HOW TURKISH-SPEAKING CHILDREN TACKLE NEGATION

WHEN IT COMBINES WITH MODALITY AND (NON)FACTIVITY

IN COMPLEX SENTENCES

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DECLARATION OF ORIGINALITY

I, Melike Hendek, certify that

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ABSTRACT

How Turkish-Speaking Children Tackle Negation When It Combines With Modality
and (Non)Factivity in Complex Sentences

This thesis explores how Turkish-speaking children interpret negation when it combines with other logical operators, such as (non)factive verbs and epistemic modals. Experiment 1, testing 60 Preschool (mean age: 5) and 30 Elementary School (mean age: 8) Turkish-speaking children investigate how children handle negation when it interacts with the cognitive factive verbs, *bil-* 'know', *anla-* 'realize'; emotive factives *üzül-* 'be sad' and *sevin-* 'be happy' and the non-factive verbs *düşün-* 'think' and *san-* 'suppose/ believe' in complex sentences. The results indicate that while Elementary school Turkish-speaking children show a ceiling level accuracy in the interpretation of both factive and nonfactive verbs under the scope of negation, Preschool children experience problems, such as overfactivization of non-factive verbs, not being able to attribute false-belief to the attitude holders in the presence non-factive verbs, over-affirmation of negative sentences and paying attention to the truth value of the complement clauses only, in handling negation especially when it combines with non-factive verbs. Experiment 2 explores another logical operator 'modality' and how it is interpreted when it interacts with negation. Testing 18 children it shows how challenging the acquisition and comprehension of this interaction is. In particular, the results of Experiment 2 show that Turkish-speaking children tend to favor negative strong epistemic reading over negative weak epistemic reading, hence tend to extend the strong reading to weak epistemic modals.

ÖZET

Türkçe Konuşan Çocukların Olgusal-Olgudışı Eylemler ile Bilgisel Kiplik Eylemleriyle Aynı Cümle İçinde Etkileşim Halindeyken Olumsuzluğu Kavrayışı

Bu tez, Türkçe konuşan çocukların olgusal ve olgudışı eylemler ve bilgisel kiplik eylemleri ile olumsuzluk arasındaki ilişkiyi nasıl yorumladıklarını araştırmaktadır. 60 okul öncesi (ortalama yaş: 5) ve 30 ilkokul çağındaki çocuğun (ortalama yaş: 8) test edildiği Deney 1, çocukların bilişsel olgusal eylemler *bil-* ve *anla-*, duygusal olgusal eylemler *üzül-* ve *sevin-* ile olgudışı eylemler *san-* ve *düşün-* ile aynı tümce içinde etkileşim halindeyken olumsuzluğu nasıl yorumladıklarını göstermeyi hedeflemektedir. Sonuçlar, 8 yaşındaki çocukların olumsuzluk kapsamı altında, hem olgusal hem de olgudışı eylemleri son derece başarılı bir şekilde yorumladıklarını, ancak okul öncesi çocukların, olumsuzluğu, özellikle olgudışı eylemlerle etkileşim halindeyken, yorumlamakta bazı zorluklar (olgudışı eylemleri olgusal eylemlermiş gibi yorumlama, olgudışı eylemlerin öznelerine yanlış inanç atayamama, olumsuz tümceleri olumlu tümcelermiş gibi yorumlama ve yalnızca tümceciğin doğruluk değerine odaklanma gibi) yaşadıklarını göstermiştir. Deney 2 ise çocukların olumsuzluğu, bilgisel kiplik eylemleriyle aynı cümle içinde etkileşim halindeyken nasıl yorumladığını araştırmaktadır. Okul öncesi yaştaki 18 çocuğun test edildiği Deney 2, bu etkileşimin ediniminin ve doğru bir şekilde yorumlanmasının çocuklar açısından ne kadar zor olduğunu göstermektedir. Sonuçlar, Türkçe konuşan çocukların güçlü-olumsuz bilgisel kiplik yapılarını, zayıf-olumsuz bilgisel kiplik yapılarına göre daha çok tercih ettiklerine ve güçlü yapılardaki kapsam ilişkilerini zayıf yapılara da genellediklerine işaret etmektedir.

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TABLE OF CONTENTS

LIST OF FIGURES

ABBREVIATIONS

3SG	third person singular
ACC	accusative
AOR	aorist
GEN	genitive
LOC	locative
NEG	negation
NOM	nominative
POSS	possessive
PROG	progressive
SES	socioeconomic situation
SSP	semantic subset principle

CHAPTER 1

INTRODUCTION

1.1 Aim

Negation has been a crucial topic of interest not only in linguistics, but in various

other fields, such as psychology and philosophy due to the fact that negation itself is

a multi-layered concept pertaining to a number of different concepts, such as

cognition, perception, attitude, emotions, volition and communication (Saury, 2008).

In the absence of negation, the power of reasoning would be reduced as negation is a

fundamental component of deductive reasoning or our perception would be

impoverished, for negation is crucially important especially in perceiving the

input/reality that conflicts with the expectations, i.e., when what we see is not what

we expect. With negation, it is possible to assess an attitude or a result as 'negative'

and to experience negative emotions towards it. Being an essential part of such

crucially important concepts in human life, without the expressions of negation in

language, it would be impossible to communicate properly or express ourselves

consistently.

The multi-layered nature of negation not only makes it the core of a number

of concepts, but also leads to a plenty of uses in language. Depending on the concept

and the context, different uses of negation, such as double negation, sentential

negation or implicitly negative verbs or adjectives, i.e., *forget* and *ugly*, could be

observed. Besides, there are also cases where negation interferes with the scope of

other operators, such as quantifiers, (non)factive verbs and modal verbs, resulting in

changes in information strength of the verb or truth value of the complements of the

sentences. As digging up the complex and interrelating structure of negation, an

important question is posed: How do we acquire and interpret such an important concept?

Acquisition of negation has been investigated in various languages, such as English, German, Dutch, French, Finnish, Cantonese and Italian, among others, to explore mostly the contexts that give rise to children's use of negative constructions. Acquisition of negation in Turkish has also been studied through this lens where Aksu Koç and Slobin (1985) and Kavak (2018) conducting longitudinal studies, explored children's production of negation in natural settings. The conclusions drawn in these studies have been based on data coming only from several children, whose language production with respect to negation has been investigated for a brief period of time. Most cross-linguistic work on the acquisition of negation has focused on the semantic features of negation (such as refusal, nonexistence, prohibition etc.), the order of acquisition of the semantic features of negation (i.e., non-existence firstly acquired and followed by prohibition, rejection and failure), the forms of negation (sentential vs. phrasal negation) and the order of acquisition of these forms (i.e., sentential first, then phrasal) by examining longitudinal data (Klima and Bellugi, 1966; Wode, 1977; Pea, 1980; Lee et al., 1981; Choi, 1988; Tam, C. W. et al., 2001; Cameron- Faulkner, 2007). The findings obtained in previous work has so far described the acquisition trajectory and the developmental path that children follow in grasping concepts that pertain to negation. They do not, however, provide deeper insights about the inner mechanisms behind the processing of negation which can in fact be viewed as a multi-way intersection as negation bears on other logical operators, such as factivity or modality,[1] in terms of scope or truth value, leading to differences in meaning.

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[1] Factivity and modality is used in linguistics means in this study and constitutes to (non)factive verb and modal verbs.

However, recent years have witnessed a radical change in the study of negation and acquisition studies. Researchers have started to focus on other aspects of negation in order to explore what a child understands from a negated utterance and how s/he formulates the scope and structure of negation. In order to obtain insights about the inner mechanisms that may be in operation in the interpretation of negation and whether it is the knowledge of syntax semantics, or pragmatics that gets negation off the ground, recent studies have departed from employing the classical longitudinal data, but have implemented experimental setups to test children's acquisition of this complex component of language. In other words, this new line of research has given rise to the reformulation of the earlier questions posed in the literature and introduced a way of exploring the issue by primarily focusing on how the complexities of the interpretation of negation can be tackled by tapping on children's developing competence in semantics and pragmatics. Studies carried out so far on the acquisition of negation with an attempt to uncover the role of semantics and pragmatics are only a handful, and they are limited to a few languages, mostly English for (non)factivity and English and Italian for modality. The present thesis attempts to explore the comprehension, hence the acquisition of negation in Turkish, by primarily focusing on how negation interacts with modality, in particular epistemic modality, and (non)factivity in complex sentences, and intends to contribute to the literature with findings from a head-final language. Thus the thesis is primarily interested in exploring how Turkish-speaking children interpret a factive verb such as *bil-* 'know', *anla-* 'realize/understand' as opposed to a non-factive verb such as *düşün-* 'think' and *san-* 'believe/suppose' in affirmative and negated matrix sentences and investigating whether there are any differences in children's interpretations of factive vs. non-factive verbs in affirmative vs. negative sentences.

Furthermore, it looks into how in child Turkish modality, in particular, the so-called weak negative V-MA-yAbIl-Ir 'may not V' and the strong negative, V-A-mAz 'cannot V', are interpreted, in an attempt to uncover whether there are any cross-linguistic similarities between children's interpretations of weak vs. strong negatives.

In this section, factivity and modality as they pertain to the questions that the present thesis explores will be discussed briefly. In Chapter 2, I will provide an overview of the previous studies on the acquisition of negation, mainly focusing on the comprehension and interpretation of negation when it combines with modality and factivity. The investigation of Turkish-speaking children's understanding of negation and (non)factive verbs in complex sentences, and Experiment 1 conducted to test this interaction will be presented in Chapter 3. Chapter 4 presents Experiment 2 and turns to an investigation of the complex relationship between negation and modal verbs by testing Turkish-speaking children's interpretation of sentences that contain epistemic modals. Chapter 5 summarizes the results of the study and explores avenues for future research.

