Caused Motion Events in Turkish: Verbal and Gestural Representation in Adults and Children

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Caused Motion Events in Turkish: Verbal and Gestural Representation in Adults and Children

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Promotoren:	Prof. dr. Aslı Özyürek
	Prof. dr. Pieter Muysken
Manuscriptcomissie:	Prof. dr. Helen de Hoop
	Prof. dr. Marianne Gullberg (Lund University)
	Prof. dr. Aylin Küntay (Koç University)

For Bilbo

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ABBREVIATIONS

3	third person
ABL	ablative
ACC	accusative
ADJ	adjectivizer
CAUS	causative
CONN	connective
DAT	dative
GEN	genitive
LOC	locative
MOD	modifier
NOM	nominalizer
NEG	negative
PRS	present
PST	past
PLU	plural
POSS	possessive
REL	relativizer
SG	singular
VERB	verbal suffix

ENCODING MOTION EVENTS

CHAPTER 1

1.1 Introduction

In their daily lives, people experience and discuss countless events. In order to talk about these events, speakers have to break up their perceptual experience into units and map these onto words. For instance in the domain of motion, humans attend to event properties and components such as agency and affectedness, intention and causation, and manner and path of motion. These elements are consistently encoded across languages, however are the same event components linguistically represented in the same way crosslinguistically? Decades of linguistic and psychological research has shown that the answer to this question is a resounding no. That is, languages differ drastically from one another in how they distribute semantic elements both at the lexical and the syntactic level. Diversity in linguistic encoding is a general phenomenon (Evans & Levinson, 2009), and has been attested in different event types such as events of causation (e.g. Bohnemeyer, Enfield, Essegbey, & Kita; 2011; Majid, Bowerman, Van Staden, & Boster, 2007), placement (e.g. Gullberg, 2011; Hickmann & Hendriks, 2006; Narasimhan & Brown, 2009; Slobin, Bowerman, Brown, Eisenbeiß, & Narasimhan, 2011), and motion (e.g. Allen et al., 2007; Naigles, Eisenberg, Kako, Highter, & McGraw, 1998; Papafragou, Massey, & Gleitman, 2006; Slobin, 1996; Talmy, 1985).

Children begin to understand basic events early on in their first year of life, long before they start to speak (e.g. Baillargeon, 1995; Cohen, Amsel, Redford, & Casasola, 1998; Kotovsky & Baillargeon, 1994, 2000; Lakusta, Wagner, O'Hearn, & Landau, 2007; Leslie & Keeble, 1987). Given all the variation in linguistic event encoding, how do they then learn to talk about events? To date, most studies investigating this question focused on spontaneous motion events, and examined child speakers born into communities with typologically different languages

that have different lexical and syntactic patterns of event description. Satellite-framed languages such as English tend to encode Manner in the main verb (e.g., *float* in (1)) and represent the Path in a non-verbal element, that is, a ‘‘satellite’’ (e.g., *into*). In contrast, verb-framed languages such as Spanish tend to encode Path in the main verb (e.g., *entró* in (2)) and express Manner in an adverbial, gerund (e.g., *flotando* in (2)), or a subordinate verb. Accordingly, Manner and Path of a motion event can be encoded within one or two clauses depending on the typology of the language (Talmy, 1985). Speakers of satellite-framed languages typically use a single clause to encode Manner and Path, as shown in (1). In contrast, speakers of verb-framed languages typically use two separate clauses, in a matrix–subordinate construction, as shown in the Spanish sentence taken from Talmy (1985) in (2).

(1) *The bottle floated into the cave.*

(2) *La botella entró a la cueva flotando.*
ball bottle moved.in to the cave floating
‘The bottle floated into the cave’

Recent research has shown that children’s linguistic encoding of motion events is language-specific from early on (e.g. Allen et al., 2007; Choi & Bowerman, 1991; Özçalışkan & Slobin, 1999; Papafragou, Massey & Gleitman, 2002). Previous studies have assumed that languages easily fit into typologies and children are guided by the typological specifications of their language. However, this may not always be the case. What happens when a language displays both typological patterns? What types of challenges do child learners of such a language face and how do they encode events? Does it take longer for them to identify and use the diverse patterns specific to their native language, or can they decipher these patterns early on without any difficulties?

In order to answer the above questions, this dissertation investigates the development of encoding of caused motion events in Turkish. Caused

motion events are basic events where an agent causes an entity to change location by acting on it (e.g. a girl kicking a ball across a field). Based on descriptions of spontaneous motion events, Turkish has been previously classified as a verb-framed language (Talmy, 1985; Özçalışkan & Slobin, 1999). In the encoding of spontaneous motion, speakers of Turkish express Path in the main verb and Manner in a subordinate verb, packaging these semantic elements in separate clauses, as in (3).

(3) *Top yuvarlan-arak tepe-den aşağı in-di.*
ball roll-CONN hill-ABL downness descend-PST
'The ball descended the hill while rolling'

It has also been shown that this typology influences Turkish-speaking children's linguistic encoding of spontaneous motion such that they are more likely to use Path verbs and encode Manner and Path in multiple clauses than their English-speaking peers (e.g. Allen et al., 2007; Özçalışkan & Slobin, 1999). There is, however, no research on the encoding of caused motion events in Turkish.

Although previous research has analyzed Turkish as a verb-framed language in a subdomain of caused motion encoding (i.e. placement events, Slobin, Bowerman, Brown, Eisenbeiß, & Narasimhan, 2011), the following chapters of this dissertation show that the adult patterns of lexicalization of caused motion in Turkish cannot be fully accounted for using Talmy's typology and that this classification fits Turkish only for the domain of spontaneous motion. That is, when encoding caused motion Turkish speakers choose to use some verbs in verb-framed patterns while using others in nonverb-framed ones. Thus predicting how children encode caused motion events in Turkish is hard, since the language displays both verb- and nonverb-framed patterns. Going beyond previous studies, this dissertation combines language typological analyses with a more fine-grained verb semantics analysis in the study of caused motion lexicalization. It essentially shows that the fine semantic distinctions

between different verbs determine the syntactic constructions they can occur in, and investigates how and when children learn the relevant semantics-syntax pairings.

In recent years, a line of research has focused on *constructions*- form and meaning pairings in language- and claimed that syntax-semantics pairings are built on the observations that children accumulate regarding the use of verbs with similar meanings. Proponents of the "constructional" view argue that young children's speech is item-based and revolves around particular verbs (i.e. Tomasello, 1992; Pine & Lieven, 1993). They also show that syntactic knowledge develops piecemeal (Dabrowska, 2004; Tomasello, 2000, 2003). Both observational (Lieven, Pine & Baldwin, 1997; Tomasello, 1992) and experimental studies (Berman, 1993; Brooks & Tomasello, 1999; Tomasello & Brooks, 1998; Wittek & Tomasello; 2005) find that young children are initially more conservative in their language use, becoming more productive around the age of 3 and gradually building abstract and general syntactic representations. The results of these studies indicate that children do not possess adult-like, general and abstract representations of grammatical structures from early on. Instead, they begin with verb-specific constructions and later move on to more general, adult-like ones (Tomasello, 2000; 2003)[1].

Having to learn how the fine semantic distinctions between different verbs influence a verb's compatibility with syntactic constructions may present a problem for children acquiring Turkish. There are several possibilities regarding how development proceeds when children are faced with such a problem. Children could potentially have no difficulty in learning the relevant verb-construction pairings. Alternatively, they might prefer to use all verbs in a given construction and avoid the use of certain verb/constructions that are difficult for them. Finally, it is also

[1] For an opposing view which claims that children can understand and productively use various argument structure constructions early on see, for instance, Fisher (2002) and Naigles (1996; 2003).

possible that children cannot form the appropriate generalizations on such fine semantic differences and they might be expected to make mistakes in their verb-construction combinations (Bowerman, 1982a, 1988; Tomasello & Brooks, 1998). Thus, caused motion speech in Turkish could be a good test-ground to investigate how children learn verb-construction couplings and the specific strategies they use in this process.

Although the study of children's lexical and syntactic patterns can help us glean the nature of their event representation, the examination of speech alone may be an insufficient guide in this respect. Research has shown that gesture can frequently provide information about a child's knowledge not conveyed in her speech. For instance, children between the ages of 14 and 22 months use speech-gesture combinations to produce different constructions several months before the same constructions appear solely in their speech (Özçalışkan & Goldin-Meadow, 2005). Gesture-speech combinations, then, may allow children to express their knowledge of argument structure before it can be fully expressed in words. Thus, this dissertation uses a multimodal approach to event encoding and focuses on both the speech and gestures of adults and children to fully uncover how caused motion events are represented in Turkish. Although gestures as well as speech are important in event representation in adults (Kita & Özyürek, 2003; Kita, Özyürek, Allen, Brown, Furman & Ishizuka, 2007), we know little about how they are specifically used in the encoding of caused motion events in development.

Previous research has indeed shown gesture to be an important window into children's event representation (Gullberg & Narasimhan, 2010; Özyürek, Kita, Allen, Furman, & Brown, 2008), and also revealed the tight link between language and gesture development (Nicoladis, Mayberry & Genesee, 1999; Özçalışkan & Goldin-Meadow, 2005; 2009). However, most of the research on the early development of gestures has been carried out on English-speaking children. There is a dearth of research that examines the development of gestures and their relation to

both early and late language development in different cultures and languages, particularly those that are typologically different than English. There is also little research that has focused on the whole domain of caused motion events and examined how speech and gestures encode different types of events within this domain across development.

Moreover, very little is known about the development of languages like Turkish, in which verbs are acquired early on at the same time with nouns (Aksu-Koç & Slobin, 1986), and argument omissions are frequent (Demir, So, Özyürek & Goldin-Meadow, in press; Küntay & Slobin, 1996; Gürcanlı, Nakipoğlu Demiralp & Özyürek, 2007). Further research on the development of event representation in speech and gesture is important because it allows us to investigate the particular semantic and psycholinguistic factors that influence language acquisition. Moreover, examining the language-specific properties of early multimodal event representations also lets us determine the cognitive abilities and resources children use in learning how to talk about events.

1.2 Outline of the present thesis

This dissertation examines the development of caused motion event representations in Turkish-speaking children's speech and gestures between the ages of 1 and 5 in spontaneous speech and elicited event narratives and compares them to those of adults. It first shows that Turkish does not fully fit into the expected typological patterns, and finds that event encoding is determined by the fine-grained lexical semantics of a verb as well as the syntactic construction the verb is integrated into. Furthermore, it focuses on both the lexical and syntactic level of linguistic encoding to investigate the full extent of language-specificity. It establishes the adult patterns for the encoding of caused motion events by linguistic analysis, grammaticality judgments, and elicited event descriptions. It then compares adults' verbal and gestural representations to those of children to reveal developmental patterns. It seeks to go beyond previous research by investigating a broad range of exemplars within the category of caused motion events in a language that is

typologically different than English, and in particular by studying the development of both speech and gestures in event representations.

The dissertation is made up of six chapters. Chapters 1 and 2 are more theoretical in nature, Chapters 3 to 5 comprise the empirical part and Chapter 6 summarizes the findings and suggests avenues for further research.

The **current chapter** has outlined the general aim and the research questions of the study. It also briefly introduced the domain of events that are investigated.

Chapter Two discusses the linguistic encoding of caused motion in Turkish. First, it overviews the theoretical approaches to the study of the expression of caused motion. It then focuses on the semantics of verbs that encode caused motion. Verbs are relevant in the study of events in general since they refer to relations between entities and are the main means of encoding events. A detailed analysis of the linguistic properties of verbs that encode caused motion is given and their constructional, morphological and semantic features are described. Verbs are divided into two categories based on the semantic elements they encode and the possible constructions they can occur in[2]. Here, it is shown that the semantic properties of verbs rather than typological tendencies influence the syntactic constructions they can occur in.

Chapter Three is an empirical test of the analysis provided in Chapter 2. It reports the results of a grammaticality judgment study on the semantic and constructional properties of verbs that encode caused motion. To test whether the verb classification proposed in Chapter 2 is relevant for Turkish native speakers, a judgment study that focuses on the acceptance of different types of verbs (i.e. semantically general and

[2] The first group contains semantically general verbs like *koy*- 'put' that encode Action and the other one comprises of specific verbs such as *sok*- 'put in' encoding Action and Path.

specific) in the Caused Motion Construction (CMC) and Matrix Subordinate Construction (MSC) is designed and implemented. Importantly, Talmy's typology predicts that in the expression of caused motion, the CMC is typically used in satellite-framed languages while MSC is typical for verb-framed languages. These constructions differ in how they package the semantic elements of a caused motion event into clauses. That is, Action and Path are expressed in a single clause in CMCs whereas they are spread across multiple clauses in the MSC. This study tests whether the expected patterns are found in Turkish. In addition, it investigates whether there are any differences in the encoding of different types of caused motion events, since another area where languages are subject to the typological differences described by Talmy is spatial boundary crossing (i.e. motion into/out of/over a bounded region) in spontaneous motion events. These typological differences, however, have not been tested in the domain of caused motion events and the encoding of boundary crossing in caused motion might display a different pattern than that of spontaneous motion. Thus, the findings of this chapter establish the fundamentals of the adult patterns for the encoding of caused motion events in Turkish.

Chapter Four investigates how Turkish-speaking adults and children between the ages of 3 to 5 encode caused motion events in their speech and gestures in elicited event descriptions. Based on the acceptability ratings of verbs described in Chapter 3, a series of video clips depicting various instances of caused motion events are developed. Using this stimuli set, caused motion event descriptions are elicited from Turkish 3-, 4- and 5-year-olds as well as adults. The results show that there are differences between the caused motion descriptions of adults and children in both speech and gesture. Thus, although children speak and gesture in language-specific ways, the development of language-specificity into full-blown adult patterns takes time and occurs after the age of 5.

Chapter Five delves further into development and examines how children between the ages of 1 and 3 start to represent caused motion events in their spontaneous speech and gestures. In particular, the chapter

investigates whether the language-specific patterns shown in Chapter 4 are evident in the caused motion descriptions of very young children. Turkish is a language where verbs are acquired early, and arguments of a verb can be commonly omitted. Focusing on these properties, this chapter examines whether the language that children learn to speak influences the types of gestures they produce and the relationship between speech and gesture. Three specific questions are investigated. First, do children start with language-specific constructions and lexical items? Second, do the early use of verbs and the grammatically allowed omission of arguments in speech influence the gesture types that children produce? Third, is there any language-specific development in terms of speech and gesture relations and in how semantic elements are distributed across the two channels of expression? Using the Koç University Longitudinal Language Development Database (Ural, Yüret, Ketrez, Koçbaş & Küntay, 2009), the spontaneous speech and cospeech gestures of eight Turkish-speaking children are sampled, coded and analyzed. The results show that language-specificity in caused motion event descriptions is evident from the start, and also indicate that gestures in the first 3 years of life are influenced by the specific properties of the language that children learn.

Chapter 6 summarizes and discusses the results presented in the previous chapters. It also outlines the theoretical implications of the aforementioned results for typological approaches to motion event encoding, the development of event encoding and the role of gesture in this development. It ends with the conclusions that can be drawn from this dissertation.

CONSTRUCTIONAL, MORPHOLOGICAL AND SEMANTIC PROPERTIES OF VERBS EXPRESSING CAUSED MOTION IN TURKISH

CHAPTER 2

2.1 Introduction

The previous chapter introduced the domain of caused motion events and gave a brief account of how they are encoded crosslinguistically. This chapter takes a detailed look at the encoding of caused motion in Turkish. It finds that Turkish does not fully conform to the properties that are characteristic of verb-framed languages in the encoding of caused motion events as described by Talmy (1985, 2000), and instead displays both verb-framed and nonverb-framed patterns. It also shows that an alternative theoretical approach such as Construction Grammar cannot wholly account for the Turkish data either. Specifically, this chapter examines the lexicalization of caused motion in Turkish from the perspective of these two theoretical approaches. Given that two typological patterns exist within the same language, it is clear that classifying Turkish as a verb- or satellite-framed language within Talmy's classification does not fully and accurately capture the nature of the lexicalization of caused motion events. Thus, the aim of this chapter is to take a detailed look at the verbs used in the expression of caused motion in Turkish to investigate whether their morphological and semantic properties influence the type of typological pattern they display in the encoding of event components.

The following section reviews different theoretical perspectives that can be used to study the encoding of caused motion. The first one classifies caused motion events as a type of motion event and investigates how lexicalization patterns of motion events differ across languages

(Talmy, 1985, 2000). The second focuses on constructions and investigates how a specific grammatical form conveys the meaning of caused motion (Goldberg, 1995). Section 2.3 focuses on the morphological, semantic, and constructional properties of verbs that encode caused motion in Turkish. It goes beyond previous studies of caused motion encoding by offering an analysis that takes into account verb semantics as well as typological patterns and constructions. The concluding remarks are provided in Section 2.4.

2.2 Encoding caused motion events

2.2.1 A Motion Event Perspective

A lot of crosslinguistic research to date has focused on events of change of location, namely motion events, and investigated how languages differ in encoding them. Talmy (e.g. 1985, 2000) has studied the crosslinguistic lexicalization of motion events in detail. A motion event refers to a situation where an entity moves or is located with respect to another entity and has four internal components: *Figure*, *Ground*, *Path*, and *Motion* (Talmy, 1985). These can be seen in (1):

(1)	*The ball*	*moved*	*down*	*the slope.*
	Figure	Motion	Path	Ground

The Figure is the object that moves or is located. The Motion component refers to motion or locatedness. The Ground is the reference object with regard to which the Figure moves or is located. And, Path represents the course followed or location occupied by the Figure with regard to the Ground. In addition to these internal components, a motion event can also have an external *Co-event* such as the *Manner* or *Cause* of the Motion. Manner refers to the specific way the Figure moves, and Cause is the event that makes the Figure move. These are illustrated in (2) and (3):

(2)	*The ball*	*rolled*	*down*	*the slope.*
	Figure	Motion+Manner	Path	Ground

(3) *The tissue blew off the table.*
Figure Motion+Cause Path Ground

According to Talmy (1985), a motion event can be non-agentive like (2)-(3) above, or agentive, that is, having an explicit *Agent* as the instigator of the motion event, as seen in (4) and (5). To decide whether it is the Cause or the Manner that is conflated in the main verb, Talmy examines whose action the verb refers to. That is, if the verb refers to the action of the Figure as in (4), then Manner is conflated in the verb. If it refers to what the Agent did, as in (5), then it is Cause that is conflated with Motion in the verb.

(4) *The girl rolled the ball down the hill.*
Agent Motion+Manner Figure Path Ground
(5) *The man kicked the ball down the hill.*
Agent Motion+Cause Figure Path Ground

Talmy (1985) was also the first person to argue that languages can be divided into two categories with regard to how components of motion events were expressed. Languages like English allow a verb that encodes information about Cause/Manner of Motion (e.g. *float*) to combine with a Path in a single clause as in *The bottle floated into the cave* (Talmy, 1991) whereas this combination is not grammatically possible in other languages. Instead, languages like Spanish and Turkish choose to encode the Path of motion in the main verb and the Cause/Manner is expressed in a separate verbal clause as an adjunct (e.g. *La botella entro flotando a la cueva* 'the bottle entered floating into the cave', taken from Talmy, 1991).

Talmy (1985) originally accounts for the typological variation in the expression of motion by examining the differences in the event components that are encoded in the same lexical items (i.e. verbs) across languages. Specifically, he proposes that languages like English allow Manner and Path information to be packaged in a single clause because

they have Manner verbs that are "lexicalization doublets" (1985: 64), that is these verbs have both a simple Manner meaning in addition to a complex meaning that conflates Manner and Motion. In contrast, verbs in languages like Spanish only have a simple Manner meaning, which prevents them from occurring in single clauses with Path phrases. In a subsequent account, however, he declares Path to be the core event of a motion event and shifts his focus to how Path elements are encoded in different grammatical categories across languages (1991). He differentiates between "satellite-framed" languages like English that express Path in closed-class items that are "satellites" (e.g. the English verb particles *in, out, off* etc.). In contrast, "verb-framed" languages such as Spanish and Turkish express Path along with Motion in open-class grammatical items, i.e. verbs that encode both Path and Motion, as the verb *gir* 'enter' in (6).

(6) *Kız oda-dan içeri koş-arak gir-di.*
girl room-ABL in run-CONN enter-PST
'The girl entered the room running.'

Crucially, Talmy treats both Cause and Manner as similar and defines them as external events that either cause or modify the motion event. That is, he proposes that these two elements are lexicalized in identical ways in different languages: "In a motion-sentence pattern characteristic of one group of languages, the verb expresses at once both the fact of Motion and either its manner or its cause. A language of this type has a whole series of verbs in common use that express motion occurring in various manners or by various causes (1985: 62). In the second typological pattern for the expression of Motion, the verb root at once expresses both the fact of Motion and the Path (1985: 68)". Based on this account, the lexicalization patterns of spontaneous and caused motion are expected to be similar. That is, satellite-framed languages such as English are expected to have verbs that conflate Motion and Cause, which can be expressed in a single clause with Path. In contrast, verbs in verb-framed

languages such as Spanish or Turkish should encode Motion with Path and express Cause in a separate verbal clause. The English (7a) and Spanish (7b) examples below illustrate this typological difference in the encoding of caused motion.

(7) a. *I sawed the tree down.*
b. *Tumbé el árbol serruchándolo.*
I.felled. the tree sawing.it
'I sawed the tree down' (taken from Talmy (2007))

Contrary to Talmy's typology, however, motion events with Cause and Path can be described using a single clause in Turkish, similar to satellite-framed languages such as English. Examples (8)-(10) are headlines taken from recent editions of major newspapers and news websites in Turkey. All illustrate that Turkish can pattern with satellite-framed languages in the syntactic packaging of Cause and Path:

(8) *Çocuk yol-a el bomba-sı at-tı.*
child road-DAT hand bomb-POSS throw-PST
'The child threw a hand grenade to the road.' (*Radikal*, 07/04/2008)

(9) *Edu top-u hakem-in yüz-ün-e*
Edu ball-ACC referee-GEN face-POSS-DAT
fırla-t[3]*-tı*
hurl-CAUS-PST
'Edu hurled the ball to the referee's face.' (*Hürriyet*, 26/10/2008)

[3] The notion Cause as defined by Talmy (1985) refers to the Manner/means of the causing event whereas the notion encoded by the causative morpheme *–DIr* in Turkish refers to a general sense of causation, i.e. whether an event occurs by itself or is caused by another event/force.

(10) *Ev-i-ni* *sat-ma-yan* *kadın-ın* *üzer-i-ne*
house-POSS-ACC sell-NEG-REL woman-GEN on-POSS-DAT
kayna-r *su* *dök-tü.*
boil-ADJ water pour-PST
'(he/she) poured boiling water on the woman who didn't sell her house.' (*Milliyet*, 26/06/2008)

Thus, although Turkish has been classified and analyzed as a verb-framed language previously due to the encoding of spontaneous motion events (Allen et al., 2007; Kita & Özyürek, 2003; Özçalışkan & Slobin, 1999; Talmy, 1985), here we see that it patterns similar to satellite-framed languages in the expression of caused motion. Moreover, as can be seen from the examples that are provided in the rest of this chapter, this phenomenon is not restricted to a few verbs. For instance, even an agentive Manner verb such as *yuvarla-* 'roll' can occur with Path in a single clause as seen in (11)-(13), although this is not the attested pattern for spontaneous motion events (Allen et al., 2007).

(11) *Baş-ın-a* *düş-en* *taş* *uçurum-a* *yuvarla-dı.*
head-POSS-DAT fall-REL stone cliff-DAT roll-PST
'The stone that fell on (his/her) head rolled (him/her) to the cliff.' (*Sabah*, 29/04/2008)

(12) *Borç-lu* *iş-adam-ı* *arac-ın-ı* *uçurum-a*
debt-ADJ business-man-POSS vehicle-POSS-ACC cliff-DAT
yuvarla-dı.
roll-PST
'The business man who had debts rolled his car to the cliff.' (*NTVMSNBC*, 07/04/2008)

(13) *Kadın* *sürücü-ye* *çarp-ma-mak* *için* *İETT otobüs-ü-nü*
woman driver-DAT hit-NEG-INF for IETT bus-POSS-ACC
şarampol-e *yuvarla-dı*
cliff-DAT roll-PST

'(he/she) rolled the IETT (public) bus to the cliff in order not to hit the woman driver.' (*Haber Vitrini*, retrieved on 03/11/2011 http://www.habervitrini.com/kadin_surucuye_carpmamak_icin_iett_otobusunu_sarampole_yuvarladi_-508657.html)

Sentences like (12) and (13) show the pattern characteristic of satellite-framed languages where the Manner component of the event is conflated with Motion and Path is expressed in a nonverbal element.

Thus, the packaging of verbs that express Cause or Manner in a single clause with Path has been previously documented for satellite-framed languages and is typologically very unexpected for Turkish. This pattern, however, cannot be used with all Turkish verbs. For instance, the use of verbs such as *tekmele-* 'kick' and *zıplat-* 'bounce' in descriptions where Cause and Path are encoded in a single clause results in ungrammaticality, as shown in (14). Instead, the Cause and Path components of the motion event have to be encoded by different verbs, as in (15).

(14) a. **Adam fıçı-yı aşağı tekme-le-di.*
man barrel-ACC downness kick-VERB-PST
'The man kicked the barrel down.'

b. **Kız top-u yukarı zıpla-t-tı.*
girl ball-ACC upness jump-CAUS-PST
'The girl bounced the ball up.'

(15) a. *Adam fıçı-yı tekme-le-yerek in-dir-di.*
man barrel-ACC kick-VERB-CONN descend-CAUS-PST
'The man caused the barrel to descend by kicking it.'

b. *Kız top-u zıpla-t-arak yukarı çık-ar-dı.*
girl ball-ACC jump-CAUS-CONN upness ascend-CAUS-PST
'The girl bounced the ball up.'

Another area where languages are subject to the typological differences described by Talmy is spatial boundary crossing (i.e. motion into/out of/over a bounded region) in motion events. When describing motion events that involve the traversal of a spatial boundary, speakers of verb-framed languages (i.e. Spanish, Turkish) tend to use a Path verb such as *enter*, *exit*, *cross* to mark the change of location, whereas speakers of satellite-framed languages (i.e. English) typically use Manner verbs coupled with path satellites such as *crawl into*, *creep out of* (Aske, 1989; Özçalışkan, under review; Slobin & Hoiting, 1994). When required to mention Manner in their descriptions, Turkish speakers either use Path verbs with subordinate Manner verbs (e.g. *he enters the house while crawling*) or use Manner and Path verbs in a serial way (e.g. *he crawls towards the carpet, and crosses it, then he crawls away*), thus using multiple clauses where speakers of English use a single clause (Özçalışkan, under review). However, in contrast to spontaneous motion events, boundary crossing in caused motion events is not always encoded by distributing Cause and Path to separate clauses, as shown in (16).

(16) *Kız kitab-ı çanta-sın-ın için-e*
girl book-ACC bag-POSS-GEN inside-DAT
Agent Figure Ground Path
sok-tu.
insert-PST
Motion+Path+Cause
'The girl put the book into her bag.'

Turkish, then, does not wholly pattern neither with verb-framed languages such as Spanish nor with satellite-framed languages such as English in the encoding of motion events with Cause and Path. Thus, Talmy's typology, although adequate for motion events with Manner and Path, does not seem to properly classify Turkish with respect to motion events with Cause and Path.

One of the reasons Talmy's typology fails to account for the encoding of caused motion events may be related to the way Talmy defines the element Cause. As described in section 2.2.1, Talmy differentiates between Manner and Cause depending on whose action the verb refers to. That is, if the verb refers to the action of the Figure as in *The boy rolled the ball down the hill*, then Manner is conflated in the verb. If it refers to what the Agent did, as in *The boy kicked the ball down the hill* then it is Cause that is conflated with Motion in the verb. Although this classification appears to be an adequate representation of caused motion events, it has to be noted that Talmy focuses only on verbs that encode a particular Manner of causation (e.g. *saw*, *kick*, *roll)*. However, caused motion events can also be represented using verbs that encode a less distinct Manner of causation (e.g *put*, *throw*) as well as those that encode the Path of the Figure's motion in addition to the Cause of the motion (e.g. *insert*). Interestingly, verbs from these two categories can be used in a single clause with Path, as examples (8) and (16) show.

These facts indicate that Talmy's classification is not fully adequate in its treatment of caused motion. In the next section, I examine an alternative theoretical approach that has viewed caused motion events through the perspective of constructions and investigate whether it can account for the encoding of caused motion in Turkish.

2.2.2 A Construction Perspective

Constructions are form and meaning pairings in language. Construction Grammar is a label used for theories of language in which the notion of construction is seen as representing the basic unit of language. Constructions have been of central importance in the theoretical frameworks of Fillmore (1988), Langacker (1987, 1991), Goldberg (1995, 2006) and Croft (2001). They can be found in all components of grammar. They can be morphemes (i.e. *-ing*, *un-*), words (i.e. *puppet*, *the*) or general phrasal patterns (i.e. *She baked him a chocolate cake*). A

linguistic pattern can be recognized as a construction provided that some aspect of its form or function is not predictable from its component parts or from other recognized constructions. Even in cases where patterns are fully predictable, they can still be stored as constructions provided that they occur with sufficient frequency (Goldberg, 2006, Goldberg & Jackendoff, 2004). Thus, in contrast to Talmy's motion event approach which focuses on the expression of semantic elements at the lexical level in a single event domain, Construction Grammar has a broader unit of analysis and range of inquiry.

In constructional approaches, a verb is assumed to have its own minimal meaning and associated arguments. The minimal meaning of the verb is integrated with the meaning of an argument structure construction. Goldberg (1995) has provided an in-depth study of argument structure constructions, that is, the pairings of form and function used to express basic clauses. Of particular interest here is the *caused motion* construction (CMC). This construction in English has the structure [SUBJ [V OBJ OBL]] where V is a verb and OBL represents a directional phrase. Some examples are (17 and 18 taken from Goldberg, 1995):

(17) *They laughed the poor guy out of the room.*
[SUBJ [V OBJ OBL]]

(18) *Frank sneezed the tissue off the table.*
[SUBJ [V OBJ OBL]]

(19) *She kicked the ball across the field.*
[SUBJ [V OBJ OBL]]

In contrast, the structure of the Turkish CMC is a) [SUBJ [OBJ-acc OBL-dat/abl V]] or b) [[SUBJ [OBJ-acc OBL V]], where V is a verb and OBL represents a directional phrase. The difference between the two structures is that the oblique noun phrase is marked either with the dative or ablative case or both in (a), and remains caseless in (b), as shown in (20)-(23). Different cases are used to express the various semantic elements of the caused motion event. That is, an oblique noun phrase marked with the

dative case represents the goal argument while one marked with the ablative refers to the source argument of the caused motion.

(20) *Mr. Spock* *biz-i* *gezegen-e* *ışın-la-dı.*
[SUBJ [OBJ-acc OBL-dat V]]
mr. Spock we-ACC planet-DAT beam-VERB-PST
'Mr. Spock beamed us to the planet.'

(21) *Selen* *kitab-ı* *çanta-sın-dan* *çık-ar-dı.*
[SUBJ [OBJ-acc OBL-abl V]]
Selen book-ACC bag-POSS-ABL exit-CAUS-PST
'Selen took the book out of her bag.'

(22) Ahmet *su-yu* *bardak-tan* *lavabo-ya*
[SUBJ [OBJ-acc OBL-abl OBL-dat
Ahmet water-ACC glass-ABL sink-DAT
boş-al-t-tı.
V]]
empty-VERB-CAUS-PST
'Ahmet emptied the water from the glass to the sink'

(23) *Çocuk* *top-u* *aşağı* *at-tı.*
[SUBJ [OBJ-acc OBL V]]
kid ball-ACC downness throw-PST
'The kid threw the ball down'

The CMC in English has the basic meaning of a causer argument (that is, Agent in Talmy's [1985] terminology) directly causing the theme argument (Figure in Talmy's [1985] terminology) to move along the path represented by the directional phrase. However, the motion interpretation cannot always be attributed to the main verb or the preposition; thus a specific construction is required to account for this interpretation. For instance, in (24) (taken from Goldberg, 1995) neither the verb nor the preposition encodes motion:

(24) *Sam squeezed the rubber ball inside the jar.*

In addition to its basic meaning, this construction also has a few related senses such as a causer enabling a theme to move to a new location (i.e. *The driver let the students into the bus*), and a causer helping a theme to move to a new location (i.e. *The nurse helped the old lady into her bed*) (Goldberg, 1995).

Similar to its English counterpart, the Turkish CMC has a few related senses such as a causer enabling a theme to move to a new location, as in (25). However, the sense where a causer helps a theme to move to a new location cannot be coded in Turkish in this construction, as in (26). This brings us to the limited productivity of the Turkish CMC.

