way that 18-month olds looked significantly less at the matching side during the bird identification trial compared to the 27-month-old and the 36-month-old group and their percentage of match score in that trial was not significantly different than chance level.

5.2.2 Accusative study

Results for the accusative study indicated no significant differences in terms of looking to the side of the matching scene during the control versus test trials. Although not significant, the control-test difference was in the expected direction only for the oldest age group (36-month-olds). To further investigate the matching behavior over the course of the test and control trials, we divided them into two equal 3-second segments. This division presented us with a different picture, although we did not find a significant control-test

difference in either half, we obtained a significant difference between the percentage of match in the first and the second half of the test trials, indicating higher matching percentages in the second half. This difference was much more pronounced for the 36-month-old group. Examining the time course graphs for the accusative study, we notice that, although not significant, children look at the matching side more than the non-matching side only in the second half of the test trials.

The fact that children's matching behavior was slow to develop could mean that they waited until the end of the directing audio, took time to process it and then turned to the right scene in the second half of the test trial. The fact that children looked at the matching side more in the second half of the directing audio could be due to the positioning of the accusative case marker in the sentence. The fact that the accusative case marker is attached to the direct object which is located in the middle of the SOV type sentences, (e.g. *bak işte kuş at-ı it-iyor* 'look now the bird horse-ACC push-PROG', children may have waited for its appearence until directing their attention to the matching scene.

The late and non-significant matching behavior for the accusative study may be due to several reasons. We can suggest that adding another cue to the sentence, be it complementary and in the case of the accusative case marker a definitive indicator of the object role, may have burdened children in terms of the processing load. Although the

accusative case marker is accepted to be a very strong and reliable cue for object marking in Turkish (Aksu-Koç & Slobin, 1985; Küntay & Slobin, 1996; Ural et al., in press), and previous studies showed that the usage of the accusative case marker is early in development (24 months) and that there is some evidence of its productive use even for the 15 month-olds, although the used methodology was not discussed in detail (Aksu-Koç & Slobin, 1985), and nouns generally appear more in the inflected form than not in the parental speech to children (Küntay & Slobin, 1996), it may require more time for it to be mastered to an adult degree and be processed faster.

Two known studies so far have investigated the role of the accusative case marker in the language comprehension of young children: one investigating its effect in identifying verb transitivity (Göksun et al., 2006) and the other, more relevant here, is the study of Slobin and Bever (1982) which investigated the comprehension of simple transitive sentences describing reversible actions. Those two studies both involved an enactment procedure. Although enactment procedures are more demanding compared to the IPL procedure, because they only tap the final behavior, they do not allow for observation of the comprehension process. The correct choice of enactment comes after the experimenter has asked the question a few times, so we do not really understand whether the choice was a quick one, but only whether it is the right one or not. According to Slobin's (1982) local cues hypothesis, language-specific cues like case markers lower the processing burden and

facilitate the quick identification of sentence roles. We can suggest that depending on the late matching behavior in our data, although accusative case marker is a reliable cue in Turkish and may result in correct enactments in 2-year-olds, its processing may not be very quick in the early years of childhood.

Research in other languages similar to Turkish in terms of dependence on case markers and flexible word order can be examined for relevant findings. Dittmar et al. (2008a) showed that German-speaking 4-year-olds depend more on word order when the word order and the accusative marking conflict with each other. Dittmar et al. (2008a) suggested that German children may not have mastered the accusative cue until the age of seven. German children may take extra time to become fully functional in paying attention to the interaction of all the cues because the accusative and the word order can sometimes be used in conflict with each other in the input. They suggested that word order is a more established cue in the early years of life compared to the accusative case marker or others. Our study investigated the accusative cue only for the prototypical sentences but further research using sentences in which word order and accusative cue conflicted with each other can be investigated using the IPL method in order to better comprehend the reliance on the accusative case marker in sentence comprehension.

Dittmar et al. (2008a) also showed that 2-year-old children correctly identified sentences roles in the prototypical sentences involving case markers, but for this they used a picture pointing task by freezing actual video frames. This procedure may be beneficial in terms of examining children's active choosing behavior. Looking at the viewing behavior of children in our IPL study, we observed that children sometimes pointed to the right screen with their index fingers and immediately afterwards looked at the opposite screen, sometime while still pointing to the matching screen.

Sokolov (1998) proposed that the relative weight given to the aspects of the cue validity (cue availability and cue reliability) may be different across developmental periods. To support that claim, Sokolov (1988) showed that the cue availability is much more important for younger Hebrew-speaking children than cue reliability. In that regard, it would be informative to examine closely whether younger Turkish children are exposed to the word order cue more frequently compared to the accusative cue in their input. Also, according to Dittmar, et al. (2008), the proposition of Bates & MacWhinney can only be true if the prototypical sentences have the highest occurrence rate in child-directed speech. They also suggested that if fragment sentences (with the subject or the object missing) are also counted in the input, the word order cue can be accepted to be used more frequently than the accusative case marker in the input, increasing its cue availability, because word order information is present for the fragment sentences in addition to fully specified

sentences. We can suggest that if children rely more on cue availability in younger ages as proposed by Sokolov (1998), and if the cue availability of word order is higher in the input, then it is possible that early in development, Turkish children depend more on word order than case marking information in sentence comprehension. The analyses done in Ural et al. (2009) can be expanded to specifically address this question.

In interpreting the relative reliance on word order in 4-year-olds compared to 7-year-olds, Dittmar et al. (2008a) argued that German children may be depending more on cue availability early in the development compared to cue reliability, which appears more important for older age groups. Relatedly, Kempe and MacWhinney (1999) showed in a reaction time analysis, that German adults reacted faster when tested with sentences containing cues high in availability compared to reliability. However, when asked to identify the agent of a sentence without time-constraint, they depended more on cue reliability. This result can be important in terms of interpreting the different results obtained about the reliance on the accusative case marker in sentence comprehension tasks using an enactment procedure (Göksun et al., 2006; Slobin & Bever, 1982,) and our study which employed an IPL method.

We can also suggest that languages with multiple cues come with a cost. The coalition model (Hirsh-Pasek & Golinkoff, 1996) suggests that it requires time to integrate

all the learned cues and separate the redundancies. While accusative case marker may result in more reliable, quicker and accurate inferences in the face of ambiguous sentences in later years, it may burden the processing speed of younger children who are still in the verge of acquiring that inflection, which may in turn result in slower processing, i.e., better matching behavior only towards the end of a trial.

In addition to the percentage of match results, we observed a significant difference between the control and test trials in terms of the response latency in the accusative study. That indicated that children's first look to the matching scene was later in the test trials compared to the control trials, which suggests that children were processing the directing audio. Results also showed that children looked later at the matching scene compared to the non-matching scene further showing that matching behavior in the accusative study was late in the course of the video. Latency results strenghten the proposition that the presence of the accusative case marker increases the processing speed, resulting in late responses in terms of the expected behavior. Also, the significant difference between the word order and the accusative studies in terms of the response latency to the matching scene in the test trials shows us that children reacted more slowly to sentences featuring an accusative case marker on the object compared to the sentences that did not. The slower latency in the test trials in the accusative study strenghtens the possibility that the non significant results

observed for the percentage of match measure may be due to reasons more related to processing speed, not necessarily lack of comprehension.

Thirdly, results for the switching behavior was similar to the word order study in that children switched sides more often during the control trials than the test trials, again suggesting that the directing audio had an effect compared to the neutral control audio which yielded a more purposeless looking behavior. Although children behaved similarly in both studies in terms of the switching behavior, there was a trend towards switching sides more often in the accusative study. This also suggests a slower processing in the accusative study which may have resulted in the late stabilization of the matching behavior.