1.2 Factive verbs vs. non-factive verbs

Factivity can be roughly described as a feature that is attributed to specific verbs, enabling them to presuppose, entail and preserve the truth of their complements (Karttunen, 1971; Kiparsky & Kiparsky, 1971; Hopmann & Maratsos, 1978; Schulz, 2003). Non-factivity, on the other hand, is a feature assigned to a particular group of verbs that neither presuppose nor entail the truth of their complement clauses. Rather, non-factive verbs denote the beliefs or thoughts of the users of these verbs with respect to the possible occurrences of the events at issue (Kiparsky & Kiparsky, 1971; Hopmann & Maratsos, 1978; Schulz, 2003; Nagel, 2017). In general, factive

verbs are divided into two categories, simple or cognitive factives and emotionally

evaluative or emotive factives. Some examples for cognitive factives in English are

know, understand, regret, discover, forget, realize, be aware and *remember and*

emotive factives are be happy, be sorry that, be proud, be indifferent, be glad and *be*

sad. Some of the non-factive verbs, on the other hand, are *think, believe, suppose,*

assume and *feel*.[2]

      Negation has served as a classic test to differentiate between factive and non-

factives verbs. The complement clause of a factive predicate is true regardless of

whether the predicate is negated or not, as factive predicates always assume the truth

of their complement clauses. Non-factive predicates, however, do not presuppose

their complement clauses to be true, rather denote the possibility of what the

complement clause conveys, but when they are negated, the likelihood of the

complement changes (Hopmann & Maratsos, 1977). In (1a) for example, with the

factive verb *forget* the presupposition that 'Mary will come' is preserved under

negation (1b), hence the truth value of the complement clause does not change. In

sentences with nonfactive verbs, such as *think* in (2), however, when the main

predicate is negated, the truth value of the complement clause changes. In (2a), there

is the likelihood of Mary's coming, but in (2b) the likelihood diminishes when the

predicate is negated.

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[2] According to Kiparsky (1968), there is also an intermediate category standing between factives and non-factives, that is, semi-factives. What differentiates semi-factives from factives is that semi-factive vebrs behave differently in questions and conditionals, i.e., they seem to lose their factivity, which is the reason why these verbs are called as semi-factives. For example, in a sentence like "Did you discover that you had not told what you really feel?", the verb *discover* loses its factivtiy in question sentences and is more likely to be interpreted as a request for information, rather than asking the addressee's reply to accept what the complement says as a fact, while the factive verb *regret* presupposes the truth of its complement even in a question such as "Did you regret that you had not told what you really feel?" The factive verb *discover* appears to lose its factivity in conditionals, as well. In a sentence like, "If I discover later that I have not told what I really feel, I will be very sad", the subject seems to admit that there is a possibility he or she doesn't tell the truth; whilst the factive verb *regret* presupposes the truth of its complement in a sentence like, "If I regret later that I have not told what I really feel, I will be very sad" (Karttunen, 1971).

(1) a. John forgets that Mary will come

Presupposition: Mary will come.

b. John doesn't forget that Mary will come.

Presupposition: Mary will come.

(2) a. John thinks that Mary will come.

Presupposition: It is possible for Mary to come (according to John).

b. John doesn't think that Mary will come.

Presupposition: It is not that possible for Mary to come (according to John).

Moreover, a factive verb can take both declarative and interrogative complements, while a nonfactive verb can only take declarative complements as in (3) and (4) (Ginzburg, 1995; Dudley et al., 2017).

(3) John knows/thinks that Mary is home.

(4) John knows/*thinks where Mary is.

Furthermore, complement type could also affect the factivity of a verb (Karttunen, 1971). In the indicative mood, there is no difference between *that* complements and poss-ing complements. Both (5a) and (5b) presuppose that Mary's boyfriend lied to her.

(5) a. That her boyfriend lied to her bothers Mary.

b. Her boyfriend's lying to her bothers Mary.

But in the subjunctive mood these two types of complements differ. *That* complements denote the truth in the actual world, but *poss-ing* complements could be used as fictitious. (6a) presupposes that Mary's boyfriend did not lie to her in fact, whereas (6b) does not have any such presupposition. In these examples, *bother* stands as a factive verb in (6a), but non-factive in (6b) due to the fact that the type of the complement affects the factivity of the verb (Karttunen, 1971).

(6) a. That her boyfriend lied to her would bother Mary if she knew about it.

(*Luckily he didn't lie to her)

b. Her boyfriend's lying to her would bother Mary, if she knew about it.

(Luckily he didn't lie to her)

Even though the differences between factive and non-factive verbs are obvious, and are supported by a number of tests, some recent corpus studies have also revealed that the distinction between factives and non-factives is very likely to be vague at times, providing evidence for overlapping usages of factive *know* and non-factive *think*. In the corpus study conducted by Dudley et al. (2010), it has been found that there is plenty of assertive uses of *think*, which is peculiar to factive verbs in fact. It has been also found that the frequency of utterances in the format of *x thinks p* are higher than the ones in *x knows* where *p* format. Furthermore, the study has provided evidence that the English-speaking children are exposed to negation with *think,* i.e., sentences like "I do not think" more than with know, i.e., sentences such as "I do not know".

Bearing in mind the characteristics and the overlapping uses of factives and non-factives, the most important questions to be posed appear to be as follows: How do children comprehend differences between factivity and nonfactivity? How and when do children have an adult like comprehension of (non)factivity, especially in negated complex sentences? Chapter 3 will attempt to provide answers to these questions by providing evidence from Turkish.

1.3 Modal verbs

Modality, another logical operator that is to be investigated in this thesis with respect to its relation to negation, is one of the crucial features of language, enabling us to make inferences about the possibilities or necessities of the events. Modals are generally used to express what we believe or see as possible or necessary (Moscati and Crain, 2014). Although there is a number of expressions that have modal meanings, such as modal auxiliaries (must, should, might etc.), semi-modal verbs (has to, ought to etc.), adverbs (perhaps, probably, etc.), nouns (possibility, probability, etc.), adjectives (necessary, possible etc.) and conditionals, modal verbs are divided into at least six groups[3] in accordance to the modal meaning they have, but this study investigates whether and how Turkish-speaking children interpret negation when it combines with epistemic modals; therefore, only epistemic modals will be touched upon in this section. To put it succinctly, epistemic modality denotes possibility, i.e., the view or beliefs of speakers about situations as in (7).

(7) Mary might be guilty.

(Based on the speaker's point of view or belief)

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[3] Modals are divided into at least six groups according to modal meanings they denote. These are (i) alethic modality, (ii) epistemic modality, (iii) deontic modality, (iv) bouletic modality, (v) circumstantial modality, and (vi) teleological modality (von Fintel, 1994; Palmer, 2001).

Moreover, epistemic modality is divided into two categories, namely strong modality

and weak modality (de Haan, 1997). For example, *may* and *can* are considered as

weak as in (8), while must is seen as an example of strong modality in (9).

(8) Mary may be guilty. (Situation: It is possible for Mary to be guilty.)

(9) Mary must be guilty. (Situation: There is strong evidence indicating

that Mary is guilty.)

Yet when epistemic modality combines with negation, the strength of the

modals changes. For example, (10) is stronger than (11) even though the former

includes the weaker modal *may* due to the fact that when negation is in relation with

the modal *may* as in (11), the statement turns out to mean that even the possibility of

Mary's being guilty is not possible, which makes (10) stronger than (11). Therefore,

it can be concluded that the strength can change when modality is under the effect of

negation.

(10) It is not the case that Mary may be guilty.

(11) It is not the case that Mary must be guilty

Negation could also affect the scale of strength between two weak modals,

such as *may* and *can*. In affirmative sentences, both *may* and *can* denote weak

meanings. For instance, both (12) and (13) are the same in terms of information

strength.

(12) Mary may be guilty.

(13) Mary can be guilty.

But when they are negated, *can* turns out to be stronger than *may* as in (14) and (15).

(14) Mary may not be guilty.

   Situation: It is still possible for Mary to be guilty.

(15) Mary cannot be guilty.

   Situation: It is impossible for Mary to be guilty.

As laid out above, negation has an important effect on the strength of modality. How a Turkish child judges and interprets the strength of modality when it combines with negation and when is it that s/he becomes aware of information strength provided by the modals is what the present thesis investigates in Chapter 4.

To summarize, in this introductory chapter, I have provided a brief overview of the notion of factivity touching upon the differences between factive verbs and nonfactive verbs and how they behave under negation in order to lay the ground for what I will investigate in Experiment 1. I have also provided a brief overview of modality and how it behaves under negation. Chapter 2 discusses previous studies as they pertain to the questions the current thesis attempts to answer. Chapter 3 will focus on Turkish-speaking children's comprehension of (non)factivity and negation through presenting Experiment 1, while Chapter 4 will discuss how Turkish-speaking children interpret epistemic modality, in particular, when it is in relation with negation hence it will present Experiment 2 and will show that Turkish speaking children behave very much like their English and Italian-speaking age-

mates in the interpretation of modality and negation and interpret the weak modals errorfully as strong for extensive periods of time. Finally, Chapter 5 will present the results of the two studies conducted and put forward suggestions for future research.