(25) *Çoban* *koyun-lar-ı* *çayır-a* *sal-dı*.
shepherd sheep-PL-ACC meadow-DAT let-PST
'The shepherd let the sheep to the meadow'

(26) **Hemşire* *yaşlı* *adam-ı* *yatağ-ın-a* *yardım* *et-ti*.
nurse old man-ACC bed-POSS-DAT help do-PST
'The nurse helped the old man into his bed'

2.2.2.1 The Limited Productivity of the Turkish CMC

In contrast to English where the CMC can occur with a very wide range of verbs, a general feature of this construction in Turkish is its limited productivity. Although the CMC can occur with many verbs in Turkish, the verbs that can be used in this construction are both fewer in number and variety compared to English. That is, the Turkish construction is grammatical with some verbs and ungrammatical with others even though the verbs may be semantically similar. Let us compare the examples in (27) and (28):

(27) a. *Ali top-u* *aşağı* *düş-ür-dü.*
Ali ball-ACC downness fall-CAUS-PST
'Ali dropped the ball down.'

b. *Ali topu* *aşağı* *it-ti.*

Ali ball-ACC downness push-PST
'Ali pushed the ball down.'

c. *Ali topu aşağı yol-la-dı.*
Ali ball-ACC downness road-VERB-PST
'Ali sent the ball down.'

(28) a. **Ali topu aşağı zıpla-t-tı.*
Ali ball-ACC downness jump-CAUS-PST
'Ali bounced the ball down.'

b. **Ali topu aşağı hareket et-tir-di.*
Ali ball-ACC downness move do-CAUS-PST
'Ali moved the ball down.'

c. **Ali topu aşağı tekme-le-di.*
Ali ball-ACC downness kick-VERB-PST
'Ali kicked the ball down.'

A possible explanation for the compatibility of a given verb with the Turkish CMC could be related to the morphological properties of the verb. This, however, does not seem to be true. In (27a) and (28a) there are verbs with the causative suffix (used to causativize intransitive verbs) where one verb (e.g. *düş-ür-* 'make fall/drop') can be used in the construction and the other cannot (e.g. *zıpla-t-* 'make jump/bounce'). Likewise, both (27c) and (28c) contain verbs that have the *–lA* suffix (used to make verbs out of nouns) and only one is compatible with the construction (i.e. *yol-la* 'send' in 27c).

Alternatively, one could propose that verb semantics influences the occurrence of Turkish verbs in the CMC. At first glance, the compatibility of a verb with this construction does not depend on the general semantic class of the verb either. For instance, although both *yuvarla-* 'make roll' and *zıplat-* 'make bounce' are agentive Manner verbs (according to Talmy's [1985] classification), only *yuvarla-* 'make roll' is grammatical when used in the CMC. The two major semantic distinctions that influence the compatibility of verbs with the CMC in Turkish,

however, are transitivity and whether the verb in question has a sense of motion. Whereas the English CMC can occur with both transitive (29a) and intransitive (29b and c) verbs that do not encode the motion of the theme argument, its Turkish counterpart can only be used with transitive verbs that encode motion, as shown by the ungrammaticality of (30b and c) (in contrast with 29b and c).

(29) a. *Hilda kicked George out of the room.*
b. *Pat sneezed the napkin off the table*.
c. *The audience laughed the pianist off the stage*.

(30) a. *Ali mendil-i masa-dan aşağı at-tı*.
Ali tissue-ACC table-ABL downness throw-PST
'Ali threw the tissue down the table.'
b. **Ali mendil-i masa-dan aşağı hapşır-dı*.
Ali tissue-ACC table-ABL downness sneeze-PST
'Ali sneezed the napkin down the table'
c. **Seyir-ci-ler piyanist-i sahne-den dışarı*
spectacle-NOM-PLU pianist-ACC stage-ABL out
gül-dü-ler.
laugh-PST-3PL
'The audience laughed the pianist off the stage.'

Why are there such differences in productivity between the CMC in English and Turkish? If we assume that the core meanings of verbs in the two languages (e.g. *kick* and *tekmele-* 'kick') are identical, then the constructional approach fails to account for these facts. This is because it cannot explain why *kick* can be integrated into this construction while *tekmele-* 'kick' cannot. Alternatively, we could stipulate that the limited productivity of the Turkish CMC may actually be related to the limited range of some verb types in Turkish. Indeed, the number of verbs of a particular type found in a language might affect the type of constructions that can be found in that language. For instance, Levin and Rappaport (2005) suggest that English, a language which has a rich inventory of

Manner of Motion verbs (Slobin, 1996), also has a very productive locative alternation pattern (e.g. *Kay sprayed paint onto the wall*/*Kay sprayed the wall with paint*). The general disposition of English "… to lexicalize verbs with distinct roots specifying particular manners of placing while restricting both the nature of the stuff and of the surface or container" (Levin & Rappaport, 2005, p. 241) enables many of its verbs to participate in the locative alternation. If such an association exists between a large Manner verb lexicon and the existence of some constructions, we might then expect Turkish, a language with a relatively poor inventory of Manner verbs, to exhibit fewer instances of the CMC due to this characteristic.

On the other hand, it is also possible that the core meaning of *kick* and *tekmele-* 'kick' may not be identical and there might be subtle differences in meaning between them. Two apparently synonymous verbs in different languages can indeed have semantic differences, as Levin and Rappaport (2005, p. 19) also note: "When alternate construals [of an event] are possible and involve different grammatically relevant aspects of meaning, the result can be pairs of near-synonyms within or across languages showing different argument realization options". As an example, they give the English-Italian pair *blush/arrossire* where the same event is specified as a process in English, but as a change of state in Italian. This type of an approach could also shed light on why some seemingly similar verbs are more compatible than others with a certain construction within a language (e.g. *Deniz topu aşağı düşürdü* 'Deniz dropped the ball down' vs. **Deniz topu aşağı hareket ettirdi* 'Deniz moved the ball down'). Thus, the lexical semantics of verbs may determine their ability to be integrated into a construction, a notion which I propose in the following section.

To summarize, neither a motion event nor a construction perspective by itself can fully account for the encoding of caused motion in Turkish. In what follows, I describe the compositional, constructional and lexical semantic properties of Turkish verbs used to encode caused motion in more detail.

2.3 Analysis of the morphological, semantic and constructional properties of verbs encoding caused motion

Verbs in conjunction with non-verbal elements such as postpositions or cases (dative, ablative) are typically used to encode caused motion events in Turkish. In contrast to verbs, however, postpositions and cases form a closed set grammatically, are limited in number and productivity. Therefore, I focus on verbs in the following analysis since they provide the diversity of meaning in the encoding of caused motion events.

In contrast to Talmy (1985; 2000) who focused solely on verbs that encoded different Manners of causation (see section 2.2.1), I attempt to examine all types of verbs in order to provide a complete account of the representation of caused motion. In the following sections, I describe different classes of verbs that encode caused motion based on their morphological, semantic and constructional properties. I also test whether event component encoding is determined both by the fine-grained lexical semantics of a verb and the semantics of the argument structure construction to which it can be integrated.

2.3.1 Morphological properties of verbs that encode caused motion

Out of the 4700 verbs in Turkish, only a limited number are composed of a bare root, while others are morphologically complex even though the suffix in the stem is sometimes no longer transparent (Nakipoğlu Demiralp & Üntak, 2008). For instance, the verb *dön-dür* 'make rotate' is composed of the root *dön* 'rotate' plus the productive causitivizing suffix *–DIr*, thus making it easy to identify each component in the stem. In contrast, the verb *yuvarla-* 'make roll' at first glance appears to be a bare form as it does not contain a readily identifiable suffix. However, the verb is actually composed of the root *yuv-* (with no current discernable meaning) and the suffix *–ArlA*. There are many suffixes such as *–ArlA* which are no longer productively used, and speakers typically assume the verbs that contain them to be morphologically simplex. A detailed

morphological analysis of Turkish verbs is presented by Nakipoğlu Demiralp and Üntak (2008) and here I use their classification to group verbs that encode caused motion, as shown in (31)[4]:

(31) *Morphological classes of verbs that encode caused motion*
- a. Bare root verbs: *as-* 'hang', *ört-* 'cover, spread', *sok-* 'insert', tak- 'put on'
- b. Verbs with *–A*: *ele-* 'sift'
- c. Verbs with *–AlA*: *itele-* 'force someone on', *ufala-* 'crumble'
- d. Verbs with *–ArlA*: *yuvarla-* 'roll'
- e. Verbs with *–DAr*: *gönder-* 'send'
- f. Verbs with *–I*: *taşı-* 'carry'
- g. Verbs with *–I/AklA*: *ayıkla-* 'shell, clean', *sürükle-* 'drag'
- h. Verbs with *–Ir*: *devir-* 'knock over', *savur-* 'fling', '*süpür-* 'sweep'
- i. Verbs with *–It*: *dağıt-* 'distribute'
- j. Verbs with *–lA*: *dilimle* 'slice', *ekle-* 'add', *iğnele* 'pin', *tekmele-* 'kick'
- k. Verbs with *–p*: *serp-* 'sprinkle'
- l. Verbs with *–rA*: *doğra-* 'chop'
- m. Verbs with *–y*: *koy-* 'put', *yay-* 'spread on/over'
- n. Verbs with *-etmek*: *hapset* 'imprison'
- o. Causative verbs with *–Ir/Ar*: *çıkar-* 'take out', *düşür-* 'drop', *yatır-* 'put to bed'
- p. Causative verbs with *–DIr*: *indir* 'make descend', *kaldır-* 'make ascend', *kaydır-* 'slide'
- q. Causative verbs with *–t*: *fırlat-* 'hurl', *yürüt* 'make walk', *zıplat* 'bounce'

[4] Note that this is not a comprehensive list of all verbs that can be used to encode caused motion in Turkish, but only a few examples are presented for each morphological category.

With the exception of verbs that contain the productive causative suffixes *–Ir/Ar*, *–DIr* and *–t*, I will not consider any verbs encoding caused motion to be morphologically complex since their complexity is entirely historical. Next, I describe the semantic classes of verbs used to express caused motion.

2.3.2 Semantic classes of verbs that encode caused motion

Verbs from a wide range of semantic classes can be used to encode caused motion. Typical classes include verbs that entail transfer, verbs of path of motion and posture verbs. We can classify these verbs on the dimension of the amount of information they package. Some verbs are 'general' in the sense that they can be used across a variety of situations whereas others are more 'specific' and limited in their use. For instance, Turkish divides the domain of putting into different kinds by the use of verbs such as *sok-* 'put in' and *çıkar-* 'take off', which encode the Path of the object that undergoes movement. Other languages such as Tzeltal (Narasimhan & Brown, 2009) encode the specific properties of the object that is moved (e.g. *jojk'an'* "hang up from handle/strap, taken from Brown, 2008) or the properties of the Ground to which the object moves as in Korean (e.g. *nehta* 'put things in a loose container' taken from Choi & Bowerman, 1991).

In describing the semantic elements encoded in Turkish verbs, I adopt the terminology used by Slobin et al. (2011) and use Action rather than Motion+Cause, the term preferred by Talmy (1985; 2000). Unlike verbs used to describe spontaneous motion which always encode the Motion of the Figure, not all verbs used to encode caused motion have a sense of Motion, thus making Action better suited to describe them (e.g. *kick* and *blow* encode Action but not Motion as in *I kicked the keg/blew on the tissue but it did not move*, see also Dowty, 1979; Jackendoff, 1990; Levin & Rappaport-Hovav, 1995). Thus, the term Action encompasses both agentive Manner as well as Cause in Talmy's sense. Examples of verbs that encode caused motion are shown in (32), classified into two categories on the basis of their semantics.

(32) Semantic classes of verbs that encode caused motion

a. General: these encode only the Action component of the caused motion event. They can be further subdivided into two based on whether a particular verb encodes the Action of the Agent or Figure.

i) Verbs that represent only the Action of the Agent that causes the Motion of the Figure:

as- 'hang'	*hapşır*-'sneeze'
at- 'throw'	*it*- 'push'
çak- 'nail'	*koy*- 'put'
çarp- 'bump'	*ört*- 'cover'
çek- 'push'	*sil*- 'wipe'
fırlat 'hurl'	*süpür*- 'sweep'
getir- 'bring'	*taşı*- 'carry'
giy-'wear'	*tekmele*- 'kick'
götür- 'take'	*topla*- 'gather'

ii) Verbs that encode the Action of the Agent that causes the Motion of the Figure and the Manner of Motion:

döndür- 'make rotate'	*süründür*- 'make crawl'
kaydır- 'make slide'	*yuvarla*-'make roll'
koştur- 'make run'	*yürüt*- 'make walk'
sürükle- 'drag'	*zıplat*- 'make jump'

b. Specific: they encode both the Action of the caused motion event and the Path of the Figure. Some of these verbs also represent the Manner of the Figure's Motion[5].

alçalt- 'lower'	*indir*- 'make descend'
atlat- 'make jump over' (M)	*sıyır*- 'peel off' (M)

[5] These are indicated by the letter (M) next to their gloss.

bindir- 'make get on/make ride' (M)	*sok-* 'put in'
çıkar- 'make ascend/take out'	*sök-* 'pull out' (M)
devir- 'knock over'	*sür-* 'spread, rub' (M)
diz- 'line up'	*tak-* 'put on'
dola- 'wind on' (M)	*tırmandır-* 'make climb up' (M)
dök- 'pour'	*tık-* 'stuff in' (M)
düşür- 'drop'	*yatır-* 'make lie down'
kaldır- 'lift up, raise'	*yol-* 'tear out' (M)
kopar- 'break/tear off' (M)	*yükselt-* 'higher'

The general-specific semantic classification of verbs is a fruitful one that has been used in examining children's acquisition of language (Brown, 2008; Narasimhan & Brown, 2009; Slobin, et al., 2011), and I will be employing it in the following chapters as well. In the next section, I describe the constructions that verbs encoding caused motion can occur in.

2.3.3 Constructions that verbs encoding caused motion occur in

As discussed earlier, not all verbs can be used in the CMC in Turkish although they are semantically appropriate for this construction (e.g. *tekmele-* 'kick'). Thus, different verbs require different constructions to convey a sense of caused motion. Here, I take a detailed look at three different constructions- the CMC, the transitive-intransitive construction, and the matrix-subordinate construction in order to find which verbs can be used felicitously in them when encoding caused motion. I find that not all three constructions are equally acceptable in the encoding of caused motion and that there are also differences between them in verb compatibility.

2.3.3.1 The caused motion construction (CMC)

The CMC described in 2.1.2 is the most typical way to encode a caused motion event in Turkish. Some of the common verbs that can be integrated into this construction are listed in (33):

(33) Common verbs used with the CMC:

as- 'hang'	*götür*- 'take'
at- 'throw'	*kaldır*- 'lift up, raise'
boşalt- 'empty'	*koy*- 'put'
çek- 'pull'	*ört*- 'spread'
çıkar- 'take off/out or make ascend'	*sok*- 'insert'
doldur- 'fill up, stuff'	*sür*- 'spread/rub on'
doğra- 'chop'	*tak*- 'put on'
düşür- 'drop'	*taşı*- 'carry'
dök- 'pour, spill'	*yapıştır*- 'stick'
fırlat- 'hurl'	*yatır*- 'lay down'
geçir- 'make go through/make pass over'	*yuvarla*- 'make roll'
getir- 'bring'	

All verbs in (33) can be combined with a directional phrase in the form [[SUBJ [OBJ-acc OBL V]] or [SUBJ [OBJ-acc OBL-dat/abl V]] and convey a meaning of caused motion. The specific form of the directional phrase, that is whether it is bare, marked with the ablative or the dative case depends on the meaning of the verb. General verbs that require a Goal argument, such as those entailing attachment or transfer, are combined with a bare or dative-marked directional phrase, as illustrated in (34a). They can also optionally occur with an ablative-marked phrase, as in (34b).

(34) a. *Aylin* *Brad Pitt'in* *resm-in-i* *masa-ya*
Aylin Brad Pitt-GEN picture-POSS-ACC notebook- DAT
koy- du.
put-PST
'Aylin put Brad Pitt's picture on the table.'

b. *Selim* *saksı-yı* (*balkon-dan*) *aşağı* *at-tı.*
Selim pot-ACC balcony-ABL downness throw-PST
'Selim threw the pot down the balcony.'

Note that although they inherently code the Path of the Figure's Motion, semantically specific verbs can also occur in this construction, with a redundant and/or disambiguating directional phrase, as shown in (35):

(35) a. *Zeynep bavul-un-u* *yokuş-tan* *yukarı*
Zeynep suitcase-POSS-ACC slope-ABL upness
çık-ar-dı.
ascend-CAUS- PST
'Zeynep carried her suitcase up the slope.'

b. *Burcu kol-lar-ın-ı* *yukarı* *kal-dır-dı*.
Burcu arm-PL-POSS-ACC upness get up-CAUS-PST
'Burcu raised her arms up.'

Some of the general verbs listed in (32), particularly those that refer to the Manner of the motion of the Figure cannot be used in the CMC. Thus, *kaydır-* 'make slide', *koştur-* 'make run', *yürüt-* 'make walk', *uçur-* 'make fly', *zıplat-* 'make bounce' and *döndür-* 'make rotate' are all unacceptable in the CMC, as (36) illustrates.

(36) a. **Defne* *Örümcek* *Adam'ı* *duvar-dan* *yukarı*
Defne spider man-ACC wall-ABL upness
kay-dır-dı.
slide-CAUS-PST
'Defne slid the Spider Man up the wall.'

b. **Fulya Barbie'yi havuz-a koş-tur-du.*
Fulya Barbie-ACC pool-DAT run-CAUS-PST
'Fulya made the Barbie run to the pool.'

c. **Cenk Sünger Bob'u oyuncak ev-e*
Cenk sponge Bob-ACC toy house-DAT
yürü-t-tü.
walk-CAUS-PST
'Cenk made Sponge Bob walk to the toy house.'

d. **Seher oyuncak uçağ-ı balkon-a uç-ur-du.*
Seher toy plane-ACC balcony-DAT fly-CAUS-PST
'Seher flew the toy plane to the balcony.'

e. **Serkan Mickey Mouse'u yokuş-tan aşağı*
Serkan mickey mouse-ACC slope-ABL downness
zıpla-t-tı.
jump-CAUS-PST
'Serkan made Mickey Mouse jump down the slope.'

f. **Gaye topac-ı oda-dan içeri dön-dür-dü.*
Gaye top-ACC room-ABL inside spin-CAUS-PST
'Gaye spun the top into the room.'

Exceptions to this pattern are *sıçrat-* 'make splatter, splash', *bindir-* 'make get in/on, make mount', and *tırmandır-* 'make climb up'. That is, although these are also Manner verbs that have been causativized by the addition of the *–DIr/-t* suffix, they can appear in the CMC, unlike their counterparts in (36). Examples are given in (37):

(37) a. *Araba üst-üm-e çamur sıçra-t-tı.*
car top-GEN-DAT mud splash-CAUS-PST
'The car splashed mud on me.'

b. *Adam çocuğ-u atlıkarınca-ya bin-dir-di*[6].
adam child-ACC merrygoround-DAT mount-CAUS-PST
'The man made the child get on the merrygoround.'
c. *Selma Winnie-yi ağac-a tırman-dır-dı.*
Selma Winnie-ACC tree-DAT climb up-CAUS-PST
'Selma made Winnie climb up the tree.'

Interestingly, the intransitive forms of these verbs, namely *sıçra-* 'fly out, splash', *bin-* 'get in/on, mount', and *tırman-* 'climb up', can also be used in a single clause with Path or Goal to encode a motion event. As discussed earlier, this conflation type is preferred in satellite-framed languages such as English and is not exhibited by other Turkish Manner verbs such as *zıpla-* 'jump', as seen in (38):

(38) a. *Yol-da-ki çamur üst-üm-e sıçra-dı.*
road-LOC-MOD mud-PL on-GEN-DAT splash-PST
'The mud on the road splashed on me.'
b. Ç*ocuk atlıkarınca-ya bin-di.*
Child merrygoround-DAT mount-PST
'The child got on the merrygoround.'
c. *Kedi ağac-a tırman-dı.*
Cat tree-DAT climb up-PST
'The cat climbed up the tree.'
d. **Tigger yokuş-tan aşağı zıpla-dı.*
Tigger slope-ABL downness jump-PST
'Tigger jumped down the slope.'

Both the intransitive and transitive causative forms of these verbs may be exhibiting a pattern unusual for Turkish because, unlike other Manner verbs, they encode both the Manner and the Path of the motion. That is,

[6] *Bin-* is polysemous and can also mean 'make ride'. The meaning I aim for here, however, is 'make get on, mount'.

sıçra- refers to an outwards movement with a splashing Manner, *bin-* means 'get on/in' or 'mount' and *tırman-* expresses an upward movement in a climbing Manner[7]. Thus, Turkish Manner verbs can be divided into two groups: purely Manner verbs, such as *zıpla-* 'jump' and *dön-* 'turn', and Manner verbs that also encode Path. The former group exhibits a typical verb-framed language pattern (i.e. no conflation with Action) in spontaneous motion events and also cannot be used in a CMC when encoding caused motion events. In contrast, the latter group shows a typical satellite-framed language pattern when encoding spontaneous motion events and their use is also acceptable in the CMC. Crucially, the semantic element that allows the latter group of Manner verbs to be used in the CMC is Path. That is, caused motion verbs that encode Path (i.e. those that are semantically specific) seem to be particularly compatible with the CMC, even if they also encode Manner (which on its own is infelicitous in the CMC, as seen in (36)).

To sum up, the CMC is quite productive in Turkish, and semantically specific verbs that encode both the Action and Path elements (with or without Manner) of the caused motion event can be used in it. However, there are still a significant number of verbs, such as some general verbs, which are not acceptable in this construction. How, then, can such verbs be used to encode caused motion? In the next section, I describe the transitive-intransitive construction combination that can accommodate the verbs unacceptable in the CMC.

2.3.3.2 The transitive and intransitive constructions (TIC)

An alternative means of describing a caused motion event in Turkish is to use a combination of the *transitive* and *intransitive* constructions (TIC). In this case, the semantic elements of the event are distributed over two constructions and each construction contains different elements. The

[7] Unlike English, *climb* in Turkish refers exclusively to an upwards movement.

transitive construction encodes the only the Action element and has the form [[SUBJ [OBJ-acc V]], while the intransitive construction encodes the Path element with the form [[SUBJ [OBL-dat/abl-ø V]]. Any verb that can encode caused motion can occur in the TIC. But most typically, verbs that are unacceptable in the CMC can be used in this combination, as illustrated in (39):

(39) a. *Çocuk kedi-yi* *tekmele-di.* *Kedi* *merdiven-ler-den* *aşağı*
child cat-ACC kick-PST cat stair-PLU-ABL downness
git-ti.
go-PST
'The child kicked the cat. The cat went down the stairs.'

b. *Ali Ayşe'ye* *çarp-tı/vur-du.* *Ayşe* *yer-e* *düş-tü.*
Ali Ayşe-DAT bump-PST/hit-PAST Ayşe ground-DAT fall-PST
'Ali bumped into/hit Ayşe. Ayşe fell to the ground.'

The concatenation of the Action and Path components of a caused motion event only hints that the movement of the Figure was caused by the Agent, since there is no explicit mention that the Agent's Action led to the Figure's Motion. Thus, when the event is encoded with the TIC, the link between Action and Path has to be assumed. Indeed, although grammatically possible, this constructional combination might not be the most semantically appropriate way to encode caused motion. Typically, events with *direct causation*, where the causer and causee touch- rather the causer influencing the causee indirectly- are encoded with single-clause sentences (e.g. *The blue marble moved the green marble*) while two-clause sentences (e.g. *The blue marble made the green marble move*) are more frequently used to represent indirect causation (Wolff, 2003). Thus, the use of two separate sentences only linked through concatenation may be better fit semantically to encode indirectly caused motion events.

A second drawback of using the TIC combination relates to the animacy of the Figure. That is, in Turkish the motion of animate Figures such as the ones in (39) is encoded with verbs like *git-* 'go', *in-* 'descend', *çık-* 'ascend'. The use of the same verbs to encode the motion of

inanimate Figures, however, leads to semantic anomaly because these verbs require their subjects to be animate. This is illustrated in (40):

(40) a. *#Defne bebeğ-i kay-dır-dı. Bebek duvar-dan*
Defne doll-ACC slide-CAUS-PST doll wall-ABL
yukarı çık-tı.
upness ascend-PST
'Defne slid the doll. The doll went up the wall.'

b. *#Çocuk top-u zıplat-tı. Top merdiven-ler-den*
child ball-ACC bounce-PAST ball stair-PLU-ABL
aşağı in-di.
downness descend-PST
'The child bounced the ball. The ball descended the stairs.'

To summarize, although the combination of TIC is grammatically compatible with many verbs, the semantics of this combination do not fit the encoding of caused motion very well. Moreover, since most motion verbs require animate subjects, the use of inanimate subjects in the intransitive construction leads to further semantic anomaly. In the next section, I examine the third strategy to encode caused motion and see whether it has any advantages over the current combination.

2.3.3.3 The matrix-subordinate construction (MSC)

As discussed earlier, spontaneous motion events containing Manner and Path are encoded by the use of a *matrix-subordinate* construction (MSC) in verb-framed languages such as Turkish. The same construction can also encode caused motion. That is, since Manner and Action elements are distributed in similar lexical slots across languages, it is possible in some cases to encode the Action and Path components of a caused motion

event in the MSC (Talmy, 1985). Examples (41a) and (41b) demonstrate this point.

(41) a. Spontaneous motion event

Top	*yuvarlan-arak*	*tepe-den*	*aşağı*	*git-ti.*
ball	roll-CONN	hill-ABL	downness	go-PST
Figure	Manner	Ground	Path	Action+Path

'The ball went down the hill while rolling.'

b. Caused motion event

Adam	*fiçı-yı*	*tekmele-yerek*	*in-dir-di.*
man	barrel-ACC	kick-CONN	descend-CAUS-PST
Agent	Figure	Cause	Action+Path

'The man caused the barrel to descend by kicking it.'

Although Talmy's typology does not fully account for the encoding of caused motion in Turkish (i.e. many events can be encoded with a single clause à la the satellite-framed languages), numerous verbs that are ungrammatical in the CMC can appear in the MSC. Here, I take a more detailed look at the MSC and examine which verbs it is compatible with.

First, verbs that cannot be used in the CMC are all acceptable in this construction. That is, most semantically general verbs that specify the Action that causes the motion of the Figure and the Manner of the Figure's Motion (given in 32a) can be used felicitously in this construction. Compare the examples in (42) with their counterparts in (36):

(42) a. *Defne bebeğ-i kay-dır-arak duvar-dan yukarı*
Defne doll-ACC slide-CAUS-CONN wall-ABL upness
çık-ar-dı.
ascend-CAUS-PST
'Defne made the doll go up the wall by sliding it.'

b. *Fulya Barbie'yi koş-tur- arak havuz-a*
Fulya Barbie-ACC run-CAUS-CONN pool-DAT
götür-dü.

take-PST
'Fulya took the Barbie to the pool by making it run.'

c. *Cenk Sünger Bob'u yürü-t-erek oyuncak*
Cenk sponge Bob-ACC walk-CAUS-CONN toy
ev-e götür-dü.
house-DAT take-PST
'Cenk took Sponge Bob to the toy house by making it walk.'

d. *Seher oyuncak uçağ-ı uç-ur-arak balkon-a*
Seher toy plane-ACC fly-CAUS-CONN balcony-DAT
götür-dü.
take-PST
'Seher took the toy plane to the balcony by making it fly.'

e. *Serkan Mickey Mouse'u zıpla-t-arak yokuş-tan*
Serkan mickey mouse-ACC jump-CAUS-CONN slope-ABL
aşağı in-dir-di.
downness descend-CAUS-PST
'Serkan made Mickey Mouse go down the slope by making it jump.'

f. *Gaye topac-ı dön-dür-erek oda-dan içeri*
Gaye top-ACC spin-CAUS-PST room-ABL inside
sok-tu.
insert-PST
'Gaye made the top go into the room by spinning it.'

It is interesting that none of the verbs that are acceptable in the MSC are semantically specific. That is, verbs that are felicitous in the MSC typically *do not* encode the Path of the caused motion event (e.g. *it-* 'push' and *tekmele-* 'kick' specify the Action that causes the Motion of the Figure but not the change of location).

The productivity of the MSC, however, is limited to these groups of verbs, since many other verbs cannot be used in this construction. Crucially, these are the very same verbs that are acceptable in the CMC

and most of them are semantically specific. For instance, the use of semantically specific verbs such as Path encoding Manner verbs (e.g. *sıçrat-*'make fly out/splash', *bindir-* 'make get in/on'), posture verbs (e.g. *yatır-* 'lay down', *oturt-* 'make sit') and semantically general transfer verbs (e.g. *koy-* 'put', *dök-* 'pour') in the CMC all result in ungrammaticality. Examples are presented in (43):

(43) a. **Araba* *çamur-u* *sıçra-t-arak* *üst-üm-e*
car mud-ACC splash-CAUS-CONN on-GEN-DAT
at-tı.
throw-PST
'The car threw mud on me by splashing it.'

b. **Adam* *çocuğ-u* *otur-t-arak* *mama*
man child-ACC sit-CAUS-CONN baby food
sandalye-si-ne *koy-du*.
chair-POSS-DAT put-PST
'The man put the child on the high chair by making him/her sit.'

c. **Ozan* *kitap-ı* *koy-arak* *masa-ya* *ulaş-tır-dı*.
Ozan book-ACC put-CONN table-DAT reach-CAUS-PST
'Ozan made the book reach the table by putting it.'

To summarize, there is no single construction in Turkish that is compatible with all verbs that can encode caused motion. How can we determine if a given verb can occur in one of these constructions reviewed here? To answer this question, I make a classification of caused motion encoding verbs according to the construction(s) they are compatible with in the next section.

2.3.4 A classification of verbs that encode caused motion based on their constructional properties

Verbs that encode caused motion can be grouped according to the constructions they occur in. I focus on the CMC and MSC here, since the TIC combination reviewed in 2.3.3.2 has some semantic disadvantages.

On the basis of their constructional properties, I have identified two groups of verbs, which are further divided according to semantic class. These are presented in (44)[8].

(44) a. *Verbs compatible with the CMC*

i) Semantically specific verbs that specify both the Action and the Path of the caused motion event (optionally with Manner of the Figure's Motion):

bindir- 'make get in, mount'	*oturt*- 'make sit'
çıkar- 'make ascend/take off'	*sıçrat*- 'make fly out, splash'
devir 'knock over'	*sok*- 'put in'
diz- 'line up in a row'	*sök*- 'pull out'
dola- ''wind on'	*tak*- 'put on'
düşür- 'drop'	*tırmandır*- 'make climb up'
götür- 'take'	*yatır*- 'make lie down'
getir- 'bring'	*yerleştir*- 'place in'
kaldır- 'lift up, raise'	

ii) Semantically general verbs that encode only the Action element of the caused motion event:

as- 'hang'	*koy*- 'put'
at- 'throw'	*ört*- 'cover'
çak- 'nail'	

[8] Note that this is not intended as an exhaustive list of all verbs that be used in these constructions to encode caused motion, and only presents representative examples for each category.

b. *Verbs compatible with the MSC*

i) Semantically general verbs that encode only the Action element of the caused motion event:

çarp- 'bump'	*tekmele-* 'kick'
çek- 'push'	*vur-*'hit'
it- 'push'	

ii) Semantically general verbs that encode the Action of the Agent as well as the Manner of the Figure's Motion:

kaydır- 'make slide'	*yuvarla-* 'roll'
koştur- 'make run'	*yürüt-* 'make walk'
sürükle- 'drag'	*zıplat-* 'make jump'
süründür- 'make crawl'	

Thus, if a verb in Turkish encodes both the Action and the Path of the caused motion, it has to be compatible with the CMC. Interestingly, some verbs can even code a third semantic element- Manner- and still be compatible with the CMC, as in (44a i). General verbs (44b) do not encode a change of location. That is, some of them may encode both the Action and the resulting Manner of a caused motion, as in (44b ii) but crucially no change of location and they are acceptable in the MSC.

2.4 Discussion and Conclusions

To sum up, verbs that encode both Action and Path are acceptable only in the CMC whereas those that encode Action (and optionally Manner) but not Path are compatible only with the MSC. Thus, the CMC in Turkish requires a verb to encode both the Action and Path, although there seem to be a few exceptions to this rule such as the semantically general verbs *koy-* 'put', *at-* 'throw', etc.

The analysis shows that the encoding of caused motion in Turkish cannot be fully accounted for by using a single theoretical approach such as Talmy's typology (1985) or Construction Grammar (Goldberg, 1995) since event component encoding in Turkish is determined both by the

fine-grained lexical semantics of a verb and the semantics of the argument structure construction in which it can be integrated. Consequently, the present analysis has implications for both theories.

First, the analysis has implications for Talmy's motion event typology, which treats spontaneous and caused motion events identically and claims that the same encoding pattern holds within a given language across these two event types. This claim is mainly based on his identical conceptualization of Manner and Cause as co-events that modify the motion event as well as his restricted focus on verbs that encode Manner of causation. Here I have shown that the lexicalization of Manner and Cause differs intralinguistically, and the typological patterns that hold for the expression of spontaneous motion events are not identical to those that are used in the expression of caused motion. Interestingly, a recent study that investigated the expression of metaphorical motion in English and Turkish has also found a difference between verb choice used in the descriptions of spontaneous and caused motion (Özçalışkan, 2005). That is, across both languages a greater number of Manner verbs were used in descriptions of metaphorical caused motion events compared to spontaneous ones. The increase in Manner verbs was particularly marked for Turkish with Manner verbs being used approximately 13% of the time on average in metaphorical spontaneous motion descriptions as opposed to 45% in caused motion representations. To account for the lexicalization differences between these two event types within the same language, Özçalışkan (2005, p. 221) suggests that "(a) caused-motion perspective necessitates a stronger evaluative component than a self-motion perspective, because it gives cues about narrative motivation in a particular act and its associated outcome, leading to greater use of manner verbs". Indeed, the lexicalization and syntactic packaging differences between spontaneous and caused motion events may be the result of a universal human attention to manipulation of objects (i.e. change of location of the Figure) and the specifics of how this manipulation was carried out (e.g. by kicking, pulling, rolling etc.). Further research is

needed to study the event structure differences between these two event types and investigate how those differences influence the linguistic encoding of Manner and Cause.