Lastly, the overall percentage of match scores for the character identification trials in the accusative study indicated that children looked more than expected by chance to the matching side of the screen during the test trials for the horse and bird introduction indicating that the IPL method worked in principle for the children participating in the accusative study.

5.3 Methodological considerations and future research

There are several points pertaining to the experimental stimuli, conditions and the data analyses that can be discussed to further illuminate the findings in our study. Accordingly, several suggestions can be made for future research.

The IPL method is a passive procedure and relies only on eye movements. Interpretation of the results brings many questions to mind. There are many possible problems starting from the length and the attractiveness of the visual stimuli to the presence of the mother. These may distract the child from the video and limit the watching time and quality, decreasing the amount of attention paid to the stimuli.

According to our guidelines of eliminating data, to consider a test trial missing, the child has to look less than .6 seconds in one trial but how the child makes use of that little time is questionable. A better strategy could be to include a test trial only if the child looks at least half the time at either scene. Gertner, Fisher and Eisengart (2006) applied such a criterion to detect missing trials. We can say that 3 seconds of looking time in each trial can give us a better picture about the meaning of the direction of match because the child would have more time to process the video and audio. Although preliminary analyses using

that methodology did not provide a substantial change in our results, we can suggest that expending the time interval to 3 seconds gives us more reliable figures.

We can also add the direction of the first look variable to our analyses to make better sense of the latency to match behavior. Because the scenes appear in the same sides of the screen in both the control and test trials and the child first hears the testing audio in the blank before a certain test trial, they can be expected to direct their attention to the side of the match at the beginning of the testing trial (Naigles & Kako, 1993).

One improvement in subsequent studies concerning the testing material may be about the attractiveness of the costumed characters to children. Gertner et al. (2006) reported higher comprehension scores (%70) using human characters (preferably children) over people dressed in animal costumes (%56) which resulted in percentage values similar to ours. It could be argued that some children might find it difficult to associate the image of a bird or a horse in his mind with the represented costume or some children may even become afraid. Also, using costumed people can make it difficult for the child to understand "who does what to whom" clearly because of the difficulty of the clear presentation of agency. But the most important reason may be that nowadays children are highly accustomed to cartoon characters. Consequently, costumed characters can appear unfamiliar or unattractive to them and they may lose interest quickly and do not provide

reliable scores. We can say that a future IPL study using cartoon characters that depict the selected actions may work better in attracting children's attention but preparing this kind of a video requires better resources, equipment, and software expertise.

A second concern with the methodology of the study can be about the content of the testing layout. Previous studies which employed the IPL method can be examined in terms of their differences to our audio-visual stimuli and testing conditions. One of those studies is the Gertner et al.'s (2006) study which investigated sentence comprehension in 21-month-old English-speaking children using novel words. For the auditory stimulus, they introduced two testing trials for each verb and also formulated the first between-trial blank in the future tense like (*'The duck is gonna gorp the bunny'*) and the second inter-trial blank in the past tense like *'The duck gorped the bunny'*). Dittmar et al. (2008b) also used the same future-past stimuli format for blanks in their study. The second inter-trial blank in Gertner et al.'s (2006) study also included a directive such as '*Find gorping'*. Their test trial also had differences compared to ours in that their testing audio was much longer which will cover the whole scene and also included a recurring instruction such as *'Find gorping. Find gorping'*. Our study on the other hand, used only simple transitive sentences in the affirmative format and in the present tense like *at kuş it-iyor* 'the horse the bird push-PROG' for both the inter-trial blanks and for the test trials. We also used a single test

trial for each verb and our testing audios were approximately 4s long for each verb in a 6s long video.

Concerning the format-related differences, we can suggest that the introduction of the action in the future and past format may attract more the attention of the children in forming a story-like narration and the fact that the intertrial blank involves a question can prepare children from the start to look at the intended scene from the start. Also, introducing the test trial in a question or a directive format may be more goal-oriented from the child's part and may motivate them to look for the intended scene. We can also suggest that providing a video-long auditory stimulus rather than leaving a video-final silence can be functional in terms of keeping the child's attention on the screen. Another important methodological difference was about the number of test trials for each verb. The reason for us to provide a single test trial for each verb was to shorten the duration of the whole video in order to prevent children from losing interest towards the end. Using two consecutive test trials can be beneficial in terms of providing a more reliable measure of the testing audio's informative value. Taking the average of those trials can give us a better measure of the children's comprehension of the presented auditory stimuli. We can also expect to find a decrease in the number of switches in the second test trial due to familiarity to the directing audio. We can try this method in future research especially for the accusative study in which we observed a late matching behavior.

A further point to be made could be about the content of the testing audio. The directing audio in the test trial repeats the same utterance in the previous blank only adding "look" to its beginning. Presenting the testing audio in a question format can prompt children to think that they are asked a question and motivate them more to find the right answer. Only the testing audio of the character identification trials are in that format and children tend to search more for the right answer in those trials. So, for example, introducing a testing audio like *'Find where is the bird pushing the horse?'* ('Nerde kuş at-ı it-iyor?') could be more beneficial in terms of directing the child towards a particular screen. Also, we can try to see if introducing a second test trial for each verb can change the matching results. Among many others, Naigles and Kako (1993) introduced two testing trials for each verb. This can have a beneficial effect in terms of singling out any confounding variables in the form of distraction or time constraint. The mean of those two trials could give us a better measure of the matching behavior.

The last concern can be about the testing situation and the parent-child interaction during the viewing of the video. Despite all the efforts, the testing situation is not free from distractions. Taking into account the short-attention span of young children, they tend to stand up from their chair during the viewing of the video. Although many studies using the IPL methodology use high chairs for the youngest age group, the fact that Turkish children are not accustomed to those types of chairs in their daily lives created nervousness from the

child's part and did not work in the Turkish sample. Also, many studies in the US adopted concealment procedures for the parent like making him/her wear headphones or dark/opaque glasses or a hat. (Gertner et al., 2006; Naigles & Kako, 1993; Dittmar et al., 2008b). The purpose was to decrease parental influence to a minimum. In their study, Dittmar, Abbott-Smith, Lieven & Tomasello (2008) instructed the parent to close their eyes to prevent any possible directing to a specific screen. They also instructed the experimenter not to look at the screen at all. Although we gave strict instructions to the mother/father not to talk to the child about the video or direct him/her in any direction, we did not provide them with head-phones or glasses. Because the involvement of a Turkish mother/father and his/her familiarity to a testing environment is not the same as the involvement of an American mother/father and because children are more dependent on their care taker in the Turkish culture and because the relationship is closely-knit, isolating the child from his/her mother/father may have resulted in adverse effects (Ataca, Kağıtçıbaşı & Diri, 2005, Kağıtçıbaşı, 2007). Limiting the interaction between the child and the mother/father to that degree may have been problematic in terms of keeping the child motivated in an unfamiliar environment such as our testing lab.

5.4 General discussion

First of all, the results suggested that the IPL procedure has worked in principle especially for the older age group children. One of the results that we turn to in order to question the method has been the character identification trials due to their low processing load and easiness in content. The results for the word order and the accusative study showed that children looked longer at the side of the match more than the chance level during the character identification trials. Thus, we can accept the IPL measure to be informative in terms of children's compliance to the auditory directions. In addition to that, in both studies children switches sides more in the control trials compared to the test trials indicating that the testing audio had an effect in directing children's attention to either one of the screen compared to the more purposeless looking behavior in the control trials. Therefore, the directing audio had the function of rendering the looking behavior more stable and consistent in the test trials compared to the control trials.