CHAPTER 2

PREVIOUS RESEARCH ON THE ACQUISITION OF NEGATION

IN COMPLEX SENTENCES

WHEN IT COMBINES WITH (NON)FACTIVITY AND MODALITY

2.1 Overview

This chapter will provide a background on the acquisition of negation, in particular on how children comprehend negation when it interacts with i. (non)factive verbs and ii. modal verbs.

Acquisition of negation has been investigated in various languages as can be seen in Table 1 by focusing on either the syntactic, the semantic or the pragmatic characteristics of the concept. Recent acquisition studies, however, mostly focus on how semantics and pragmatics interact in the interpretation of negation. To make headway into the discussion, it what follows, I will briefly review earlier studies on the acquisition of negation, then will turn to a discussion of the recent literature on semantics- pragmatics interface in the unfolding of negation when it combines with verb (non)factivity and modality.

2.2 Acquisition of negation: syntactic accounts

Syntactic accounts on the acquisition of negation investigates how children acquire syntactic properties of negation. This account mainly focuses on the syntactic position the children place negation during acquisition. A pioneering work on the issue is Bellugi (1967) where she has claimed that there are three stages in the acquisition of sentential negation. In Stage I, the so-called "primitive stage", children appear to add the negative operators 'no' or 'not' to an NP or a VP (e.g. *'No the sun*

shining' and *'Not a teddy bear'*). This stage is also referred to as external negation.

In Stage II, children are reported to assign the negation markers to sentence-internal

positions, where they combine *no* and *not* with the predicate (e.g. 'He no bite you'),

and they start to use negative auxiliary verbs.[4] In Stage 3, children start to acquire the

other members of the auxiliary system and they use both positive and negative forms

of auxiliaries confidently.[5]

Table 1. Studies on the Acquisition of Negation in Various Languages (Dimroth, 2010).

Target Language	Source
Cantonese	Tam and Stokes (2001)
Dutch	Jordens (1987), van der Wal (1996)
English	Klima and Bellugi (1966), Pea 1980, Choi (1988), Bloom (1991)
Finnish	Bowerman (1973)
French	Choi (1988), Clark (1985), Weissenborn et al. 1989, Meisel 1997,
German	Verrips & Weissenborn 1992, Clahsen 1988, Drenhaus 2002
Hungarian	Barbarczy 2006
Italian	Volterra and Antinucci 1979
Japanese	Clan Clancy 1985, Ito 1981, Sano 1998, Wakabayashi 1983
Korean	Choi 1988, Hahn 1981
Mandarin	Lee 1982
Polish	Smoczyńska 1885
Russian	Snyder and Bar-Shalom 1998
Swedish	Lange and Larsson (1973)
Turkish	Aksu-Koç and Slobin (1985)

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[4] *Don't* and *can't* are the most common negative auxiliary verbs uttered at the second stage. According to Bellugi (1967), the rest of the auxiliary system is absent at this stage.

[5] In one of the most extensive cross-linguistic studies on the acquisition of negation, Wode (1976) investigates German, Russian, Swedish, Dutch, Finnish, Egyptian Arabic, Japanese and Polish and proposes that acquisition of negation can be viewed as taking place in four stages. In Stage I, children start with *no* or its counterparts in the languages examined. In Stage II, *two- or more-word negation stage*, children use the negation marker in either an anaphoric or a non-anaphoric way. In the former, external negative element is added to the sentence, usually in the initial position. But the negative relationship doesn't hold between negator and the rest of the sentence. In the latter, on the other hand, external negative element is added to the sentence, usually in the initial position. But in such types of negative utterances, the negative relationship holds between the negator and the rest of the sentence. In Stage III--intra-sentential negation stage, children are accustomed to the use of negation by adults. For instance, German speaking children depart from *nein* to *nicht*, while English speaking children switch from *no* to *not* or *n't*. In Stage IV, children finally learn the correct position of negation marker.

Later studies on the syntactic account of negation mostly revolve around how the absence of tense and agreement or an underdeveloped tense/agreement system in child language hinders the proper use of negation. According to these studies, when children are in the so-called optional infinitive stage of grammatical development (Harris & Wexler, 1996; Guasti & Rizzi, 2002; Schütze, 1996), they omit the tense and agreement markers and that gives rise to children's non-adult like usages of negative utterances, such as *It not fit in here*. According to this account, since children lack tense and agreement markers, they utter sentences like *It don't fit in here* instead of *It doesn't fit in here.*[6]

2.3 Acquisition of negation: semantic accounts

Semantics accounts on the acquisition of negation attempt to unpack how children understand various meanings conveyed through negation. Choi (1988), for example, defines nine contexts for the uses of negation in early acquisition, namely non-existence, rejection, prohibition, failure, denial, inability, epistemic negation, inferential negation and normative negation,[7] and suggests that these categories appear to be acquired in three phases. In Phase 1, children's use of negation appears

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[6] Thornton and Tesan (2012), on the other hand, argue for Bellugi's assumption and claim that children aren't really aware that *n't* is a separate negative marker, so they just assume *don't* as a standalone negative marker, just like *not.*

[7] The non-existence category emerges when the child's expectation of the presence of an entity at a particular place is not met, hence the child simply expresses the absence or disappearance of the category by using words such as *gone* or *none*. In the rejection category, when the interactant does something that the child does not want, the child rejects it usually by gestures or using *no*. Prohibition category shows up, when the child does something wrong and he/she is warned by the parents. The child learns the concept of prohibition and when s/he does something wrong and after that s/he warns himself/herself or others by using such phrases like *No touch*. Negated presupposition for these three categories is limited to immediate events that occur here and now. In failure category, the child expresses the non-occurrence of an expected event which occurs here and now by using phrases like *'Not work'*. In denial category, the child negates the presupposition that is uttered by the interactant (e.g. *'No, that's a pony'*). To express physical inability or lack of knowledge which prevent the child to do something, children use negation, as well. When children do not have the information requested, they use epistemic negation, while normative negation category conveys a discrepancy between the actual state of affairs and the child's expectation (e.g. [Experimenter puts a horse on a boat. The child taking the horse down] *'Him can't go on a boat'*). Finally, inferential negation category expresses the child's inference about the listener.

to be restricted with the concepts of non-existence, prohibition, rejection and failure. In Phase 2, new functions, namely denial, inability and epistemic negation, are acquired. In Phase 3, the concepts of normative negation and inferential negation are grasped, hence acquired.[8]

Studies on the acquisition of semantics of negation have revealed that children learn meanings of negation "from outer to inner" (Pea, 1980). That is children start to use negation first for concrete things and then for more abstract things. For example, children appear to acquire disappearance, prohibition and rejection initially because they denote more concrete incidents. Truth-functional meanings, on the other hand, are related to pragmatics and they appear to be acquired much later.

2.4 Acquisition of negation: pragmatic accounts

More recent studies on the acquisition of negation have focused on the pragmatic aspects of the acquisition and comprehension of negation (Donaldson, 1974; De Villiers & Flusber, 1975, Pea, 1980; Nordmeyer & Frank, 2014, Dudley et al., 2010).

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[8] Bloom (1970) examines data coming from three English-speaking children and points out that in the acquisition of the semantics of negation children follows an order where nonexistence is acquired first which is then followed by rejection and denial. Similar to Bloom, McNeill and McNeill (1968) examine the data from Japanese-speaking children and conclude that Japanese children's semantic development in negation proceeded in the order of nonexistence, non-entailing denial, rejection and entailing denial. According to Pea, first meanings of negation that are used by the children in the study, are rejection and self-prohibition (Pea, 1980). Then it is followed by disappearance and truth-functional negation of false statements about the world. The reason why rejection is acquired first could be related to the word learning patterns of infants. Since negation is neither a noun nor a verb, rather it is a concept, concreteness play an important role. Rejection, the first meaning of negation acquired by children, is more concrete than other meanings of negation and doesn't need highly abstract cognitive abilities. The child usually rejects an activity or an object, both of which are visible and concrete. Moreover, infants' usage of gestures for meaning of negation could also indicate that some meanings of negation are more concrete (Pea, 1980). For example, rejection is displayed both with speech and gesture, while disappearance and truth-functional meanings of negation (both of which require abstract cognitive abilities) are not displayed with gestures. Since gesture is concrete and rejection can be displayed with gestures, it could be said that children initially acquire rejection (Pea, 1980). Self-prohibition is also one of the first meanings of negation learned by children (Pea, 1980). It means that when a child approaches to an object that is previously forbidden to touch, he or she expresses negation. Since the child frequently hears negation in parental prohibition, it is reasonable to say that the child learns the most frequent meaning at first (Pea, 1980).

According to these studies, an informative, pragmatically appropriate context is crucial for a proper evaluation of how children comprehend a negated utterance. Therefore caution should be exercised in evaluating the results of experiments which do not use a pragmatically enriched set up.