Second, the present analysis also has implications for Construction Grammar (Goldberg, 1995), which assumes that a particular verb can be combined with a construction as long as the minimal meaning associated with the verb does not clash with the meaning of the construction. Languages other than English, however, seem to have additional language-specific requirements associated in addition to the basic restriction described by Goldberg. That is, in languages such as English where constructions are very productive, the specific meanings of verbs (as well as the semantic elements packaged in the verb) might not be crucial for the compatibility of the verb with a given construction. In contrast to English, the productivity of constructions is more limited in languages like Turkish. Consequently, the lexical semantics of verbs gains more importance in the compatibility of a verb with a construction. Thus, crosslinguistic studies have to be conducted to uncover the relative importance of verb lexical semantics across languages and find out how critical this is in verb-construction combinations.

The verb classification presented in this chapter is based solely on my own judgments, however, and may differ in some respects from judgments of other Turkish speakers. This informal method of data collection has been frequently criticized to be subjective and open to experimenter bias (e.g. Bybee & McClelland, 2005; Ferreira, 2005; Myachykov, Tomlin & Posner, 2005). To test whether my verb classification is relevant for other speakers, I designed and implemented a grammaticality judgment study, which is discussed in the next chapter. The ultimate aim of this study was to determine verb-construction compatibility and based on the results, to develop a series of video clips to elicit caused motion event descriptions from adults and children that was used in the collection of the data presented in Chapter 4.

A GRAMMATICALITY JUDGMENT STUDY: SEMANTIC AND CONSTRUCTIONAL PROPERTIES OF VERBS THAT ENCODE CAUSED MOTION IN TURKISH

CHAPTER 3

The present chapter examines the relation between verb semantics and the constructions verbs appear in, with the specific aim of empirically testing the taxonomy proposed in Chapter 2. The analysis presented here is based on the results of a grammaticality judgment study designed to obtain Turkish-speaking adults' assessment of caused motion descriptions comprising of different verbs that occur in the caused motion and matrix-subordinate constructions across caused motion events with and without boundary crossing.

I begin with a brief recapitulation of the proposal made in the previous chapter and outline its predictions (section 3.1). Section 3.2 is dedicated to methodology, stimuli and data collection. An analysis of the data is presented in Section 3.3 and the results are discussed in Section 3.4, with concluding remarks given in Section 3.5.

3.1 Introduction

The crosslinguistic examination of spontaneous motion events using Talmy's typology (1985; 1991) has resulted in an impressive amount of work detailing the variation in event coding across languages (with considerable attention to Turkish, e.g. Allen et al., 2007; Kita & Özyürek, 2003; Özçalışkan, 2005; under review; Özçalışkan & Slobin, 1999; Slobin, 1996; Slobin & Hoiting, 1994). As discussed in detail in the previous chapter, languages differ in the ways they encode motion events. Satellite-framed languages such as English syntactically package the Manner and Path components of a motion event in a single clause (e.g.

the ball rolled down the hill), whereas verb-framed languages like Turkish distribute these semantic elements across two clauses (e.g. *top yuvarlanarak aşağı indi* 'the ball descended while rolling') (Talmy, 1985).

The same typology has also been applied in the domain of caused motion (e.g. Choi, 2009; Slobin, Bowerman, Brown, Eisenbeiß, & Narasimhan, 2011) to examine the differences in the encoding of these events across languages. For instance, Slobin et al. (2011) have investigated how four satellite-framed (English, German, Russian, Finnish) and four verb-framed (Spanish, Hindi, Turkish, Tzeltal) languages encode placement events (a subtype of caused motion events) and charted the development of placement event speech in these languages. Although the classification of Turkish as a verb-framed language seems to have yielded results in line with Talmy's typology in the encoding of placement as found by Slobin et al., an examination of the complete domain of caused motion shows that Turkish displays both typological patterns. That is to say, in Turkish some verbs encoding Action can occur in a single clause with Path elements (to form what has been called a caused motion construction- henceforth CMC, Goldberg, 1995), just like their counterparts in English as illustrated in (1).

(1) a. *The car splashed mud on me.*
b. *Araba* *üst-üm-e* *çamur* *sıçra-t-tı.*
car top-POSS-DAT mud splash-CAUS-PST
'The car splashed mud on me.'

However, other Turkish Action verbs, unlike their English equivalents, cannot be used in the CMC and instead have to occur in separate verbal clauses with the main verb encoding Path and the subordinate verb encoding Action (termed matrix subordinate construction, MSC, in Chapter 2), as shown in (2).

(2) a. The man kicked the barrel down.

b. **Adam fıçı-yı aşağı tekme-le-di.*
man barrel-ACC down kick-VERB-PST
'The man kicked the barrel down.'
c. *Adam fıçı-yı tekmele-yerek in-dir-di.*
man barrel-ACC kick-CONN descend-CAUS-PST
'The man caused the barrel to descend by kicking it.'

Thus, Talmy's motion event typology alone is not sufficient to account for the lexicalization of caused motion events in Turkish. A detailed examination of the linguistic encoding of caused motion in Turkish in the previous chapter established that verbs that encode both Action and Path in Turkish could occur in the CMC, whereas those that encode only Action have to be used in the MSC to represent caused motion. There are, however, some exceptions to this generalization. For instance, the verb *yuvarla-* 'make roll' does not encode Path and yet is still used in the CMC, as seen in (3).

(3) *Kız fıçı-yı bayır-dan aşağı yuvarla-dı.*
girl barrel-ACC slope-ABL downness roll- PST
'The girl rolled the barrel down the slope.'

The semantic analysis and generalizations outlined in Chapter 2, however, were based on my own judgments and were not tested using a wide range of verbs in the respective constructions in a systematic way.

In addition, another area where languages are subject to the typological differences described by Talmy is spatial boundary crossing (i.e. motion into/out of/over a bounded region) in spontaneous motion events. When describing spontaneous motion events that involve the traversal of a spatial boundary, speakers of verb-framed languages (e.g. Spanish, Turkish) tend to use a Path verb to mark the change of location such as *enter*, *exit*, *cross*. For instance, when required to mention Manner in their descriptions, Turkish speakers either use Path verbs with subordinate

Manner verbs (e.g. *he enters the house while crawling*) or use Manner and Path verbs in a serial way (e.g. *he crawls towards the carpet, and crosses it, then he crawls away*), thus using multiple clauses (Özçalışkan, under review). In contrast, speakers of satellite-framed languages like English typically use a single clause that couples Manner verbs with Path satellites (e.g. *he crawls into the cave*) (Aske, 1989; Özçalışkan, under review; Slobin & Hoiting, 1994). These claims, however, have not been tested in the domain of caused motion events, and as the Turkish data in the previous chapter has shown, the encoding of boundary crossing in caused motion may display a different pattern than that of spontaneous motion.

The current study, then, aims to provide a systematic test of verbs that encode caused motion in Turkish in two different constructions (CMC and MSC) and across two different kinds of events (i.e. caused motion with and without boundary crossing).

Target sentences describing two kinds of motion events were created- caused motion with boundary crossing and caused motion (no boundary crossing). As discussed in Section 2.1.1, speakers of verb-framed languages such as Turkish have a strong preference to use multiple clauses to encode boundary crossing in spontaneous motion events (Özçalışkan, under review) and the aim was to investigate whether the same tendency held true for caused motion as well. In addition to the different event types, different constructions- the CMC and the MSC- were used to encode an event. Thus for any given verb, e.g. *at-* 'throw' four different sentence versions were created, as presented in Table 1.

Event Type	Construction Type	
	CMC	MSC
Caused Motion	*Pelin çöpü yola attı.* 'Pelin threw the piece of thrash onto the road.'	*Pelin çöpü atarak yola ulaştırdı.* 'Pelin made the piece of trash fall onto the road by throwing it.'
Caused Motion w. Boundary Crossing	*Pelin çöpü arabadan dışarı attı.* 'Pelin threw the piece of trash out of the car.'	*Pelin çöpü atarak arabadan dışarı gönderdi.* 'Pelin sent the piece of trash out of the car by throwing it.'

Table 1. Stimulus conditions for exemplified with the verb *at-* 'throw'

The predictions regarding the acceptability judgments were as follows: 1) Specific verbs (encoding Action and Path) will be rated as more acceptable in the CMC than general ones (encoding only Action). 2) General verbs will be rated as more acceptable than specific ones when used in the MSC. 3) Boundary crossing caused motion events encoded with either verb type in the CMC will receive lower ratings compared to events without boundary crossing.

3.2 Methodology

3.2.1 Stimuli

Since this rating study would also be used to develop a stimulus set of video clips for children to watch and describe (the study reported in Chapter 4), only frequently occurring verbs were identified and chosen to create the test sentences. The verbs (37 in total) and their distributions according to constructional and morphological categories are given in Table 2.

Semantic Properties	
General (Action)	Specific (Action and Path)
as- 'hang'	*bindir*- 'make get on/in'
at- 'throw'	*çıkar*- 'make ascend'
atlat- 'make jump'	*devir*- 'knock over'
çek- 'pull'	*diz*- 'make line up'
döndür- 'make rotate'	*dök*- 'pour'
fırlat 'hurl'	*düşür*- 'drop'
getir- 'bring'	*indir*- 'make descend'
giy-'wear'	*kaldır*- 'lift up, raise'
götür- 'take'	*sok*- 'put in'
hapşır-'sneeze'	*sök*- 'pull out'
it- 'push'	*tırmandır*- 'make climb up'
kaydır- 'make slide'	*yatır*- 'make lie down'
koştur- 'make run'	
koy- 'put'	
ört- 'cover'	
uçur- 'make fly'	
sil- 'wipe'	
süpür- 'sweep'	
sürükle- 'drag'	
taşı- 'carry'	
tekmele- 'kick'	
topla- 'gather'	
yuvarla- 'make roll'	
yürüt- 'make walk'	
zıplat- 'make bounce'	

Table 2. The semantic properties of stimulus verbs

A total of 138 sentences, with four different sentence versions for each verb, were created to fit the conditions described in Table 1.[9]

[9] Stimuli sentences describing boundary crossing caused motion events could not be created for the verbs *giy*- 'wear', *ört*- 'cover' and *sil*- 'wipe' since these verbs are not semantically compatible with this type of an event.

Additionally, a context sentence was constructed for each verb to provide scene setting information and help with the interpretation of the target sentences. All target and context sentences are listed in Appendix 3.1. The target sentences were ordered and divided into two sets of 69. A given rater saw only one of these sets, and evaluated 69 sentences in total. PowerPoint presentations rather than paper questionnaires were chosen to present the sentences to the raters, in order to prevent raters from going back and forth between different versions of the target sentences and purposefully comparing them during the rating process. Both sets of target sentences and their context sentences were transferred to two PowerPoint presentations. Each target sentence and its context sentence were presented on a slide with the context sentence written at the top and the target sentence in the mid section. To distinguish context sentences from target sentences, the former were written in italics and with a black font whereas the latter were in non-italic, in bold. Target sentences were also numbered to help raters identify them. Sample slides are provided in Figure 1.

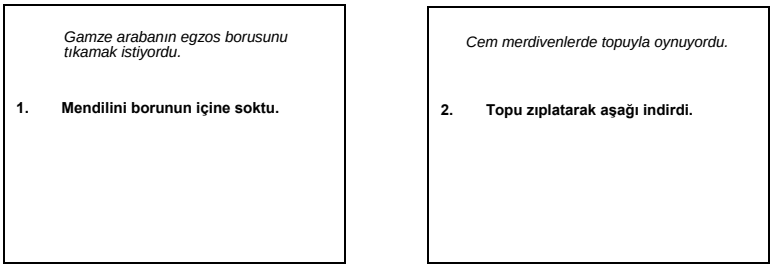

Figure 1. Sample PowerPoint slides with context (in italics) and target (bolded) sentences

The timing between each slide was automatically set to be 8 seconds. Thus, for instance, after viewing the slide containing the context sentence *Gamze arabanın egzos borusunu tıkamak istiyordu* 'Gamze wanted to

block off the exhaust pipe' and the target sentence *Mendilini borunun içine soktu* '(she) put her handkerchief into the pipe' for 8 seconds, the presentation automatically advanced to the next slide which contained a different context and target sentence, as shown in Figure 1.

3.2.2 Participants and procedure

Participants were 63 undergraduate students at Koç University in Istanbul, Turkey. All participants were native speakers of Turkish. They were tested in groups in a classroom where the PowerPoint presentations were projected to a big screen on the wall. Participants were provided with a rating sheet that contained only the sentence numbers and a 5-point scale for each sentence. They were instructed to evaluate the acceptability of the bolded (i.e. target) sentences in Turkish using the scale. Participants had to pick 1 on the scale if they "definitely would not use" and 5 if they thought they "definitely would use" the sentence in Turkish. An experimenter was present during the testing session and the whole procedure lasted approximately 10-12 minutes.

3.3 Results

In order to ensure that there was agreement in the judgments of the raters and that individual raters judged each item in a consistent way with the other raters, I performed reliability analyses. The overall reliabilities of the raters for both sets of target sentences were very high, αs = .97 and .95. However, the elimination of 8 raters increased overall rater reliability since these individuals' judgments correlated very poorly with others' (highest r = .54; lowest r = -.20). Thus, subsequent analyses were performed on the judgments of 55 raters.

3.3.1 Analysis of all acceptability ratings

I analyzed all sentences to determine the effects of construction type (CMC, MSC), verb semantics (general vs. specific), and event type (boundary crossing vs. no boundary crossing) on acceptability ratings. An ANOVA with construction type, verb semantics and event type as

variables showed a main effect of construction type, $F(1, 3784) = 326.74$, $p < .001$; verb semantics, $F(1, 3784) = 13.72$, $p < .001$; and for event type, $F(1, 3784) = 14.52$, $p < .001$. All two-way interactions as well as the three-way interaction were significant (ps $< .05$). In order to investigate these interactions, I conducted separate ANOVAs for each construction type.

3.3.2 Analysis of Sentences with CMCs

I first focused on sentences with CMCs to discern the effects of verb semantics and event type. Figure 2 presents the mean acceptability ratings for all sentences with CMCs and mean ratings for individual verbs are given in Appendix 3.2. An ANOVA with verb semantics and event type as variables showed a main effect of semantics $F(1, 1924) = 28.97$, $p < .001$. Specific verbs (M= 4.01, SD=1.36) were rated to be more acceptable compared to general ones (M= 3.36, SD=1.63). Event type also influenced acceptability, $F(1, 1924) = 56.69$, $p < .001$. CMCs that encoded caused motion events that did not involve the traversal of a boundary (M= 3.62, SD=1.56) were more acceptable than those that did (M= 3.12, SD=1.5). Verb semantics and event type interacted significantly, $F(1, 1924) = 12.35$, $p < .001$. Specific verbs (M= 4.01, SD=1.36) were rated more acceptable than general ones (M= 3.36, SD=1.63) in CMCs that did not encode boundary crossing, $F(1, 1065) = 45.47$, $p < .001$. The two verb types, however, did not differ significantly in CMCs that encoded boundary crossing (M= 3.21, SD=1.56 for specific; M= 3.04, SD=1.46 for general). Thus, specific verbs were more compatible with the CMC in non-boundary crossing events compared to general verbs. Event type had an influence on the acceptability of specific verbs, $F(1, 1424) = 22.51$, $p < .001$. That is, specific verbs that were used in CMCs encoding boundary crossing (M= 4.01, SD=1.36) were judged to be less acceptable than those that did not (M= 3.21, SD=1.56), $F(1, 715) = 52.66$, $p < .001$. The acceptability of general verbs also changed according to event type (M= 3.07, SD=1.47 with boundary crossing; M= 3.36, SD=1.63 without

boundary crossing), $F(1, 1209) = 10.53$, $p < .001$. These results show that semantics influences the acceptability of verbs in the CMC. As predicted, semantically specific verbs that encode Action and Path are more felicitous in the CMC. Furthermore event type also affects acceptability such that across the board, CMCs that do not encode boundary crossing are rated as more acceptable than those that do.

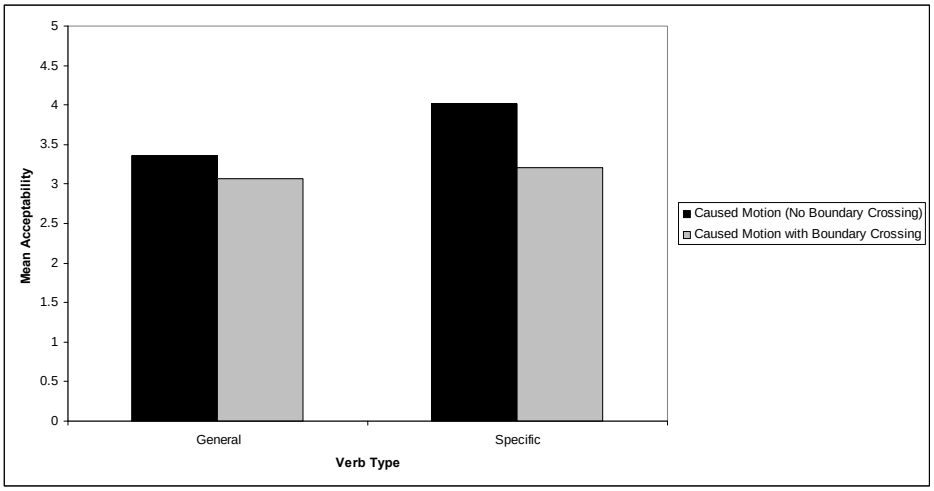

Figure 2. Mean acceptability ratings of sentences with CMCs as a function of verb semantics and event type

The results show that the semantic properties of verbs described in the previous sections do have relevance for Turkish native speakers. Specifically, these properties influence the acceptability ratings of CMCs encoding caused motion events with boundary crossing. That is, specific verbs that encode both the Action and Path of caused motion events (e.g. *sok-* 'put in'*, çıkar-* 'take off/out') are more acceptable in CMCs than general verbs that encode only Action (e.g. *at-* 'throw', *koy-* 'put'). The findings also confirm that CMCs that encode caused motion events with boundary crossing were consistently rated to be less acceptable than those

without. This shows that the boundary crossing constraint previously documented for spontaneous motion events (Özçalışkan, under review; Slobin & Hoiting, 1994) is also relevant for caused motion events in languages such as Turkish.

3.2.3 Analysis of Sentences with MSCs

This analysis examines sentences that contain MSCs encoding a caused motion event with no boundary crossing and investigates whether acceptability ratings vary by verb semantics and event type. Figure 3 presents the mean acceptability ratings for all sentences with MSCs and mean ratings for individual verbs are given in Appendix 3.2. Verb semantics influenced acceptability, $F(1, 1860) = 117.93$, $p < .001$ such that general verbs (M= 2.89, SD=1.53) were rated to be more acceptable compared to specific ones (M= 2.11, SD=1.36). There was also a main effect of event semantics, $F(1, 1860) = 5.21$, $p < .05$, with MSCs that encoded boundary crossing events (M= 2.71, SD=1.58) being judged as more acceptable than those that did not (M= 2.48, SD=1.45). Verb semantics and event type did not interact.

The results confirm the predictions regarding the acceptability of general verbs in MSC. Since these verbs encode only Action, and MSC allows the elements of Action and Path to be distributed across different clauses, the combination of general verbs with the MSC leads to acceptability. In contrast, specific verbs conflate Action and Path in one lexical form and the distribution of these elements into separate clauses leads to infelicitous results. Interestingly, MSCs that encoded caused motion events with boundary crossing were not consistently rated to be less acceptable than those without boundary crossing. However, if we consider that speakers of verb-framed languages such as Turkish have a strong preference to use multiple clauses to encode boundary crossing in spontaneous motion events (Özçalışkan, under review), the present results are not entirely unexpected. Thus, these findings show that speakers of

Turkish prefer to use MSC to represent caused motion events that involve the traversal of a boundary.

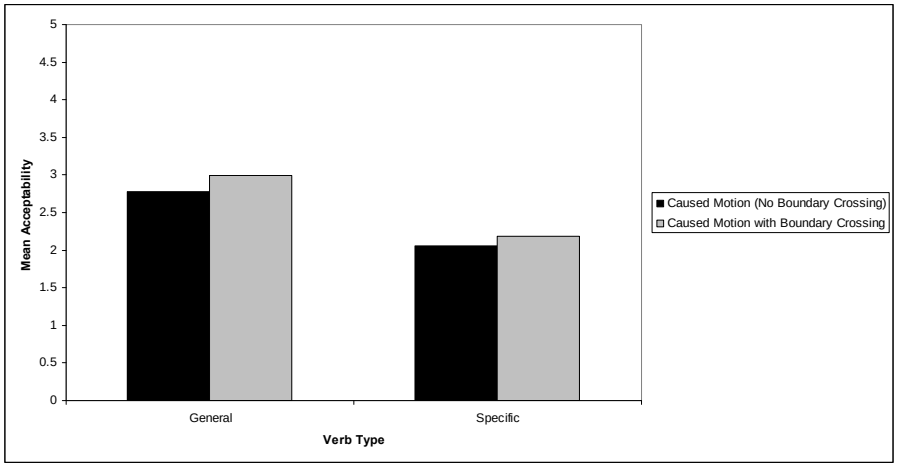

Figure 3. Mean acceptability ratings of sentences with MSCs as a function of verb semantics and event type

To summarize, the results here essentially confirm the findings in the previous section. Verb semantics influences acceptability in the MSC. That is, regardless whether a caused motion event contains boundary crossing or not, semantically general verbs are more acceptable in this construction than specific ones. The incompatibility of specific verbs with the MSC may possibly be due to the fact that MSCs distribute the Action and Path elements of a caused motion event across different clauses, and the separation of these elements that are contained in one lexical item (i.e. as in specific verbs) lead to ungrammaticality. Consider, for instance, the sentence **Tuba kadının torbalarını çıkararak yukarı götürdü* 'Tuba took the woman's bags up by making them ascend'. Here, Action and Path are encoded once in the first clause by the verb *çıkar-* 'make ascend' and a second time in the following clause by the directional NP *yukarı* "up' and the verb '*götür*'. The double encoding of Action and Path leads to

unacceptability. Finally, the results also show that MSCs are the preferred construction over CMCs in Turkish to encode caused motion events that involve boundary crossing.

3.4 Discussion

This study was conducted to determine whether the acceptability of sentences encoding various types of caused motion events would vary according to the semantics of the verb and the type of event encoded. Verb semantics was predicted to affect acceptability such that semantically specific verbs were expected to be rated as more acceptable than general ones when used in the CMC. General verbs, on the other hand, were predicted to be more acceptable than specific ones in the MSC. Finally, boundary crossing caused motion events encoded with the CMC were predicted to be less acceptable compared to those without boundary crossing and the reverse pattern was predicted for the MSC.

In general, these predictions were confirmed. Verb semantics affects acceptability both in the CMC and in the MSC. In the CMC, specific verbs are more acceptable than their general counterparts. In contrast, general verbs are rated as more acceptable in the MSC. Thus, the verb types outlined earlier do have relevance for Turkish speakers. Specifically, verbs that package Action and Path are more felicitous when they encode caused motion in a single clause whereas verbs that encode only Action tend to be more grammatically acceptable when they represent caused motion in multiple clauses. One reason why some general verbs are less acceptable than specific ones in CMC may be related to the fact that they are Action verbs that also encode Manner (e.g. *yürüt-* 'make walk', *zıplat-* 'bounce', see Appendix 3.2). Talmy (1985, 2000) distinguishes between the internal components of a motion event (i.e. Figure, Ground, Path) and co-events (i.e. Cause and Manner). A co-event is external and generally bears a supporting relation to the main event, which is Action in the case of a caused motion event. Talmy (2000) states that when a co-event bears a Manner relation to the main

event the Agent's causal chain causes the main event (Action), but not the co-event (Manner). The co-event is just a concurrent action that the Figure performs as it is forced to perform the main event. For instance, in the case where a boy rolls a ball down a hill, the boy as the Agent actually causes the movement down the hill and not the rolling because the latter is an incidental action that the ball performs as it moves down. The complex way of representing such an event in English is *the boy acted on the ball and made it move down the hill, rolling as it went* and the integrated form is *the boy rolled the ball down the hill*. Given that the Agent does not in fact cause the co-event (Manner), representing such events with a causative Manner verb (e.g. *döndür-* 'make rotate', *zıplat-* 'bounce' etc.) is a very inaccurate reflection of event semantics. This may perhaps be the main reason general Manner verbs are rated as less acceptable than specific ones in the CMC.

Previous research has shown that when describing motion events that involve the traversal of a spatial boundary, speakers of verb-framed languages prefer to use multiple clauses while speakers of English use a single clause (Özçalışkan, under review; Slobin & Hoiting, 1994). The present results also confirm that the boundary crossing constraint is as strong for Turkish in caused motion events as it is in spontaneous ones. That is, Turkish speakers in this study rated all verbs in a single clause as less acceptable when they were used to describe caused motion events with boundary crossing compared to those without. Interestingly, the reverse pattern was found for verbs that encoded boundary crossing in multiple clauses. Namely, the acceptability ratings of both general and specific verbs in multiple clauses increased when used to describe caused motion events involving boundary crossing. These results indicate that in Turkish, single clauses are more suitable for encoding caused motion events without boundary crossing while multiple clause constructions are more felicitous for describing caused motion events that involve the crossing of a spatial boundary. Thus, the boundary crossing constraint seems to apply to most verbs encoding caused motion in Turkish.

3.5 Conclusions

The results of the grammaticality judgment study presented in this chapter have shown that semantics influences the acceptability of verbs that encode caused motion events. Furthermore, the findings indicate that as in the case of spontaneous motion events, boundary crossing is a constraint that shapes the syntactic packaging of caused motion event descriptions. These results imply that, at least for Turkish, boundary crossing may serve as a reliable domain to test Talmy's typology (1985) since it is only in caused motion events that involve the traversal of a spatial boundary that the lexical and syntactic properties of verb-framed languages apply in event descriptions. Caused motion events that do not involve boundary crossing on the other hand, are linguistically encoded in ways that are not wholly consistent with Talmy's typology and their representation is influenced by the semantics of individual verbs. Thus, it appears that spontaneous and caused motion events are not encoded following the same typological constraints intralinguistically. Although Talmy (1985; 1991) has described both Cause and Manner as external events that either cause or modify the motion event, and claimed that they are lexicalized in identical ways in within a given language, this is not the case. Further research in languages other than Turkish is needed to determine the specific similarities and differences between these two elements of motion events.

Appendix 3.1. Test sentences used in the grammaticality judgment task. (a) contain sentences with the MSC depicting non-boundary crossing events, (b) are sentences with the CMC depicting non-boundary crossing events, (c) include sentences with the MSC depicting boundary crossing events, and (d) are those sentences with the CMC that depict boundary crossing events.

Verb: *yuvarla-* 'roll'
Context Sentence: *Ali topuyla oynuyordu.* 'Ali was playing with his ball'
a) *Ali topu yuvarlayarak aşağı indirdi.* 'Ali took the ball down by rolling it.'
b) *Ali topu aşağı yuvarladı.* 'Ali rolled the ball down.'
c) *Ali topu yuvarlayarak kutunun içine soktu.* 'Ali put the ball into the box by rolling it.'
d) *Ali topu kutunun içine yuvarladı.* 'Ali rolled the ball into the box.'
Verb: *at-* 'throw'
Context Sentence: *Pelin cebinde bir çöp buldu.* 'Pelin found a piece of thrash in her pocket.'
a) *Pelin çöpü atarak yola ulaştırdı.* 'Pelin made the piece of trash fall onto the road by throwing it.'
b) *Pelin çöpü yola attı.* 'Pelin threw the piece of thrash onto the road.'
c) *Pelin çöpü atarak arabadan dışarı gönderdi.* 'Pelin sent the piece of trash out of the car by throwing it.'
d) *Pelin çöpü arabadan dışarı attı.* 'Pelin threw the piece of trash out of the car.'
Verb: *it-* 'push'
Context Sentence: *Ahmet eşyalarını taşıyordu.* 'Ahmet was moving his stuff.'
a) *Ahmet koliyi iterek arabaya götürdü.* 'Ahmet took the box to the car by pushing it.'
b) *Ahmet koliyi arabaya itti.* 'Ahmet pushed the box to the car.'
c) *Ahmet koliyi iterek evden dışarı çıkardı.* 'Ahmet took the box out of the house by pushing it.'
d) *Ahmet koliyi evden dışarı itti.* 'Ahmet pushed the box out of the house.'
Verb: *koy-* 'put'
Context Sentence: *Sema kitap okuyacaktı.*
a) *Sema kitapları koyarak masaya ulaştırdı.* 'Sema made the books reach the table by putting them.'

b) *Sema kitapları masaya koydu.* 'Sema put the books on the table.'

Context Sentence: *Sema okula gidiyordu.* 'Sema was going to school.'

c) *Sema kitapları koyarak çantanın içine soktu.* 'Sema put the books inside the bag by inserting them.'

d) *Sema kitapları çantasının içine koydu.* 'Sema put the books inside her bag.'

Verb: *sürükle-* 'drag'

Context Sentence: *Can oyuncak ayısıyla oynayacaktı.* 'Can was going to play with his teddy bear.'

a) *Can oyuncak ayıyı sürükleyerek salona götürdü.* 'Can took the teddy bear to the living room by dragging it.'

b) *Can oyuncak ayıyı salona sürükledi.* 'Can dragged the teddy bear to the living room.'

c) *Can oyuncak ayıyı sürükleyerek salonun dışına çıkardı.* 'Can took the teddy bear out of the living room by dragging it.'

d) *Can oyuncak ayıyı salonun dışına sürükledi.* 'Can dragged the teddy bear out the living room.'

Verb: *sok-* 'insert, put in'

Context Sentence: *Gamze arabanın egzoz borusunu tıkamak istiyordu.*'Gamze wanted to block the exhaust pipe of the car.'

a) *Gamze mendilini sokarak boruya koydu.* 'Gamze put her handkerchief into the pipe by inserting it.'

b) *Gamze mendilini boruya soktu.* 'Gamze put her handkerchieft into the pipe.'

c) *Gamze mendilini sokarak borunun içine koydu.* 'Gamze put her handkerchief into the pipe by inserting it.'

d) *Gamze mendilini borunun içine soktu.* 'Gamze put her handkerchief inside the pipe.'

Verb: *dök-* 'pour'

Context Sentence: *Emrah kahve yapıyordu.* 'Emrah was making coffee.'

a) *Emrah sütü dökerek fincana doldurdu.* 'Emrah filled the cup with milk by pouring it.'

b) *Emrah sütü fincana döktü.* 'Emrah poured the milk into the cup.'

c) *Emrah sütü dökerek fincanın içine doldurdu.* 'Emrah filled the cup with milk by pouring it.'

d) *Emrah sütü fincanın içine döktü.* 'Emrah poured the milk inside of the cup.'

Verb: *taşı-* 'carry'

Context Sentence: *Erhan yolculuğa çıkacaktı.* 'Erhan was going to go on a trip.'

a) *Erhan bavullarını taşıyarak arabaya götürdü.* 'Erhan took his suitcases to the car by carrying them.'

b) *Erhan bavullarını arabaya taşıdı.* 'Erhan carried his suitcases to the car.'

c) *Erhan bavulları taşıyarak evden dışarı çıkardı.* 'Erhan took the suitcases out of the house by carrying them.'

d) *Erhan bavullarını evden dışarı taşıdı.* 'Erhan carried his suitcases out of the house.'

Verb: *as-* 'hang'

Context Sentence: *Caner eve geldi.*' Caner came home.'

a) *Caner paltosunu asarak sandalyeye koydu.* 'Caner put his coat on the chair by hanging it.'

b) *Caner paltosunu sandalyeye astı.* 'Caner hung his coat on the chair.'

c) *Caner paltosunu asarak dolabın içine koydu.* 'Caner put his coat into the wardrobe by hanging it.'

d) *Caner paltosunu dolabın içine astı.* 'Caner hung his coat in the wardrobe'

Verb: *çek-*'pull'

Context Sentence: *Yeşim eşyalarını taşıyordu.* 'Yeşim was moving her stuff.'

a) *Yeşim kutuyu çekerek yukarı çıkardı.* 'Yeşim made the box go up by pulling it.'

b) *Yeşim kutuyu yukarı çekti.* 'Yeşim pulled the box up.'

c) *Yeşim kutuyu çekerek çalışma odasının dışına çıkardı.* 'Yeşim took the box out of the room by pulling it.'

d) *Yeşim kutuyu çalışma odasının dışına çekti.* 'Yeşim pulled the box out of the room'

Verb: *ört-* 'cover, spread'

Context Sentence: *Nilgün havanın soğuduğunu farketmişti.* 'Nilgün had noticed that it got cold.'

a) *Nilgün battaniyeyi örterek çocukların üzerine koydu.* 'Nilgün placed the blanket over the children by spreading it.'

b) *Nilgün battaniyeyi çocukların üzerine örttü.* 'Nilgün spread the blanket over the children.'