The 18-month-olds's relatively less dependence on word order and the accusative case in identifying sentence elements may be due to other reasons pertaining to the experimental method. Results showed that 18-month-old group looked significantly less to the screen during the whole video compared to the older age groups for both the word order and the accusative studies. We also observed that their percentage of match scores for the

bird identification trials were significantly lower compared to the 27-month-olds and 36-month-olds for both the word order and the accusative studies. Depending on those results, we can suggest that the IPL method may have been difficult for the younger kids because of their lower attention span or they simply refused to listen to the auditory stimuli because they found the situation to be strange. Either way we can say that low matching scores in either study for the 18-month-olds may have been resulted from those children's general lack of compliance to the procedure.

Contrary to our expectations, the word order study seemed to reveal better results in terms of comprehension compared to the accusative study, though the overall mean percentage of match score for the test trials to be somewhat low (53%), which is not a substantial effect. Additionally, children looked significantly later to the side of the match during the test trials of the accusative study compared to the word order study, suggesting that the directing audio in the word order study was much easier to comprehend or react to than the directing audio in the accusative study. This may indicate that adding the accusative case marker to the sentence resulted in a late matching behavior. The fact that children responded much slower to the directing audio and that 36-month-olds performed better compared to the younger age groups in the accusative study, might indicate that the processing of the accusative case marker may still be hard for young age groups. Although the accusative case marker appears a reliable cue in Turkish, it might take time for young

children to fully master it and quickly respond to it. Latency results further support a more reaction-time based approach to the non-significant results obtained in the accusative study. Although young children use these forms productively in their own speech, they might not yet fully comprehend their function. This line of results suggests that the complexity of cues in a language, although beneficial later in life, can come with a cost to new speakers of that language.

In conclusion, we can say that although Turkish allows for different ordering of the sentence elements in input (Küntay & Slobin, 1996; Slobin, 1982) and although SOV order is used only 48% of the time in the CDS, it is still used as an important cue to sentence comprehension in very young children (25-months onwards) suggesting its acquisition to be early in development. This result appears to be in line with the rule-based account which claims that there exists language-universal generalizations which are hard to explain based on input alone, and which proposes that sentential relations are early abstract constructs that guide the child in everday comprehension (Fisher, 2002; Gertner et al., 2006; Lidz, Gleitman & Gleitman, 2003; Naigles, Gleitman & Gleitman, 1993). Contrary to the usage-based account which would suggest the amount of input to be weak for acquiring word order cue in young children (Abboth-Smith & Tomasello, 2006; Ahtar, 2001; Tomasello, 2003); our results seem to be more supportive of word order having a much more basic

function in language comprehension by being a more language-universal cue (Fisher, 2002; Gertner et al., 2006; Lidz, Gleitman & Gleitman, 2003).

Lastly, looking at our results from a crosslinguistic perspective, we see that although we acquired significant matching results for the word order study, the percentages were still low compared to the previous IPL work on word order involving English-speaking children (Golinkoff et al., 1987; Hirsh-Pasek & Golinkoff, 1996). Hirsh-Pasek & Golinkoff (1996) found 75% preference to the matching-screen with 16- to 19-month-old children using familiar verbs, our kids only attended to the matching side of the screen only 53% of the time during the test trials. In support, related work comparing the effect of word order in Turkish to an English sample also showed that English-speaking children were more consistent and certain in their choice of scene proposing a somewhat weaker word order effect in Turkish (Cheung, Küntay, Wagner, Candan, Yeh, Li & Naigles, 2009). We can say that while word order is used to a degree in Turkish sentence comprehension, it is not as strong as a cue as in English.

Age-related results add more to the picture. The fact that word order is more of an effective cue for older age groups and that the accusative case marker worked better in 36-month-olds suggests that language-specific input plays a crucial role in language acquisition. Therefore, Slobin's cognitivist theory (1985) which merges the cognitive

readiness in the form of domain-general abstracting with language-specific input can be more suited to the present picture. The fact that word order, although important, is not as stressed in Turkish as in English and that accusative case marker, although slower to process, functions better with older children suggests that, sensitivity to language-specific properties learnable from input is present from early on in language comprehension.

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APPENDICES

Appendix A. Parent Letter

Sayın Anne/Baba,

Çocuk gelişimi konusundaki heyecan verici gelişmeleri takip ediyor musunuz? Bu alandaki yeni çalışmalar bize bebeklerin ve küçük çocukların zihinsel becerilerinin sanıldığından daha fazla olduğunu göstermekte. Örneğin, artık bebeğinizin çevresini bizim gördüğümüz gibi görmeye ve bizim duyduğumuz gibi duymaya çok erken başladığını biliyoruz. Diğer şaşırtıcı bir bilgi ise, bebeğinizin konuşmaya başlamadan önce de dil hakkında bizim bildiğimiz pek çok bilgiye sahip olduğu! Bu alanda gittikçe gelişen bilgi birikimimiz görüşlerimizi yeniden gözden geçirmemize yol açtı: şimdi bebekleri ve küçük çocukları çevrelerine pasif tepkiler veren varlıklar olarak değil, daha aktif ve zeki varlıklar olarak görüyoruz.

Bizim de Koç Üniversitesinde yeni kurulmuş bir Çocuk Dil Gelişimi laboratuarımız var. Sizi ve çocuğunuzu yeni araştırmamızın bir parçası olmaya davet ediyoruz. Çocuğumuz konuşmayı nasıl öğreniyor? Bu kuşkusuz çok merak uyandırıcı bir soru. Çocuklar büyük olasılıkla konuşmaya başlamadan önce de dil hakkında bir bilgiye sahipler. Bizim amacımız, çocukların konuşmaya başlamadan önceki veya ilk kelimelerini söylemeye başladıkları dönemlerde dil hakkında *gerçekten* ne bildiklerini ortaya çıkarmak.

Çalışmamızda kullandığımız yöntem henüz konuşmayan ya da konuşmaya yeni başlayan bir çocuğun konuşulanı ne kadar anladığına bakmamıza olanak sağlıyor. Çalışmamızda 12-39 aylık çocuklar laboratuarımıza gelip yanyana yerleştirilmiş iki ekranda aynı anda gösterilecek 5-10 dakikalık iki film izleyecekler. Biz sadece onların hangi filmi seyretmeyi daha çok tercih ettiklerini gözlemleyeceğiz. **Sizden beklediğimiz ise çocuğunuzla birlikte bir kereye özgü laboratuarımıza gelmeniz ve bir saatinizi araştırmamıza ayırmanızdır.** Bu ziyaretiniz sırasında çocuğunuza genel gelişimini ve dil becerilerini ölçmemize yarayacak iki gelişim testi uygulayacağız. Bu testler çocuğunuzun becerilerini hem sizin hem de bizim bir kez daha fark etmemizi de sağlayacaktır. Böylece

çocuğunuzun gelişimi hakkında da bir fikir sahibi olabileceksiniz. Tabii ki bütün çalışma boyunca çocuğunuzun yanında kalabileceksiniz.

Bu çalışma çocukların erken dönemlerde dil gelişim düzeyini araştırmak için tasarlandı. Çocuğunuzun yaptığı her şey bize dil gelişiminin nasıl başladığı ve çeşitli dil yapılarının ne zaman geliştiğiyle ilgili yeni bilgiler verecektir. Bu araştırmada doğru ya da yanlış yoktur. Söylediğimiz gibi çocuğunuzun yaptığı her şey bizim için çok önemli ve değerli! Siz de çocuklarınızın bize ne kadar çok şey öğrettiğini görünce şaşıracaksınız.