Overall, these studies have uncovered that both children and adults experience difficulties in judging the truth value of the true negative sentences, while it is much easier with the false negative sentences (Donaldson, 1974; De Villiers & Flusber, 1975 and Pea, 1980). According to Pea, this is related to the social aspects of negation because some kind of theory of mind is necessary to process negation. In other words, knowing the belief system and presuppositions of others might have a role in interpreting negative utterances. Thus it is important to examine acquisition of negation especially from an interface of a semantic and a pragmatic perspective.[9]

2.5 Acquisition of negation: semantics and pragmatics interface accounts

Recent studies on the acquisition of negation examine children's production and comprehension of negation when it combines with other operators, such as modality, quantifiers, presupposition triggers in terms of factive verbs, as the combination of negation with another operator might give more cues about the acquisition and the comprehension of negation. These studies have been grouped under the category of semantics and pragmatics interface on the acquisition of negation because they attempt to explain what children understand from negation is restricted with pragmatics. One can understand the reason why a child rejects a correct negative

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[9] In a famous study carried out by Wason (1965), for example, Wason attempts to uncover why true negative sentences are hard to process by children. In his experiment, he shows eight circles to children. 7 of these circles are white and only one is black. The children are then tested with sentences like A: *'Circle 7 is not white'* and B: *'Circle 6 is not black'*. It has been observed that children processed A sentences more successfully than B sentences. This reveals that children are aware of the manner in which we categorize things because in daily life it is more plausible to exclude the exceptional one rather than to exclude the item that is similar to the items in a given setup.

sentence not just by looking at the semantics of negation, but by investigating the effects of pragmatics that forces the child to deny the sentence. Studies under the category of semantics and pragmatics interface mostly focus on the following topics: (i) The combination of negation and quantifiers/scalar implicature (Hurewitz et al., 2000; Musolino & Lidz, 2003; Musolino & Gualmini, 2004; Papafragou & Musolino, 2003; Smits et al., 2007). (ii) The combination of negation and (non)factive verbs (Hopmann & Maratsos, 1978; Lyon & Flavell, 1994; Johnson & Maratsos, 1976; Dudley, Orita, Hacquard & Lidz, 2010; Hacquard, 2014; Léger, 2008; Oiry & Hartman, 2015) (iii) The combination of negation and modal verbs (Gualmini & Moscati, 2008; Moscati, 2008; Moscati & Crain, 2014; Noveck et al., 1996; Noveck, 2001). This thesis will focus on (ii) and (iii) and will discuss how 5-year-old Turkish speaking children interpret negation when it combines with modality and with (non)factive verbs in complex sentences. In what follows, a brief overview of previous studies on these topics will be presented in order to shed light on the issue.[10]

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[10] The reason why I have considered this study as an example of semantics-pragmatics interface on the acquisition and comprehension of negation is that the experiments I have conducted with Turkish-speaking children have revealed that children's low rate of correct answers for specific structures is not because of solely syntactic, semantic or pragmatic shortcomings, rather may stem from a combination of semantic and pragmatic issues. As we will see in Chapter 3 and Chapter 4, the correct response rate for specific structures (factive verbs in Experiment 1 in Chapter 3 and negative-strong structures in Experiment 2 in Chapter 4) is observed to be almost adult-like, but children appear to be less successful with other structures (non-factive verbs in Experiment 1 and negative-weak structures in Experiment 2), suggesting that if the reason for their poor performance were syntactic, the children would be performing poorly in all structures. If it were just semantics, on the other hand, then the children would be expected to fail in the test items that include the same verb. But children were observed to be successful with a specific verb in a specific condition, while unsuccessful in a task with the same verb in another condition probably because of the pragmatics-related reasons. Due to these, the reasons leading to the poor performance for some specific structures are considered as related to the semantics-pragmatics interface and examined according to this approach.

2.6 Children's comprehension of negation and (non)factive verbs: an overview of previous studies

Children's comprehension of the combination of negation and (non)factivity has been a topic of interest since 1970s. Even though pioneering studies on this issue date back to 1970s, there are only a handful of studies and, what is more, all of the research has been carried out on English. In other words, the comprehension of (non)factivity and negation has only been studied in English, so the conclusions have been drawn are based on the data coming from just one language. Needless to say, the literature on this topic needs insights from other languages, as well, in order to see the bigger picture behind the question of how children interpret negation when it is in interaction (non)factive verbs.

Previous research on the comprehension of negation and (non)factivity has mostly focused on the differences in the comprehension of two verbs, either a factive verb vs. a non-factive verb (e.g. *know* and *think*) or a cognitive factive vs. an emotive factive (e.g. *know* and *be happy*). Only Hopmann and Maratsos (1978) has included more than two verbs both in the factive and non-factive category, however, the experimental design appears to be criticized for not being pragmatically appropriate for the children; hence the results, which will be explained in detail in the following section, are contested.

Nonetheless, important findings have been gathered thanks to the former studies on the interpretation of negation when it combines with (non)factive verbs. Each one of these studies have attempted to explain children's understanding of negation and (non)factive verbs in their own accounts. For instance, some studies have proposed that that children's Theory of Mind abilities should be looked into in addressing the issue, while others consider syntactic structures as an answer to all

questions related to the performance of the children on the tasks that required them to interpret negation and (non)factivity together. The studies in this field have appeared to focus on five aspects, namely (i) cognitive aspects, (ii) syntactic aspects, (iii) semantic aspects, and (iv) pragmatic aspects.

2.6.1 Studies focusing on cognitive aspects

Cognitive aspects have mainly focused on the cognitive abilities, such as Theory of Mind abilities, that the comprehension of (non)factivity would deem to be necessary and the way the children tackle with them. Even though some of the studies that will be mentioned in this section do not include negation, but only the comprehension of (non)factivity, it is worth looking into these studies in order to observe the possible cognitive obstacles that affect children's understanding of (non)factivity independent from negation. This will enable us to accurately interpret the data coming from Turkish-speaking children because if we obtain an understanding of the cognitive issues with the factive verbs, it will be easier to tease apart the effect of (non)factivity and negation in the erroneous interpretations of children.

Let us first consider the conceptual differences between a factive verb and a non-factive verb. Factive verbs require a mental state that knows or is aware of something so that it can associate the attitude holder with the truth. Non-factive verbs, on the other hand, is a consequence of a mental state that thinks or believes in something hence makes connections between the attitude holder and the truth or the falsehood of the sentence. For example, when someone utters a sentence like "John knows that his next door neighbor will move to a new city," we consider the presupposition, i.e., 'his next door neighbor will move to a new city,' as true, and attribute a knowing mental state to the attitude holder, John, and eventually link the

attitude holder to the truth. By contrast, in a sentence like "Mary thinks that her next-door neighbor will move to a new city," we do not interpret the presupposition conveyed by the complement clause to be true at all times. Instead, we are aware that what Mary thinks could be either true or false, we cannot know for sure. So we assign a believing mental state to the attitude holder, Mary, in this case, and associate the attitude holder with either the truth or the falsehood in the end. But if we know that Mary's next-door neighbor won't move to a new city, but to a new house, we need to attribute to her a 'reality-incongruent state of mind', as suggested in Nagel (2017), which is also known as false belief. So in order to correctly interpret a factive sentence, one needs to attribute to the attitude holder an accurate mental state which knows that the presupposition is true. For the non-factive verb, on the other hand, one cannot decide whether the presupposition is true or not if she or he has no prior knowledge on the issue. If s/he has prior knowledge and knows that the presupposition is true, one needs to assign an accurate state of mind to the attitude holder. But if the prior knowledge says that the presupposition is false, then one should assign an inaccurate mental state, i.e. the state of false belief, to the attitude holder (Nagel, 2017; Aravind & Hackl, 2017).

As laid out in Chapter 1, unlike non-factives, factive verbs are restrictive because the truth of the presupposition is very important for factive predicates because they not only entail the truth of their presupposition, but also presume the truth of it (Kiparsky & Kiparsky,1970). Therefore, factive verbs tend to protect the truth of their complements, which is 'the background fact' in Nagel's terms, even when they combine with other logical operators, such as negation. Due to this, the truth of the complement of a factive verb doesn't change under negation. But if a

non-factive verb is negated, the truth value of the complement changes.[11] Consider the sentences below. The sentence (1) entails and assumes the background fact in (2). Even if (1) is negated as in (3), the background fact is still preserved.

      (1) John knows that his next door neighbor moved.

      (2) John's next door neighbor moved.

      (3) John doesn't know that his next door neighbor moved.

But if a non-factive verb, such as *believe* is used instead of *know*, the background fact in (2) will be no longer available. For example, someone can utter the sentence (4) and then continue as "and he is right" or "but he is wrong." These two options, i.e., whether the neighbor moved or not, are equally possible in (4). But in (5), because of negation, the possibility of John's neighbor not having moved is more probable.

      (4) John believes that his next door neighbor moved.

      (5) John doesn't believe that his next door neighbor moved.

As laid out in Nagel (2017), since "the natural domain of what people do and do not know is just the background set of true presuppositions or facts, factives are essentially simpler to attribute than non-factives" (p. 531). When someone utters a

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[11] Moreover, non-factive mental states sustain their existence regardless of the external changes. For example, if someone says, "Mary believes that the key is in the drawer," she will probably to continue to believe this 'before and after the unwitnessed transfer' as put by Nagel (2017). In other words, the attitude holder will continue to believe that the key is in the drawer whether or not she has witnessed that someone put the key in the drawer or somewhere else. On the other hand, factive mental states are closely associated with the external changes. If any change in the external conditions affect the truth value of the presuppositiɪ, factive verbs terminate their existence. For example, if someone says, "Mary knows the key is in the drawer," and then Mary finds out that the key isn't in the drawer, but in somewhere else, she will lose her knowledge about the location of the key.

sentence like "John knows that *p*" or "John doesn't know that p", where p is the complement, *p* itself is a fact as a part of the speaker's world and is true and certain. In other words, when someone uses a factive predicate, the complement must be a background fact, which is true. However, as Nagel (2017) has claimed, "the domain of what is merely believed is much less constrained, including true and false presuppositions alike" (p. 531). In other words, the world of beliefs is much wider than the world of facts. Since factive verbs present a more constrained environment for both the speaker and the listener, it could be easier for children to accurately attribute an accurate state of mind to the attitude holder (because the complement of these sentences is simple facts, available to both the attitude holder, the speaker and the listener) and comprehend complex sentences where negation and factive verbs combine.