Verb: *tekmele-* 'kick'
Context Sentence: *Nazlı çok sinirliydi.* 'Nazlı was very irritated.'

a) *Nazlı çöp kovasını tekmeleyerek aşağı attı.* 'Nazlı threw the trash can down by kicking it.'

b) *Nazlı çöp kovasını aşağı tekmeledi.* 'Nazlı kicked the trash can down.'

c) *Nazlı çöp kovasını tekmeleyerek evden dışarı attı.* 'Nazlı threw the trash can out of the house by kicking it.'

d) *Nazlı çöp kovasını evden dışarı tekmeledi.* 'Nazlı kicked the trash can out of the house.'

Verb: *hapşır-* 'sneeze'
Context Sentence: *Cansu çok hastaydı. Mendiliyle burnunu siliyordu.*'Cansu was very ill. She was wiping her nose on a handkerchief.'

a) *Cansu hapşırarak mendili aşağı düşürdü.* 'Cansu made the handkerchief fall down by sneezing.'

b) *Cansu mendilini aşağı hapşırdı.* 'Cansu sneezed her handkerchief down.'

c) *Cansu hapşırarak mendili çekmecenin içine düşürdü.* 'Cansu made the handkerchief fall into the drawer by sneezing.'

d) *Cansu mendilini çekmecenin içine hapşırdı.* 'Cansu sneezed into the drawer.'

Verb: *topla-* 'gather'
Context Sentence: *Derin etrafı düzenliyordu.* 'Derin was tidying around.'

a) *Derin kalemleri toplayarak masanın ortasına koydu.* 'Derin put the pens to the center of the table by gathering them.'

b) *Derin kalemleri masanın ortasına topladı.* 'Derin gathered the pens to the center of the table.'

c) *Derin kalemleri toplayarak kutunun içine koydu.* 'Derin put the pens into the box by gathering them.'

d) *Derin kalemleri kutunun içine topladı.* 'Derin gathered the pens into the box.'

Verb: *sil-*'wipe'
Context Sentence: *Berk temizlik yapıyordu.* 'Berk was cleaning'

a) *Berk kirleri silerek duvardan çıkardı.* 'Berk took the dirt off the wall by wiping it.'

b) *Berk kirleri duvardan sildi.* 'Berk wiped the dirt off the wall.'

Verb: *süpür-*'sweep'

Context Sentence: *Rana evi temizliyordu.* 'Rana was cleaning the house.'

a) *Rana pislikleri süpürerek odanın ortasına götürdü.* 'Rana took the dirt to the center of the room by sweeping it.'

b) *Rana pislikleri odanın ortasına süpürdü.* 'Rana swept the dirt to the center of the room.'

c) *Rana pislikleri süpürerek odadan dışarı çıkardı.* 'Rana took the dirt out of the room by sweeping it.'

d) *Rana pislikleri odadan dışarı süpürdü.* 'Rana swept the dirt out of the room.'

Verb: *giy-* 'wear, put on'

Context Sentence: *Işıl dışarı çıkacaktı.* 'Işıl was going to go out.'

a) *Işıl ceketini giyerek üzerine geçirdi.* 'Işıl put her jacket on herself by wearing it.'

b) *Işıl ceketini üzerine giydi.* 'Işıl put her jacket on.'

Verb: *fırlat-* 'hurl'

Context Sentence: *Emel çok kızmıştı.* 'Emel was very annoyed.'

a) *Emel cep telefonunu fırlatarak yere attı.* 'Emel threw her mobile phone to the ground by hurling it.'

b) *Emel cep telefonunu yere fırlattı.* 'Emel hurled her mobile phone to the ground.'

c) *Emel cep telefonunu fırlatarak çöp tenekesinin içine attı.* 'Emel threw her mobile phone into the garbage can by hurling it.'

d) *Emel cep telefonunu çöp tenekesinin içine fırlattı.* 'Emel hurled her mobile phone into the garbage can.'

Verb: *düşür-* 'drop'

Context Sentence: *Su içerken Selim'in eli titredi.* 'Selim's hand trembled when drinking water.'

a) *Selim bardağı düşürerek yere attı.* 'Selim threw the glass to the floor by dropping it.'

b) *Selim bardağı aşağı düşürdü.* 'Selim dropped the glass down.'

c) *Selim bardağı düşürerek lavabonun içine attı.* 'Selim threw the glass into the sink by dropping it.'

d) *Selim bardağı lavabonun içine düşürdü.* 'Selim dropped the glassinto the sink.'

Verb: *getir-* 'bring'

Context Sentence: *O gün Levent annesi için süpriz bir doğumgünü partisi düzenliyordu.* 'Levent was organizing a surprise birthday party for his mother that day.'

a) *Levent pastayı getirerek masaya koydu.* 'Levent put the cake on the table by bringing it.'

b) *Levent pastayı masaya getirdi.* 'Levent brought the cake to the table.'

c) *Levent Pastayı getirerek mutfağın içine taşıdı.* 'Levent carried the cake into the kitchen by bringing it.'

d) *Levent pastayı mutfağın içine getirdi.* 'Levent brought the cake into the kitchen.'

Verb: *götür-* 'take'

Context Sentence: *Ege Öğretmenler Günü'nde öğretmenine çiçek almıştı.* 'Ege got his teacher flowers for Teachers Day.'

a) *Ege çiçekleri götürerek sınıfa ulaştırdı.* 'Ege made the flowers reach the classroom by taking them.'

b) *Ege çiçekleri sınıfa götürdü.* 'Ege took the flowersto the classroom.'

c) *Ege çiçekleri götürerek Öğretmenler Odası'nın içine soktu.* 'Ege put the flowers into the teachers'room by taking them.

d) *Ege çiçekleri Öğretmenler Odası'nın içine götürdü.* 'Ege took the flowers. The flowers reached into the teachers'room.'

Verb: *çıkar* 'take out'

Context Sentence: *Filiz makyaj yapacaktı.* 'Filiz was going to put on makeup.'

a) *Filiz rujunu çıkararak çantadan dışarı koydu.* 'Filiz put her lipstick out of the bag by taking it out.'

b) *Filiz rujunu çantasından dışarı çıkardı.* 'Filiz took out her lipstick out of her bag.'

Verb: *çıkar* 'make ascend, higher'

Context Sentence: *Tuba asansör bozuk olduğu için yaşlı komşusuna yardım etti.* 'Tuba helped the old woman because the elevator was broken.'

a) *Tuba kadının torbalarını çıkararak yukarı götürdü.* 'Tuba took the woman's bags up by making them ascend.'

b) *Tuba kadının torbalarını yukarı çıkardı.* 'Tuba made the woman's bags ascend up.'

Verb: *indir-*'make descend, lower'

Context Sentence: *Hakan oyuncak kedisiyle oynayacaktı.* 'Hakan was going to play with his toy cat.'

a) *Hakan oyuncak kediyi indirerek raftan aldı.* 'Hakan took the toy cat down the shelf by lowering it.'

b) *Hakan oyuncak kediyi raftan indirdi.* 'Hakan lowered the cat down the shelf.'

Context Sentence: *Hakan oyuncak kedisini uykuya yatıracaktı.* 'Hakan was going to lay his toy cat to sleep.'

c) *Hakan oyuncak kediyi indirerek sepetin içine koydu.* 'Hakan put the toy cat into the basket by lowering it.'

d) *Hakan oyuncak kediyi sepetin içine indirdi.* 'Hakan lowered the toy cat into the basket.'

Verb: *yatır-* 'lay down'

Context Sentence: *Onur oyuncak ayısıyla oynuyordu.* 'Onur was playing with his teddy bear. '

a) *Onur oyuncak ayıyı yatırarak yatağa koydu.* 'Onur put teddy bear on the bed by laying it down.'

b) *Onur oyuncak ayıyı yatağa yatırdı.* 'Onur lay the teddy bear down on the bed.'

c) *Onur oyuncak ayıyı yatırarak kutunun içine koydu.* 'Onur put the teddy bear into the box by laying it down.'

d) *Onur oyuncak ayısını kutunun içine yatırdı.* 'Onur lay the teddy bear down into the box.'

Verb: *kaldır-* 'raise, make stand up'

Context Sentence: *Defne oyuncak bebeğiyle oynuyordu.* 'Defne was playing with the doll.'

a) *Defne oyuncak bebeği kaldırarak yerden aldı.* 'Defne took the doll up from the floor by raising it.'

b) *Defne oyuncak bebeği yerden kaldırdı.* 'Defne raised the doll from the floor.'

Verb: *bindir-* 'make get in, make mount'

Context Sentence: *Zeynep bez bebeğiyle oynuyordu.* 'Zeynep was playing with her rag doll.'

a) *Zeynep bez bebeği bindirerek atlıkarıncaya koydu.* 'Zeynep got the rag doll on the merry-go-round by making it mount.'

b) *Zeynep bez bebeği atlıkarıncaya bindirdi.* 'Zeynep made the rag doll mount the merry-go-round.'

c) Zeynep b*ez bebeğini bindirerek arabanın içine koydu.* 'Zeynep put the doll into the car by making it mount.'

d) *Zeynep bez bebeği arabanın içine bindirdi.* 'Zeynep made the rag doll mount into the car.'

Verb: *zıplat-* 'bounce'

Context Sentence: *Cem merdivenlerde topuyla oynuyordu.* 'Cem was playing on the stairs with his ball.'

a) *Cem topu zıplatarak aşağı indirdi.* 'Cem made the ball go down by bouncing it.'

b) *Cem topu aşağı zıplattı.* 'Cem bounced the ball down.'

Context Sentence: *Cem topuyla oynuyordu.* 'Cem was playing with his ball.'

c) *Cem topu zıplatarak odanın içine götürdü.* 'Cem took the ball into the room by bouncing it.'

d) *Cem topu odanın içine zıplattı.* 'Cem bounced the ball into the room.'

Verb: *döndür-* 'spin, turn, rotate'

Context Sentence: *Ahmet topacıyla oynuyordu.* 'Ahmet was playing with his top.'

a) *Ahmet topacı döndürerek aşağı götürdü.* 'Ahmet made the top go down by spinning it.'

b) *Ahmet topacı aşağı döndürdü.* 'Ahmet spinned the top down.'

c) *Ahmet topacı döndürerek odadan dışarı çıkardı.* 'Ahmet took the top out of the room by spinning it.'

d) *Ahmet topacı odadan dışarı döndürdü.* 'Ahmet spinned the top out of the room.'

Verb: *uçur-* 'fly'

Context Sentence: Damla kağıt uçağıyla oynuyordu. 'Damla was playing with her paper plane.'

a) *Damla uçağı uçurarak salona götürdü.* 'Damla took the plane to the living room by flying it.'

b) *Damla uçağı salona uçurdu.* 'Damla flew the plane to the living room.'

c) *Damla uçağı uçurarak pencereden dışarı attı.* 'Damla threw the plane out of the window by flying it.'

d) *Damla uçağı pencereden dışarı uçurdu.* 'Damla flew the plane out of the window.'

Verb: *kaydır-* 'slide'

Context Sentence: *Selin küvette oyuncak ördeğiyle oynuyordu*. 'Selin was playing with her toy duck in the bathtub.'

a) *Selin oyuncak ördeği kaydırarak aşağı indirdi.* 'Selin lowered the toy duck by sliding it.'

b) *Selin oyuncak ördeği aşağı kaydırdı.* 'Selin slid the toy duck down.'

Context Sentence: *Selin banyoda oyuncak ördeğiyle oynuyordu*. 'Selin was playing with her toy duck in the bathroom.'

c) *Selin oyuncak ördeği kaydırarak küvetin içine indirdi.* 'Selin lowered the toy duck into the bathtub by sliding it.'

d) *Selin oyuncak ördeği küvetin içine kaydırdı.* 'Selin slid the toy duck into the bathtub.'

Verb: *yürüt-* 'make walk'

Context Sentence: *Batu oyuncak köpeğiyle oynuyordu.* 'Batu was playing with his toy dog.'

a) *Batu oyuncak köpeği yürüterek mutfağa götürdü.* 'Batu took the toy dog to the kitchen by making it walk.'

b) *Batu oyuncak köpeğini mutfağa yürüttü.* 'Batu made the toy dog walk to the kitchen.'

c) *Batu oyuncak köpeği yürüterek mutfaktan dışarı götürdü.* 'Batu took the toy dog out of the kitchen by walking it.'

d) *Batu köpeği mutfaktan dışarı yürüttü.* 'Batu walked the toy dog out of the kitchen.'

Verb: *koştur-* 'make run'

Context Sentence: *Deniz oyuncak atıyla oynuyordu.* 'Deniz was playing with her toy horse.'

a) *Deniz oyuncak atı koşturarak salona götürdü.* 'Deniz took the toy horse to the living room by making it run.'

b) *Deniz oyuncak atı salona koşturdu.* 'Deniz made the toy horse run to the living room.'

c) *Deniz oyuncak atı koşturarak salondan dışarı götürdü.* 'Deniz took the toy horse out of the living room by making it run.'

d) *Deniz oyuncak atı salondan dışarı koşturdu.* 'Deniz made the toy horse run out of the living room.'

Verb: *atlat-* 'make jump'
Context Sentence: *Gülşen oyuncak kaplanını koltuğun üzerine koymuştu.* 'Gülşen had put her toy tiger on the couch.'

a) *Gülşen oyuncak kaplanı atlatarak aşağı indirdi.* 'Gülşen lowered the toy tiger by making it jump down.'

b) *Gülşen oyuncak kaplanı aşağı atlattı.* 'Gülşen made the toy tiger jump down.'

Context Sentence: *Gülşen oyuncak kaplanıyla sokakta oynuyordu.* 'Gülşen was playing with her toy tiger on the street.'

c) *Gülşen oyuncak kaplanı atlatarak bir çukurun üzerinden geçirdi.* 'Gülşen passed the toy tiger over a hole by making it jump.'

d) *Gülşen oyuncak kaplanı bir çukurun üzerinden atlattı.* 'Gülşen made the toy tiger jump over a hole.'

Verb: *tırmandır-* 'make climb'
Context Sentence: *Burhan oyuncak ayısıyla oynuyordu.* 'Burhan was playing with his teddy bear.'

a) *Burhan oyuncak ayıyı tırmandırarak ağaca çıkardı.* 'Burhan made the teddy bear go up the tree by making it climb.'

b) *Burhan oyuncak ayıyı ağaca tırmandırdı.* 'Burhan made the teddy bear climb the tree.'

c) *Burhan oyuncak ayıyı tırmandırarak oyuncak sepetinden dışarı çıkardı.* 'Burhan took the teddy bear out of its toy basket by making it climb.'

d) *Burhan oyuncak ayıyı oyuncak sepetinden dışarı tırmandırdı.* 'Burhan made the teddy bear climb out of the toy basket.'

Verb: *devir* 'knock over'
Context Sentence: *Begüm aceleyle koşuyordu.* 'Begüm was running in a hurry.'

a) *Begüm sandalyeyi devirerek yere düşürdü.* 'Begüm made the chair fall to the floor by knocking it over.'

b) *Begüm sandalyeyi aşağı devirdi.* 'Begüm knocked the chair down.'

c) *Begüm sandalyeyi devirerek odanın dışına düşürdü.* 'Begüm made the chair fall out of the room by knocking it over.'

d) *Begüm sandalyeyi odanın dışına devirdi.* 'Begüm knocked the chair out of the room.'

Verb: *diz* 'line up in a row'

Context Sentence: *Cemal kütüphanesini düzenliyordu.* 'Cemal was organizing his library.'

a) *Cemal kitapları dizerek rafın üzerine koydu.* 'Cemal put the books on the shelf by lining them up.'

b) *Cemal kitapları rafın üzerine dizdi.* 'Cemal lined the books on the shelf.'

Context Sentence: *Cemal mutfağı düzenliyordu.* 'Cemal was tidying the kitchen.'

c) *Cemal reçel kavanozlarını dizerek buzdolabının içine koydu.* 'Cemal put the jars of jam by lining them up.'

d) *Cemal reçel kavanozlarını buzdolabının içine dizdi.* 'Cemal lined the jars of jam into the refrigerator.'

Verb: *sök-* 'rip out'

Context Sentence: *Gülçin odasının duvarlarını boyayacaktı.* 'Gülçin was going to paint her room.'

a) *Gülçin posterleri sökerek duvardan çıkardı.* 'Gülçin took the posters off the walls by rippimg them out.'

b) *Gülçin posterleri duvardan söktü.* 'Gülçin took the posters off the walls. '

Appendix 3.2. Mean acceptability ratings for all verbs in different constructions and event conditions

Verb	Gloss	CMC Mean (SD)		MSC Mean (SD)	
		No Boundary Crossing	Boundary Crossing	No Boundary Crossing	Boundary Crossing
as-	'hang'	4.28 (1.25)	3.31 (1.62)	1.73 (1.22)	2.45 (1.50)
at-	'throw'	4.48 (.95)	4.65 (0.69)	1.31 (.74)	1.79 (1.11)
atlat-	'make jump over'	1.62 (1.01)	3.46 (1.17)	2.23 (.82)	3.17 (1.51)
bindir-	'make get in/on'	4.31 (1)	2.50 (1.42)	1.19 (.63)	1.83 (1.20)
çek-	'pull'	2.90 (1.54)	3.46 (1.10)	3.81 (1.39)	3.97 (1.12)
çıkar-	'make ascend'	4.62 (.62)	3.19 (1.47)	1.50 (.81)	1.69 (1.00)
devir-	'knock over'	4.00 (1.41)	1.69 (0.88)	2.81 (1.55)	1.59 (0.91)
diz-	'line up'	4.73 (.83)	4.55 (0.83)	3.23 (1.42)	3.10 (1.40)
dök-	'pour'	3.86 (1.3)	3.92 (1.38)	1.96 (1.15)	2.00 (1.28)
döndür-	'make rotate'	1.90 (1.32)	1.77 (0.99)	2.19 (1.23)	3.62 (1.40)
düşür-	'drop'	4.97 (.19)	4.54 (0.71)	1.32 (.69)	1.24 (0.51)
fırlat-	'hurl'	4.55 (.99)	4.00 (0.94)	2.96 (1.66)	3.62 (1.42)
getir-	'bring'	4.28 (1.1)	1.88 (1.14)	2.73 (1.46)	1.45 (0.99)
giy-	'wear'	3.38 (1.61)	----	1.19 (.49)	----
götür-	'take'	4.79 (.77)	2.00 (1.06)	1.81 (1.1)	1.45 (0.91)
hapşır-	'sneeze'	1.03 (.19)	1.08 (0.39)	2.15 (1.22)	2.48 (1.64)
indir-	'make descend'	4.07 (1.03)	1.35 (0.80)	1.58 (.86)	2.21 (1.50)
it-	'push'	3.28 (1.44)	2.92 (1.44)	4.35 (.75)	4.83 (0.38)
kaldır-	'lift up'	4.45 (.87)	----	2.27 (1.28)	----
kaydır-	'make slide'	2.24 (1.48)	2.23 (1.24)	2.31 (1.09)	2.24 (1.35)
koştur-	'make run'	2.24 (1.35)	2.08 (1.09)	2.62 (1.24)	2.55 (1.40)
koy-	'put'	4.97 (.19)	4.08 (1.09)	1.38 (.98)	1.31 (0.68)

Verb	Gloss	CMC Mean (SD)		MSC Mean (SD)	
		No Boundary Crossing	Boundary Crossing	No Boundary Crossing	Boundary Crossing
ört-	'cover'	4.83 (.38)	----	1.46 (.9)	----
sil-	'wipe'	3.21 (1.32)	----	3.15 (1.41)	----
sok-	'put in'	4.21 (1.11)	3.12 (1.45)	1.77 (1.27)	1.62 (1.12)
sök-	'tear off'	4.42 (.81)	----	3.17 (1.44)	----
süpür-	'sweep'	3.45 (1.12)	3.62 (1.36)	3.19 (1.23)	3.69 (1.37)
sürükle-	'drag'	4.41 (1.05)	3.81 (0.80)	4.35 (.75)	4.28 (0.75)
taşı-	'carry'	4.69 (.76)	4.54 (0.71)	2.88 (1.48)	3.55 (1.24)
tekmele-	'kick'	2.00 (1.36)	3.42 (1.21)	3.58 (1.33)	2.90 (1.35)
tırmandır-	'make climb'	2.83 (1.47)	2.00 (1.17)	2.85 (1.43)	2.72 (1.62)
topla-	'gather'	3.41 (1.43)	3.54 (1.14)	4.00 (1.2)	4.72 (0.80)
uçur-	'make fly'	3.41 (1.38)	3.65 (1.13)	2.85 (1.29)	1.86 (1.06)
yatır-	'make lie down'	4.48 (1.06)	4.04 (1.04)	2.00 (1.26)	3.48 (1.50)
yuvarla-	'make roll'	3.83 (1.44)	3.54 (1.27)	3.46 (1.27)	3.72 (1.28)
yürüt-	'make walk'	2.76 (1.5)	2.92 (1.38)	3.04 (1.15)	2.52 (1.50)
zıplat-	'make bounce'	1.34 (.77)	2.08 (1.16)	3.76 (1.33)	2.86 (1.38)

DEVELOPMENT OF LANGUAGE-SPECIFICITY IN SPEECH AND GESTURE: TURKISH ADULTS' AND CHILDREN'S CAUSED MOTION EVENT REPRESENTATIONS

CHAPTER 4

4.1 Introduction

Turkish has been previously classified as a verb-framed language that typically encodes the Path of a caused motion event in the main verb and Action in an adverbial or subordinate verb (e.g. Talmy, 1985). However, based on the grammaticality judgments of Turkish speakers, I have found in Chapter 3 that in addition to these verb-framed properties, Turkish also displays typologically unexpected nonverb-framed characteristics. Hence, one of the primary goals of this study is to establish Turkish adults' production patterns of encoding cased motion to see whether these properties are also evident in production and also compare them to those of children aged 3, 4 and 5. While previous research has focused on the encoding of spontaneous motion events, nothing is known about the representation of caused motion events in Turkish and its development.

Specifically, I examine both Turkish speech and gestures to get a fuller picture of language-specific encoding and focus on the following questions. How do Turkish-speakers encode caused motion events in speech? Are there any developmental differences in this encoding? For instance, given that Turkish displays both verb-framed and nonverb-framed patterns in caused motion lexicalization, do children take a long time to identify and use the diverse syntax-semantics pairings of their language, or can they decipher them early on without any difficulties?

Furthermore, Turkish is a language where noun phrases can be omitted to avoid repetition of reference across different sentences (Göksel & Kerslake, 2005), unlike languages like English where all arguments have to be obligatorily spelled out. However, not much is known about how

argument omission works within the context of event representation. For instance, do speakers of Turkish encode all semantic elements in their event descriptions or are some semantic elements omitted? If so, which ones and how does the omission of elements influence the development of caused motion representations?

Speaking is not the only way to encode event components. Gestures can also represent event components and be specific to the typological properties of the accompanying language (Gullberg, 2011; Kita & Özyürek, 2003; McNeill, 1992). As a further insight into adults' and children's caused motion representations, I also examine gesture patterns and ask the following questions. Which semantic elements do adult and child speakers encode in their gestures? Do they use gestures to supplement the omitted arguments in their speech and does this supplementation change throughout development?

Section 4.1 starts the chapter off by reviewing two lines of developmental literature to uncover the predictions they can make with regard to the development of caused motion event representation in speech. I first concentrate on the most relevant studies on the acquisition of constructions. As we have seen in the previous chapters, caused motion events are encoded in Turkish through the caused motion (CMC) and matrix-subordinate (MSC) constructions, which are combined with semantically general and specific verbs. Thus, it is essential to consider how children learn to use constructions. I then review previous research on the crosslinguistic development of caused motion event encoding and discuss how children might learn the deviations from the typology. Finally, I examine the role gestures play in event representation. Section 4.2 presents the methodology of an elicitation study examining the caused motion event descriptions of adults and children, focusing on both speech and gesture. Section 4.3 presents the results and 4.4 summarizes and discusses the findings, drawing some conclusions about the developmental process.

4.1.1 Speech

4.1.1.1 Learning constructions

Caused motion events are among the basic "scenes" of experience that children understand and express early on (Slobin, 1985). A scene is a coherent conceptual package that includes an event or a state of affairs with one or more participants (Fillmore, 1977; Langacker, 1987) and specific scenes correspond to specific argument structure constructions (Goldberg, 1995). For instance, "manipulative activity scenes" such as someone pushing an object somewhere correspond to the causative motion construction (CMC), while "figure-ground scenes" such as an object moving up or down correspond to the intransitive motion construction and so on (Goldberg, 1995). If basic scenes of experience are expressed through the use of argument constructions, how do children learn these constructions?

Constructions are form and meaning pairings in language that comprise the basic units of grammar. They can be found on all levels of grammar. That is, they can be morphemes (i.e. *-ing*, *un-*), words (i.e. *puppet*, *the*) or general phrasal patterns (i.e. *She baked him a chocolate cake*). Grammatical categories such as words, phrases (including idiomatic expressions), and sentences are constructions on a continuum of varied productivity. Thus, productivity can be defined as an interaction between the component(s) of a construction and the semantics and morphosyntax of the construction. For instance, in verb constructions, the construction itself constrains the class of verbs that can be integrated with it (Goldberg, 1995). Thus, acquiring knowledge of both the semantics and syntax of the constructions as well as the various constraints associated with them is essential for children to achieve productivity in their language.

Proponents of the constructional view claim that syntax-semantics pairings are shaped and supported by the observations that children accumulate regarding the use of verbs with similar meanings. Goldberg (1995) proposes that understanding which verbs can participate in which

argument structure constructions involves implicit generalizations over learned instances. This means that young children's speech is initially item-based and revolves around specific verbs (i.e. Tomasello, 1992; Pine & Lieven, 1993) and that syntactic knowledge develops piecemeal (Dabrowska, 2005; Tomasello, 2000, 2003).

Indeed, various studies on children's spontaneous speech (Lieven, Pine & Baldwin, 1997; Tomasello, 1992) and controlled experimental studies with novel verbs (Berman, 1993; Brooks & Tomasello, 1999; Tomasello & Brooks, 1998; Wittek & Tomasello; 2005) show that young children are initially more conservative in their language use, becoming more productive around the age of 3 and gradually building abstract and general syntactic representations. The results of these studies indicate that children do not possess adult-like, general and abstract representations of grammatical structures from early on. Instead, they begin with verb-specific constructions and later move on to verb-general, adult-like constructions (Tomasello, 2000; 2003).

A different line of research in the constructionist approach to language acquisition however, indicates that children develop generalizations much earlier than age 3. Syntactic overgeneralization errors found in children's spontaneous speech, such as using an intransitive verb in a transitive construction (e.g. *You jump me to the sky*, from Goldberg, 2006), also allow for inferences about productivity and indicate the generality of children's representations. Such overgeneralization errors have been found in English-speaking children's spontaneous speech starting from the age of twenty months (Goldberg, 2006) and these errors can continue well into late childhood, e.g. even 9-year olds have been found to make argument structure errors (Bowerman, 1982b; 1988).

To account for how children learn verb-construction combinations and the persistent errors that children make, Bowerman (1982b) has proposed that children initially use verb-particle pairs such as *push up* correctly since they are yet unaware that these forms have a complex internal structure. Early on, children conceptualize these forms as independent from each other or possibly make shallow analyses (e.g. representing

them as *pull/push* plus a satellite). With time, however, individual forms get integrated under a single, more abstract schema. This allows children to disregard the specific properties of the individual lexical items and discover the commonalities. For instance, in the case of the English CMC, this means arriving at the abstraction that the main verbs in this construction all specify an action that causes an entity to undergo a change of location, and the satellites or other directional markers specify the nature of the change of location. Children start to use novel combinations and also make errors only after they arrive at this semantic abstraction and associate it with a particular construction.

Studying the development of caused motion event representations in Turkish can help us further understand when and how children's argument structure constructions are learned and become generalized. As described in Chapters 2 and 3, the groups of verbs that can be integrated into the CMC and MSC in Turkish are semantically limited and children accordingly have to constrain their generalizations. Thus, based on the previous findings regarding the acquisition of constructions, we may expect Turkish-speaking children to make "mistakes" in their verb-construction pairings and use combinations that are not adult-like.

The literature on how children learn to use constructions, however, does not give us any clues regarding the development of caused motion encoding. For instance, it cannot shed light on the similarities and differences between the encoding patterns of child speakers of different languages or predict which patterns children are likely to learn in a particular language. Hence, I now turn to previous research that has investigated the development of caused motion event representations across different languages in the next section, and the predictions that would follow from this line of research regarding the development of Turkish.

4.1.1.2 Learning to talk about caused motion across languages

A caused motion event, such as a boy pulling a box into a room, is a basic event where an Agent (the boy) performs an Action (pulling) that causes a Figure (box) to move in a spatial Path (into) to a Goal (the room). As described in the previous chapters, these semantic elements are mapped onto lexical and syntactic structures differently across languages (Talmy, 2000). *Satellite-framed* languages such as English encode Action in the verb and express Path in the satellite. These languages commonly use verbs that are semantically general to express caused motion events. In contrast, speakers of *verb-framed* languages such as Spanish can encode Path in the main verb, and encode Action in an adverbial or subordinate verb.

A few recent studies have investigated how children learning typologically different languages express caused motion events. Hickmann and her colleagues have studied Chinese- and English-speaking adults and children between the ages of 3 and 10 and asked them to describe caused motion events instigated by Agents pushing and pulling Figures (Ji, Hendriks & Hickmann, 2011). They found some language-specific differences between adults' descriptions. That is, English-speaking adults typically encoded Action or Manner in the verb with Path in a satellite while Chinese speakers expressed these elements in verb clusters. It was also found that overall children encoded less information than adults in their descriptions. Further, Chinese children tended to give more semantic information compared to their English-speaking counterparts. The authors argue that since Chinese is an equipollently-framed language that displays both satellite- and verb-framed characteristics and uses resultative verb compounds to encode motion, Chinese children can cram more semantic information into their descriptions than their English-speaking counterparts whose language employs only satellite-framed patterns.

Using the same set of stimuli, Ochsenbauer (2010) has found that children speaking German, a satellite-framed language, represent more semantic information in caused motion descriptions as compared to child

speakers of French, a verb-framed language. Moreover, she has shown German children to be more adult-like in their encoding of caused motion compared to their French peers, since French adult patterns required the use of complex syntactic constructions involving subordination. That is, whereas German children's speech was language-specific at the age of 4, French children's descriptions became adult-like by the time they were 10.

Although these studies have documented speakers' general encoding tendencies in terms of the density of semantic information across languages, they have not made systematic comparisons between languages and ages to determine which semantic elements are expressed by different groups of speakers. For instance, these studies do not allow us to determine whether particular semantic elements are expressed in some languages/ages more than others. Moreover, the caused motion events depicted in the stimuli were triggered by only two Actions (i.e. pulling and pushing), thus limiting the generalizability of the results to the whole domain of caused motion events.

Recent research has also focused on a subcategory of caused motion, that is, placement events. For instance, Hickmann and Hendriks (2006) have examined the way French- and English-speaking adults and children (aged 3 to 5) talked about objects being put to/taken off from different places by eliciting dynamic action descriptions. In line with the typological properties of a verb-framed language, French-speaking adults preferred to use verbs when describing caused changes of location (e.g. *Tu emboîtes les Légos*. 'You in-fit the Legos.'). In contrast, their English-speaking counterparts were more likely to use satellites (e.g. *You put one bead into another bead*). French- and English-speaking children followed the adult lexicalization patterns from age 3 onwards.

In another crosslinguistic study, Narasimhan and Gullberg (2011) examined how Dutch- and Tamil-speaking children learned to talk about putting objects to different places. Dutch encodes the resulting posture of the displaced object through the use of two caused posture verbs (*leggen*

'lay' and *zetten* 'set/stand') and differentiates between horizontal and vertical placement. Crucially, however, these verbs are not easily comprehensible semantically since factors other than object orientation (e.g. whether the located object rests on its functional base, or the shape of the located object) also determine their use. In contrast, Tamil represents caused posture with morphologically complex verbs that transparently label the causal and result subevents (*nikka veyyii* 'make stand'; *paDka veyyii* 'make lie'). Overall, children's frequency of use of placement verb types was similar to those of their adult counterparts. Individual verbs, however, were not used in similarly adult-like ways across the two languages. Four-year-old Tamil children used the caused posture verbs correctly despite the fact that they are very infrequent in the input. Even 5-year-old Dutch children, in contrast, used high-frequency placement verbs (i.e. *leggen* 'lay' and *zetten* 'set/stand') inappropriately, possibly because they still had not deciphered the precise meaning of these verbs. The authors conclude that children's verb use is determined more by semantic transparency than input frequency.

In sum, previous studies have shown that while not yet quite adult-like, children are sensitive to the language-specific encoding of caused motion and placement in the ambient language. There are, however, no studies that have examined caused motion in general as they have only focused on pushing/pulling or placement events. Furthermore, even though research has shown that cospeech gestures are important components of event representation in adults (McNeill, 1992; 2005) and that they represent information that is not found in children's speech (Özçalışkan & Goldin-Meadow, 2005), to date very few studies have investigated gestures that accompany children's caused motion expressions. In the following sections, I turn to how gestures are used in adults' and children's event descriptions.