Sizin için de uygunsa araştırma grubumuzdan bir eleman sizi gelecek hafta içinde arayacak ve size araştırmaya katılmak isteyip istemediğinizi soracak. Proje hakkında daha fazla bilgi edinmek isterseniz bize Koç Üniversitesi Psikoloji Bölümündeki 0212-338-1409 (Aylin Küntay, cep: 0546-224-1251) veya 0212-338-1892 (proje ofisi) numaralı telefonlardan ulaşabilirsiniz. (Bu iki numaraya sizi geri arayabilmemiz için bilgileri sesli mesajla da bırakabilirsiniz.) İlgi gösterdiğiniz ve bize zaman ayırdığınız için teşekkür ederiz.

Saygılarımızla,

Doç. Dr. Aylin Küntay
Psikoloji Bölümü, Koç Üniversitesi

English Translation of the Parent Letter

Dear Parents,

Have you recently read about exciting new findings in the field of infancy and early child development? This line of research has helped us to understand just how clever our babies and toddlers are. For example, it has helped us to understand that babies start earlier than we used to think to see the world very much as we see it and to hear very much as we hear. Moreover they know a lot about speech before they say some words themselves! Our rapidly expanding knowledge in this area has altered everyone's thinking, as we now see babies and toddlers as active and intelligent –not as organisms who passively react to the world around them.

The aim of this letter is to invite you and your child to our new Child Language Laboratory at Koç University to a study examining language development. How do children learn to talk? Surely this is a very puzzling question, and surely they know a great deal about language before they actually talk to us. Our aim is to look beyond their verbalizations to learn more about what they *really* know about language.

The research method that we will use in our study allows us to peer beneath language production and into language comprehension. Children from 12-39 months of age come into our laboratory and are asked to watch two simultaneously presented 5-10 minute long TV "shows". We will simply observe which of the TV shows they prefer. **For the parents this entails bringing your child into the lab for one-time visit that takes approximately 1 hour.** In addition, we will administer a developmental test to your child while you fill out a detailed questionnaire about your child's language development. In this way we will have an insight into your child's linguistic performance and general development. Of course, you can remain with your child at all times.

We designed much of this work to explore the frontiers of early child learning. Whatever the children do will begin to teach us more about when language starts to develop, and when different aspects of language knowledge "kick in". There is no right or wrong in this research. As we said, whatever the babies do is important! You'd be surprised to see how much your children can teach us!

One of our research assistants will call you sometime next week to ask you whether you would like to participate in our research. Please feel free to call us if you would like to know more about the project through the Psychology Department at Koç University at

0212-338-1409 (Aylin Küntay) or at 0212-338-1892. Thank you for your time and consideration.

Sincerely,

Aylin Küntay, Associate Professor
Psychology Department
Koç University

Appendix B. Consent Form

Araştırma Projesine Katılım İçin İzin Belgesi
Koç Üniversitesi

Baş Araştırmacı: Doç. Dr. Aylin C. Küntay

Araştırma Konusu: Küçük çocukların dil becerisini inceleme

1. Katılıma Davet:
   Çocuğunuzu ve sizi çocukların anadillerini anlamalarıyla ilgili olan bu çalışmaya katılmanız için davet etmekteyiz.

2. Araştırmanın Amacı:
   Bu araştırmanın temel amacı 12-36 ay yaş gruplarındaki çocukların kelime ve cümle gelişimlerini incelemektir. Araştırmanın hedefi ortalama verilere ulaşmaktır. Araştırma çocuğumun değerlendirilmesi olarak algılanmayacak, veriler teşhise yönelik kullanılmayacaktır.

3. Araştırmanın Yöntemi:
   Araştırmada çocuğunuz yanyana duran iki ekranda değişik hareketler yapan insan ya da hayvan videoları izleyecektir. Çocuğunuzun ne zaman hangi videoya baktığını tespit etmek amacıyla gözleri kameraya çekilecektir. Tüm uygulama boyunca çocuğunuz yanınızdan ayrılmayacaktır. Bunun yanısıra daha büyük olan çocuklara benzer hareketler içeren, yan yana duran resimler gösterilecek ve duyduklarına denk gelen resimleri işaret etmeleri istenecektir. Ayrıca sizden aileniz hakkında genel bilgiler içeren bir form ve çocuğunuzun dil gelişimine dair ayrıntılı bir anket doldurmanız istenecektir. Siz bu formları doldururken proje ekibimizden bir araştırmacı da çocuğunuza onun genel gelişimini değerlendirmemize yarayacak bir gelişim testi uygulayacaktır. Uygulamadan sonra, laboratuarımızda çocuğunuzun videoya çekilen göz kaydı, videoları ne kadar süreyle izlediğine göre kodlanacaktır.

4. Araştırmanın Riskleri ve Güçlükleri:
   Araştırmacılar bu çalışmanın minimum düzeyden yüksek bir risk içermediğine inanmaktadırlar. Çünkü bu araştırmada çocuğunuzun sizin yanınızda iki televizyon ekranı karşısındaki koltuğa emniyet kemeriyle bağlı oturacağından

düşme tehlikesi de olmayacaktır. Çocuğunuz koltuğa emniyet kemeriyle. Ancak bağlı oturmaktan dolayı çocuğunuzun huysuzlanma riski olabilir. Bu durumda uygulamaya son verilecektir. Ayrıca uygulamanın 40 dakika sürmesini bazı aileler zahmetli bulabilirler.

5. Araştırmanın Yararları:
   Bu araştırma sonucunda elde edilecek bilgiler genel bir fayda sağlayacaktır. Bu bilgilerin yardımıyla dil gelişiminde güçlük çeken çocuklara yönelik yardım amaçlı yeni stratejiler geliştirilebilecektir.

6. Gizlilik:
   Araştırma bulgularının basımı yalnızca anonim bilgiler içerecek, tüm katılımcıların kimlikleri tanınma olasılığına yer vermeyecek şekilde gizlenecektir. Çocuğunuzun gözlerinin video kayıtları, araştırma sonuçlarının basımından sonraki yedi yıl boyunca laboratuar dolaplarında kilitli tutulacak, sonra imha edilecektir. Bu kayıtlardan kısa görüntüler az sayıdaki araştırmacı ve/veya öğrencilere eğitim amaçlı gösterilebilir.

7. Araştırmaya Gönüllü Katılım:
   Siz ya da çocuğunuz bu araştırmaya katılmayı ya da anketteki soruları yanıtlamayı reddedebilirsiniz. Çalışmadan istediğiniz herhangi bir anda neden göstermeden çekilme hakkınız vardır. Katılımı red veya terk çocuğunuza ya da size sunulan hizmetleri tehlikeye atmayacaktır.

8. Sorunuz var mı?
   Karar vermeden önce dilediğiniz kadar düşünebilirsiniz. Araştırmayla ilgili sorularınızı yanıtlamaktan mutluluk duyarız. Projeyle ilgili sorularınız ya da araştırmayla ilgili bir sorununuz varsa, baş araştırmacı Doç. Dr. Aylin Küntay'a 0212-338-1409 numaralı telefondan ulaşabilirsiniz. Bir katılımcı olarak haklarınız hakkında bir sorunuz olması durumunda Koç Üniversitesi Rektör Yardımcısı Prof. Dr. Yaman Arkun'a da 0212-338-1313 numaralı telefondan ulaşabilirsiniz.