However, the complement of a non-factive verb is a part of the world of the beliefs, which is less restricted because there are no certain things and both true and false complements are identical. Moreover, one needs to attribute an inaccurate state of mind to the attitude holder, which requires to first realize the fact and obtain the accurate state of mind and then to falsify it and attribute the false belief states of mind to the attitude holder. For example, think of an experiment where the children were presented that John took an important exam in the first scene. In the second scene, the children were told that John and his sister Mary don't know the results, but only the teacher knows. In the third scene, the children see that the teacher alone in her room while grading the papers says to herself "That's interesting! John is a hardworking student, but I am afraid he will fail." In the fourth scene, Mary and her mother are in Mary's room and Mary says that she believes in John. In the last scene, John and his family are talking about the exam. At that moment, John's mother says,

"John, Mary believes that you will pass the exam." The task of the children is to judge whether the utterance of the mother is true or not. The answer is true even though the complement of the sentence is false. But in order to correctly evaluate this, the children (i) should understand that John failed the exam, (ii) should be aware that John and his family are unaware of this fact and finally (iii) should attribute a false belief mental state to the attitude holder, Mary, and conclude that even though what Mary believes is wrong, she doesn't know that it is wrong, so she continues to believe in it. Thus it is much more complicated to interpret a sentence with a non-factive predicate than a sentence with a factive predicate. Since children's Theory of Mind abilities continue to develop until the age of six (Calero et al., 2013), they might have difficulties in figuring that Mary has a different state of mind and she might have a false belief without being aware of it.

Therefore, according to some researchers, not yet fully developed ToM abilities and lack of the concept of false belief could be the reason for children's erroneous interpretations of complex sentences where negation and (non)factivity are in relation. Furthermore, they claim that there is a strong correlation between children's performance on false belief tasks and their interpretations of non-factive verbs, such as *think* or *believe* and a proper understanding of false belief tasks and comprehension of non-factive verbs appear to develop hand in hand.

One of the pioneering studies on the relation between false belief task and comprehension of (non)factivity was conducted in 1976 by Johnson and Maratsos. In their study, 3- and 4-year-old children were tested to see whether or not they were good at false belief task and comprehended (non)factive verbs correctly. They used the factive verb *know* and the non-factive verb *think* in order to see whether there is a difference in the comprehension of these verbs by the children. In the experiment,

the children were told a false belief task story.[12] An important point about the procedure was that in order to continue with other questions, the children had to pass the false belief task first. The results indicated that 4-year-olds were more successful in comprehending, producing and differentiating between *know* and *think*, whereas 3-year-olds showed chance-level performance even though they passed the criterion of understanding the false belief concept. This suggests that mastering a false belief task might not be a crucial precondition for the comprehension of (non)factivity. The important thing is whether or not the children were able to draw the conclusion that the complement of the verb *think* may be false, but the complement of *know* must be true. Interestingly, the correct response rate of both 3 and 4-year-old children on the comprehension of *know* is higher than the rate for non-factive *think*, indicating that the children were better at comprehending factive verbs as opposed to non-factive ones.

Inspired by Johnson and Maratsos (1976), Granti (2004) tested understanding of false belief and comprehension of mental/attitude verbs such as *san-* / to suppose, *anla-* / to understand, *bil-* / to know, *hatırla-* / to remember, *düşün-* / to think, *kandır-* / to deceive, *unut-* / to forget and *tahmin et-* / to guess in Turkish. Similar to the procedure in Johnson and Maratsos (1976), the children were first tested on a false belief task and those who passed it were tested with respect to their comprehension of mental verbs. The procedure was as follows: The children were presented a story about two siblings, Emre and Selin, and then the experimenter asked questions about

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[12] In the false belief task there were a girl and a boy. The girl hid a toy under Box A while the boy was looking somewhere else. And then the girl told the boy that the toy was under Box B. After the story, the children were asked a series of questions about the hider and the seeker, through using the verbs *know* and *think*. Upon presenting each story, the children were asked three types of question about the hider and the seeker. These are (i) wh- questions to test whether they understood the false belief task (e.g. Where would the seeker look for the item?), (ii) yes/no questions by using *know* and *think* (e.g. "Does the seeker think it's under box B?" or "Does the seeker know it's under box B?") and finally (iii) multiple choice questions which require the children to choose *think* or *know* (e.g. "Does the seeker think it is under box B or does he know it is under box B?")

which verb would be more appropriate to the situation. For example, after presenting a story, in which Emre looked outside from the window and saw that it is rainy and said "Look! We won't be able to go to the park today!", the experimenter asked the children "Does Emre know that it is raining or does he remember that it is raining?". However, the results of Granti's study revealed that false belief task did not correlate with successful use of mental verbs as children who passed the false belief task showed a poor performance in understanding the mental verbs. 3-year-olds were successful with the false belief task, but not with the verbs. 4- and 5-year-olds, on the other hand, were better at verb task, suggesting that they were able to differentiate among the mental verbs with respect to their semantic features, i.e., factivity and non-factivity.

I believe, however, that there are problems with the experiment design in both studies which may have led to a decrease in the persuasiveness of the results. First of all, the procedure was very complicated for children. Instead of creating pragmatically appropriate contexts to measure children's comprehension of a factive verb or a non-factive verb, they just told a story to the children and then made them choose a verb over another verb by simply asking, a question such as "Does she know it is in Box B or does she think it is in Box B?" or "Does Emre know that it is raining or does he remember that it is raining?" Needless to say, these questions appear to be challenging for children as children were expected to analyze both of the options, then eliminate one and choose one. Second, we cannot know for sure whether children just randomly picked one of the verbs in these questions because, as laid out in the experiment, the children weren't asked to give justifications for their answers. Therefore the children's answers were very unlikely to provide insights about how they interpreted factives and non-factives and with which verb group they

were more successful.[13] To sum up, it is really difficult to draw a conclusion about whether the children can distinguish factives from non-factives at the age of four based on the results of these experiments.

Shatz et al. (2003), on the other hand, found out that children who speak languages that have specific lexical explicitness expressing false belief. In the experiment, they compared and contrasted results coming from speakers of Puerto Rico Spanish and Turkish, which have specific lexical forms to denote false belief, and English and Brazilian Portuguese, which do not have a specific form to mark false belief.[14] The classical false belief experiment, using the verb *think* (as in 'Where does X think the crayons are?') and *look* (as in 'Where is X going to look for the crayons when s/he returns to draw?') with the child speakers of these four languages reveled that the speakers of lexically marked languages for false belief, namely Turkish and Puerto Rico Spanish, were found out to be more successful with *think* sentences than the speakers of English and Brazilian Portuguese. Yet Shatz et al. have realized that the reason for this difference could have its origins in socioeconomic status (SES) of the children and their families. Therefore, the experiments were repeated with participants who were divided into two groups according to SES of their families and the results indicated that the speakers of English and Brazilian Portuguese performed better if children's families had higher SES.

However, there are two main challenges to the so-called conceptual accounts. First, it has been observed that children might succeed in the linguistic tasks with

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[13] Dudley et al. (2017) lays out that a corpus study in English has indicated that the factive verb *know* and the non-factive verb *think* are used interchangeably to give factive meanings. In other words, *think* is also being used in substitution for *know*. So in this experiment the children might have interpreted *think* as a factive verb and might have answered accordingly.
[14] Turkish and Puerto Rico Spanish have three meanings of think. These are (i) performing a mental action, (ii) believing (neutral) and (iii) believe falsely (as *san-* or *zannet-* in Turkish.)

attitude verbs earlier than they are competent in false beliefs tasks (de Villiers and Pyers, 2002). Second, recent research on children's ToM abilities indicate that children can reason about false belief tasks before they reach the age of 4. Even children as young as 15-months understand false belief in certain tasks (Onishi & Baillargeon, 2005). Young children successfully complete false belief tasks if the task is less direct or the language used in the task is more basic (Buttelmann, Carpenter & Tomasello, 2009; Knudsen & Liszkowski, 2012; Rubio-Fernández & Geurts, 2013; Scott, He, Baillargeon, & Cummins, 2012; Southgate, Chevallier, & Csibra, 2010). Thus, since recent evidence suggests that children understand false beliefs earlier than what earlier literature has suggested, the reason for children's non-adult-like performance on (non)factives and negation might not be because of their underdeveloped cognitive abilities–which brings us the discussion of the syntactic accounts put forward to account for the acquisition of attitude verbs.

2.6.2 Studies focusing on syntactic aspects

Some researchers have considered syntactic aspects of negation and (non)factive verbs as the main reason for children's poor performance and argued that their incorrect interpretations of the attitude verbs may be arising from the complexity of the syntactic structure that the attitude verbs have. Unlike other verbs, attitude verbs require embedded clauses to convey the belief of another person and children might find it difficult to analyze embedded structures (Sowalsky, Hacquard & Roeper, 2008).

As is well known children's early use of attitude verbs is limited to specific structures. For example, children use the verb *think* usually in present tense and with first person singular subject (Bloom et al., 1989; Diessel & Tomasello, 2001), which

suggests that attitude verbs may be behaving like an adverb in a clause (Lewis, Hacquard & Lidz, 2015). Let us now consider the studies on children's comprehension of the (non)factive sentences from a syntactic point of view.

Sowalsky, Hacquard & Roeper (2008) claim that children's failure to correctly evaluate sentences like "John thinks that the apple is in the box" might stem not only from conceptual difficulties, such as memory load and absence of direct observability, but also from syntactic complexities the attitude verbs pose regardless of their (non)factivity. Some researchers have even claimed that syntactic properties of attitude verbs could be the main reason for children's poor performance in the interpretation of complex sentences with attitude verbs.