4.1.2 Gesture

4.1.2.1 The role of gesture in event encoding: Cross-linguistic differences

Speaking is not the only way to encode event components. Speech and cospeech gestures are part of an integrated system (Bernardis & Gentilucci, 2006; Clark, 1996; Kendon, 2004; McNeill, 1992, 2005). Cospeech gestures are spontaneous and frequent accompaniments to speech and the expressions in the two modalities have been found to be tightly integrated pragmatically, semantically, and temporally (Kita & Özyürek, 2003; McNeill, 1992). Cospeech gestures serve different semiotic functions, such as *deictic/pointing* gestures that indexically refer to objects, *iconic* gestures that bear visual resemblance to the events and objects (e.g. extending fist-shaped hands away from body to depict someone pushing a cart), or *conventional* gestures that have agreed upon meanings (e.g. both hands turned palm up with a shrug to mean "I don't know").

Interestingly, in spite of their visual resemblance to events and objects, iconic gestures representing aspects of events have been found to vary crosslinguistically in adults and in ways relevant to our questions in this study. Specifically, gestures are sensitive to how semantic information is packaged syntactically at the clausal level, that is, how event components are packaged within the verb versus distributed to other elements such as prepositions. Speakers of verb-framed languages such as Japanese and Turkish encode the Manner and Path components of a spontaneous motion event in separate clauses and verbs in speech and also use separate gestures for each element (e.g. the utterance *Domates adam yuvarlanarak tepeden indi* 'Tomato man descended the hill while rolling') occurring with a circular gesture representing Manner and another one moving down representing Path). In contrast, speakers of a satellite-framed language like English encode these elements within a single clause, in a verb and a following satellite, and using a single gesture representing both the Manner and the Path elements (e.g. saying *Tomato man rolled down the hill* coupled with a single gesture that moves

down and draws circles, representing Manner and Path simultaneously) (Kita & Özyürek, 2003; Özyürek, Kita, Allen, Furman, & Brown, 2008).

In addition to being sensitive to the packaging of semantic information at the clausal level, iconic gestures vary according to verb semantics. For instance, placement events are encoded using the semantically general verb *mettre* 'put' in French and adult French speakers have been found to use iconic gestures that encode only the Path or direction of movement in their caused motion descriptions. Speakers of Dutch, on the other hand, encode these events by using semantically specific caused posture verbs such as *leggen* 'lay' and *zetten* 'set/stand' (used in accordance with the shape of the object that is placed) and their gestures represent the form of the moved object (via the hand shape) as well as the direction of movement (Gullberg, 2011).

4.1.2.2 The role of gesture in event representation across development and languages

Children start to use iconic gestures only after the age of 26 months (Iverson, Capirci & Caselli, 1994; Nicoladis, Mayberry & Genesee, 1999; Özçalışkan & Goldin-Meadow, 2005, 2009, 2011). Typically, their first gestures are *deictics* that refer to entities present in the immediate environment (e.g. a point at a teddy bear).

Functionally, young children use gestures to enhance the information conveyed in their speech (Özçalışkan & Goldin-Meadow, 2005). Children at the one-word stage supplement their speech via gestures to produce a variety of constructions such as argument-plus-argument (e.g. by saying *Mommy* and pointing at a shoe to mean 'Mommy's shoe') or verb-plus-argument (e.g. by saying *Eat* and pointing at an apple) (Özçalışkan & Goldin-Meadow, 2005, 2009). Interestingly however, once children become adept at using a construction in speech, they cease using supplementary gestures while expressing the construction (Özçalışkan & Goldin-Meadow, 2009).

A recent study examined how English-speaking children aged 2;6 to 5 talked and gestured about a particular caused motion event elicited by

description of a stimulus item where the experimenter pushed a ball across a small pool with the help of a stick (Göksun, Hirsh-Pasek & Golinkoff, 2010). The results of this study confirmed previous studies about the late emergence of iconic gestures, in that very few iconic gestures were used before the age of 4-5, and children used more deictics than iconics across all ages. Although children of all ages used supplementary gestures, it was only the 5-year-olds who used iconic gestures such as those representing the instrument of the action to augment their speech (e.g. a fist-shaped hand moving away from self as if holding a stick, occurring with the utterance *You pushed the ball*).

There is also some research on how children tune into their language-specific speech and gesture patterns in elicited narratives in later ages. It has been found that tuning of gestures to the semantic and syntactic packaging of events in different languages takes place quite late in development. For instance, Özyürek et al. (2008) investigated at what age Turkish and English-speaking children's gestures revealed the differences in adult patterns found previously by Kita and Özyürek (2003). Kita and Özyürek (2003) have shown that English speakers prefer to package Manner and Path elements in spontaneous motion in one gesture, while Turkish speakers tend to separate these elements into different gestures. Özyürek et al. (2008) found that although Turkish- and English-speaking children's gestures were mainly language-specific at age 3, their gestures were not as different as those of adults. That is while Turkish children represented Manner and Path using separate verbs and gestures as their adult counterparts did, English-speaking children did not begin with using one gesture to express both elements but separated their gesture into two just like Turkish adult speakers. The gestures of English-speaking children became adult-like at the age of 9 years.

Likewise, McNeill (2005) investigated how Spanish-, Mandarin Chinese-, and English-speaking children aged 3 to 11, as well as adults, gesturally encoded Manner and Path in spontaneous motion descriptions. He found that all children across all age groups tended to use more

Manner only and Path only gestures compared to their adult counterparts, who all mainly represented these elements in single gestures.

Finally, Gullberg and Narasimhan (2010) have shown that in the domain of placement events, children's knowledge of verb semantics influences their gestures, and also demonstrated a late tuning of gesture into the target language in Dutch-speaking children. Three-year-old Dutch speakers have been found to gesture differently from their adult counterparts when they talk about placement events. Specifically, unlike adults and 5-year-olds who represented both the Figure that moves and the Path of movement in their gestures of placement events (i.e. fist-shaped hands moving from right to left), 3-year-old Dutch children encoded only the Path in gesture (i.e. a flat hand with no discernable shape moving from right to left). Gesture use, however, was linked to language development. That is, those children who erroneously generalized *leggen* 'lay' for all placement events only gestured about Path. In contrast, those who used *leggen* 'lay' and *zetten* 'set/stand' correctly for horizontal and vertical placement (i.e., thus indicating an understanding of the role of Figure orientation in verb use) represented Figures in gesture like adults. The authors have concluded that Dutch children's understanding of the semantics of placement verbs changes and moves from a focus on only Path to a focus on Path and Figure, and that their gestures also reflect the state of their verb knowledge.

4.1.3 Present study

Overall, very few studies have examined the development of event encoding in a language (with argument-omission possibilities) that displays both verb-framed and nonverb-framed patterns through the use of different constructions. Here, I investigate the way Turkish-speakers encode caused motion events in both speech and gesture, and examine whether there are any developmental differences in this encoding. In particular, I use caused motion descriptions elicited through videoclips depicting a diverse variety of caused motion events. I choose to examine elicited rather than spontaneous descriptions in order to be able to make

systematic comparisons between the speech and gestures of speakers of different ages. Moreover, I focus on preschool children aged 3 to 5 since previous research has found that children in this age group encode events in language-specific ways but also show interesting developmental differences compared to adults. In what follows, I outline the predictions that can be made based on the research reviewed in the previous sections and the findings of Chapter 3.

Speech

With regard to the encoding of caused motion in adult speech, I expect a replication of the patterns found in Chapter 3. That is, adult speakers of Turkish are expected to use semantically general and specific verbs in different constructions (CMC and MSC) when talking about caused motion. Particularly, they are expected to use specific verbs in the CMC. Predictions can vary with regard to the expression of semantic elements in adults' speech. Considering that argument omission is common in Turkish, we may expect adults to omit some of the semantic elements encoded outside of the verb in their caused motion descriptions. Thus, they are expected to encode Action most frequently in their descriptions since both general and specific verbs encode this element.

Several predictions can be made regarding children's caused motion speech. They are expected to be language-specific in their encoding of caused motion given previous research showing that 3-year-old children already resemble adults in their event encoding. That is, we may expect them to use both semantically general and specific verbs in caused motion descriptions although they may not use these verbs in exactly adult-like ways. Based on previous research on the development of constructions (Bowerman, 1982b, 1988; Goldberg, 2006), we can expect Turkish-speaking children to make "errors" in their verb-construction pairings and use unadult-like combinations since the semantic properties of the verbs may not yet be particularly clear to children. That is, we may expect Turkish children to take a long time to identify and use the diverse syntax-semantics pairings of their language since Turkish displays both

verb-framed and nonverb-framed patterns in caused motion lexicalization. With regard to the expression of semantic elements in speech, children are expected to omit some arguments and encode fewer elements than their adult counterparts, in line with the findings of Ji, Hendriks and Hickmann (2011). Children are also expected to represent the semantic element Action most frequently, like their adult counterparts.

Gesture

Given the results of Özyürek et al. (2008) showing that language-specific patterns are evident in Turkish adults' gestures in the encoding of another type of motion event (i.e. spontaneous motion), we may expect the adult speakers in the current study to gesturally encode caused motion events in language-specific ways. That is, similar to their caused motion speech, adults' gestures are expected to encode Action the most frequently. Moreover, we may expect their gestures to possibly include the semantic elements that have been omitted in speech, provided that such omission occurs in adult caused motion descriptions.

As children's gestures have been previously found to tune into language-specific patterns quite late (e.g. McNeill, 2005; Özyürek et al., 2008), Turkish children's gestures encoding caused motion are expected to be unadult-like. Predictions may vary regarding the supplementation of omitted arguments in speech through the use of gestures. If they omit arguments in speech, children may be also expected to use gestures to supplement their speech in accordance with previous research (e.g. Özçalışkan & Goldin-Meadow, 2005). This supplementation strategy, however, has only been documented in children up to the age of 26 months, after which it declined. Thus, given that the child participants in the present study are older (i.e. at least 3 years old), it is possible that they may not choose to use gestures to compensate for their speech. Alternatively, provided that adults use gesture to supplement omitted elements in speech, we may expect children to also do so.

4.2 Method

4.2.1 Participants

Participants were 40 Turkish-speakers comprising of 10 adults, 10 5-year-olds, 10 4-year-olds and 10 3-year-olds. The adults ranged in age from 18 to 29 and were all students at Koç University in Istanbul, Turkey. The age range for 5-year-olds was 5;0 to 6;1 with a mean of 5;6. The 4-year-old group ranged in age from 4;3 to 4;8 with a mean of 4;5. The mean age for 3-year-olds was 3;8, with a range of 3;2 to 3;11. All children attended and were recruited from kindergartens in Istanbul, Turkey.

4.2.2 Stimuli

Data were collected by elicitation, using video clips that depicted caused motion events. The stimuli video clips were developed based on the results of the grammaticality judgment study presented in chapter 3. The reader is reminded that the study consisted of Turkish-speakers evaluating 37 verbs in the caused motion construction (CMC) and matrix-subordinate constructions (MSC) on a scale from 1 to 5, with 5 being more grammatically acceptable. Reviewing the results of the judgment task I chose 18 verbs, of which 8 were acceptable (rated at least 4 out of 5), 5 that were moderately acceptable (rated between 4 and 2.5) and 5 that were unacceptable (rated lower than 2.5) with the CMC. Table 1 shows these verbs and their mean acceptability ratings for the CMC and MSC (taken from Chapter 3).

I then developed a series of short video clips that featured a human Agent who acted on an inanimate Figure and caused it to change location by performing the Actions represented by the chosen verbs. The change of location in each clip had a distinct endpoint to ensure that participants described not only the Action of the Agent but also the Path of the Figure. Two examples are given in Figure 1.

	Verb	Gloss	Acceptability Ratings (1-5) Mean (CMC)	Mean (MSC)
Acceptable in the CMC	*koy-*	'put'	4.97	1.38
	götür-	'take'	4.79	1.81
	at-	'throw'	4.48	1.31
	yatır-	'make lie down'	4.48	2.00
	kaldır-	'lift up'	4.45	2.27
	sürükle-	'drag'	4.41	4.35
	bindir-	'make get in/on'	4.31	1.19
	devir-	'knock over'	4.00	2.81
Moderately acceptable in the CMC	*dök-*	'pour'	3.86	1.96
	yuvarla-	'make roll'	3.83	3.46
	süpür-	'sweep'	3.45	3.19
	it-	'push'	3.28	4.35
	çek-	'pull'	2.90	3.81
Unacceptable in the CMC	*kaydır-*	'make slide'	2.24	2.31
	koştur-	'make run'	2.24	2.62
	tekmele-	'kick'	2.00	3.58
	döndür-	'make rotate'	1.90	2.19
	zıplat-	'make bounce'	1.34	3.76

Table 1. The mean acceptability ratings for the verbs chosen to develop video stimulus portraying caused motion events

Figure 1. Selected stills from the videoclips depicting *bindir-* 'make get in/on' and *zıplat-* 'make bounce'

4.2.3 Procedure

Participants were tested individually in a quiet space at their university (adults), or kindergarten (children). All interactions were videotaped for later coding and analysis. The procedure had three parts. During the warm-up phase, the first experimenter showed participants three practice clips on a laptop computer that depicted a person acting on an object (e.g. a woman eating a cookie), and asked the participant to recount what happened in the clip to a listener (experimenter 2) who purportedly had not seen it. In the case of adult participants the listener was a research assistant, while it was a puppet called Bobby (controlled by the second experimenter) for child participants. Children were introduced to Bobby, told that the he was in the process of learning Turkish and that he wanted to know what happened in the clips. Each clip was played once, with only a blank frame visible at the end of the clip. Experimenter 1 then asked the participant to tell the listener what happened in the clip, and particularly encouraged them to give information about the caused motion event if they did not spontaneously do so.

Following the practice clips, the free elicitation task started. In this phase, experimenter 1 presented the 19 test clips for the participant to narrate, following the same format as in the warm-up phase[10]. If participants did not mention the caused motion event in their narration, either of the two experimenters asked them the question "What did the Agent (i.e. the human actor depicted in the clip) do?".[11] As the participant narrated each clip, experimenter 2 noted whether the participant described the clip using the target verb for that clip (i.e. the verbs listed in Table 2). For instance, participants were expected to use the verb *zıplat-* 'make bounce' to describe a clip showing a woman bouncing a ball down the stairs (see Figure 1). All clips were narrated in turn.

After the completion of the clips, the forced elicitation task began. The participants were required to describe only the clips where they had not used the target verb. After they viewed each clip, they were given the target verb by experimenter 1 and asked to describe the clip using that verb to experimenter 2. This task was rendered more child-friendly by introducing the child to a second puppet, named Cookie (again controlled by experimenter 2). Children were told that Bobby was tired and had to rest but they would meet Bobby's friend Cookie who had been sleeping. Experimenter 1 explained that Cookie was very curious about the clips but also spoke very little Turkish. She further told children that Cookie could understand only some words in Turkish so she would tell them the word that Cookie knew and they would describe the clips to Cookie using that particular word. After these instructions, each clip was narrated in turn to the listener (adults) or listener and puppet (children).

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[10] Participants watched 40 clips in total; including 16 clips depicting boundary crossing caused motion events and 2 Maus cartoons clips showing caused motion. However, I leave the analysis of that data to a later point in time.

[11] Crucially, this question focused on the Action of the Agent as the goal of the study was to elicit caused motion descriptions. Thus, I chose not to use a more neutral question such as "What happened?" in order not to obtain spontaneous motion descriptions such as "The ball rolled down".

4.2.4 Speech coding

Any speech that referred to the semantic elements of the caused motion event, i.e. Action, Agent, Figure, Goal/Path[12], and Ground was transcribed[13] and coded.

Verb Type

Caused motion descriptions were first coded for the semantic elements they contained, and any omission of arguments was noted. Descriptions were also coded for the semantic properties of the verb used. These could be semantically general verbs that encoded only Action such as *koy*- 'put', *at*- 'throw' etc. or specific ones that encoded Action and Path such as *sok*- 'put in' or *bindir*- 'make get on'. Appendix 4.1 presents all the general and specific verbs used by different participant groups.

Construction type

Caused motion construction (CMC)

Each event description was also coded for how Action and Path were syntactically packaged. Two categories were differentiated: CMC (both elements expressed in one clause), and MSC (each element expressed in separate clauses). Event descriptions that were categorized as CMC contained utterances in which Action and Path were expressed in one clause. CMCs include either a semantically general verb (*koy*- 'put' as in (1a)) with a postpositional phrase that encodes the Path or Goal of the Figure's motion (*kütüphanenin boş yerine* 'in the empty space in the bookcase' as in (1a)), or a specific verb (*kaldır*- 'lift up' in (1b)) that can optionally be coupled with a postpositional Goal/Path phrase (*yukarı doğru* 'towards upness' in (1c)). The attribution for each example indicates the subject group (e.g. T3: 3-year-old, AD: adult), and the subject number (e.g. T3_02 = Subject 02 in the 3-year-old group).

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[12] As it is very hard to distinguish between Goal and Path in some cases in Turkish, I chose to code these semantic elements as one category.

[13] Utterances that referred to a semantic element but were irrelevant for the task at hand were excluded. For instance, if a child stated that she had a toy dog similar to the one in one of the clips, this utterance was not transcribed.

(1) a. *Kutu-yu kütüphane-nin boş yer-i-ne*
box-ACC bookcase-GEN empty place-POSS-DAT
koy-muş.
put-PST
'(he/she) put the box in an empty place on the bookcase.'
(T3_02)

b. *Bir kız bavul-u kaldır-ıyor.*
one girl suitcase-ACC lift up-PRS
'A girl lifts up a suitcase' (AD_01)

c. *Küçük bir kız boş bir bavul-u kocaman*
little one girl empty one suitcase-ACC huge
kaldır-ıyor böyle yukarı doğru.
lift.up-PRS like this upness towards
'A little girl lifts up an empty suitcase up very high like this.'
(T5_26)

Matrix-subordinate construction (MSC)

Event descriptions in the MSC category typically include a subordinated general verb encoding Action in the first clause and a specific verb encoding Action and Path in the second clause with a postpositional phrase (2a, b), or a subordinated general verb in the first clause and another general verb plus a postpositional phrase in the second clause (2c). Alternatively, MSCs contain a clause that expresses the motion of the Agent by the use of an intransitive Path verb (e.g. *çık- 'ascend')* coupled with a second clause that refers to the cause of Figure's motion by use of an Action verb (2d). The Path of the Figure, then, is inferred indirectly since it moves with the Agent (e.g. upwards in 2d).

(2) a. *Atkı-yı sürükle-yerek merdiven-den yukarı*
Scarf-ACC drag-CONN stairs-ABL upness
çık-ar-dı.
ascend-CAUS-PST
'(he/she) took the scarf up the stairs by dragging it' (AD_04)

b. *Dön-dür-erek* *hoooppp* *aşağı* *in-dir-di.*
spin-CAUS-CONN whoop downness descend-CAUS-PST
'(he/she) made (it) go down whoop by spinning it.' (T5_35)

c. *Çimen-ler-den* *sürükle-yerek* *karşı-dan* *karşı-ya*
grass-PLU-ABL drag-CONN opposite-ABL opposite-DAT
götür-dü.
take-PST
'(he/she) took it from one side to the other by dragging it on the grass.' (T5_35)

d. *Yukarı-ya* *çık-tı* *ama* *o* *atkı-yı*
upness-DAT ascend-PST but that scarf-ACC
sürükle-yerek.
drag-CONN
'(he/she) went up but while (he/she) dragged that scarf.'
(T4_21)

4.2.5 Gesture coding

Using the digital multimedia annotation software ELAN (http://www.lat-mpi.eu/tools/elan), I identified and transcribed the gestures that occurred with caused motion event descriptions. In deciding whether a gesture represented any of the semantic elements of a caused motion event, I only focused on the stroke (the meaningful phase) of the gesture (Kendon, 1980; McNeill, 1992). The stroke was isolated using frame-by-frame video analysis, according to the procedure detailed in Kita, van Gijn, and van der Hulst (1998).

Semantic elements

Gestures were coded for the semantic elements (e.g. Action, Agent, Figure, Goal, Path or any combinations of these) they represented, based on the framing of the co-occurring speech as well as the visual features of the gesture such as hand shape and direction of movement. Action gestures represent the cause of the Figure's movement. However, gestures very rarely depicted Action alone and almost all gestures encoding Action

incorporated other elements such as Figure or Path. Gestures coded as containing Figure were done with a hand shape that depicted the object being moved. Path gestures expressed a change of location that could be encoded with a direction that was lateral, vertical or sagittal. Goal gestures were deictics that referred to endpoints of the Figure's movement. It was possible to distinguish Goal and Path as separate categories since Goals were depicted with points and Paths with iconic gestures. An example for this coding system is a gesture with two fist-shaped hands moving away from the body co-occurring with a description of a box being pushed towards a car. This was coded as containing the elements Action, Path and Figure. Likewise, when describing a girl who lifted up the suitcase (e.g. Figure 1b), a gesture done with the right hand in a fist moving up from the elbow was coded as including the elements Action, Figure and Path.

Relation to speech

Gestures could be related to the co-occurring speech in three different ways (adapted from Özçalışkan & Goldin-Meadow, 2005; 2009). *Reinforcing* gestures expressed the same information as the utterance they occurred with (e.g. a claw-shaped hand twisting clockwise at the wrist depicting the ball rolling with the utterance *Topu çimenlerin üzerinden yuvarlıyor* '(He/She) rolls the ball on the grass'). *Supplementary* gestures added semantic elements not conveyed in speech (e.g. an index finger moving from left to right representing Path with the utterance *Onu çekti* '(He/She) pulled it'). *Demonstrative* gestures occurred with utterances containing demonstrative adverbials such as *böyle* 'like this' in speech. These gestures essentially showed how a particular Action was performed and were generally used by children to compensate for the lexical items they could not produce. For instance, not knowing the verb *zıplat-* 'bounce', a child can say *Topu böyle yaptı* '(He/She) did the ball like this' while moving her claw-shaped hand up and down. Demonstrative gestures also occurred with utterances where the relevant semantic elements were encoded in speech, but the word *böyle* 'like this' was used

as a discourse marker (e.g. raising an arm with a fist-shaped hand up, and saying *Valizi kaldırdı böyle* '(He/She) lifted the suitcase up like this').

4.3 Results

4.3.1 Speech

4.3.1.1 Free elicitation task

Expression of semantic elements

I first examined the encoding of semantic elements in caused motion descriptions. Turkish-speakers of all ages were expected to represent Action most frequently in their descriptions since the verbs used to describe caused motion all encode Action. To investigate whether the semantic elements expressed in caused motion event expressions changed with element type and age, I determined the mean proportion of events that included a given element for each participant (see Figure 2). A 5 (Semantic Element Type) x 4 (Age) ANOVA yielded a significant effect for type of semantic element, F (4, 180) = 262.65, $p < .001$. As expected, Action was encoded more than the other elements overall. Figure was encoded more than Goal/Path, Agent, and Ground, and Goal/Path was encoded more frequently than Agent and Ground (Bonferroni, p's = .000). Expression of Agent and Ground did not differ from each other significantly. Age also influenced the encoding of semantic elements, F (3, 180) = 12.36, $p < .001$. In line with the predictions, adults represented all semantic elements except Action more frequently in their speech compared to children of all ages (Bonferroni, p's = .000). There were no differences between the child groups. Type of semantic element and age did not interact significantly.

I next investigated speech for the overall omission of semantic elements and calculated the mean proportion of event descriptions where argument omission occurred for each age group. Predictions regarding the omission of arguments in adults' speech varied, while children were expected to omit arguments in speech. I found that argument omissions decreased with age, F (3, 36) = 4.80, $p < .05$. Compared to all children,

adults omitted elements less frequently (Bonferroni, *p*'s = .000). Mean proportion of event descriptions where at least one element was omitted was as follows. Adults: *M* = .71, *SD* = .23; 5-year-olds: *M* = .94, *SD* = .11; 4-year-olds: *M* = .96, *SD* = .11; and 3-year-olds: *M* = .92 *SD* = .19. Thus, although less frequently than children, adults still omitted arguments quite often in line with the general characteristics of Turkish. Overall, adults mainly omitted Agent and Ground in their descriptions, while children tended to also omit Figure and Goal/Path.

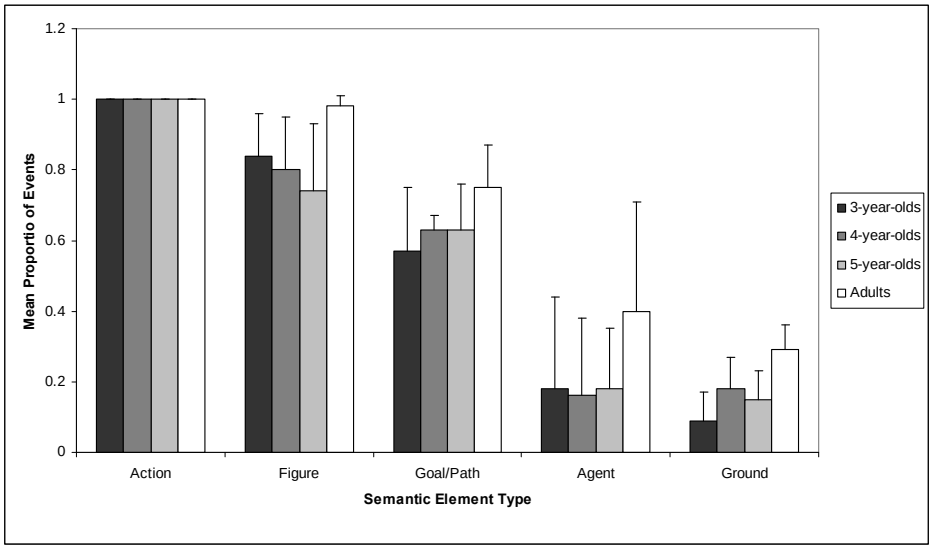

Figure 2. Mean proportion (error bars represent SD) of events that include each semantic element by age

Verb Types

To examine how different types of verbs were used, I then calculated the mean proportion of event descriptions that contained semantically general (i.e. Action Only) and specific verbs (i.e. Action and Path) in each age group. Speakers of all ages were expected to use both verb types when

talking about caused motion. Figure 3 shows the mean proportion of event descriptions that include each verb type across different ages and Appendix 4.1 lists all of the verbs used in each group. I found that verb use was influenced by verb semantics, F (1, 72) = 166.29, $p < .001$. Overall, semantically general verbs were used more frequently than specific ones. Age did not affect verb use. There was, however, a significant interaction between verb use and age, F (3, 72) = 7.5, $p < .001$. Semantically specific verbs were used more frequently with age, F (3, 36) = 4.39, $p < .001$. That is, children used fewer specific verbs compared to adults (Bonferroni, p's = .000). In contrast, the use of semantically general verbs dropped with age, F (3, 36) = 3.25, $p < .05$. Five-year-olds encoded caused motion events using general verbs less frequently than adults (Bonferroni, p = .05). All other differences between age groups were not significant. Speakers, then, preferred to encode the caused motion events they talked about with semantically general verbs rather than specific ones. Also, children tended to use specific verbs less than adults, pointing to developmental differences between the acquisition of verbs encoding a single semantic element (i.e. Action) and those encoding multiple ones (i.e. Action and Path).

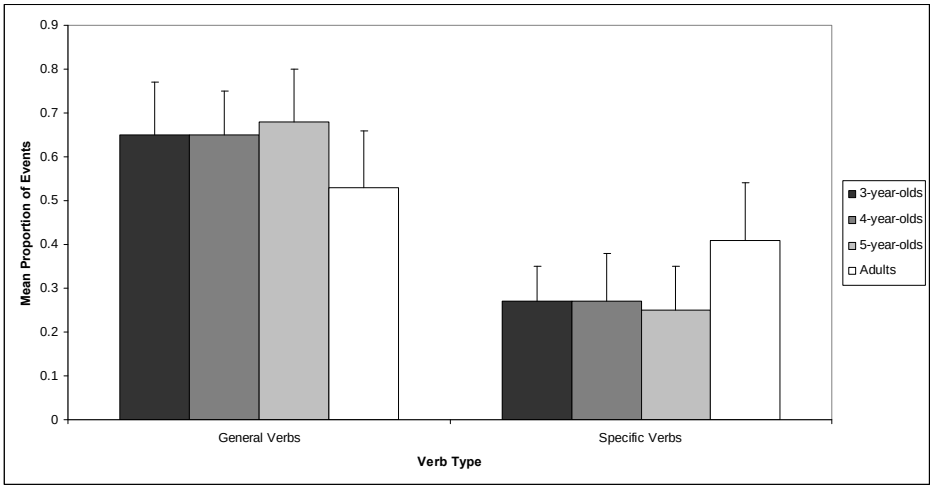

Figure 3. Mean proportion (error bars represent SD) of events that include each verb type across different ages

Constructions

I next focused on how speakers used the two constructions- CMC and MSC- in their descriptions of caused motion. To determine whether caused motion events were described in different ways syntactically, I calculated the mean proportion of events that included each construction type across all age groups, presented in Table 2. A 2 (Construction Type) x 4 (Age) ANOVA revealed a significant main effect for construction type, F (1, 72) = 2636.95, $p < .001$, but not for age. Overall, speakers preferred to use the CMC more frequently than the MSC to describe caused motion. There was also a significant interaction between construction type and age, F (3, 72) = 17.98, $p < .001$. One-way ANOVAs with each construction type were conducted to explore this interaction. The use of the CMC dropped with age, F (3, 36) = 8.92, $p < .001$. All children used this construction more frequently than the adults, (Bonferroni, $ps < .05$). In contrast, the use of the MSC increased with age, F (3, 36) = 9.62, $p < .001$. Adults tended to use the MSC more frequently

than children of all ages (Bonferroni, *p*s < .05). There were no differences between the child groups in the use of these constructions. These results indicate that although adult Turkish speakers prefer to use the CMC to encode caused motion, they still use the MSC occasionally (i.e. 20% of the time). In contrast, children describe caused motion mainly using the CMC, possibly because they have difficulties producing the MSC as it involves subordination.

	Caused Motion Construction (CMC)	**Matrix-Subordinate Construction (MSC)**
Adults	.87 (.09)	.20 (.12)
5-year-olds	.99 (.04)	.03 (.05)
4-year-olds	.95 (.06)	.07 (.12)
3-year-olds	1 (0)	0

Table 2. Mean proportion[14] (SD) of events containing each construction type across age groups

Lastly, I examined how verb semantics and syntactic packaging interacted and whether this interaction changed throughout development. The previous chapters have revealed that semantically specific verbs that encode Action and Path are used mostly in the CMC. I was thus interested whether there were any differences in the specific verb-CMC combination across the age groups. The use of specific verbs in the CMC changed with age, F (3, 36) = 5.18, p < .005. Three- and 4-year-old

[14] The mean proportion of events adds up to more than 1 in these analyses since a given event could be described using both types of constructions.

children used specific verbs in the CMC more frequently than adults (Bonferroni, *p*s < .05), while 5-year-olds were marginally different than adults (Bonferroni, $p = .058$). Mean (SD) proportion of event descriptions where specific verbs were used in the CMC is as follows. Adults: $M = .91$, $SD = .11$; 5-year-olds: $M = .98$, $SD = .05$; 4- and 3-year-olds: $M = 1$, $SD = 0$. Moreover, adults paired specific verbs with the MSC only 5% of the time, while children never did so.

The results of the free elicitation task show that the expression of semantic elements in caused motion event descriptions changed with type, such that Action and Figure were encoded most frequently across all ages. Semantic elements were encoded differently in development, with children encoding all elements except Action less frequently than adults. Further, in line with the argument omission property of Turkish, adults also frequently omitted semantic elements. Children, however, did so even more. Caused motion event encoding was language-specific in that all groups used semantically general as well as specific verbs. There were, however, some developmental differences in verb use. Compared to adults, children used more general and fewer specific verbs. Lastly, as expected all groups were more likely to use specific verbs in the CMC than in the MSC, but children tended to do so more than adults.

4.3.1.2 Forced elicitation task

The aim of the forced elicitation task was to find out how participants used particular verbs in different constructions when describing caused motion events and to test whether there were any differences in verb-construction combinations over development. The task was designed to ensure that speakers got a chance of using the target verb to describe a given clip if they had failed to do so during the free elicitation task.

The requirement to describe a clip with a certain verb, however, proved difficult for many children under the age of 5, leading to too few data points to conduct statistical analyses on a verb-by-verb basis. To overcome this problem, I first divided the list of verbs given in Table 1 into three categories based on the ratings they had received in the

grammatical judgment study described in Chapter 3. The first group of verbs was compatible with the CMC (rated at least 4 out of 5), while the second group comprised of verbs that had been rated as moderately acceptable (rated between 4 and 2.5) and the third group was unacceptable (rated lower than 2.5) in the CMC (see Table 1). After having thus categorized the verbs, I then calculated the number of times each verb type was used in the CMC and the MSC, combined the responses of all the children into one group and compared it to those of adults, as shown in Table 2.