Onay:

Bu formu okudum ve çocuğum _____’(n)ın
(çocuğunuzun ismini yazınız)
yukarıda anlatılan araştırmaya katılmasına karar verdim. Araştırmanın temel amaçları, uygulanması ile ilgili bilgiler, olası risk ve güçlükleri yeterince açıklanmıştır. İmzam bu onay belgesini aldığım ve uygun gördüğümün göstergesidir.

İmza:
_____

Çocuğa yakınlık derecesi:
_____

Tarih: _____

_____
_____
Baş Araştırmacının İmzası Telefon

veya

_____
_____
Onayı Alan Araştırmacının İmzası Telefon

English Translation of the Consent Form

Consent Form for Participation in a Research Project
Koç University

Principal Investigator: Aylin C. Küntay
Study Title: Investigating young children's grammatical knowledge

1. Invitation to participate:
   You and your children are invited to participate in this study about children's language comprehension.

2. Purpose:
   The general purpose of the study is to explore the development of words and sentences in children between 12-36 months of age. The aim of the study is to obtain average data. It should not be considered an evaluation of my child, nor will it be used for any diagnostic purposes.

3. Description of Procedures:
   The study will consist of your child watching two side-by-side videos of people or animals performing various actions. Your child's eyes will be videotaped, to ascertain which video he/she prefers to watch. You will remain with your children at all times. Older children will also be shown side-by-side pictures of similar actions, and asked to point to the picture that matches what they hear. You will be asked to fill out a form giving general information about your family and a detailed questionnaire about your child's language development. In the meantime, one research assistant will administer a developmental test to your child. After this procedure, the video of your child's eyes will be coded for his/her duration and direction of looking.

4. Risks and Inconveniences:
   The researchers believe that there will be no more than minimal risks involved in this research. Because your child will be strapped into a booster seat in front of two side-by-side videos while you are present; there is no risk of your child falling out. There is a small risk that your child become fussy because of being strapped in, in which case the procedure will be discontinued. There will be a time commitment of 40 minutes per session which some parents might find inconvenient.

5. Benefits:
   Knowledge on this topic will be generally useful, and might lead to new strategies for helping children with language delays and learning disabilities.

6. Confidentiality:
   Publications of the findings of this study will include only anonymous information; all individuals will be disguised so that no identification can be made. The videos of your child's eyes will be kept in locked cabinets in the PI's laboratory, for a total of seven years after publication of the findings, and then destroyed. Short portions of these videos may be shown to small audiences of researchers and/or students for teaching purposes.

7. Voluntary Participation:
   Either you or your child may decline to answer any questions or to engage in any procedure. You or your child may withdraw from this study at any time. Refusal to participate or withdrawal from participation at any time will not jeopardize any services either you or your child might be entitled to.

8. Do You Have Any Questions?
   Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the principal investigator, Dr. Aylin Küntay, at 0212-338-1409. If you have any questions concerning your rights as a research subject, you may contact the Koç University Provost Yaman Arkun at 0212-338-1313.

Authorization:
I have read this form and decided that my child _____
(name of subject)
will participate in the project described above. Its general purposes, the particulars of involvement and possible hazards and inconveniences have been explained to my satisfaction. My signature also indicates that I have received a copy of this consent form.

Signature:
_____

Relationship: _____

Date: _____

_____ _____

Signature of Primary Investigator Phone

or

_____ _____

Signature of Person Obtaining Consent Phone

Appendix C. Pamphlet

2-3 yaşındaki çocukların dil ve iletişim becerileri

Dil anlama becerileri dil üretme becerilerinden daha önce ve daha hızlı gelişir. Bu yaştaki çocuklar söyleyebildiklerinden çok daha fazla sözcüğün anlamını bilirler. Ayrıca üretebildikleri cümlelerden çok daha uzun ve karmaşık cümleleri anlarlar.

Kelime bilgileri oldukça zengindir. Yeni duydukları sözcükleri dağarcıklarına eklemeye çok hazırdırlar. Her gün birkaç tane yeni kelime öğrenebilirler. Bu yaşta henüz duydukları bir kelimeyi hemen kullanmaya başlamaları mümkündür.

Ek üretebilirler. Kullandıkları fiillere ve isimlere ekledikleri ekler epey çeşitlenmiştir. Örneğin, "koyamıyorum", "arabamda" gibi çok ekli sözcükler üretebilirler.

3-5 kelimelik basit cümleler kurabilirler. Örneğin "senin yüzünden sabunlar elimden çıkmıyor" diyebilirler. Ama sık sık "onu ver", "anne otur" gibi daha basit cümleler de kullanırlar.

Anlatı becerileri gelişmeye başlar. Cümleleri birleştirip kısa hikayeler anlatmaya başlayabilirler. Gelecekle ilgili planlarını da art arda birkaç cümle sıralayarak yapabilirler.

Ses üretme problemleri. Bazı çocuklar bazı sesleri üretmekte zorluk çekebilirler (örneğin, r, s, z, l). Bazı kelimeleri seslerin yerlerinii değiştirerek söyleyebilirler (örneğin: "bakşa", "duzbolabı"). Ama genellikle 3 yaş civarında çoğu çocuğun dili başkaları tarafından anlaşılır hale gelir.

Duygu ve düşünceler hakkında konuşmaya başlarlar. Duygu ve düşünce belirten sözcükleri ("sana kızdım", "bir fikrim var", "unuttum") kullanmaya başlayabilirler.

Çok soru sorarlar. Olaylara ve nesnelere karşı çok ilgili ve meraklıdırlar. Size "ne, nasıl, neden, nerede" ile başlayan birçok soru sorabilirler.

Dili yaratıcı olarak kullanırlar. Dil oyunlarını, yani yeni kelimeler üretmeyi, dilde mevcut olan kelimeleri değiştirerek söylemeyi ve tekerlemeleri çok severler.

2-3 yaşındaki çocukların dil ve iletişim becerilerini nasıl destekleyebiliriz?

Onunla çok konuşun. Oyun oynarken, gezerken, onu giydirirken, yedirirken, yatırırken onunla bol bol konuşun. Kendi yaptıklarınızı, kullandığınız nesneleri tanıtarak, eylemleri açıklayarak ona anlatın. Kafanızdan geçenlerin çocukla tartışılacak şeyler olmadığını düşünebilirsiniz. Ama unutmayın, çocuğunuz kendi ürettiği dilin çok üzerinde bir dil anlama kapasitesine sahiptir.

KOÇ ÜNİVE

DİL GELİŞİMİ LABORA

DİL ve İLETİŞİM BECERİLERİ

Yeni kelime öğrenmesine yardımcı olun. Karşılaştığı ve bilmediği nesneler, özellikler, eylemler hakkında konuşun.

Sorularına yanıt verin. Onun sorularına istekle ve sabırla yanıt verin. Çocuklar birçok bilgiyi kendileri tecrübe ederek değil, size sorarak öğreneceklerdir.

Yanlış ya da eksik söylediklerini düzeltmeyin, ama yanlış cümleleri taklit etmeyin. Çocuklar bu yaşta düzeltmelerden faydalanmazlar, hatta düzeltmelere direnç gösterebilirler. Siz onun söylemeye çalıştığı fikri düzgün bir şekilde ifade ederseniz, bu model çocuğun dil gelişimine faydalı olacaktır.

Anlatılarını dinleyin. Onu dinleyip anlattıklarını daha da geliştirmesini sağlamak için ona sorular sorabilirsiniz. Anlatı becerisini desteklemek için siz de başınızdan geçen basit olayları ona anlatabilirsiniz.

Kitap okuyun. Onunla beraber resimli kitaplar okuyabilirsiniz. Çocuğunuz yaşamında göremeyeceği nesneleri ve olayları kitap eşliğinde isimlendirmeyi öğrenerek kelime dağarcığını geliştirecektir. Ayrıca Türkçe'yi iyi kullanan kitaplardan yeni deyimler ve yeni cümle yapıları öğrenebilecektir.