To investigate the role of syntactic competence in the development of attitude verbs, Sowalsky, Hacquard & Roeper (2008), using the Truth Value Judgement Test, tested thirty-eight children, (mean age 4;0) with the non-factive attitude verb *think* and the construction *according to*. The construction *according to* was chosen simply because it does not allow recursion, hence it would be possible to isolate the syntactic reasons for children's low rate of accurate responses.[15]

If the cause of children's failure in the comprehension of complex sentences with attitude verbs is conceptual, children tested in the study, are expected to be unsuccessful with both *think that* and *according to*. On the other hand, if it is syntactic, children are predicted to perform better with the construction *according to*. Moreover, they have examined the effect of the context on the correct responses by using stories with a reality background and no reality background. The children were

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[15] These sentence structures were chosen on purpose because Sowalsky, Hacquard & Roeper (2008) have thought that what gives rise to difficulties in the comprehension of attitude verbs may be instigated by the fact that the complement in *think that* type sentences exhibit recursion, i.e., one can add a limitless number of *that* complements to a sentence like "Mary thinks that Sue believes that Jane is unhappy." Yet recursion is not possible with *according to*. For example, a sentence like "According to Mary, according to Sue, Jane is unhappy" is not unacceptable.

told a short story about two characters. Then a puppet uttered sentences about the characters and the children's task is to judge whether what the puppet said was true or false.[16] Results have indicated that children performed better with *according to* construction compared to *think that* sentences, in particular in the non-reality stories.

Sowalsky, Hacquard and Roeper argued that children have the concept of attributing beliefs to other minds because they were very successful with *according to* when compared with *think*. The reason behind the difficulty in evaluating sentences with attitude verbs is less likely to be the lack of sufficient cognitive abilities, but is more likely to be due to the syntactic complexity of attitude verbs. They also discussed the effect of the reality on children's performances. When the character's state of mind was incongruent with the reality, the children exhibited more difficulties in interpreting test sentences because the children may have found it odd to attribute a false state of mind to the character.[17] Therefore, Sowalsky, Hacquard and Roeper (2008) has concluded that syntactic factors appear to play a crucial role in children's understanding of complex sentences with attitude verbs, in particular, the non-factive verb think. But also the concept of attributing false belief had an effect when the state of mind of the subject in the story was in conflict with the reality. In order to see whether the reality stories were problematic for the

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[16] In the experiment, children were shown a picture of two characters with thought bubbles over their heads. For example, the children are told a story about a turtle and a dog as in (a). Then, the puppet uttered the sentences in (b) and (c).
(a) This is Turtle. This is Puppy. Turtle and Puppy sit in the playroom with no windows and they talk about the weather. Turtle says, "I bet there's snow outside. I want to make a snowman." Puppy says, "No way. I bet it is just raining. You can't make a snowman out of rain" (p. 256).
(b) According to Turtle, it is snowing outside.
(c) Puppy thinks that it is raining outside.

[17] For example, in the experiment in one of the reality-based stories, there was a cat that was looking up in the sky. The cat saw that it was very cloudy. Then she said that it would be a rainy day, hence it would be good to sleep the entire day.. But while the cat was asleep the sun came out. The children experienced more difficulties in interpreting stories where the reality was in contradiction with what the cat considered to be the case,

children because of the non-factive verb *think*, however, I believe that the authors should have added at least one factive verb, like *know*, to the experiment.

Hacquard et al. (2014), on the other hand, have tried to explain the comprehension of factive and non-factive verbs through using syntactic bootstrapping hypothesis. According to this hypothesis, children learn new words by associating them with concrete objects. But for attitude verbs, such as *think* and *know*, there are no concrete concepts or observable contexts, so children cannot extract the literal meaning of these verbs.[18] According to the syntactic bootstrapping hypothesis, since there is no concrete context to associate such verbs, children have to pay attention to syntactic cues provided through complementation.

In order to see whether children were successful in comprehending attitude verbs, an experiment with two non-factive verbs, namely *want* and *think*, was conducted.[19] Results have indicated that 3-year-olds had a tendency to reject sentences with *think*, while they accepted the ones with *want* and they were observed to incorrectly evaluate sentences more when the complement clause was false. For example, they have made use of complements. Yet this study has shown how the children interpret attitude verbs by providing false belief within a Truth Value Judgement Test, but it is limited to only two non-factive verbs. There should have been factive verbs and negation or at least negation in order to see how 3-year-old children interpret non-factives when there was another logical operator, that is negation.

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[18] While learning attitude verbs, children have no direct access to the semantics of these verbs. According to Hacquard (2014), this leads to two pragmatic challenges for the children: (i) how to extract the literal meaning from the speaker meaning (for attitude verbs, speakers convey their own beliefs on situations) and (ii) the speaker convey not only foregrounded content, but also content against background assumptions.

[19] In the experiment, there was a hide and seek scenario. Swiper was hiding behind the curtain, but his friend Dora wrongly believed that he was behind the chest and then the target sentences. such as "Dora thinks that Swiper is behind the chest," and "Dora wants Swiper to be behind the chest" were uttered by the puppet.

2.6.3 Studies focusing on semantic aspects

Apart from cognitive aspects and syntactic aspects, some studies have paid attention to semantic aspects of the issue and consider it as the main reason leading to children's erroneous interpretations of (non)factive verbs and negation. As can be seen, the experiments focusing on the conceptual differences between factive and nonfactive verbs presented in this section so far have not investigated how children would comprehend (non)factivity when it interacts with negation. In the ensuing paragraphs, I will turn to a review of studies which have used negation in relation with factive and non-factive verbs. Hopmann & Maratsos (1978) is a pioneering study in the investigation of (non)factivity and negation. In their experiment, they included five factive verbs, namely *know*, *be surprising*, *be happy*, *be nice* and *be sad,* and five non-factive verbs including *think*, *be possible*, *desire*, *be true* and *want*. They tested 60 children in three age groups, namely Group 1 (3;6 – 4;5, mean: 4;2), Group 2 (4;6 – 5;5 mean: 5;0) and Group 3 (6;0 – 7-11, mean: 7;1), through using factive and non-factive verbs in both affirmative and negative sentences. There were 40 test sentences in total, half of which included factives and the other half had non-factives. Among these 20 factive or non-factive sentences, 10 of them were in the affirmative condition, the remaining 10 were negated. There were 20 complement sentences, 10 of which included the characters fish and bunny and the remaining 10 had a girl and a boy as characters and they were balanced. For example, a group of children saw factive predicates in fish/bunny sentences and non-factives in girl/boy sentences, while another group was presented the data in the opposite manner. Moreover, the factive and non-factive verbs weren't shuffled. So half of the children first completed the factive sentences and then continued with the non-factives and the other half did the opposite. Each of the target verbs were presented to the

children twice in the affirmative condition and twice in the negative condition. For example, a child saw the factive verb *know* twice in both affirmative and negative conditions.[20]

Hopmann and Maratsos (1978) have observed that children rejected the complement more often for negative factives than affirmative factives and this tendency diminished with age, which they think supports the so-called Overextended Negation Tendency.[21] The same tendency was observed with non-factives, as well. Secondly, the children seemed to comprehend emotionally neutral predicates (*know, be surprising*) more easily than emotionally evaluative predicates (*be happy, be sad, be nice*).[22]

Even though Hopmann and Maratsos (1978) has tried to present a comprehensive study by using 5 factive and 5 non-factive predicates in both affirmative and negative conditions, there are a number of problematic parts in the experiment which could affect the reliability of the results. Let us begin with the materials. Recall that, the children were presented 40 test sentences in total, moreover, these sentences weren't presented to the children within a story. Rather the experimenter read sentences about either a fish and a bunny or a girl and a boy.

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[20] The procedure was very basic. Each child was tested alone in a quiet room at their school. The test items weren't presented to the children with a story. The experimenter put some toys peculiar to the test sentences in front of the participants and then uttered the test sentence. The task of the children was to repeat the sentence. Hopmann and Maratsos argued that repetition is cruicial in showing that children processed negation and then chose the character who did the action in the sentence. A sample protocol for each condition is presented in (a).
    (a) E: It's surprising that the bunny eats dinner (with bunny and fish).
            P: It's surprising that the bunny eats dinner
            E: Who eats dinner?
            P: The bunny (correct response).
[21] Some of the children assign the negation in the main predicate to the embedded clause. Hence they extended the scope of negation in the matrix predicate. For example, they expected children to paraphrase the sentence "Mary doesn't know that the teacher will move to a new city" as "Mary knows that the teacher won't move to a new city". Hopmann and Maratsos referred to this as Overextended Negation Tendency.
[22] They claimed the reason for this was that they considered to *be happy* costlier because *know* is a simple factive verb, it just refers "a simple awareness of the truth" (p. 7), but *be happy,* on the other hand, refers to both "an awareness of a truth and a positive reaction to it" (p. 7).

As laid out earlier, there were ten fixed complement sentences about fish/bunny and ten fixed complements about a girl/boy and these were balanced within the verbs and conditions. For example, the participants in Group I, saw fish/bunny sentences for affirmative factive sentences. After seeing 10 affirmative factive sentences, the children were presented negative factive sentences with the same factive predicates and the same complement sentences. Then they continued in the same way with non-factives. So the children saw the same complements in contradicting environments. For instance they probably saw both "It is surprising that the rabbit eats the dinner" and "It is not surprising that the rabbit eats the dinner." This must have been very confusing and demanding for the children and the sheer size of the experimental items and they are presented to the children in a contradictory manner must have confounded the study.[23] Furthermore, the sentences beginning with "It is surprising that…" or "It isn't nice that…" might have been hard for children to process. The children might not have mastered the expletive *it*, yet.