Adults and children used verbs that were CMC-compatible in similar ways, χ^2 (1, N = 79) = 3.4, p = .07. As expected, both groups mainly used these verbs in the CMC. In contrast, the use of verbs that were moderately acceptable, χ^2 (1, N = 52) = 5.04, p = .03 and unacceptable in the CMC, χ^2 (1, N = 55) = 6.43, p = .01 was different between adults and children. That is, children were more likely than adults to use these less acceptable verb types in the CMC as well.

These results confirm those of the free elicitation task and further indicate that although children are adult-like in the use of verbs that are acceptable in the CMC, unlike adults, they use verbs that are not compatible with the CMC in this construction. Thus, they overextend the use of the CMC.

Verb Type	Age	Caused Motion Construction (CMC)	Matrix-Subordinate Construction (MSC)
CMC-compatible	Adults	27	7
	Children	42	3
Moderately acceptable in CMC	Adults	7	15
	Children	19	11
Unacceptable in CMC	Adults	4	23
	Children	13	15

Table 2. Frequencies of use of different verb types in each construction

4.3.2 Gesture

4.3.2.1 Semantic elements encoded in gesture

I first examined the encoding of semantic elements in caused motion gestures. Turkish-speakers of all ages were expected to represent Action the most frequently in their gestures since the verbs used to describe caused motion all encode Action. In order to investigate whether the semantic elements expressed in caused motion event gestures changed with element type and age, I calculated the mean proportion of event descriptions that included each element, presented in Figure 4. A 6 (Semantic Element Type) x 4 (Age) ANOVA yielded a significant effect for type of semantic element, F (5, 216) = 901.69, $p < .001$ but not for age. There was, however, a significant interaction between type of semantic element and age, F (5, 216) = 2.83, $p < .001$. Post-hoc one-way ANOVA tests were conducted to investigate the nature of the interaction.

I focused on each semantic element and examined if it was encoded differently in gesture throughout development. Parallel to the encoding of semantic elements in speech, children tended to use Action gestures the most, followed by those representing Path. Action gestures, F (3, 36) = 2.97, $p < .05$ and Path gestures, F (3, 36) = 3.32, $p < .05$ were used less frequently with age, although subsequent post-hoc tests did not reveal any difference between specific age groups. Gestures encoding Figure did not change with age, while those encoding Goal did, F (3, 36) = 8.58, $p < .001$. Adults used Goal gestures more frequently than children (Bonferroni, ps < .005). Agent gestures also increased with age, F (3, 36) = 3.14, $p < .05$. However post-hoc tests with Bonferroni adjustment did not show any difference between age groups. Finally, the use of gestures that depicted Ground increased with age, F (3, 36) = 5.83, $p < .005$. That is, adults used these gestures more frequently than children (Bonferroni, ps < .005).

I then examined each age group separately to find out which semantic elements were encoded most frequently at a given age. Semantic element type influenced adults' gesture use, F (5, 54) = 130.14, $p < .001$. Action and Path were encoded more frequently than all other elements, (Bonferroni, ps < .001). Figure was represented as frequently as Path and more than Agent, Goal and Ground in gestures, (Bonferroni, ps < .001). Five-year-olds' gesture use differed with semantic element type also, F (5, 54) = 281.99, $p < .001$ and displayed the same distribution of semantic elements as adults. Semantic elements were also differentially encoded in gesture by 4-year-olds, F (5, 54) = 365.98, $p < .001$ and 3-year-olds, F (5, 54) = 223.74, $p < .001$. Younger children represented these elements with the same pattern of frequency as older speakers except for Figure, which was encoded less than Path in gesture. Overall, these results partly replicated the speech patterns for all ages, where Action was encoded the most frequently and Figure was represented more than Path.

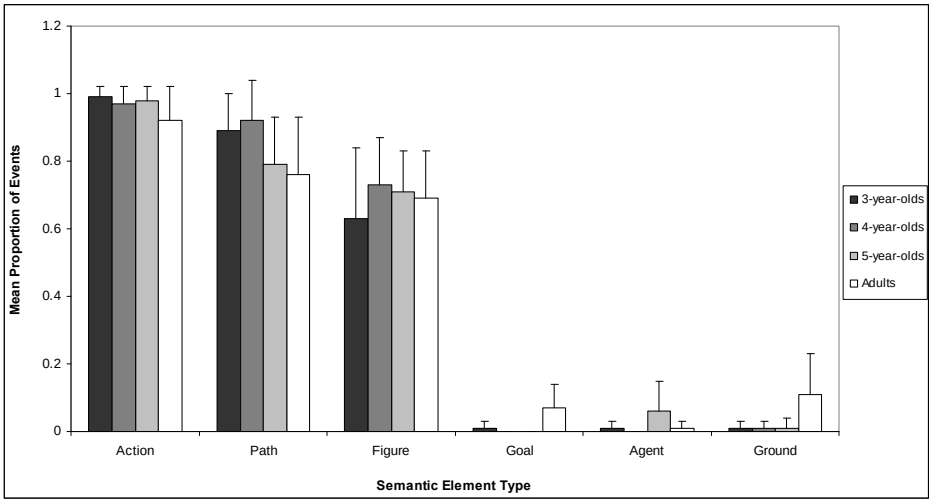

Figure 4. Mean proportion (error bars represent SD) of events that include each semantic element encoded in gesture by age

4.3.2.2 Speech-Gesture Relationship

Predictions regarding the supplementation of omitted arguments in children's speech varied. Given the results of previous research (Özçalışkan & Goldin-Meadow, 2005), children could be expected to use gestures to supplement their speech. However, the child participants in this study could as well be expected not to use gestural supplementation, since this strategy has been found to decrease after the age of 26 months (Özçalışkan & Goldin-Meadow, 2009).

To determine the different functions of gesture in relation to speech (i.e. reinforcing, demonstrative, and supplementing) over development, I calculated the mean proportion of events that contained gestures with different functions (see Figure 5). I then computed a 3 (Gesture Function Type) X 4 (Age) ANOVA. Gesture type, F (2, 108) = 306.65, $p < .001$, as well as age, F (3, 108) = 8.23, $p < .001$ was significant. There was also an interaction between the two factors, F (6, 108) = 6.3, $p < .001$. Post-hoc one-way ANOVA tests showed that overall gestures were used to

reinforce speech the most, followed by supplementation and demonstration functions (Bonferroni, *p*s < .005). The use of reinforcing gestures changed with age, F (3, 36) = 6.3, $p < .05$. In particular, adults produced more reinforcing gestures than 3-year-olds. Gestures that supplemented speech were also used differently throughout development, F (3, 36) = 8.52, $p < .001$. That is, all children used more supplementary gestures than adults (Bonferroni, *p*s < .05). Similarly, age influenced the use of demonstrative gestures, F (3, 36) = 6.45, $p < .005$. Three- and 4-year-olds used these gestures more frequently than their adult counterparts (Bonferroni, *p*s < .05).

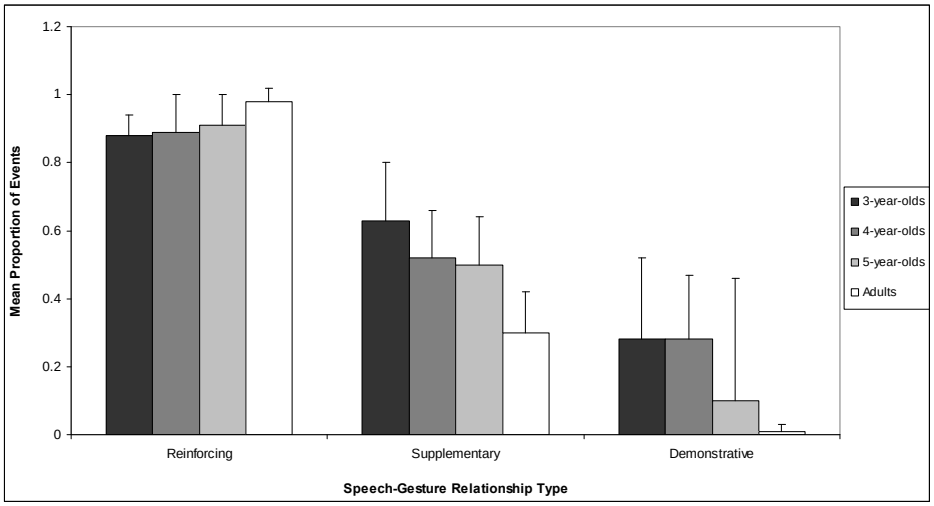

Figure 5. Mean proportion (error bars represent SD) of events that include gestures fulfilling each function gesture by age

4.3.2.3 Supplementation of semantic elements

Finally, I was interested in the semantic elements that were supplemented in gesture over development. I focused on supplementary gestures that

encoded Figure or Path and investigated how their use changed with age. I concentrated on the supplementation of only Figure and Path because children occasionally omitted these two elements in speech but also represented them in their gestures, unlike Agent, Goal and Ground which were not encoded in gesture despite being omitted in speech. Figure 6 presents the mean (SD) proportion of events that contained gestures that supplemented the Figure and Path elements omitted in speech. A 2 (Semantic Element) x 4 (Age) ANOVA showed that overall, Path gestures were used to supplement speech more than gestures representing Figure, F (1, 72) = 14.05, $p < .001$. The use of supplementary Figure and Path gestures dropped with age, F (3, 72) = 3.56, $p < .005$. In particular, adults used them significantly less than 4-year-olds, (Bonferroni, ps < .05). These results show that compared to Figure, Path is both omitted more in adult speech, and supplemented in gesture more frequently.

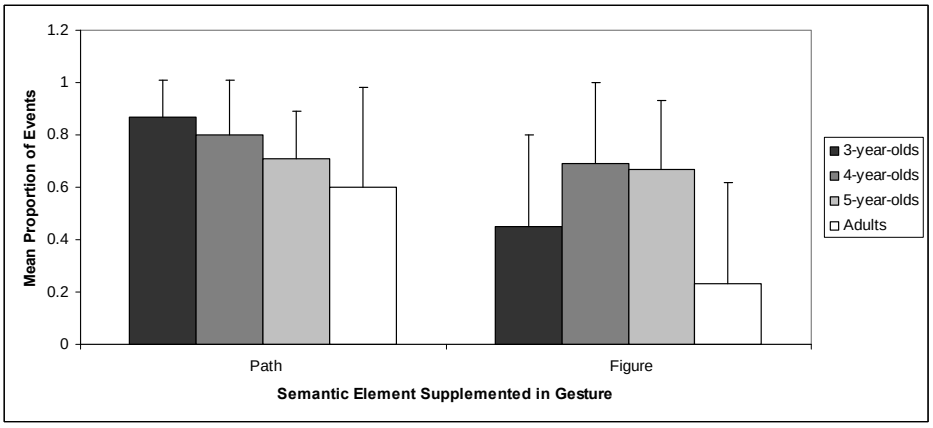

Figure 6. Mean proportion (error bars represent SD) of events containing gestures that supplement the omitted Path and Figure elements in speech

4.4 Discussion and Conclusions

This chapter investigated how language-specificity manifests itself in the caused motion representations of Turkish-speaking adults and children.

Turkish has been previously classified as a verb-framed language (Talmy, 1985). However, I have argued in Chapters 2 and 3 that in addition to these verb-framed properties, Turkish also displays typologically unexpected nonverb-framed characteristics. Furthermore, unlike other languages previously studied, it also allows omission of arguments in speech. Hence, one of the primary goals of this study is to establish the adult production patterns of encoding caused motion in Turkish and later compare them to those of children aged 3, 4 and 5.

Specifically, I examined both speech and gestures to get a fuller picture of language-specific encoding and focus on the following questions. First, how do Turkish-speakers encode caused motion events in speech? Second, are there any developmental differences in this encoding? For instance, given that Turkish displays both verb-framed and nonverb-framed patterns in caused motion lexicalization, do children take a long time to identify and use the diverse patterns specific to their language, or can they decipher them early on without any difficulties? Third, are there language-specific patterns evident in Turkish speakers' gestures? For example, do speakers use gestures to supplement certain caused motion event elements in their speech and are there any developmental differences in such supplementation?

4.4.1 The development of caused motion encoding in speech

With regard to patterns of semantic element encoding in speech, both adults and children represent Action the most frequently, followed by Figure and Path when they talk about caused motion in Turkish. There are also developmental differences between the two groups. As expected, all children express the semantic elements of a caused motion event (i.e. Figure, Goal/Path, Ground and Agent) less frequently than their adult counterparts. This finding is in agreement with previous research, which has documented that child speakers of various languages tend to express less information in their event descriptions (e.g. Allen et al., 2007; Ji, Hendriks & Hickmann, 2011). Omission of semantic elements, however,

is not only specific to child speakers. That is, in line with the argument-drop properties of Turkish, adults omit arguments in speech very frequently (75% of the time). Nevertheless, even at the age of 5, children omit more arguments than adults, indicating that both language-specific and developmental forces shape argument omission in Turkish.

As expected given the results of Chapter 3, adults used both semantically general verbs encoding Action and specific ones that encode Action and Path when talking about caused motion. However, there was a tendency among all speakers to use general verbs more than specific ones. Children used specific verbs even less than the adults. Thus, children's verb use differed from that of adults.

Moreover, I also found developmental differences in the constructions used to describe caused motion. In line with the results of Chapter 3, adult speakers used both the CMC and MSC in their descriptions, although there was a tendency to use the former more. Comparing the constructions used by adults and children, I found that adults used the MSC more than children. The reverse pattern was true for the use of the CMC. These results are not unexpected given that the MSC has a complex syntactic structure that requires the use of a main and a subordinated verb, and it appears that children have difficulties using this construction even at the age of 5. Previous research has also found that 3-year-old Turkish children use the CMC more in comparison to other constructions when they talk about caused motion, showing that they resemble their English-speaking peers in this sense more than their adult counterparts (Furman, Özyürek, & Allen, 2006).

In addition, I tested the semantics-syntax association I argued for in Chapters 2 and 3 and investigated if there were any developmental changes in the use of semantically specific verbs in the CMC. In particular, all groups of children had a stronger tendency than adults to use specific verbs in the CMC. That is, even though adults almost always displayed this semantic-syntax association, children did so even more. This developmental difference may be related to children's tendency to use the CMC more than other constructions in the encoding of caused

motion. Importantly, however, these results show that children are well aware of the requirement to use specific verbs in the CMC.

Results of the forced elicitation task also support those of free elicitation and indicate to further differences between adults' and children's speech. This task was designed to test children's sensitivity to the productivity of constructions. Thus, I examined adults' and children's use of verbs that had been rated as acceptable, moderately acceptable and unacceptable in the CMC in Chapter 3. Specifically, I found that although age did not influence the use of verbs that are acceptable in the CMC, unlike adults, children tended to use verbs that were not compatible with the CMC in this construction showing that they overextended the use of the CMC. Thus, children uttered descriptions where they used verbs such as *zıplat* 'make bounce' and *koştur* 'make run' in the CMC, as shown in (3) and (4).

(3) *Zıpla-t-tı* *top-u* *merdiven-ler-den* *aşağı-ya.*
jump-CAUS-PST ball-ACC stair-PLU-ABL down-DAT
'(he/she) bounced the ball down the stairs.' (T5_06)

(4) *Bebeğ-i-ni* *böyle* *araba-ya* *doğru*
doll-POSS-ACC like this car-DAT towards
koş-tur-du.
run-CAUS-PST
'(he/she) made his/her doll run towards the car like this.'
(T5_34)

One reason why children use unadult-like verb-construction combinations may be related to Turkish displaying both verb-framed and nonverb-framed properties in the encoding of caused motion. That is, the diversity in encoding of caused motion may be delaying children's understanding of the fine semantic distinctions between verbs and causing them to use inappropriate verb-construction combinations.

Hence, I have found that in line with Bowerman (1982b) and Goldberg (2006), Turkish-speaking children use inappropriate verb-construction combinations at least up to the age of 6, the oldest age tested in this study. Given Bowerman's (1982b) account of English-speaking children's argument structure errors, we can surmise that the Turkish children in the current study are still in the process of grasping the semantic commonalities between the verbs that can be used in the CMC. They thus tend to make "mistakes" and overextend this construction by integrating verbs that cannot be used in it. Alternatively or additionally, it is also plausible that children find the use of the MSC hard since it involves subordination, and prefer to use verbs that would regularly be used in the MSC with the CMC in an effort to avoid the MSC. Turkish-speaking 3-year-olds have previously been found to use fewer MSCs in their descriptions of spontaneous motion events (Allen et al., 2007), lending support to the view that children may be avoiding the use of a construction that is still syntactically too difficult for them. Similarly, up to the age of 10 years French children's caused motion descriptions also include syntactic structures that are simpler than those used by adults (which typically include subordination). In contrast, 4-year-old German speakers' descriptions are adult-like as German adults typically produce simple, CMC-like constructions when talking about caused motion (Ochsenbauer, 2010). Given this pattern of developmental differences, we can conclude that children speaking verb-framed languages such as French or Turkish take longer to attain adult-like proficiency in the encoding of caused motion compared to their peers speaking satellite-framed languages as English or German.

Even though they use constructions in unadult-like ways, 3- to 5-year-old children may still be aware of the limitations regarding verb-construction combinations. That is, when these children describe events that would require the use of verbs compatible with the MSC (such as *döndür-* 'make rotate' and *zıplat-*, 'make jump') they do not attempt to use the CMC with these verbs. Instead, they employ one of two strategies. They either use these verbs in an alternative construction such as the

transitive construction (e.g. *Topu döndürdü* '(he/she) rotated the ball') thereby encoding Action but omitting the Path component of the caused motion event. Or, they avoid using the MSC-incompatible verbs and use CMC-compatible verbs instead (e.g. using *at-* 'throw' rather than *döndür-* 'make rotate'). These strategies are indications of children's implicit knowledge of semantics-syntax pairings of Turkish.

In sum, the results show that language-specificity is evident in the caused motion descriptions of children between the ages of 3 to 5. However, it needs further tuning into adult patterns. Even at the age of 5, Turkish-speaking children are unadult-like on various levels of caused motion encoding such as the choice of verb, the inclusion of arguments and the use of appropriate verb-construction combinations. I surmise that the reasons for such developmental differences are two-fold: First, they may be partly caused by Turkish not fully fitting into expected typological patterns in caused motion representation. That is, child learners of English, a purely satellite-framed language, are expected to learn the encoding patterns of their language without much difficulty and quicker than their Turkish counterparts since a single construction (i.e. CMC) is used to encode caused motion and very few verb-construction incompatibilities exist. This claim has to be tested in other languages that display similarly diverse patterns of caused motion encoding as Turkish to see whether it is indeed diversity that affects children's development. Second, they may stem from the verb-framed properties of Turkish that require the use of a syntactically complex construction (MSC), which may still be too difficult for children. Finally, the present study cannot determine when exactly children become adult-like in their caused motion descriptions and further studies with older children have to be conducted to gauge the precise timing of this process.

4.4.2 The development of caused motion encoding in gesture

The semantic elements depicted most frequently in gesture across all ages were Action and Path, followed by Figure. This result is consistent with the speech results as these three elements were encoded more than others in speech. As in speech, the semantic elements encoded in caused motion representations in gesture changed with age. That is, the use of Action and Path gestures decreased with age, while those encoding Figure, Goal, Ground, and Agent increased.

Across development, gestures were mainly used to reinforce the semantic information in speech, followed by supplementation and demonstration functions. However, the use of gestures in relation to speech showed changes over time. Compared to adults, children had fewer reinforcing gestures. Interestingly, adults supplemented the missing arguments in their speech with their gestures approximately one third of the time. Children employed this strategy more frequently than their adult counterparts and used supplementary gestures in half of their event descriptions. This difference in argument supplementation through gesture is expected since children also had more arguments omitted in their speech compared to adults.

These results are the first ones to show that supplementation in gesture is not only limited to child speakers who are inept in the verbal expression of all necessary semantic information. In a language like Turkish where arguments representing Figure, Goal and Path are easily dropped as they can be recovered from the discourse context and the verb semantics (Brown, 2008), gestures serve the additional function of supplementing arguments omitted in speech of speakers of all ages. Thus, in such a language, the use of supplementary gestures does not necessarily only pave the way for the development of constructions with full argument structure, only to disappear when full verbal constructions make their appearance, as it does for English (Özçalışkan & Goldin-Meadow, 2005; 2009). Instead, its supplementation function changes nature and becomes more discourse-related and language-specific than developmental and language-general as children grow up.

Finally, focusing more on supplementary gestures and the semantic elements they encoded, I found that children supplemented their speech with gestures that encoded Figure or Path more than their adult counterparts. Thus, although gestural supplementation of omitted arguments in speech continues well into adulthood, children are able to selectively convey information in their speech and include crucial elements of a caused motion event such as Figure and Path into their representations, even if they do not encode these elements in their speech. This shows that even though they are speakers of a language that routinely omits arguments, Turkish children are still aware of the fact that they have left out important semantic information in speech and in turn they represent it in gesture.

4.4.3 Conclusions

To conclude, this study shows that Turkish-speaking adults use the dual pattern of encoding caused motion (displaying both satellite- and verb-framed properties) not only in their judgments of grammatically acceptable descriptions as shown in Chapter 3, but also in elicited narratives of caused motion events. Although language-specificity is evident in children's caused motion speech, it needs to develop into full-blown adult patterns, and the results indicate that attainment of language-specificity happens after age 5. The findings also highlight the importance of studying event representation multimodally, as gestures have been shown to play a crucial developmental and pragmatic role in the expression of semantic information not encoded in speech across all age groups.

This study, however, is somewhat constrained in the conclusions it can draw regarding development since it has only focused on the event representations of children aged 3 to 5. In addition, the data consisted of elicited caused motion descriptions. To fully understand how the development of multimodal caused motion event representations unfold, we also have to examine the speech and gestures of younger children in

their natural speech environment. Thus, the following chapter studies Turkish children between the ages of 1 and 3 and investigates how they start to talk and gesture about caused motion events spontaneously.

Appendix 4.1. List of All Verbs Used

	Verb Type	
	Semantically General (Action)	Semantically Specific (Action and Path)
Adults	*at*- 'throw', *çarp*- 'bump', *çek*- 'pull', *çevir*- 'make turn/rotate', *döndür*- 'make rotate/spin', *fırlat*- 'hurl', *getir*- 'bring', *git*- 'go', *gönderil*- 'be sent', *götür*- 'take', *hareket ettir*- 'make move', *it* 'push', *kaydır*- 'make slide, *koy*- 'put', *oynat*- 'make move', *sektir*- 'make bounce', *süpür*- 'sweep', *sürü*- 'drag', *sürükle*- 'drag', *taşı*- 'carry', *tekme at*- 'to give a kick', *yuvarla*- 'roll', *yürüt*- 'make walk',	*bırak*- 'leave/put in/on', *bindir*- 'make mount, make get on', *boşalt*- 'pour out', *çıkar*- 'make ascend', *daya*- 'lean against', *devir*- 'knock down', *dök*- 'pour out', *düş*- 'fall', *ilerlet*- 'make move forward', *indir*- 'make descend', *kaldır*- 'lift up', *oturt*- 'make sit down', *sür*- 'spread on, spread over, put on', *sürt*- 'rub against', *yaklaştır*- 'draw/bring near', *yatır*- 'make lie down', *yerleştir*- 'put/place in', *yık*- 'pull down'
5-year-olds	*at*- 'throw', *çek*- 'pull', *çek*- 'pull', *döndür*- 'make rotate/spin', *fırlat*- 'hurl', *git*- 'go', *götür*- 'take', *it* 'push', *koy*- 'put', *oynat*- 'make move', *sektir*- 'make bounce', *sürükle*- 'drag', *taşı*- 'carry', *tekme at*- 'to give a kick', *yuvarla*- 'roll', *yürüt*- 'make walk'	*bırak*- 'leave/put in/on', *bindir*- 'make mount, make get on', *devir*- 'knock down', *dök*- 'pour out', *düşür* 'drop/make fall', *kaldır*- 'lift up', *oturt*- 'make sit down', *uzat*- 'hold out, extend', *yatır*- 'make lie down', *yık*- 'pull down'

Verb Type		
	Semantically General (Action)	Semantically Specific (Action and Path)
4-year-olds	*al-* 'take', *dön-* 'rotate/spin' *döndür-* 'make rotate/spin', *getir-* 'bring', *git-* 'go', *götür-* 'take', *it* 'push', *kaydır-* 'make slide, *koy-* 'put', *sürükle-* 'drag', *taşı-* 'carry', *tekme at-* 'to give a kick', *tut-* 'hold', *yuvarla-* 'roll', *yürü-* 'walk', *yürüt-* 'make walk'	*atlat-* 'make jump over', *bırak-* 'leave/put in/on', *bindir-* 'make mount, make get on', *çıkar-* 'make ascend', *devir-* 'knock down', *dök-* 'pour out', *düş-* 'fall', *sür-* 'spread on, spread over, *yaklaştır-* 'draw/bring near', *yatır-* 'make lie down', *yık-* 'pull down'
3-year-olds	*al-* 'take', *at* 'throw', *çek-* 'pull', *çevir-* 'make turn/rotate', *döndür-* 'make rotate/spin', *dök-* 'pour out', *getir-* 'bring', *götür-* 'take', *it* 'push', *kaydır-* 'make slide, *koy-* 'put', *sektir-* 'make bounce', *süpür-* 'sweep', *sürü-* 'drag', *taşı-* 'carry', *tekme at-* 'to give a kick', *tut-* 'hold', *yuvarla-* 'roll', *yürüt-* 'make walk', *zıplat-* 'make jump'	*dök-* 'pour out', *in-* 'descend', *yık-* 'pull down'

INFLUENCE OF EARLY ACQUIRED VERBS ON ACTION GESTURES: EVIDENCE FROM CAUSED MOTION EXPRESSIONS IN TURKISH*

CHAPTER 5

5.1 Introduction

How do child speakers of Turkish start to talk and gesture about caused motion events? The study in Chapter 4 has shown that although language-specificity is evident in Turkish 3- to 5-year-olds' caused motion speech, it still needs to develop into full-blown adult patterns. Previous research on language development points out that children are tuned early on to language-specific semantic and syntactic encodings of their native language (Choi & Bowerman, 1991). I ask here whether this early tuning is found in younger Turkish children. Specifically, I investigate how children aged 1 to 3 start to talk about caused motion and also examine whether children's gestures that accompany early utterances also show language-specificity. For instance, do children whose first words are mainly Action verbs also produce early iconic gestures representing Actions? To find out, I explore the multi-modal interplay between the spontaneous speech and cospeech gestures of 8 children aged 1 to 3 in their natural communicative settings.

* This chapter is a slightly revised version of Furman, R., Özyürek, A., & Küntay, A. C. (2010). Early language-specificity in Turkish children's caused motion event expressions in speech and gesture. In K. Franich, K. M. Iserman, & L. L. Keil (Eds.), Proceedings of the 34th Boston University Conference on Language Development. Volume 1 (pp. 126-137). Somerville, MA: Cascadilla Press.

Children observe many dynamic events as part of their daily life. Once they start to speak, they have to represent aspects of these events in words. This, however, is not a straightforward task. First they have to understand the structure of those events. Then, they have to recognize the way their specific language expresses components of this structure. The latter may be quite challenging for children, since languages do not package actions and events in the same way (Bohnemeyer & Pederson, 2011; Gentner, 1982; Gentner & Boroditsky, 2001; Hirsh-Pasek & Golinkoff, 2006). While some languages package more components of the event into the verb and omit nominal arguments, others distribute them to linguistic elements outside of the verb (i.e. prepositional phrases etc.). Nevertheless, previous crosslinguistic research has provided ample evidence showing that children's speech is language-specific to a large extent from the start, in terms of how and which event components are encoded lexically and syntactically (Allen et al., 2007; Berman & Slobin, 1994; Choi & Bowerman, 1991; Golinkoff & Hirsh-Pasek, 2008; Özçalışkan & Slobin, 1999; Slobin, Bowerman, Brown, Eisenbeiß, & Narasimhan, 2011).

These findings raise the issue of whether this early tuning to language-specificity may have an early-appearing effect on the development of children's other event representations, such as gestures. Early gestures have been shown to play a significant role in language development in the first 3 years of children's lives, facilitating changes from one- to two-word speech, argument realization and even vocabulary development (Iverson & Goldin-Meadow, 2005; Özçalışkan & Goldin-Meadow, 2005; Rowe & Goldin Meadow, 2009). Yet, these developmental patterns have rarely been investigated in typologically different languages.

Previous research, mostly conducted with English-speaking children, suggests that children's first words (generally nouns) are preceded and frequently accompanied by deictic/pointing gestures, which are initially used by younger children to supplement their verbal expressions. Deictics are followed by a gradual increase in iconic gestures that represent

objects and actions from around 24 months onwards (Özçalışkan & Goldin-Meadow, 2011). The late and slow emergence of iconic gestures has been attributed to their being conceptually more complex (i.e., representing relations within actions) than points that individuate objects (Özçalışkan & Goldin-Meadow, 2011).

Here I test whether the emergence and frequency patterns of gesture types and their relation to the information in speech show a different pattern in a language typologically different from English, namely Turkish. Turkish verbs emerge earlier than in English and many grammatical arguments are omitted, allowing emphasis on verbs (Aksu-Koç & Slobin, 1986). I specifically investigate Turkish children's verbal and gestural encodings of events involving direct manual causation that result in an object's change of location (e.g., a girl putting a ball into a bag) between the ages of 1 and 3. Testing the emergence of gestural representations and their relation to speech in typologically different languages other than English is an important next step for figuring out whether the iconics-after-points sequence is caused by a general cognitive difficulty of encoding relational meanings. It is possible that an emphasis on verbs in early Turkish child language may facilitate young children's conceptualization of relations at an earlier age than found for English, which may also lead to the relatively early emergence of iconic gestures representing actions.

This section presents an overview of the previous literature on the development of language-specific patterns in children's caused motion speech as well as reviewing the development of gestures across languages. It ends with outlining the predictions of the current study. Section 5.2 then details the methodology, including a description of the data and coding. The results are given in Section 5.3, and Section 5.4 contains a discussion and conclusions.

5.1.1 Learning to talk about caused motion across languages

Caused motion events (e.g. a boy pulls a box into a room) are basic events where an Agent (the boy) performs an Action (pulling) that causes a Figure (box) to move in a spatial Path (into) to a Goal (the room). These semantic elements are mapped onto lexical and syntactic structures differently across languages (Talmy, 2000). *Satellite-framed* languages such as English encode Action in the verb (e.g. *put* in (1)) and express Path in the satellite (e.g. *into* in (1)). These languages commonly use verbs that are semantically general to express caused motion events. In contrast, speakers of *verb-framed* languages such as Turkish can encode both Action and Path in the verb (e.g. *sok-* 'put in, insert' in (2)), and thus exercise the option of using semantically specific verbs to express caused motion in addition to semantically general verbs as in English.

(1) *The girl* ***put*** *the book* ***into*** *her bag.*

(2) *Kız* *kitab-ı* *çanta-sı-na* ***sok****-tu.*
girl book-ACC bag-POSS-DAT **put in**-PST
'The girl put the book into her bag.'

Bowerman (1982a; 1988) has closely studied 2 English-speaking children's acquisition of caused motion expressions and found that they initially produced satellites such as *up* or *down* to describe a wide range of caused motion events. By the age of 2, they were able to utter more complex caused motion descriptions such as *put down*, *pull out*, and *pull off* by combining satellites with Manner/Action verbs. Around the age of 3, these children also started using novel combinations that were ungrammatical such **I pulled it unstapled* or **whenever I breathe, I breathe them down*.

A number of crosslinguistic studies have examined the effects of typological constraints on children's linguistic expressions of caused motion. An early study compared how child speakers of Korean, a verb-framed language, and English, a satellite-framed language, lexicalized components of caused motion events in spontaneous speech (Choi &

Bowerman, 1991). In contrast to English, which encodes Action in the verb and expresses Path separately in a satellite (e.g. *push up*), Korean typically conflates Action with Path and optionally Figure and Ground in verbs to encode caused motion (e.g. *ollita* 'cause something to ascend'). Children showed sensitivity to language-specific patterns in their spontaneous speech about caused motion from as early as 17-20 months. English-speaking children used Path particles like *up*, and *in* to express caused changes of location, whereas their Korean-speaking peers expressed caused motion with specific verbs.

More recent studies have focused on placement events (a subtype of caused motion events where an agent causes an object to change its location typically by exerting manual force on it). Slobin et al. (2011) compared how 2-year-old speakers of 4 satellite-framed (English, Finnish, German, Russian) and 4 verb-framed (Hindi, Spanish, Tzeltal, Turkish) languages describe placement events. They found that children had already tuned into the typological characteristics of their language at the age of 2. That is, children acquiring satellite-framed languages tended to use various sorts of directional locative markers and focused on the Path element of the placement event. On the other hand, those acquiring verb-framed languages typically used verbs, focusing on the Action of putting. Interestingly, although placement events can be represented using semantically specific verbs that encode Action and Path (cf. example 2), the Turkish-speaking children in this study used only the semantically general verbs *koy*- 'put' or *at*- 'throw' when talking about placement. Likewise, child speakers of Hindi and Tzeltal, both verb-framed languages, have been found to use specific verbs very rarely in their descriptions of placement events (Narasimhan & Brown, 2009).