Kitap okurken çocuğunuzun da size katılmasını, sizin sorularınızı cevaplamasını, sorular sormasını, sayfaları kendi kendine çevirmesini desteklemeniz önemlidir. Ona kitap okurken, çocuğun iyi bir dinleyici olduğu kadar katılımcı olması da önemsenmelidir.

Çocuğunuza kitap okurken amaç kitabı bitirmek değil, çocuğun anlayacağı ve katılacağı bir hızda okumaktır. Amaç, çocuğun kitaptaki resimleri incelemesine ve dille bağdaştırmasına fırsat verecek kadar yavaş ilerlemektedir. Çocuğun yorulduğu ya da ilgisi dağılmaya başladığı zaman kitap bitmemiş olsa da etkinlik bırakılabilir.

İnsanların duygu ve düşünceleri hakkında konuşun. Olayları açıklarken veya kitap okurken, insanların ve hikayedeki karakterlerin duygu ve düşüncelerini anlatın. Bu duygu ve düşüncelerin ne tür davranışlara neden olduğunu açıklayın. Örneğin, "bak tavşan yere düştü, çünkü kuştan korktu", "ablan ona bebeğini vermediğin için üzüldü", "çocuk dondurma istediği için ağlıyor" gibi açıklamalar çocukları birçok yönden geliştirir.

Dil oyunlarını destekleyin. Kelimelerin ses yapısının farkına varmasını sağlayacak oyunlar oynamasını sağlayın.

Sosyal etkinlikler düzenleyin. Sizden başka insanlarla da, özellikle başka çocuklarla, oynamasını ve konuşmasını sağlayın. Bu yaşlardaki çocuklar başkalarının ne düşündüğünü ve ne hissettiğini anlamakta zorluk çekerler. Bu konuda ona destek olarak çocuğunuzun iletişim becerilerini destekleyebilirsiniz.

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Çocuk Dil Gelişimi Çalışmal
Doç. Dr. Aylin Küntay
Telefon: 0212-338-1892 (pro
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Televizyon seyretmesini başka etkinlikler önererek kısıtlayın. Çocuğunuzun televizyon seyretme süresini azaltabilmek için onunla eğlenceli oyunlar oynayın ve/veya ona kitap okuyun. Çocuklar televizyon seyrederek dil ve iletişim becerilerini geliştiremezler. Televizyon seyrederken yanında oturun, seyrettiği program hakkında açıklamalar getirin, sorularını yanıtlayın.

Çocuğunuzla sizin dışınızda ilgilenecek diğer insanların da onun dil ve iletişim becerilerini destekleyecek yetkinlikte olmasını tercih edin. Bakıcılar çocuklar ile çok uzun saatler geçirdikleri için çocuğunuzla konuşurken kullandıkları dilin özellikleri çocuğunuzun dil gelişimini doğrudan etkileyecektir. Yukarıda bahsedilen meselelerden bakıcıya da bahsedin ve çocuğunuz gelişimi için sizinle işbirliği içinde olmasını vurgulayın.

English Translation of the Pamphlet

2-3 years old children's language and communication skills

Their language comprehension skills develop faster than their language production skills. Children of this age know the meaning of more words than they can produce. Furthermore, they can understand sentences far more complex than the ones they can produce.

Their word knowledge is fairly rich. They are quite ready to add new words they hear to their own repertoire. They can learn a couple of words each day. At this age, it is possible that they start using right away a word they just learned.

They can produce affixes. The affixes that they add to verbs and nouns have become varied. For instance, they can produce words having multiple affixes like: "I can not put"; "in my car".

They can form simple sentences containing 3 to 5 words. For example, they can say the following: "the soap is not coming off my hand because of you". On the other hand, their sentences mostly consist of simpler sentences like: "give it" or "Mommy, give".

Their narrative skills start to improve. They can start narrating short stories by combining sentences. They can also express their plans for future by lining up few sentences consecutively.

Sound production difficulties. Some children can experience difficulties producing some sounds (for example, r, s, z, l). They can produce some words by changing the places of the sounds (for example: "bakşa" "duzbolabı"). However, by the age of 3, most children's language becomes clear to others.

They start speaking about thoughts and feelings. They can start using words expressing thoughts and feelings like "I am angry at you" "I have an idea" and "I forgot".

They ask a lot of questions. They are highly curious about and interested in incidents and objects. They can ask you a lot of questions beginning with the words "what, how, why, where".

They use language creatively. They like tongue games which means producing new words, saying differently the words already present in their language and tongue twisters.

How can we support 2-3 years old children's language and communication skills?

Speak with your child very often. Speak with him frequently while playing, walking around, dressing him, feeding him and putting him to bed. Tell him about what you do, the objects that you use and your actions with explanations. You may feel that what you think might not be discussible with your child but do not forget that your child has a language comprehension capacity far beyond what he or she can produce.

Help your child learn new words. Talk about the objects, attributes, actions that he or she does not know but comes across.

Answer your child's questions. Answer his questions eagerly and patiently. Children will get a lot of knowledge by asking you not experiencing them on their own.

Do not correct what your child says wrong or incomplete but do not imitate the wrong sentences. Children do not benefit from corrections at this age and even they may resist to them. If you express correctly what he or she is trying to say, this model will be helpful for your child's language development.

Listen to your child's narratives. You can listen to what he tells you and can ask him questions in order to help him improve his narrative further. You can tell him about some simple incidents that you have been through to support his narrative skills.

Read to your child. You can read picture books with him. Your child will widen his word knowledge by learning to name objects and incidents he may not come across in his life by the help of the book. Furthermore, he will be able to learn new expressions and sentence forms from books written in good Turkish.

While reading, it is important that you support your child to join you, ask questions, answer your questions and turn the pages by himself. It is crucial that the child participate as well as he is a good listener.

When you read to your child the purpose is not to finish the book but read it in a pace that your child will understand and follow. The purpose is to proceed slow enough to give the child the opportunity to examine the pictures and connect them to language. The activity can be stopped when the child starts to be tired or distracted.

Talk about the thoughts and feelings of others. While explaining the incidents, tell your child about the thoughts and the feelings of the characters in the book. Explain to him which behaviors are caused by these thoughts and feelings. For instance, explanations like "Look the rabbit fell down because it got afraid of the dog", "your sister got upset because you did not give her your doll", "the child is crying because he wants ice cream" improve children in many ways.

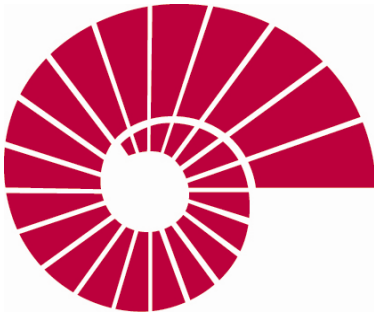
Support tongue games. Provide him with games that will help him recognize the sound form of words.

Arrange social activities. Ensure that he speaks to and play with people other than yourself especially other children. Children of this age have difficulty understanding other's thoughts and feelings. You can help him improve his communication skills by supporting him in this matter.

Restrict your child's TV time by suggesting other activities. In order to decrease the time your child spends watching television, play entertaining games with him or/and read to him**.** Children can not improve their language and communication skills by watching television. Sit with him while watching television, give explanations about the program that he is watching and answer his questions.