Furthermore, as you might recall, upon hearing the test sentence the children had to repeat it because according to Hopmann and Maratsos this ensured that the children processed negation. Yet repeating a sentence doesn't necessarily mean that the children processed and understood everything in the sentence. Besides, the children weren't told why they were asked to repeat the sentences. For example, they might have told that the puppet[24] could hardly hear so he requested you to repeat the sentences just in case he didn't hear the experimenter. So that the children might have paid more attention due to the fact that they had a reason to do this. Apart from

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[23] Furthermore, the fish and the rabbit in the complement sentences are so different from each other. They have different physical properties that could affect the children's judgements. For example, there was a sentence about the fish and the rabbit like "It isn't nice that the fish pushes the tree" in the experiment. First of all, this sentence contradicts with the reality. A fish can live in water, so it cannot push a tree. Because of this, the children might have chosen rabbit when they were asked who pushes the tree even though the correct answer is fish.

[24] Actually there was a puppet, Dumbo, who was used as the subject of test sentences when expletive it wasn't used. For example, "Dumbo knows that the girl rides down the hill."

these, there is no expression in the procedure section that the children were asked to provide a reason for their answers. So we cannot know for sure whether the children gave correct responses just by chance or because they understood the sentences. This bring us to the credibility of the results.

Since the materials and the experimental design were somewhat problematic, the results obtained appear to be questionable. Now let us revisit the results of this study. Hopmann and Maratsos observed that children rejected the complements of negative factives more often than the affirmative factives. This was also observed with the non-factives and they interpreted this result by employing the so-called overextended negation tendency, whereby negation in the main predicate was inappropriately extended to the complement. For example, according to them, the children understood a sentence like "It is not surprising that the rabbit eats the dinner" as "It is not surprising that the rabbit doesn't eat the dinner." But since children weren't asked the reason as to why they rejected negative sentences for both factive and non-factive predicates, we cannot be sure that they extended the scope of negation.

Secondly, they claimed that the children were less successful with the emotive factives than cognitive factives because they believed that emotive factives embody both the meaning of a cognitive factive and a reaction to it. For example, according to them a predicate such as *be happy* not only presupposes the truth of its complement, but also an emotional reaction to it. So they thought that the higher number of rejections for emotive factives was because of the demanding process. Yet we cannot know for sure the exact reason why they rejected emotive factives more because the children weren't asked for an explanation. They might have found the

sentence pragmatically inappropriate so that might have rejected it.[25] Moreover, I think emotive factives are way easier than cognitive factives for the children because they only needed to focus on the emotion of the character, not his/her state of mind, and then to respond accordingly. To do this, they needed a clue to show the emotion. It could be a facial expression or a sad/happy voice of the character. Since they didn't provide emotional clues to the children, the children might have been confused. Moreover, the children might have denied these because of the complement. There were sentence like "It isn't nice that the fish pushes the tree" in the experiment, which denotes realistically impossible incidents. Since it is impossible for a fish to push a tree, the children might have rejected this just because it contradicted with the reality, without focusing on the predicate.

Third they claimed that among the verbs, negative non-factives were the most denied predicates. They have tried to explain this with the order of the presentation of data. As you remember, there were three groups of participants. One group were first presented affirmatives and then negatives. So what they have claimed was that the higher rejections for not to be true and not to be possible among other negated non-factive verbs were seen in Group 1 and Group 3 because they saw first the affirmatives, due to this they showed an over-affirmation tendency towards negative sentences and interpret them as affirmatives. Yet I believe this is not the case. If it was, then Group 2 who was initially presented negative sentences would have an "overnegation tendency" and should have interpreted affirmative sentences as negative. The reason why the children rejected the non-factives not to be true and not to be possible is because these verbs are probably not frequent in the children's daily

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[25] For example, they might have rejected the sentence "Dumbo's not happy that the boy eats the dinner," due to the fact that they might have found it inappropriate for Dumbo be unhappy just because the boy eats dinner because eating dinner is a good thing and there is no reason to be unhappy about it unless an appropriate story was provided. Since there were no stories, the children might have found it pragmatically incorrect and denied it.

life and also are very difficult to process for a child. Since *think*, *desire* and *want* are more salient verbs for the children, they were more successful with them. So any explanation provided by Hopmann and Maratsos (1978) seemed irrelevant because of this.

Moreover, throughout the experiment, only the truth of the complement was paid attention to. In other words, in the experiment whether the children comprehend the complement clause was tested and the procedure was based on this (i.e., the children chose the toy that did something that was expressed in the complement). Yet this excludes the predicate. The children might have only paid attention to the complement clause, which shows us nothing about their comprehension of factive and non-factive verbs in negative sentences. They also only negated the main predicates, not the embedded ones. Due to this, it is very hard to see the bigger picture with respect to whether the children accurately interpret the (non)factives when there is negation. Therefore it is not sufficient even if an experiment has contained a number of verbs to be tested as long as the experimental design is not pragmatically appropriate for the children.

A more recent study, Léger (2008), also focused on the semantic aspects of the acquisition of the combination of factivity and negation. She tested children's understanding of the factive verb *know* and non-factive verb *be happy* in PP, PN and NP, NN True and False conditions. For *know* condition, there were four dolls. Two of them could see (open eyes) and two of them could not see (close eyes) what is to be presented. For *be happy* condition, there are four dolls again, two are happy with a smiling face and two are sad with a frown face. The child's task was to correctly associate the doll with the target sentence uttered by the puppet (Léger, 2008).[26]

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[26] She chooses *be happy* and *know* on purpose. *Know* is a semi-factive verb, which could lose its factivity in some environments, such as hypothetical or conditional contexts, but *be happy*, is a true

Results have shown that the percentage of correct answers for *be happy* condition is 100% for PP, NP and PN conditions for all age groups. For NN condition, the percentage of correct answers by 6- and 7-year-olds is 80%, 90% for 9-year-olds and 100% for 11-year-olds. Even though the percentage for correct answers for NN condition is relatively low for 6- and 7-year-olds, it is still very high when the results for *be happy* are compared with the ones for *know*. Results also have indicated that the percentage of correct answers for *know* condition isn't as high as the ones in be happy condition. Especially for NN condition, the percentages are very low and surprisingly the percentage of correct answers decreases as the age increases. Individual responses of the children have indicated that 6-year-olds treat know as it is a Neg-raising predicate (PN > NP).[27] Responses have also revealed that children treat NN type sentences as NP type (Léger, 2008).

Oiry & Hartman (2015) replicated the experiment conducted by Léger (2008) with some changes. Differing from Léger (2008) where blindfolded dolls were used for *not know* condition, Oiry & Hartman (2015) turn the characters around so that the characters cannot see their gifts. They also differ in their methodology. Instead of requesting children to choose the correct doll when the experimenter utters the sentence, Oiry & Hartman (2015) ask children 'who' questions. Their results indicate that children are more successful with the verb *be happy* than the verb *know*. For the verb *know*, children have been observed to perform better in the PN condition (where the negation is on the matrix verb) than NP (where the negation in on the subordinate

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factive. But both of them stand as a barrier to Neg-raising. She tests 39 children aged 6, 7, 9 and 11. Participants are presented the following target sentences:
a. She knows / is happy she has a turtle PP
b. She knows / is happy she doesn't have a turtle PN
c. She doesn't know / isn't happy she has a turtle NP
d. She doesn't know / isn't happy she doesn't have a turtle NN

[27] In other words, they take the negation in the main clause as the negation in the complement clause For example, they interpret "She doesn't know that she has a turtle" as "She knows that she doesn't have a turtle."

verb). For NN condition, the percentage of correct answers is higher with the verb *be happy* than the verb *know*.

The reason for this could be that there is a change of perspective with *know*, but not with *be happy*. In (6a) and (6b), the subject (who) is still aware that he doesn't have a strawberry and is happy about it. In (6c), the subject (who) is aware that he doesn't have a strawberry, but in (6d) the subject doesn't have a strawberry, but he isn't aware of that. He still thinks that he has a strawberry. Due to this complexity and change of perspective, they argue that NN condition causes an overload for the children (Oiry & Hartman, 2015).

(6) a. Who is happy he didn't have a strawberry?

   b. Who isn't happy he didn't have a strawberry?

   c. Who knows he didn't have a strawberry?

   d. Who doesn't know he didn't have a strawberry?

Both Léger (2008) and (Oiry & Hartman, 2015) have made insightful contributions to the study of (non)factivity when it interacts with negation. The experimental design implemented in both studies, however, appear to be somewhat confusing and challenging for the children. Making the animals turn their backs to represent the 'not knowing' condition or putting a smiling face in front of the animals for the 'be happy conditions' may not be very effective and convincing. Since the procedure was not entirely pragmatically appropriate, we can speculate that this might have given rise to low correct response rates. This issue brings us to the pragmatic aspects of the comprehension of (non)factivity and negation.

2.6.4 Studies focusing on pragmatic aspects

Researchers focusing on pragmatic aspects of the issue have claimed that children are capable of comprehending the literal meaning of attitude verbs, however, when they are combined with an embedded clause which has the speaker's belief, children assume the speaker's meaning to be false and that is why they reject correct sentences in some cases. Let us begin Aravind and Hackl (2017) which is a good example to illustrate the tenets of the so-called pragmatic accounts.