In sum, previous studies have shown that from 2 years onwards children are mostly sensitive to the language-specific encoding of caused motion and placement in the ambient language. That is, child speakers of verb-framed languages start with verbs and those speaking satellite-framed languages use directional markers when talking about caused

motion. However, there have been contradictory results with respect to early tuning into specificity. Furthermore, with the exception of Choi and Bowerman (1991), previous studies have not examined caused motion events in general (i.e. focused on placement events only), and none has studied the cospeech gestures that accompany very young children's caused motion expressions.

5.1.2 Gestures in development

Research on children's gestures and their relation to early language development has focused on two aspects: the types of gestures (i.e. point, iconic) children use at different developmental stages and their relation to speech (i.e. gestures reinforcing, supplementing or disambiguating what is expressed in speech).

Before starting to speak, young children communicate by using gestures (Bates, 1976; Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; Greenfield & Smith, 1976). First produced around 10 months of age, these are typically *deictic* gestures that refer to entities present in the immediate environment of the child (e.g. pointing at a teddy bear). In contrast to the abundant use of deictics, early iconic gestures comprise of 1 to 5% of young children's spontaneous gesture repertoire till 3 years (Iverson, Capirci & Caselli, 1994; Nicoladis, Mayberry & Genesee, 1999; Özçalışkan & Goldin-Meadow, 2005, 2009).

Although most previous research on the development of different types of gesture has examined English-speaking children, there is some evidence for cultural differences in the distribution of deictic and iconic gestures. For instance, Italian-speaking children growing up in a "gesture-rich culture" produce more iconic and conventional gestures than their American peers at around the age of 2 (Iverson, Capirci, Volterra & Goldin-Meadow, 2008). Yet, this study did not investigate the use of Italian children's gestures in relation to their verbal expression patterns. Thus, it is not certain what exactly causes the difference between American and Italian children's gesture patterns. Other studies with French–English bilingual children, however, reveal a link between

children's language skills and use of iconic gestures. More frequent use of iconic gestures was observed in the language spoken with higher proficiency (measured by mean length of utterance) by bilingual children (Nicoladis, 2002; Nicoladis, Mayberry & Genesee, 1999).

Young children employ gestures to enhance the information conveyed in their speech (Özçalışkan & Goldin-Meadow, 2005). Children at the one-word stage supplement their speech via gestures to produce a variety of constructions such as argument-plus-argument (e.g. by saying *Mommy* and pointing at a shoe to mean 'Mommy's shoe') or verb-plus-argument (e.g. by saying *Eat* and pointing at an apple) (Özçalışkan & Goldin-Meadow, 2005, 2009). Such supplementary gesture-word combinations predict children's later language development. For instance, the onset of supplementary gesture-speech combinations predicts the onset of two-word combinations (Iverson & Goldin-Meadow, 2005). Interestingly however, once children become adept at using a construction in speech, they cease using supplementary gestures while expressing this construction (Özçalışkan & Goldin-Meadow, 2009).

Another study, directly relevant to our investigation in this paper, recently examined how English-speaking children aged 2;6 to 5 talked and gestured about a particular caused motion event elicited by description of a stimulus item where the experimenter pushed a ball across a small pool with the help of a stick (Göksun, Hirsh-Pasek & Golinkoff, 2010). The results of this study confirmed the previous studies about the late emergence of iconic gestures, in that very few iconic gestures were used before the age of 4-5, and more deictics than iconics were used across all ages. Children of all ages used supplementary gestures, although younger children were more likely to supplement their speech by location gestures (points at the goal of the located object) whereas older ones tended to use instrument gestures (iconic gestures such as a fist-shaped hand representing the stick) as supplementary. Supplementary gestures specifically representing the instrument continued to augment children's speech even at age 5.

Overall, very few studies have examined the development of gestures and their relation to language development in cultures and languages different than English. Moreover, research on the role of gestures in event encoding during early development is scarce, as most studies have focused on children after the age of 3 (e.g. Gullberg & Narasimhan 2010; Özyürek, Allen, Furman, & Brown, 2008). Thus, the effects of language typology on this development between 1 and 3 years are almost completely unknown. For instance, are the types of gestures that children produce (e.g. points, iconics) and the relationship between speech and gesture influenced by the language that children learn to speak from early on? Specifically, does an emphasis on verbs (such as those that encode Action in caused motion) in a language lead children to use iconic gestures that encode actions earlier than reported for English speaking children? Finally, do the argument-omission patterns of a language lead children to continue to produce supplementary gestures in older ages and for different semantic elements in comparison to children speaking other languages?

5.1.3 Present study

Do Turkish children start talking about caused motion events in language-specific ways in early language development? I try to answer this question by examining the spontaneous speech and gestures of eight Turkish-speaking children longitudinally from the age of 12 months to 36 months. I also study children's cospeech gestures to find out what types of gestures are used, which semantic elements are encoded, and how the early speech-gesture relationship develops in Turkish.

I focus on caused motion events in which a person causes an object to change place (often by exerting a manual force on the object). The domain of caused motion events is especially suited to investigate the link between speech and gesture development since such events are expressed differently across languages (Talmy, 2000). Moreover, the manual nature of these actions may prompt children to use Action gestures. Thus, I examine how gestures are influenced by language-specific encoding of

caused motion, ask whether Turkish-speaking children use verbs to describe caused motion from early on and investigate if the early use of verbs leads to the production of cospeech gestures that represent actions. Furthermore, I examine how children distribute caused motion event components over gesture and speech to find out whether gesture encodes event representations not expressed in speech.

Turkish is an interesting language to track the development of caused motion expressions for various reasons. First, it is a language in which verbs are acquired early on at the same time with nouns (Aksu-Koç & Slobin, 1986). Furthermore, Turkish can use semantically specific verbs encoding Action and Path (e.g. *sok* 'put in' in (2)) as well as general verbs encoding only Action (e.g. *koy* 'put' in (3)).

(3) *Kız* *kitab-ı* *çanta-sı-na* *koy-du.*
girl book-ACC bag-POSS-DAT put-PST
'The girl put the book in her bag.'

Finally, arguments of a verb can readily be dropped in Turkish by both adults and children (Demir, So, Özyürek & Goldin-Meadow, in press; Küntay & Slobin, 1996; Gürcanlı, Nakipoğlu Demiralp & Özyürek, 2007). For instance, it is perfectly acceptable to utter verb-only constructions, as in (4), to describe a situation where one throws a ball on the couch. In this case, the verb encodes Action and Agent (through the use of the person marker) and the remaining semantic elements can be recovered from the discourse context.

(4) *At-tı-m*.
throw-PST-1SG
'(I) threw.'

5.1.4 Predictions

With regard to the development of verbal expressions of caused-motion events, we predict that Turkish-speaking children will start to talk about caused motion events by using verb-only constructions, similar to child speakers of other verb-framed languages that allow argument ellipsis (Choi & Bowerman, 1991; Narasimhan and Brown, 2009; Slobin et al., 2011). However, there are two possibilities on what types of verbs they will use. In line with Choi and Bowerman (1991), we may expect the distribution of different verbs to be language-specific from the outset and predict that children will use both semantically general and specific verbs. Alternatively, following the previous findings of Slobin et al. (2011) and Narasimhan and Brown (2009), we may expect Turkish-speaking children to use general verbs earlier than specific ones.

With regard to the types of gestures, we may also make two possible predictions. Given previous research on gesture development (Iverson, Capirci & Caselli, 1994; Nicoladis, Mayberry & Genesee, 1999; Özçalışkan & Goldin-Meadow, 2005, 2009), we may expect children to use very few iconic and many deictic gestures early on, attributable to the fact that iconic gestures require conceptualization of relations between entities. In contrast, if Turkish children use verbs in speech early on, we may also expect them to produce iconic cospeech gestures that represent the actions encoded by the verbs, since they will be tuned to event relations earlier through the specific language that they speak. This will also support the idea that speech and gesture start out as an integrated system, with gestures reflecting language development (Mayberry & Nicoladis, 2000).

Predictions can also vary with regard to the development of the speech-gesture relationship. If the development of speech and gesture is language-independent, we may expect gestures to supplement speech and this supplementation to decrease with age, in line with the findings of Özçalışkan and Goldin-Meadow for English-speaking children (2005, 2009). Alternatively if there is a language effect, supplementary gestures can be expected to be used equally frequently at younger and older ages

given that Turkish is a language in which arguments are omitted regularly. Gestures may serve a general and developmentally extended supplementary role in such languages compared to languages like English where such omission does not frequently occur in speech. In this case, we would not expect the use of supplementary gestures to drop with age in Turkish since they would have continuing crucial pragmatic functions (i.e. as shown in Chapter 5).

5.2 Method

5.2.1 Data

Using the Koç University Longitudinal Language Development Database (Ural, Yüret, Ketrez, Koçbaş & Küntay, 2009), I sampled the spontaneous speech and cospeech gestures of eight Turkish-speaking children (six girls, two boys). The children were videotaped at home while engaged in daily activities such as eating, playing, and conversing with their caregivers (parents, relatives or nannies) or occasionally with the researchers. One-hour sessions were sampled for each child every month between the ages of 12 and 36 months and on average 18 sessions were analyzed per child.

5.2.2 Speech Coding

980 utterances that referred to caused motion events were transcribed and then coded for the type of verb, construction and semantic elements represented. The types of verbs included both semantically general verbs that encode only Action and specific ones that encode Action and Path. A comprehensive list of these verbs is given in Appendix 5.1.

Three main construction types were distinguished: Verb Only, Verb plus Arguments and Argument Only. The Verb Only category denotes those utterances that included only a verb. Depending on the type of verb

used, these constructions encoded either Action, as in (5a) [15] or Action and Path as in (5b).

(5) a. *Koy-du-m*.
put-PST-1sg.
'(I) put' (Ekin, 17 months)

b. *Tak.*
attach/put on
'(you) attach/put on.' (Ogün, 26 months)

The Verb plus Arguments category denotes constructions which included a verb and one or more of its arguments. Such constructions encoded a variety of semantic elements, such as Action and Figure (6a), Action and Goal/Path[16] (6b), or Action, Figure and Goal/Path (6c).

(6) a. *Bir mandal at-tı-m.*
one clothespin throw-PST-1SG
'(I) threw a clothespin.' (İrem, 26 months)
b. *Bura-ya koy-alım*.
here-DAT put-OPT.1SG
'Let's put here.' (Burcu, 36 months)
c. *El-im-e krem sür-dü-k.*
hand-POSS-DAT cream put.on-PST-1PL
'(We) put cream on my hand.' (Can, 36 months)

The Argument Only category occurred very rarely and included the utterances that contained no verb and only arguments. These

[15] Agents were coded only if they were mentioned as nouns or pronouns. Person marking on the verb was not coded as an Agent argument.

[16] As it is very hard to distinguish between Goal and Path in some cases in Turkish, I chose to code these semantic elements as one category.

constructions were used as answers to questions posed to the child and expressed the Agent, Figure or Goal/Path.

(7) *Ora-ya*
there-DAT
'There' (Senem, 31 months, in response to experimenter's question 'Where shall I attach this?')

5.2.3 Gesture Coding

I coded the 389 gestures that accompanied the utterances about caused-motion events for type, the semantic element represented, and the speech-gesture relationship. For type, gestures were categorized as point, showing or iconic (Bates, 1976; Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; McNeill, 1992). Points were gestures where the child pointed at an object or location usually with an extended index finger (e.g. pointing at the carpet while saying *Oraya döktüm* '(I) poured there'). Showing gestures were those where the child held an object up to show it. Iconic gestures represented characteristics or actions of entities (e.g. a child saying *Tenis topunu böyle duvara attım* '(I) threw the tennis ball to the wall like this', while her hand, cupped as if holding a ball, moves from right to left). I also noticed functional actions, gesture-like object-handling actions that children performed while they also simultaneously described their actions in speech to their partners. Such object-handling actions have also been documented in Swedish children's gesture repertoires between the ages of 18 to 30 months (Andrèn, 2010). An example is a child putting a toy into a bag while saying *Çantasına koyalım* 'Let's put (it) in his/her bag'. Overall, there were 77 functional actions in this data set and they were analyzed separately from gestures.

Gestures were also coded for the semantic elements (e.g. Action, Agent, Figure, Goal, Path[17] or any combinations of these) they represented, based on the framing of the co-occurring speech as well as the visual features of the gesture such as hand shape and direction of movement. For instance, a point at the armchair co-occurring with the utterance *Buraya koyabilirsin* '(You) can put here' was coded as Goal.

Finally, gestures could be related to the co-occurring speech in three different ways (Özçalışkan & Goldin-Meadow, 2005; 2009). Reinforcing gestures expressed the same information as the utterance they occurred with (e.g. pointing at own nose while saying *Burnuna sokuyor* '(He/She) puts (it) in his/her nose'). Disambiguating gestures clarified the referent of any deictic word in speech (e.g. showing a water bottle and saying *Anne şuna da su koysana* 'Mommy put water in that one too'). Supplementary gestures added semantic elements not conveyed in speech (e.g. pointing at a notebook while saying *Kopardım* '(I) ripped').

To establish reliability of the gesture type classification, a second coder judged the gesture type (i.e. iconic, point, showing) and the semantic elements encoded in gesture (i.e. Action, Agent, Figure, Goal, Path) for 20% of the gesture strokes that had been identified and segmented by the original coder. The agreement between coders was 94% for gesture type and 93% for semantic element type. In cases of discrepancy, the judgment of the original coder was adopted.

5.3 Results

The statistical analyses were performed with the data divided into two age groups. I set the cut-off point to be 26 months since English-speaking children have been found to both comprehend and produce iconic gestures from this age on (Namy & Waxman, 1998; Namy, 2001; Namy, Campbell & Tomasello, 2004; Özçalışkan & Goldin-Meadow, 2011).

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[17] Goal and Path were coded as separate categories since it was possible to distinguish them in gesture as Goals were depicted with points and Paths with iconic gestures.

5.3.1 Speech

Figure 1 presents the mean number of different construction types each child used (i.e. Verb only, Argument only or Verb+Argument) across all sessions in each age group. To determine whether construction use changed with age, a 3 (Construction Type) x 2 (Age Group) ANOVA was computed with age group as the within subject factor. This ANOVA yielded a significant main effect for construction type, F (2, 276) = 37.05, $p < .001$. That is, Argument-Only constructions were used less frequently than Verb-Only and Verb-Plus-Arguments constructions overall (Bonferroni, p's = .000). The use of different constructions in speech did not change with age. Construction type and age, however, interacted significantly, F (2, 276) = 15.63, $p < .001$, such that the use of Verb-Only constructions decreased, F (1, 92) = 4.89, $p < .03$, and the use of Verb-Plus-Arguments increased with age, F (1, 92) = 15.26, $p < .001$.

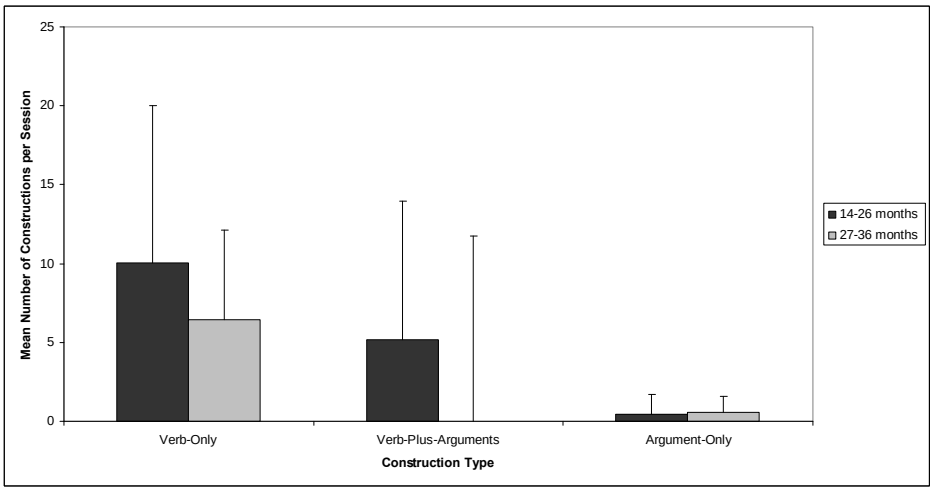

Figure 1. Mean number (error bars represent SD) of each construction per session

I then examined the semantic elements explicitly mentioned in speech and investigated whether these mentions changed with age. The mean number of utterances containing each semantic element is depicted in Figure 2. I conducted a 4 (Semantic Element Type) X 2 (Age Group) ANOVA on the frequency of utterances containing different semantic elements per age group and found that children's mention of semantic elements differed significantly, F (3, 368) = 49.58, p < .001. Overall, Action was encoded more frequently than all other semantic elements in speech (Bonferroni, p's < .001). Children's mention of elements also changed with age, F (1, 368) = 19.01, p = .000, such that all elements were encoded more frequently in later ages. There was no significant interaction between semantic element type and age.

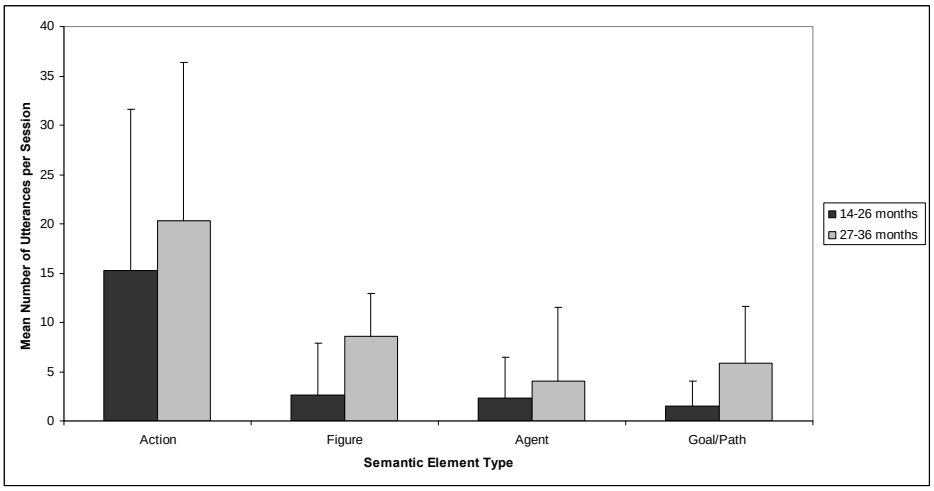

Figure 2. Mean number (error bars represent SD) of utterances containing each semantic element per session

Lastly, I calculated the mean number of utterances that contained semantically general (i.e. encoding Action Only) and specific verbs (i.e. Action and Path) in each session and found that both verb types were

used equally frequently by children at different ages, F (1, 184) = .66, $p >$ .05. Mean (SD) verb use was as follows. General verbs: 8.63 (9.42) for 14-26 months and 9.37 (7.82) for 27-36 months; specific verbs: 6.47 (8.37) for 14-26 months and 10.86 (9.66) for 27-36 months. Age also did not affect verb use and there was no significant interaction between verb use and age.

As expected from the acquisition patterns of verb-framed languages, Turkish-speaking children start to describe caused motion events using verbs encoding at least the Action component. Moreover, they use semantically general and specific verbs (packaging both Action and Path)- another typological aspect of verb-framed languages- in about equal distributions across the age groups.

5.3.2 Gesture

5.3.2.1 Gesture types and functional actions

I first examined the number of different types of gestures and functional actions produced by each child during their caused motion expressions per session, shown in Figure 3. I conducted a 4 (Gesture-Action Type) X 2 (Age Group) ANOVA on the frequency of different gesture types, and found no significant difference in children's use of functional actions and gestures across the two age groups. Thus, actions and all gesture types were used with equal frequency overall. The use of different gesture types did not change with age, as inferred from no interaction between gesture type and age.

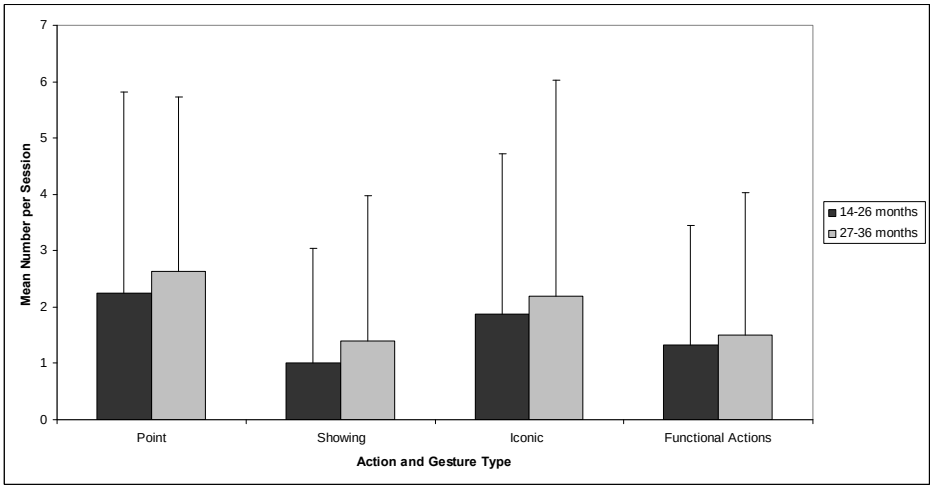

Figure 3. Mean number (error bars represent SD) of action and gesture types per session

5.3.2.2 Speech-gesture relationship

To determine the different functions of gesture in relation to speech (i.e. reinforcing, disambiguating, and supplementing) in the two age groups, I computed a 3 (Gesture Function Type) X 2 (Age Group) ANOVA. Functional actions were excluded from this analysis since they were not considered to be gestures. This ANOVA showed no difference in children's frequency of use of reinforcing, disambiguating and supplementary gestures across the two age periods and age did not influence the production of these gestures either. There was no significant interaction between gesture type and age. The mean number of different types of gestures in relation to speech in the two age groups are shown in Figure 4.

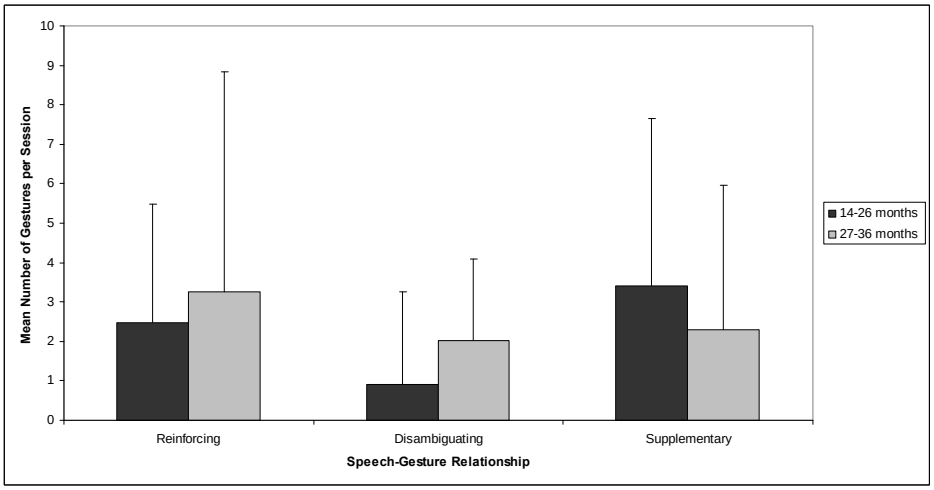

Figure 4. Mean number (error bars represent SD) of different types of gestures in relation to speech used per session

I was also interested whether different gesture types and functional actions had different relations to speech. Figure 5 depicts the mean number of different gesture types fulfilling each function across the two age groups. I first conducted a 4 (Gesture-Action Type) X 2 (Age) ANOVA on the frequency of reinforcing gestures and found a main effect for gesture type, F (3, 199) = 10.89, $p < .001$, but no effect for age group and no interaction between the two factors. Post hoc analyses with Bonferroni adjustment revealed that iconic gestures were used to reinforce speech more frequently than showing gestures ($p < .001$) and points ($p < .001$). Functional acts also reinforced speech more frequently than showing gestures ($p = .000$). I then performed a 4 (Gesture-Action Type) X 2 (Age) ANOVA on the frequency of disambiguating gestures and found a main effect for gesture type, F (3, 135) = 9.21, $p < .001$ but no effect for age group and no interaction between the two factors.

Specifically, points were used more than iconics and functional acts to disambiguate the information in speech (*p*s = .000).

Finally, I examined supplementary gestures using a 4 (Gesture-Action Type) X 2 (Age) ANOVA. There were no effects of gesture type and age and no interaction between the two factors. Thus, all kinds of gestures were used with equal frequency to supplement speech across the two age groups.

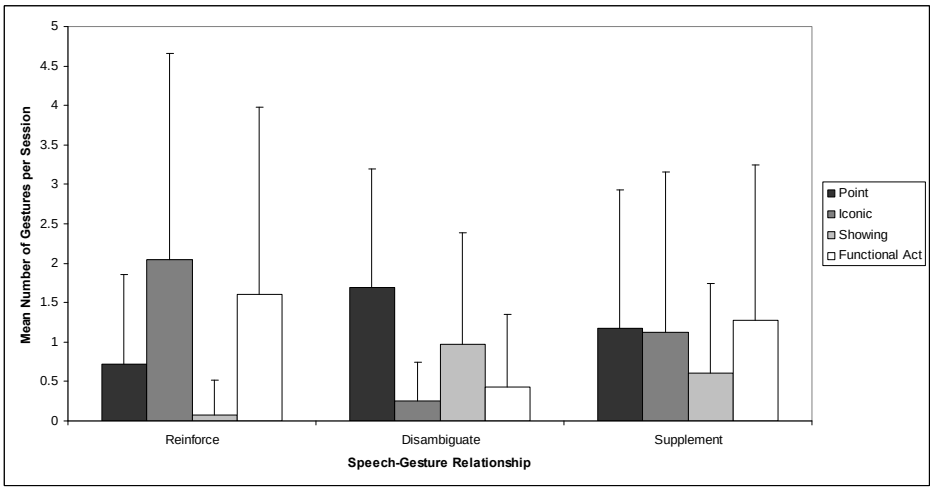

Figure 5. Mean number (error bars represent SD) of different gesture types fulfilling each function across the two age groups

5.3.2.3 Speech-gesture relationship and semantic elements

I next investigated which semantic elements were encoded by gestures with different functions. Functional actions were excluded from all following analyses since they were not considered to be gestures. Figure 2 shows the mean number of different semantic elements encoded in gesture fulfilling each function across the two age groups. I first conducted a 5 (Semantic Element Type) X 2 (Age Group) ANOVA on the frequency of reinforcing gestures that encoded various semantic

elements per session per child. I found a significant difference in the expression of semantic elements in reinforcing gestures, F (4, 290) = 7.88, $p < .001$. Post-hoc tests showed that reinforcing gestures encoded Action more frequently than all other elements across both age periods (Bonferroni, ps < .005). Representation of semantic elements in matching gestures did not change with age and semantic element type and age did not interact. Turning to disambiguating gestures, a 5 (Semantic Element Type) X 2 (Age Group) ANOVA showed a significant difference in the encoding of semantic elements F (4, 290) = 10.75, $p < .001$. Figure and Goal were encoded more frequently than Action, Path and Agent (Bonferroni, p's < .001). Lastly, to address which semantic elements were encoded in supplementary gestures, A 5 (Semantic Element Type) X 2 (Age Group) ANOVA was conducted. This ANOVA revealed a main effect both for semantic element F (4, 290) = 12.78, $p < .001$ and for age group F (1, 290) = 5.78, $p < .002$, but no interaction between the two. Supplementary gestures encoded Figure more frequently than all the other elements (Bonferroni, p's < .005). In addition, Path was encoded in supplementary gestures more often than Action and Agent (Bonferroni, ps < .005).

These results show that young children selectively match or supplement their speech with gestures in accordance with the semantic information they represent in speech. That is, if they encode Action in speech, they match this with an Action gesture and/or supplement it with a Figure or Path gesture. Moreover, they are also sensitive to the fact that deictic expressions encoding Figure and Goal (e.g. *this*, *here*) have to be disambiguated, using gestures to do so.

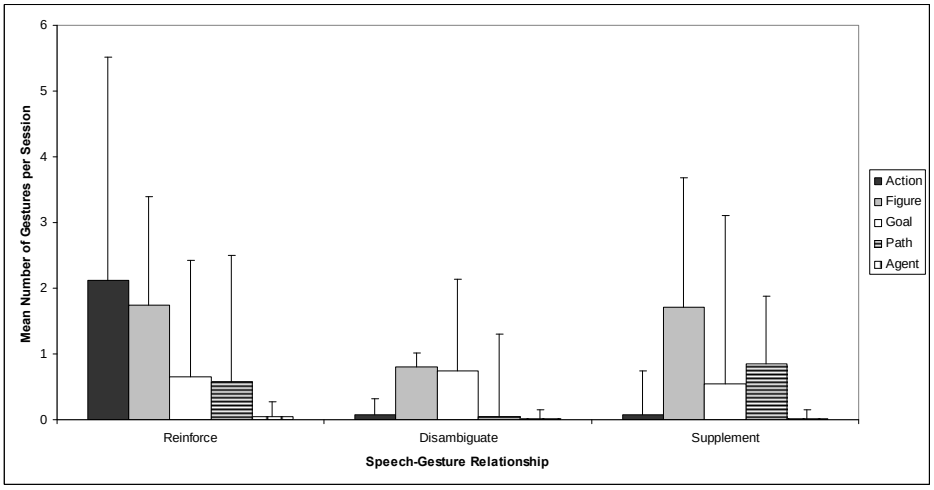

Figure 2. Mean number (error bars represent SD) of different semantic elements encoded in gesture fulfilling each function across the two age groups

5.3.2.4 Speech-gesture relationship and verb type

Finally, I was interested in whether gestures became tuned to general and specific verb types over development. Specifically, do gestures encoding particular semantic elements occur with utterances containing different verb types in speech? I focused on supplementary gestures that encoded Goal or Path and investigated which type of verbs these gestures co-occurred with when Goal or Path was not encoded elsewhere in the utterance (see Figure 6). A 2 (Verb Type) X 2 (Age Group) ANOVA showed that supplementary Goal or Path gestures were marginally more likely to occur with general verbs than specific ones, F (1, 116) = 3.47, p = .065. There were no differences between the two age periods and no interaction between verb type and age group. Thus, children had a tendency to use Goal or Path gestures with general verbs rather than specific ones and these results indicate that children are sensitive to the

information already encoded in the verb and what could be supplemented through gesture from very early on.

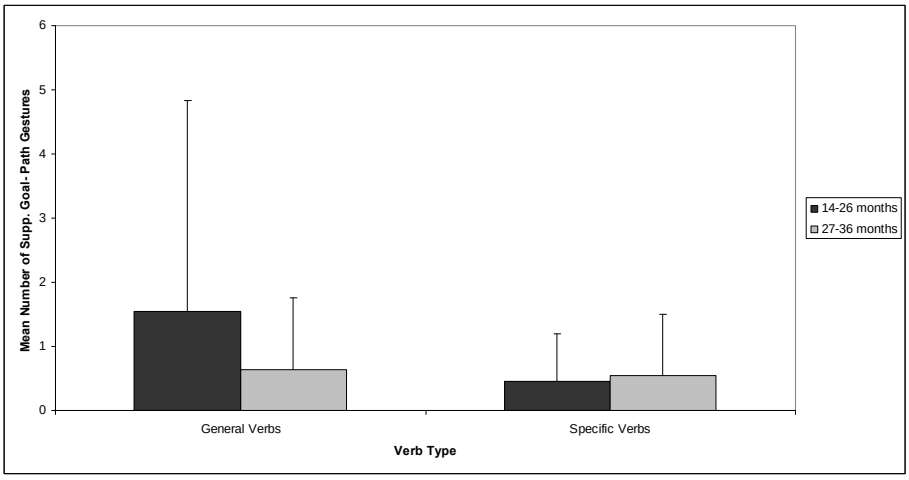

Figure 6. Mean number (error bars represent SD) of supplementary Goal or Path gestures occurring with different verb types

5.4 Discussion and Conclusions

This study investigated whether the language that children learn to speak influenced the types of gestures they produce and the relationship between speech and gesture. I focused on Turkish, a language where verbs are acquired early and the arguments of a verb can be commonly omitted, and examined how child Turkish speakers talked and gestured about caused motion events by asking three questions. First, do children start with language-specific constructions and lexical items? Second, do the early use of verbs and the grammatically allowed omission of arguments in speech influence the gesture types that children produce? Third, is there any language-specific development in terms of speech and

gesture relations and in how semantic elements are distributed across the two channels of expression?

5.4.1 Children's early tuning into language-specific patterns: Emphasis on verbs

Language-specificity in caused motion event descriptions is evident from the start. Turkish children started to talk about caused motion events using only verbs, similar to children speaking other verb-framed languages (Choi & Bowerman, 1991; Narasimhan & Brown, 2009; Slobin et al., 2011), and unlike their peers speaking satellite-framed languages who have been found to use Path particles like *up*, and *in* to describe these events (Choi & Bowerman, 1991; Slobin et al., 2011). After the age of 27 months, Verb-Only constructions were partially replaced by Verb-Plus-Argument constructions. This suggests that children had established a more full-fledged caused motion construction in their repertoire. However, children still used Verb-Only constructions fairly frequently at the 27-36 month age period, indicating that their use of this construction was not solely due to developmental reasons. That is, children's continued use of Verb-Only constructions may be related to the fact that arguments can be freely omitted in Turkish, and such constructions could possibly be used to the same extent by adults. Future research should determine the frequency of Verb-Only constructions in the caused motion expressions of older children and adults in order to find out whether the rate I report here is particular to the spontaneous speech of 3-year-olds, or is also similarly used by adults.