Prefer hiring as babysitters, people who are capable of supporting your child's language and communication skills. As babysitters spends long hours with children, the attributes of the language they use while interacting with your child will affect his language development directly. Mention the matters explained above to the babysitter and emphasize the importance of her cooperating with you for the development of your child.

LANGUAGE and COMMU
SKILLS



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Appendix D. Word order Study

Table 6.1 A condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Blank	*Bak bi at, işte at* / Look, a horse! See, the horse!	Horse	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Bird	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Blank	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Bird	*Hadi ata bak* / Look at the horse!	Horse	4	R
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Bird	*Hadi kuşa bak* / Look at the bird!	Horse	4	L
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* /They are on both screens!	H pushes B	6	
	Blank	*Kuş at it-iyor* /The bird is pushing the horse	Blank	3	
4 T1	B pushes H	*Bak işte kuş at it-iyor* / Look! The bird is pushing the horse	H pushes B	6	L
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now! Tickling!	Blank	3	

1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* / Look, tickling! See, tickling!	H tickles B	6	
	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	B tickles H	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B tickles H	*Bak iki tarafta da var* / They are on both screens!	H tickles B	6	
	Blank	*At kuş gıdıklı-yor* / The horse is tickling the bird	Blank	3	
4 T1	B tickles H	*Bak işte at kuş gıdıklı-yor* / Look! The horse is tickling the bird	H tickles B	6	R
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	B pulls H	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek-iyor* / Look, pulling! Wow, pulling!	H pulls B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pulls H	*Bak iki tarafta da var* / They are on both screens!	H pulls B	6	
	Blank	*At kuş çek-iyor* / The horse is pulling the bird	Blank	3	
4 T1	B pulls H	*Bak işte at kuş çek-iyor* / Look! The horse is pulling the bird	H pulls B	6	R
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	H washes B	6	
	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	
2 SQ	B washes H	*İşte yıkı-yor, aa bak yıkı-yor* / Look, washing! Wow, washing!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	

3 CT	B washes H	*Bak iki tarafta da var* / They are on both screens!	H washes B	6	
	Blank	*Kuş at yıkı-yor* / The bird is washing the horse	Blank	3	
4 T1	B washes H	*Bak işte kuş at yıkı-yor* / Look! The bird is washing the horse	H washes B	6	L

Table 6.2 B condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Horse	*Bak bi at, işte at* / Look, a horse! See, the horse!	Blank	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Blank	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Bird	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Horse	*Hadi ata bak* / Look at the horse!	Bird	4	L
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Horse	*Hadi kuşa bak* / Look at the bird!	Bird	4	R
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	H pushes B	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	B pushes H	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H pushes B	*Bak iki tarafta da var* /They are on both screens!	B pushes H	6	
	Blank	*Kuş at it-iyor* /The bird is pushing the horse	Blank	3	
4 T1	H pushes B	*Bak işte kuş at it-iyor* / Look! The bird is pushing the horse	B pushes H	6	R
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now! Tickling!	Blank	3	
1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* / Look, tickling! See, tickling!	B tickles H	6	

	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	H tickles B	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H tickles B	*Bak iki tarafta da var* / They are on both screens!	B tickles H	6	
	Blank	*At kuş gıdıklı-yor* / The horse is tickling the bird	Blank	3	
4 T1	H tickles B	*Bak işte at kuş gıdıklı-yor* / Look! The horse is tickling the bird	B tickles H	6	L
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	H pulls B	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek-iyor* / Look, pulling! Wow, pulling!	B pulls H	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H pulls B	*Bak iki tarafta da var* / They are on both screens!	B pulls H	6	
	Blank	*At kuş çek-iyor* / The horse is pulling the bird	Blank	3	
4 T1	H pulls B	*Bak işte at kuş çek-iyor* / Look! The horse is pulling the bird	B pulls H	6	L
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	B washes H	6	
	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	
2 SQ	H washes B	*İşte yıkı-yor, aa bak yıkı-yor* / Look, washing! Wow, washing!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	

3 CT	H washes B	*Bak iki tarafta da var* / They are on both screens!	B washes H	6	
	Blank	*Kuş at yıkı-yor* / The bird is washing the horse	Blank	3	
4 T1	H washes B	*Bak işte kuş at yıkı-yor* / Look! The bird is washing the horse	B washes H	6	R

Table 6.3 B audio condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Blank	*Bak bi at, işte at* / Look, a horse! See, the horse!	Horse	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Bird	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Blank	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Bird	*Hadi ata bak* / Look at the horse!	Horse	4	R
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Bird	*Hadi kuşa bak* / Look at the bird!	Horse	4	L
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* /They are on both screens!	H pushes B	6	
	Blank	*At kuş it-iyor* /The horse is pushing the bird	Blank	3	
4 T1	B pushes H	*Bak işte at kuş it-iyor* / Look! The horse is pushing the bird	H pushes B	6	R
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now! Tickling!	Blank	3	
1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* /	H tickles B	6	

		Look, tickling! See, tickling!			
	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	B tickles H	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B tickles H	*Bak iki tarafta da var* / They are on both screens!	H tickles B	6	
	Blank	*Kuş at gıdıklı-yor* / The bird is tickling the horse	Blank	3	
4 T1	B tickles H	*Bak işte kuş at gıdıklı-yor* / Look! The bird is tickling the horse	H tickles B	6	L
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	B pulls H	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek-iyor* / Look, pulling! Wow, pulling!	H pulls B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pulls H	*Bak iki tarafta da var* / They are on both screens!	H pulls B	6	
	Blank	*Kuş at çek-iyor* / The bird is pulling the horse	Blank	3	
4 T1	B pulls H	*Bak işte kuş at çek-iyor* / Look! The bird is pulling the horse	H pulls B	6	L
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	H washes B	6	
	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	
2 SQ	B washes H	*İşte yıkı-yor, aa bak yıkı-yor* / Look, washing! Wow, washing!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	

3 CT	B washes H	*Bak iki tarafta da var* / They are on both screens!	H washes B	6	
	Blank	*At kuş yıkı-yor* / The horse is washing the bird	Blank	3	
4 T1	B washes H	*Bak işte at kuş yıkı-yor* / Look! The horse is washing the bird	H washes B	6	R

Appendix E. Accusative Study

Table 6.4 A condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Blank	*Bak bi at, işte at* / Look, a horse! See, the horse!	Horse	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Bird	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Blank	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Bird	*İşte at! Nerde at?* / See the horse! Where's the horse?	Horse	4	R
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Bird	*İşte kuş! Nerde kuş*? / See the bird! Where's the bird?	Horse	4	L
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* / They are on both screens!	H pushes B	6	
	Blank	*Kuş at-ı it-iyor* / The bird is pushing the horse (Bird horse-ACC push)	Blank	3	
4 T1	B pushes H	*Bak işte kuş at-ı it-iyor* / Look! The bird is pushing the horse (Bird horse-ACC push)	H pushes B	6	L
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now!	Blank	3	

		Tickling!			
1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* / Look, tickling! See, tickling!	H tickles B	6	
	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	B tickles H	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B tickles H	*Bak iki tarafta da var* / They are on both screens!	H tickles B	6	
	Blank	*At kuş-u gıdıklı-yor* / The horse is tickling the bird (Horse bird-ACC tickle)	Blank	3	
4 T1	B tickles H	*Bak işte at kuş-u gıdıklı-yor* / Look! The horse is tickling the bird (Horse bird-ACC tickle)	H tickles B	6	R
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	B pulls H	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek*-iyor / Look, pulling! Wow, pulling!	H pulls B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pulls H	*Bak iki tarafta da var* / They are on both screens!	H pulls B	6	
	Blank	*At kuş-u çek-iyor* / The horse is pulling the bird (Horse bird-ACC pull)	Blank	3	
4 T1	B pulls H	*Bak işte at kuş-u çek-iyor* / Look! The horse is pulling the bird (Horse bird-ACC pull)	H pulls B	6	R
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	H washes B	6	