I also found that across the two age groups, the semantic element children encoded most frequently in their verbal descriptions of caused motion was Action. In contrast, all other semantic elements were encoded more frequently between the ages of 27 to 36 months compared to the earlier age period. This result is expected given the fact that children used Verb-Plus-Argument constructions more frequently with age.

Turkish children's speech showed language-specificity also at the level of verb use such that they used semantically specific verbs as frequently

as general ones even at very early ages. Interestingly, children's use of specific verbs showed not only high token but also high type frequency. That is, type frequency of specific verbs per child ranged between 7 and 13, showing that each child used many different specific verbs (see Appendix 5.1 for a list of all verbs). In contrast to these results, 2-year-old Turkish children have previously been found to talk about placement events using the semantically general verbs *koy-* 'put' or *at-* 'throw' (Slobin et al., 2011). Similarly, child speakers of Hindi and Tzeltal, both verb-framed languages, rarely used specific verbs in their descriptions of placement events (Narasimhan & Brown, 2009).

There could be several reasons why my results are contradictory to those of previous researchers. First, the aforementioned studies have focused on only one type of caused motion event, i.e. placement, whereas I studied caused motion in general. The full pattern of language-specificity may be easier to spot when a more general domain of events is investigated. Support for this hypothesis comes from another study which examined the specificity of Tzeltal-speaking children's verbs in their descriptions of intransitive and transitive events (Brown, 2008). It was found that Tzeltal children use many specific verbs, in contrast to Narasimhan and Brown (2009). Second, intra-typological differences between languages may be influencing acquisition patterns. For instance, although both Turkish and Hindi are verb-framed, Hindi does not typically use specific verbs which encode Action and Path to express caused motion. Instead, it uses semantically general verbs (e.g. *daal* 'put/drop' or *rakh* 'put/place') representing Action in conjunction with locative case-marked nominals encoding Path (Slobin et al., 2011). In contrast, Turkish uses both verb types to express caused motion. Moreover, in Hindi specific verbs such as *ghus-aa* 'insert' are absent in caregivers' input speech to children (Narasimhan & Brown, 2009), whereas such verbs may be found more frequently in the Turkish input. Further research is needed to confirm this point. Thus, as suggested by Slobin et al. (2011), languages exhibit the properties typical for their

typology to differing degrees and such intricate intra-typological variation affects the development of caused motion expressions.

5.4.2 Early language-specificity in children's gesture types and relations to speech

Having established Turkish children's early use of verbs in their spoken descriptions of caused motion, I was interested in the type of cospeech gestures children produced and the speech-gesture relationship at early ages. Taking all results into account, we see that early language-specificity is evident in different aspects of children's gestures.

First, language-specificity is apparent in the gesture types that children produce. Previous literature has shown that children's early gesture repertoire is composed almost entirely of pointing gestures (Iverson, Capirci & Caselli, 1994; Nicoladis, Mayberry & Genesee, 1999; Özçalışkan & Goldin-Meadow, 2005, 2009). Moreover, English-speaking children between the ages of 2;6 to 5 produce more deictics than iconics in their narrations of causal events, using iconics only after age of 4 (Göksun et al., 2010). In contrast to these results, I found that Turkish children used equal numbers of pointing and iconic gestures between the ages of 1 and 3. Moreover, there were no age differences in the use of iconics such that children produced equal numbers of iconics in the age periods 14-26 months and 27-36 months. Thus, the children in this study started producing iconic gestures much earlier than their English-speaking peers who start using them at 26 months (Namy & Waxman, 1998; Namy, 2001; Namy, et al., 2004; Özçalışkan & Goldin-Meadow, 2011).

Why are there such differences in the types of gestures children produce? I surmise that the type of gestures children produce is influenced by the language they speak. That is, Turkish children start to talk about caused motion events using Verb-Only constructions that encode Actions, which are accompanied by iconic gestures that represent those Actions. In contrast, English-speaking children use many Argument-Only constructions (Özçalışkan & Goldin-Meadow, 2005), and they would be expected to use deictic gestures early on, as has been

previously documented (Özçalışkan & Goldin-Meadow, 2011). Thus, the early and isolated use of verbs in Turkish may be driving children to use iconic cospeech gestures. Indeed, this possibility is supported by the fact that 92% of the iconic gestures that children in this study used encoded Action also incorporating Figure and/or Path (e.g. a cupped hand moving away from self as if throwing a ball). That is, even if children talk about Figure, Goal and Path, they rarely encode these elements in gesture independently of Action. Moreover, the very few Argument-Only utterances in this data set were not accompanied by iconic gestures but by pointing.

Given these results, I believe that children's late use of iconics is not caused by their difficulties in mapping between symbol and referent, thus finding the use of iconic gestures more cognitively demanding than deictic gestures, as has been previously argued (Özçalışkan & Goldin-Meadow, 2011). Rather, I think that the late occurrence of iconic gestures in English-speaking children stems from the lack of early use of verbs in this language. Since Turkish is a verb-framed language with regular argument-omission[18], children's early speech contains an abundance of verbs. Thus many cospeech gestures represent Actions, which can only be depicted by producing iconics from early on. In contrast, learners of satellite-framed languages may produce few iconics early on in development since their early descriptions of caused motion events do not include Action-encoding verbs (Choi & Bowerman, 1991). My findings on how different gesture types function with regard to speech also indicate that early and isolated verb use may be driving the production of iconics. This argument is supported by the fact that children prefer to use

[18] I surmise that Turkish-speaking children's early use of iconic gestures stems from an interplay of the argument omission and verb-framed features of Turkish. However, it is very hard tease these two factors apart and ascertain which contributes more to the production of children's iconic gestures.

iconic gestures that encode Action to match the information encoded in speech, a tendency that I discuss below.

Second, the specific language they spoke also influenced children's use of gestures in relation to speech. Turkish children used supplementary gestures as frequently as disambiguating and matching ones and the use of supplementary gestures did not decrease as children started producing more of the Verb-Plus-Argument constructions, unlike previous findings (Özçalışkan & Goldin-Meadow, 2009, 2005). Namely, 27-36 month-olds still used gestures to supplement their speech as frequently as in earlier ages, suggesting that some semantic elements continue to be encoded exclusively in gesture even after children are able to express all elements in speech. I believe that the continued use of supplementary gestures may be related to argument ellipsis in Turkish. That is to say, arguments representing Figure, Goal and Path can be easily dropped since they can be recovered from the discourse context and the verb semantics (Brown, 2008) and thus continue to appear in gesture even in later years of development. Thus, in a language like Turkish the use of supplementary gestures does not necessarily only pave the way for the development of constructions with full argument structure, only to disappear when full verbal constructions make their appearance, as it does for English.

Children also increased their use of disambiguating gestures over time, as documented in previous research (Özçalışkan & Goldin-Meadow, 2009, 2005). I surmise that the rise in disambiguating gestures may be related to children's increased use of deictic words with age and the development of their comprehension of the discourse constraint that the referents of deictic words have to be clarified. These possible links have to be tested in future studies. Interestingly, a very recent study has also documented Turkish-speaking children's tendency to use gestures to disambiguate referents in speech. Compared to their English-speaking peers, 4-year-old Turkish children have been found to use more pronouns and omitted arguments in speech and use gesture to specify the ambiguous referents (Demir, So, Özyürek & Goldin-Meadow, in press).

Third, gesture type may have also interacted with speech-gesture relation as a result of language-specificity. I found that children's use of different gesture types varied in their functions. Specifically, iconics and functional acts were used to match the content in speech whereas points disambiguated speech. In contrast, all types of gestures were used to supplement speech. Crucially, there were no age differences, indicating that children were aware from a very early age that not all gestures are equal in how they function with regard to speech. This is the first study to document young children's use of iconic gestures to supplement the missing semantic information in their speech. Previous research on the supplementary gestures of children have found them to be deictics in different languages such as English and Italian (Iverson, Capirci, Volterra & Goldin-Meadow, 2008). Young Turkish children produce many verbs in their early speech about caused motion, which may allow them to use iconic gestures that encode the semantic elements of the caused motion such as Action, Goal, Path and/or Figure in reinforcing as well as in supplementary functions. These findings also show striking differences in terms of the richness of semantic elements supplemented in gesture compared to a previous study (Göksun et al., 2010), which found that gestures supplement speech only with the semantic element Instrument in elicited narrations of English-speaking 5-year-olds'caused motion descriptions.

Finally, children's use of gestures was also fine-tuned and language-specific at the level of verb types and semantics. That is, they were more likely to supplement their speech with a gesture that encoded Goal or Path when they used a semantically general verb that encodes only Action in speech. This finding indicates that even at the tender age of 14 to 26 months, Turkish children are sensitive to the information encoded in the verb and choose to supplement this information with gestures that encode the semantic elements not represented in the verb.

Children's speech about caused motion- both in the choice of constructions and in the type of verbs used- is language-specific from the

start. In addition, the gestures children produce also mirror this language-specificity. I have found that gesture development and its relation to language is very different for child speakers of Turkish compared to, for instance, English. The typological properties of the language children learn to speak influences the types of gestures children produce and the relationship between speech and gesture. Children learning a verb-framed language use many iconic gestures involving action representations from very early on. They also tend to produce supplementary gestures longer and with richer semantic content than their peers speaking other languages, presumably due to the argument-omitting properties of Turkish.

Studying early communicative development multimodally in languages that have different typological structures provide us with new ways to understand the developmental course of language and gesture and children's early linguistic encoding of events and their representations. My results show that the early emergence patterns of gestures do not necessarily reflect a general cognitive development tied to the ability of encoding relations, which then paves the way for full linguistic encoding of events. Rather, gesture emergence is determined by and indicative of the language-specific conceptualization of event relations from the moment children start to learn their language.

Appendix 5.1. List of All Verbs Used

Semantically General (Action)

at- 'throw', *çek*- 'pull', *çevir*- 'make turn', *döndür*- 'make rotate', *getir*- 'bring', *gönder*- 'send', *götür*- 'take', *it*- 'push', *koy*- 'put', *taşı*- 'carry', *vur*- 'bump'

Semantically Specific (Action and Path)

bindir- 'make mount, make get in/on', *bırak*- 'leave on/in, put on/in' *boşalt*- 'empty, pour out', *çıkar*- 'take out, make ascend', *dağıt*- 'to scatter', *diz*- 'line up, arrange in a row', *dök*- 'pour out', *doldur*- 'fill up, stuff', *düşür*- 'drop', *giy*- 'put on', *kaldır*- 'lift up, put away', *kopar*- 'break off, tear off', *ört*- 'cover', *oturt*- 'make sit down, put in a specified place', *ser*- 'spread out on, spread over', *sıkıştır*- 'catch (one's finger etc.) in a place', *sıyır*- 'peel off, take off', *sok*- 'insert, put in', *sök*- 'rip out', *sür*- 'spread on, spread over, put on', *tak*- 'put on, attach, pin to', *topla*- 'gather, pick up', *uzat*- 'extend', *yanaştır*- 'draw up alongside'

SUMMARY AND CONCLUSIONS

CHAPTER 6

6.1 Introduction

This dissertation has investigated the encoding of caused motion events in Turkish, and the development of this encoding in speech and gesture. Specifically, it has examined adult speakers' encoding of caused motion through grammaticality judgments and elicited narratives. It then focused on how children aged 1 to 5 encode caused motion in spontaneous speech and elicited narratives, and compared children's encoding to that of adults'.

The development of caused motion event encoding in Turkish is of interest for the broader study of language acquisition for several reasons. *First*, the adult patterns of lexicalization of caused motion in Turkish do not exactly fit the expected typology described by Talmy (1985), and display both verb- and nonverb-framed characteristics. How children learn such dual patterning has not been widely investigated, as previous research has concentrated on the development of languages that are either satellite- or verb-framed. *Second*, the dual patterning in the encoding of caused motion events in Turkish represents a solution to a problem that all languages share: how to select, categorize, and combine information in communicating about everyday events. By concentrating on this domain and comparing findings to what we know about development in other languages, we can determine when and to what extent learners show sensitivity to language-specific categories and patterns. *Third*, by taking gestures as well as speech into account in the representation of events we can have a better understanding of how semantic information is encoded multimodally during development.

To explore these issues, I first examined caused motion encoding in Turkish by combining language typological analyses with a more fine-grained verb semantics analysis. I then conducted a grammaticality

judgment study with adult speakers of Turkish to establish the relevant encoding patterns. Next, I carried out a study designed to elicit caused motion event descriptions from adults and children aged 3 to 5 in order to examine the verbal and gestural representations of caused motion. Last, I investigated a longitudinal video corpus of the spontaneous speech of Turkish-speaking children between the ages of 1 and 3 to find out how caused motion is encoded in speech and gesture early on. In this final chapter, I summarize my findings and conclusions, and consider the theoretical implications for our understanding of how children achieve adult-like encoding of events in their language.

6.2 Summary of the main findings

Chapter 2 presented an analysis for the linguistic encoding of caused motion in Turkish. I focused on the semantics of verbs that encode caused motion and gave a detailed analysis of their linguistic properties. Based on the semantic elements they encoded, I divided verbs into two categories. These were a) semantically general verbs like *koy-* 'put' that encoded solely Action and b) specific ones encoding both Action and Path such as *sok-* 'put in'. The two constructions that are used to describe caused motion in Turkish, namely the Caused Motion Construction (CMC) and Matrix Subordinate Construction (MSC), differ in how they package the semantic elements of a caused motion event into clauses. That is, Action and Path are expressed in a single clause in CMCs, whereas they are spread across multiple clauses in the MSC. I found that it was the semantic properties of verbs rather than typological tendencies that determined the syntactic constructions verbs could occur in. That is to say, semantically specific verbs can be used only in the CMC, whereas general verbs can appear either in the CMC or the MSC.

Chapter 3 reported the results of a grammaticality judgment study that tested whether the verb classification provided in Chapter 2 was relevant for adult Turkish speakers. Furthermore, this study also tested whether there were any differences in the encoding of different types of caused motion events (i.e. those with and without boundary crossing). The results

showed that both semantics and event type influenced the acceptability of verbs that encode caused motion events as well as confirming the theoretical analysis outlined in Chapter 2. In particular, it was shown that specific verbs are more acceptable than their general counterparts in the CMC. In contrast, general verbs are rated as more grammatical in the MSC. Moreover, it was found that boundary crossing is a constraint that shaped the syntactic packaging of caused motion event descriptions. That is, speakers preferred to encode these events using the MSC and distributing the elements Action and Path into separate clauses. Thus, deviations from Talmy's typology (1985; 2000) were found for non-boundary crossing events, highlighting the importance of event type in semantics-syntax pairings. These findings established the fundamentals of the adult patterns for the encoding of caused motion events in Turkish.

Chapter 4 focused on production patterns and investigated how Turkish-speaking adults and children aged 3 to 5 encoded caused motion events in their speech and gestures. The results showed that both adults and children represented Action the most frequently in speech, followed by Figure and Path. There were also developmental differences between the two groups. Children in general expressed all semantic elements except Action less frequently than their adult counterparts. Interestingly, omission of semantic elements was not only found in child speakers. In line with the argument-drop properties of Turkish, adults as well frequently omitted arguments in speech. Verb use also differed with age. Although there was a tendency among all speakers to use general verbs more than specific ones, children used specific verbs even less than the adults. With regard to the constructions used to describe caused motion, adults used both the CMC and MSC. Comparing construction use across ages, I found that adults used the MSC more than children, while the reverse pattern was true for the use of the CMC. Children were also not adult-like in their verb-construction combinations. Moreover, children were aligned to the semantics-syntax pairing of specific verbs in the CMC, but not to the one for general verbs in the MSC. The semantic

elements depicted most frequently in gesture across all ages were Action and Path, followed by Figure. As in speech, the semantic elements encoded in caused motion representations in gesture changed with age. That is, the use of Action and Path gestures decreased with age, while those encoding Figure, Goal, Ground, and Agent increased. Gestures were mainly used to reinforce the semantic information in speech, followed by supplementation and demonstration functions. Adults as well as children supplemented the missing arguments in their speech with their gestures. Taken together, the results showed that although language-specificity is evident in children's speech and gestures, the development of language-specificity into adult patterns takes time.

Chapter 5 explored how children between the ages of 1 and 3 start to represent caused motion events in their spontaneous speech and gestures. I analyzed a longitudinal video corpus and found that language-specificity in caused motion event descriptions was evident from the start. Turkish children started to talk about caused motion events using only verbs. Verb-Only constructions were still found at the 27-36 month age period, indicating that the use of this construction was not solely due to developmental reasons. That is, children's continued use of Verb-Only constructions could be related to the fact that arguments can be freely omitted in Turkish. Moreover, language-specificity was also evident at the level of verb use. Children used semantically specific verbs as frequently as general ones even at very early ages. Early verb use was associated with early production of iconic cospeech gestures representing Action (from 15 months onwards) that also incorporated other semantic elements, reinforcing or supplementing speech. The findings indicated that gestures in the first 3 years of life were influenced by the specific properties of the language that children learn.

6.3 Theoretical implications

6.3.1 Language-typological approaches to motion event encoding

Talmy (1985; 2000) has proposed that the semantic components of a motion event are mapped onto lexical structures differently across

languages. Satellite-framed languages such as English encode Manner/Action[19] in the verb and express Path in the satellite. In contrast, speakers of verb-framed languages such as Turkish encode Path in the verb and express Manner/Action in a gerund or subordinate verb. Although Turkish has previously been categorized as a verb-framed language based on the encoding patterns of spontaneous motion (e.g. Allen et al., 2007; Kita & Özyürek, 2003; Özçalışkan, & Slobin, 1999), the adult patterns of encoding caused motion described in the previous section indicate that there is much more variation within a given language than Talmy originally described. Turkish adults use both verb- and nonverb-framed patterns when talking about caused motion events. Thus, the findings from Chapters 2, 3, and 4 suggest that languages can make use of different typological patterns depending on the type of motion event encoded, and also indicate that classifying languages dichotomously is too limiting.

The restrictiveness of the binary, satellite- vs. verb-framed language distinction has also been discussed by previous research on the encoding of spontaneous motion events (e.g. Filipovic 2007; Naigles, Eisenberg, Kako, Highter, & McGraw, 1998; Slobin 2003). For instance, Slobin (2003) suggests placing languages on a continuum running between satellite- and verb-framed properties in order to better account for the range of encoding options used by languages and the deviations they show from Talmy's typology. Furthermore, arguing that languages such as Mandarin do not fit into either category because they lack a distinctive finite main verb, he proposes a third language type, called *equipollently-framed* languages, in which both Path and Manner/Action have equal morphosyntactic status (Slobin, 2003: 247). The alternatives suggested by Slobin, however, still cannot account for a language like Turkish that uses typologically different encoding patterns depending on the type of motion

[19] Manner/Cause in accordance with the terminology used by Talmy (1985; 2000).

event described (i.e. with or without boundary crossing) and the type of verb used in the description (i.e. general or specific).

Further evidence of a verb-framed language displaying intralinguistic variation in the encoding of spontaneous motion comes from Hindi. Narasimhan (2003: 158) states that Hindi displays verb-framed characteristics in not allowing Manner verbs to combine in a single clause with grammatical elements that encode Path. However, this tendency cannot be due to the lack of necessary lexical items in Hindi, as both Manner verbs and Path adpositions can be found in the lexicon. Narasimhan proposes to examine the expression of motion events on the phrasal level rather than the lexical one and suggests that lexical items that are similar crosslinguistically may combine in different ways phrasally. Thus, she advocates a construction-based analysis in addition to the study of lexicalization patterns to account for variations within a given language (Narasimhan 2003: 156). Although the findings from this dissertation support the importance of combining construction-based analyses with lexical ones, Narasimhan's account does not wholly explain how encoding patterns within a language can vary depending on different motion event types.

Thus, further research is needed to fully understand the inter- and intralinguistic variation in the encoding of different kinds of motion events. Future studies should delineate the event structure differences between caused and spontaneous motion events as well as thoroughly investigating how those differences influence the linguistic encoding of Manner and Action. If new research shows that caused motion events are systematically encoded differently from spontaneous ones within different languages, then we can safely assume that the variation results from the differences between the structure/semantic components of these events.

6.3.2 Language-specificity in the development of motion event encoding

The data reported in this dissertation help us better understand how languages that display multiple patterns in the encoding of basic events

are learned. The findings from Chapter 5 indicate that Turkish children are language-specific in how they start to encode caused motion events, as evidenced by their use of Verb-Only constructions and different verb types. In contrast to previous research, which has found that 2-year-old Turkish children talk about placement events using only semantically general verbs such as *koy*- 'put' or *at*- 'throw' (Slobin et al., 2011), I showed that Turkish children use semantically specific verbs as frequently as general ones even at very early ages. Interestingly, the results of Chapter 4 indicate that older children use fewer specific verbs than general ones in their descriptions of caused motion events. The difference in verb use across these two groups may be related to the type of events depicted in the stimuli used in Chapter 4. Since that stimulus set was designed to test children's use of different constructions with different verbs, it contains many stimulus items that can be described using general rather than specific verbs. This may have biased the older children studied in Chapter 4 to use general verbs more frequently.

As Turkish children grow older, Verb-Only constructions are replaced to a large extent by the CMC. In contrast, the use of the MSC develops much later, presumably after the age of 5. Thus, being syntactically simple, the nonverb-framed patterns in Turkish are learned earlier than the syntactically complex but typologically typical verb-framed pattern. Children have also been shown to be sensitive to which constructions are more productive in adult speech. Specifically, they learn more productive constructions before less productive ones (Clark, 1993). Hence, another reason why the children studied here learn the MSC later than the CMC may be that it the former is found much less frequently than the latter in adult descriptions of caused motion, as the results of Chapter 4 show.

Although 3- to 5-year-old children use constructions differently than their adult counterparts, they may still aware of the limitations regarding verb-construction combinations. That is, when these children describe events that would require the use of verbs compatible with the CMC and unacceptable in the MSC (such as *döndür*- 'make rotate' and *zıplat*-,

'make jump') they do not attempt to use the CMC with these verbs. Instead, they employ one of two strategies. They either use these verbs in an alternative construction such as the transitive one (e.g. *Topu döndürdü* '(he/she) rotated the ball') thereby encoding Action but omitting the Path component of the caused motion event. Or, they avoid using the MSC-incompatible verbs and use CMC-compatible ones instead (e.g. using *at-* 'throw' rather than *döndür-* 'make rotate'). Thus, we see that when children are asked to describe caused motion events that require the use of a construction that they yet cannot use properly (i.e. the MSC), they come up with alternative strategies to using unadult-like construction-verb combinations. These strategies are indications of children's implicit knowledge of the semantics-syntax pairings of Turkish.

However, the precariousness of this knowledge becomes apparent when we examine the forced elicitation task in Chapter 4 and see that in some cases, these children do overextend the CMC. In the constructional approach to language development, overgeneralization "errors" are expected when children have to learn a general pattern that is subject to idiosyncratic exceptions and/or subtle semantic constraints. Turkish-speaking children's tendency to use verbs that are unacceptable in the CMC with this construction indicate that they have started making the necessary generalizations regarding the meaning of the verbs that can be used in this construction. During this process, however, they make "errors" by using unadult-like verb-construction combinations, as they are not completely aware of the semantic constraints on the verbs that are allowed in the constructions they use.

Examining the semantic elements encoded in Turkish, we see that Action is the one that speakers of all ages represent the most frequently. The encoding of Figure and Path gets more frequent after the age of 3. However, even children aged 5 do not talk about these elements as frequently as adults. Notably, adults also omit some elements when they describe caused motion events, showing that argument ellipsis in Turkish occurs both for developmental and pragmatic reasons.

The results of Chapter 4 and 5 show that studying children's speech patterns across different ages in various speech contexts with different tasks helps reveal a rich account of the development of event encoding in language.

6.3.3 The development of the role of gesture in event encoding

Research on adults' gestural encoding of motion events has mainly focused on the semantic content of gestures and neglected how gesture functions with regard to speech (e.g. Kita & Özyürek, 2003; Kita et al., 2007). In contrast, studies on children's gesture use have predominantly examined the relationship between speech and gesture while overlooking how semantic information is encoded in speech (e.g. Iverson & Goldin-Meadow, 2005; Iverson, Capirci, Volterra & Goldin-Meadow, 2008; Özçalışkan & Goldin-Meadow, 2005; 2009). This dissertation aimed to investigate these factors together across development and also to reveal how the encoding of semantic elements and the relationship between speech and gesture changes from the age of 1 to adulthood in a language where argument omission is common. The findings from Chapter 4 highlight the importance of examining how adults' gestures function with regard to speech, as they are the first ones to date showing that adults speakers frequently and systematically use gestures to encode semantic information they have omitted in their speech. Moreover, the results of Chapters 4 and 5 suggest that although gestural supplementation may initially be used as a strategy for children to "make up" for their inadequacy in producing utterances with fleshed-out argument structure, it changes function with development and acquires discourse-related functions.

In addition to argument omission, another language-specific factor, the fact that children use verbs when they start to talk about caused motion, also influences their gestures. The findings from Chapter 5 have shown that Turkish-speaking children use iconic gestures, which have been found to appear late in development (e.g. Özçalışkan & Goldin-Meadow,

2011), quite earlier than their peers speaking other languages. Although the gesture development literature has generally claimed that the late development of iconics is caused by the symbolic and hard-to-map nature of these gestures (cf. the discussion in Chapter 5), the results here show this not to be the case. Essentially, they suggest that the previous findings in the literature may be confined to the languages the children were in the process of learning. That is, a focus on the gesture development of English-speaking children may have biased the literature into proposing that the late use of iconic gestures is a general phenomenon in language development.

Taken together, these results shed light on the interaction between language-specific properties such as argument omission or starting to talk about events using only verbs and the gestural encoding of events. They highlight the importance of conducting research on speakers of languages that have different properties and show that these language-specific properties influence the role that gestures play in event encoding right from early on in childhood to adulthood.

6.4 Conclusions

The main research question this dissertation has addressed is the development in caused motion event encoding in Turkish. Although the development of the encoding of spontaneous motion events in Turkish has been previously studied, the current work is the first in-depth exploration of caused motion events. Given that these event types are quite similar in nature, one could have expected the encoding of caused motion events to be similar to that of spontaneous motion events. The current dissertation, however, shows that both the adult encoding of caused motion and the development of this encoding are very different from patterns previously described for spontaneous motion events in Turkish.

Apart from contributing to the literature on the development of Turkish, this dissertation furthers our understanding of the interaction between language-specificity and the expression of semantic information

in event descriptions. In particular, it tracks how the core semantic elements of an event are represented in speech and gesture across children of different ages and adults. The results show that both expression of semantic elements and their distribution across different channels is highly specific from the start, yet still needs tuning into adult patterns even after age 5.

The dissertation also provides insights into our understanding of how language-specificity influences the acquisition of verbs and constructions. Specifically, it zooms in on two verb types encoding different semantic elements as well as two constructions of differing syntactic complexity. The findings support and extend recent research showing that children start off with the lexical items specific to their languages. They also show that 3- to 5-year-olds are language-specific in their semantics-syntax pairings. However, the complete attainment of adult patterns has yet to develop. Faced with multiple patterns to acquire when encoding an event, children prefer to use the syntactically simpler one. Productivity in the use of more complex constructions appears to develop gradually, that is, after the age of 5.

Further research on Turkish and other languages as well as crosslinguistic comparisons will help further our understanding of how language-specific factors manifest themselves in the development of event encoding in speech and gesture.

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SAMENVATTING

Dit proefschrift onderzoekt de uitdrukking van gebeurtenissen met een beweging die door anderen wordt veroorzaakt ("caused motion") in het Turks, en de ontwikkeling hiervan in spraak en gesticulatie. Specifiek wordt de uitdrukking van caused motion door volwassen sprekers bestudeerd met behulp van grammaticaliteitsoordelen en uitgelokte verhalen. Daarna wordt toegespitst op de manier waarop kinderen tussen één en vijf jaar caused motion uitdrukken in spontane spraak en uitgelokte verhalen, en worden deze uitdrukkingen van kinderen vergeleken met die van volwassen.

De ontwikkeling van het uitdrukken van caused motion in het Turks is om twee redenen van belang voor een brede studie van taalverwerving. Ten eerste passen de volwassen patronen van lexicalisatie van caused motion in het Turks niet precies in de typologie zoals beschreven door Talmy (1985), omdat deze zowel eigenschappen van werkwoordsenkadering als niet-werkwoordsenkadering vertonen. Het is nog niet breed onderzocht hoe kinderen zulke duale patronen verwerven, omdat het onderzoek zich tot nu toe heeft geconcentreerd op de ontwikkeling van talen die hetzij een satelietenkadering, hetzij een werkwoordenkadering hebben. Ten tweede representeert het duale patroon in het uitdrukken van caused motion in het Turks een oplossing voor een probleem dat alle talen delen, namelijk hoe informatie in de communicatie over alledaagse gebeurtenissen geselecteerd, gecategoriseerd en gecombineerd wordt. We kunnen vaststellen wanneer en in hoeverre leerders gevoelig zijn voor taalspecifieke categorieën en patronen door op dit domein te focussen en de resultaten te vergelijken met wat al bekend is over de ontwikkeling in andere talen. Ten derde kunnen we beter begrijpen hoe semantische informatie multimodaal

wordt uitgedrukt tijdens de ontwikkeling door zowel spraak als gesticulatie in de representatie van gebeurtenissen in beschouwing te nemen.

Om deze zaken te onderzoeken wordt caused motion in het Turks in Hoofdstuk 2 bestudeerd door het combineren van taaltypologische analyses met een meer toegespitste analyse van werkwoordssemantiek. Hoofdstuk 3 rapporteert over een studie naar grammaticaliteitsoordelen van volwassen sprekers van het Turks om de relevante uitdrukkingspatronen vast te stellen. Samen vormen Hoofdstuk 2 en 3 de fundamenten van de patronen voor het uitdrukken van caused motion door volwassen sprekers van het Turks. De resultaten laten zien dat niet zozeer typologische tendensen maar eerder de semantische eigenschappen van de werkwoorden de syntactische constructies waarin werkwoorden kunnen voorkomen bepalen in Turkssprekende volwassenen.

Hoofdstuk 4 is gericht op productiepatronen en onderzoekt hoe volwassen sprekers van het Turks en Turkse kinderen tussen de drie en vijf jaar caused motion in spraak en gesticulatie uitdrukken. De resultaten tonen dat, hoewel taalspecificiteit al evident is in de spraak en gesticulaties van de kinderen, de ontwikkeling van deze taalspecificiteit tot volwassen patronen tijd nodig heeft, welke patronen pas voorkomen na de leeftijd van vijf jaar.

Ten slotte wordt in Hoofdstuk 5 verslag gedaan van studie van een videocorpus met longitudinale data van de spontane spraak van Turkssprekende kinderen tussen één en drie jaar oud, waarin wordt onderzocht hoe caused motion in vroege spraak en gesticulatie wordt uitgedrukt. Taalspecificiteit in de spraak blijkt al vanaf het begin aanwezig. Turkse kinderen beginnen met spreken over caused motion met gebruikmaking van alleen werkwoorden. Het vroege gebruik van werkwoorden wordt geassocieerd met vroege productie van iconische gesticulaties die Acties weergeven (vanaf 15 maanden), die ook andere semantische elementen incorporeren die de gesproken uitdrukking versterken of er extra informatie aan toevoegen. De bevindingen in deze studie wijzen erop dat de gesticulaties in de eerste drie levensjaren

worden beïnvloed door de specifieke eigenschappen van de taal die de kinderen verwerven.

Naast het leveren van een bijdrage aan de literatuur over de ontwikkeling van het Turks draagt dit proefschrift bij aan een beter begrip van de interactie tussen taalspecificiteit en de uitdrukking van semantische informatie in beschrijvingen van gebeurtenissen. Het laat in het bijzonder zien hoe de kernsemantische elementen van een gebeurtenis in spraak en gesticulatie worden weergegeven bij kinderen van verschillende leeftijden en bij volwassenen. De resultaten tonen aan dat zowel de representatie van semantische elementen als hun spreiding over verschillende uitdrukkingskanalen al vanaf het begin zeer specifiek is, hoewel nog tot na de leeftijd van vijf jaar toegewerkt wordt naar volwassen patronen.

CURRICULUM VITAE

Reyhan Furman was born in Izmir, Turkey, on 30 January 1975. She double majored in Psychology, and Guidance and Psychological Counselling at Boğaziçi University in Istanbul. She also obtained her MA in Psychology from the same university, and started to do a PhD in Linguistics. She then transferred her studies to Radboud University Nijmegen and continued her PhD as a "buitenpromovendus" at the Center for Language Studies. After being awarded a Huygens Scholarship, she moved to Nijmegen and pursued her research within the Center for Language Studies group at the Max Planck Institute for Psycholinguistics. Currently, she is a postdoctoral researcher at Radboud University Nijmegen and Max Planck Institute for Psycholinguistics in the European Research Council Starting Grant funded project "Language in our hands: The role of modality in shaping development of spatial language in deaf and hearing children" awarded to Prof. Aslı Özyürek.

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Furman, R., Küntay, A., Özyürek, A. (submitted). Early language-specificity of children's event encoding in speech and gesture: Evidence from caused motion in Turkish.

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