	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	
2 SQ	B washes H	*İşte yıkı-yor, aa bak yıkı-yor* / Look, washing! Wow, washing!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B washes H	*Bak iki tarafta da var* / They are on both screens!	H washes B	6	
	Blank	*Kuş at-ı yıkı-yor* / The bird is washing the horse (Bird horse-ACC wash)	Blank	3	
4 T1	B washes H	*Bak işte kuş at-ı yıkı-yor* / Look! The bird is washing the horse (Bird horse-ACC wash)	H washes B	6	L

Table 6.5 B condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Horse	*Bak bi at, işte at* / Look, a horse! See, the horse!	Blank	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Blank	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Bird	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Horse	*İşte at! Nerde at?* / See the horse! Where's the horse?	Bird	4	L
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Horse	*İşte kuş! Nerde kuş*? / See the bird! Where's the bird?	Bird	4	R
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	H pushes B	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	B pushes H	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H pushes B	*Bak iki tarafta da var* / They are on both screens!	B pushes H	6	
	Blank	*Kuş at-ı it-iyor* / The bird is pushing the horse (Bird horse-ACC push)	Blank	3	
4 T1	H pushes B	*Bak işte kuş at-ı it-iyor* / Look! The bird is pushing the horse (Bird horse-ACC push)	B pushes H	6	R
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now! Tickling!	Blank	3	
1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* / Look, tickling! See, tickling!	B tickles H	6	

	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	H tickles B	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H tickles B	*Bak iki tarafta da var* / They are on both screens!	B tickles H	6	
	Blank	*At kuş-u gıdıklı-yor* / The horse is tickling the bird (Horse bird-ACC tickle)	Blank	3	
4 T1	H tickles B	*Bak işte at kuş-u gıdıklı-yor* / Look! The horse is tickling the bird (Horse bird-ACC tickle)	B tickles H	6	L
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	H pulls B	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek*-iyor / Look, pulling! Wow, pulling!	B pulls H	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H pulls B	*Bak iki tarafta da var* / They are on both screens!	B pulls H	6	
	Blank	*At kuş-u çek-iyor* / The horse is pulling the bird (Horse bird-ACC pull)	Blank	3	
4 T1	H pulls B	*Bak işte at kuş-u çek-iyor* / Look! The horse is pulling the bird (Horse bird-ACC pull)	B pulls H	6	L
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	B washes H	6	
	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	
2 SQ	H washes B	*İşte yıkı-yor, aa bak yıkı-yor* /	Blank	6	

		Look, washing! Wow, washing!			
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	H washes B	*Bak iki tarafta da var* / They are on both screens!	B washes H	6	
	Blank	*Kuş at-ı yıkı-yor* / The bird is washing the horse (Bird horse-ACC wash)	Blank	3	
4 T1	H washes B	*Bak işte kuş at-ı yıkı-yor* / Look! The bird is washing the horse (Bird horse-ACC wash)	B washes H	6	R

Table 6.6 B audio condition

Type	Video 1	Audio	Video 2	Length	Match
	Blank	*Aa bak bi at* / Oh look, a horse!	Blank	3	
1 SQ	Blank	*Bak bi at, işte at* / Look, a horse! See, the horse!	Horse	4	
	Blank	*Aa bak bi kuş* / oh look a bird!	Blank	3	
2 SQ	Bird	*Bak bi kuş, işte kuş* / Look, a bird! See, the bird!	Blank	4	
	Blank	*Hani nerde at?* / Where's the horse?	Blank	3	
3 T1	Bird	*İşte at! Nerde at?* / See the horse! Where's the horse?	Horse	4	R
	Blank	*Hani nerde kuş?* / Where's the bird?	Blank	3	
4 T1	Bird	*İşte kuş! Nerde kuş*? / See the bird! Where's the bird?	Horse	4	L
	Blank	*Aa bak it-iyor* / Oh, look here! Pushing!	Blank	3	
1 SQ	B pushes H	*Bak it-iyor, aa it-iyor* / Look, pushing! See, pushing!	Blank	6	
	Blank	*Aa bak itiyor* / Oh, look here! Pushing!	Blank	3	
2 SQ	Blank	*İşte itiyor, aa bak it-iyor* / Look, pushing! Wow, pushing!	H pushes B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pushes H	*Bak iki tarafta da var* / They are on both screens!	H pushes B	6	
	Blank	*At kuş-u it-iyor* / The horse is pushing the bird (Horse bird-ACC push)	Blank	3	
4 T1	B pushes H	*Bak işte at kuş-u it-iyor* / Look! The horse is pushing the bird (Horse bird-ACC push)	H pushes B	6	R
	Blank	*Aa bak gıdıkl-ıyor* / Oh, look now! Tickling!	Blank	3	
1 SQ	Blank	*Bak gıdıklıyor, aa gıdıklı-yor* /	H tickles B	6	

		Look, tickling! See, tickling!			
	Blank	*Aa bak gıdıklı-yor* / Oh, look here! Tickling!	Blank	3	
2 SQ	B tickles H	*İşte gıdıklıyor, aa bak gıdıklı-yor* / Look, tickling! Wow, tickling!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B tickles H	*Bak iki tarafta da var* / They are on both screens!	H tickles B	6	
	Blank	*Kuş at-ı gıdıklı-yor* / The bird is tickling the horse (Bird horse-ACC tickle)	Blank	3	
4 T1	B tickles H	*Bak işte kuş at-ı gıdıklı-yor* / Look! The bird is tickling the horse (Bird horse-ACC tickle)	H tickles B	6	L
	Blank	*Aa bak çek-iyor* / Oh, look now! Pulling!	Blank	3	
1 SQ	B pulls H	*Bak çek-iyor, aa çek-iyor* / Look, pulling! See, pulling!	Blank	6	
	Blank	*Aa bak çek-iyor* / Oh, look here! Pulling!	Blank	3	
2 SQ	Blank	*İşte çek-iyor, aa bak çek*-iyor / Look, pulling! Wow, pulling!	H pulls B	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B pulls H	*Bak iki tarafta da var* / They are on both screens!	H pulls B	6	
	Blank	*Kuş at-ı çek-iyor* / The bird is pulling the horse (Bird horse-ACC pull)	Blank	3	
4 T1	B pulls H	*Bak işte kuş at-ı çek-iyor* / Look! The bird is pulling the horse (Bird horse-ACC pull)	H pulls B	6	L
	Blank	*Aa bak yıkı-yor* / Oh, look here! Washing!	Blank	3	
1 SQ	Blank	*Bak yıkı-yor, aa yıkı-yor* / Look, washing! See, washing!	H washes B	6	
	Blank	*Aa bak yıkı-yor* / Oh, look now! Washing!	Blank	3	

2 SQ	B washes H	*İşte yıkı-yor, aa bak yıkı-yor* / Look, washing! Wow, washing!	Blank	6	
	Blank	*Aa şimdi bak* / Oh, look now!	Blank	3	
3 CT	B washes H	*Bak iki tarafta da var* / They are on both screens!	H washes B	6	
	Blank	*At kuş-u yıkı-yor* / The horse is washing the bird (Horse bird-ACC wash)	Blank	3	
4 T1	B washes H	*Bak işte at kuş-u yıkı-yor* / Look! The horse is washing the bird (Horse bird-ACC wash)	H washes B	6	R