As a number of studies on the acquisition of factivity have claimed children's performance on interpreting the truth value of the complex sentences including (non)factivity accurately has been problematic (Hopmann and Marastos 1978, Scoville and Gordon 1980, Léger 2008, Dudley et al. 2010). Some researchers have concluded that this most probably stems from the fact that children do not consider factive verbs as presuppositional initially.

In order to uncover to what extent children consider (non)factive verbs as presupposition triggers Aravind and Hackl (2017) employed a different approach in preparing the test stories in order to see whether the change in the semantic and pragmatic structure of the test sentences had an effect on children's performance on factive verbs or not. To do so, they raised the argument of Question Under Discussion (QUD) and Not-At-Issueness Constraint and conducted two experiments based on these.

According to Aravind and Hackl (2017), the presupposition of a factive verb usually hinges upon common knowledge; thus in order to use presuppositions in a pragmatically felicitous way the context, i.e., the common ground, should also

necessitate the truth of the presupposition.[28] But sometimes the requirement of common ground is disregarded and the speakers utter sentences with presuppositions. What it means is that sometimes the presupposition isn't based on common ground; it is just uttered out of nowhere, but still we can infer the truth of the presupposition if the predicate is a factive verb. For example, think of a situation in which your friend says in the middle of a conversations, "Do you know Maclaren's Pub?" Yet you don't know this place and simply say, "No". Then your friend goes on as follows: "Maclaren's Pub had been very popular for years. I was surprised that it is closed." As you can see, there is no common background among participants of the conversation, yet you would probably take the presupposition (Maclaren's Pub is closed) for granted, thanks to the emotive factive verb *to be surprised*; thus you would be making it felicitous to use a presuppositional sentence in a context where there is no common ground by 'accommodating', as in Aravind and Hackl's words, the presupposition.

Building on the insights in the literature that argues that in the interpretation of every sentence, there is a Question Under Discussion (QUD) (Stalnaker, 1974) that seeks new information. Bearing in mind that the presupposition should be based on common ground, Aravind and Hackl (2017) drew the conclusion that the presupposed information cannot target QUD. Due to this, what Aravind and Hackl (2017) argues is that a factive sentence in the format of *X Verb-ed that p* (where *p*

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[28] For example, think of a situation in which there is a very introvert woman whose name is Julia in your office who merely speaks about her life. But somehow she trusts you and your close friend at office, Emma, and tell both of you a little bit about her life. She says she is married and has a daughter. Two weeks later, you see that another colleague, let us call her Jane, gives a picture book to Julia saying, "Your daughter will love it!" You are surprised because you know that this shy woman generally avoids conversations about her private life. Then in the lunch time, you and your friend were together and you need to share what you see today. You say the sentence (a) Jane knows that Julia has a daughter. As it can be seen, (a) is a sentence which includes a factive verb (*know*) and a presupposition (*Julia has a daughter*) whose truth is entailed and presupposed by the factive verb *know*. As you remember, the knowledge in the presupposition is a common knowledge between you and Emma. So when you use this as the complement of a factive verb, Emma finds out its truth not only because there is a factive verb, but also what the presupposition denotes is a common knowledge.

constitutes the common grounded, i.e., the presupposed information,) cannot be uttered if there is a question which inquires a new information about p. So already known and presupposed complement cannot meet the expectations of QUD.[29] Rather it needs to be accommodated. The knowledge which QUD is after is new information, not part of the common ground, hence the content that is related to the QUD has been considered as "at-issue". So Aravind and Hackl (2017) formulated the 'Not-At-Issueness Constraint on presuppositions' which postulates that presuppositions cannot be used to directly target the Question Under Discussion. They further argued that what may have given rise to children's poor performance in the comprehension of factive predicates in previous work may be the design of the experiments in particular, their failure in observing the Not-At-Issueness Constraint. To see to what extent children pay attention to this restriction, Aravind & Hackl (2017) conducted two experiments based on the factive verbs *remember* and *forget* in affirmative and negative sentences both in True and False conditions.

In the first experiment, the children were told stories about two characters who had to fulfill their responsibilities in the farm. The characters who carried out the chores and reported them correctly were given a sticker. After each story, the children were asked the question: "How many stickers did X get?", which served both as a comprehension question and a QUD raising. After this, the experimenter asked the puppet what happened in the story and then the puppet expressed what he thought had happened with a sentence where he used the target verb–which is to be

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[29] More precisely, let us consider again the example above about the introvert colleague Julia. Before telling your friend Emma that Jane knows Julia has a daughter, if Emma asked you the question (a) would sentence (b) still target what is asked in (a)? Or would you accommodate (b) as in B'.
    (a) A: Do you know Julia's daughter's name?
    (b) B: #Jane knows that Julia has a daughter
          B': I don't know her name, but Jane knows that Julia has a daughter
As you can see, the answer given by B, which is the sentence (b), cannot target (a).

judged by the children. For example, the children were told the following story for the verb *forget* in affirmative true condition:

> Billy was supposed to help Farmer Mary around her farm. He helped by feeding the chickens and milking the cow. The next day, Farmer Mary asked, "How did you help?" He said, "I milked the cow, but I'm not sure what else I did!" He didn't tell her about feeding the chickens!
>
> Comprehension: How many stickers will Billy get? (One)
>
> Puppet's sentence: Billy forgot that he fed the chickens. (True)

Before the factive sentence (the puppet's sentence with the presupposition 'he fed the chickens') was presented to the children, the experimenter made sure that the presupposition is to be considered common ground by saying "He didn't tell her about feeding the chickens!" In other words, the presupposition of the puppet's sentence seemed to provide the reason why he got only one sticker. So according to Aravind and Hackl, since the presupposition in the test sentence was related to the QUD, the presupposition was considered as "at-issue" and so it was easier to accommodate because of this. In Experiment 2, however, the experiment was designed in such a way that the presupposition of the target sentence wasn't "at-issue", i.e., not related to the context of the QUD. For example, the children were presented the story as follows:

> Today, Billy and Jane were supposed to help Farmer Mary around her farm. Billy fed the chickens, but Jane was sleeping instead. The next day, Farmer Mary asked them, "Did you feed the chickens?". But both

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of them said, "It was so long ago, we're not sure anymore!"

Comprehension: Who should get a sticker? (Billy)

Puppet's sentence: Billy forgot that he fed the chickens. (True)

In this story, the main focus is whether Billy and Jane gave grains to the chickens. The most congruent summary sentence that describes what happened in the story should give information about who fed the chickens. Yet, instead of providing an appropriate description, the puppet utters a sentence including the factive verb *forget* which assumes and presupposes that Billy fed the chickens without preparing a common background in advance of his utterance. So the presupposition of the sentence uttered by the puppet violated the Not-At-Issueness Constraint.

The results have shown that children exhibited an adult-like performance in Experiment 1,[30] but not in Experiment 2, that is when the truth of the complement clause violated the "at-issue" constraint, i.e., not related to the context of the QUD, the children were confused and gave more incorrect responses. So according to Aravind and Hackl (2017), this shows that children are sensitive to Not-At-Issueness constraint and avoid factives when they are incongruent with the QUD and the context. In order to accurately understand and use factive sentences, one should be able to create a common ground in order to present the presupposed information.

Aravind and Hackl (2017) is an important study that shows how crucial a well-developed knowledge of pragmatics is in children's evaluations of the test sentences. Of course every study doesn't include QUD in the experimental setup, but before presenting the test sentences it is important to create a common background where the children can base the test sentences with (non)factive verbs.

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[30] The children appeared to be aware that forget denotes a negative memory state, while remember is a positive memory state. The children were also very good with the negative factive sentences.

Dudley et al. (2010) has also proposed that an underdeveloped knowledge of pragmatics may give rise to children's poor performance with (non)factives when combined with negation in a complex sentence. To prove this, an experiment was conducted by using the cognitive factive verb *know* and the non-factive verb *think* in order to see whether 3-year-old children could differentiate between these two types of verbs and comprehend them accurately. The verbs were presented in affirmative (a&b), matrix negation (c&d) and embedded negation conditions (e&f) as exemplified in (7).[31]

(7) a. Lambchop thinks that the toy is in the red box. (Nonfactive

PP/affirmative)

b. Lambchop knows that the toy is in the red box. (Factive

PP/affirmative)

c. Lambchop doesn't think that the toy is in the red box. (Nonfactive

NP/matrix negation)

d. Lambchop doesn't know that the toy is in the red box. (Factive

NP/matrix negation)

e. Lambchop thinks that the toy is not in the red box. (Nonfactive

PN/embedded negation)

f. Lambchop knows that the toy is not in the red box. (Factive

PN/embedded negation)

The procedure of the experiment was like a false belief task. There were two boxes in front of the children. The experimenter told them that he would put one toy

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[31] Since English is a head final language, the abbreviations, following the surface word order, used for Positive and Negative conditions in Turkish is different in English. For example, embedded negation is shown in Turkish as NP, while it is PN for English. Similarly, PN stands for matrix negation in Turkish, whilst NP constitutes to matrix negation in English.

in either the first box or the second one. The children's task was to find it based on the clues provided by Lambchop, the puppet.[32]

The results have indicated that children chose the correct boxes for *know* in the PP and PN (embedded negation) conditions, yet the majority of them (around 60%) failed in the NP condition, that is, when the matrix verb was negated as in "Lambchop doesn't know that the toy is in the red box." This suggests that (i) three-year-old children can differentiate between the factive verb *know* and the non-factive verb *think,* challenging Hopmann and Maratsos' (1978) earlier claim that children cannot distinguish between these two verbs until the age of four; and (ii) because of their semantic representation of *know*, some children appear to correctly treat *know* as factive, but not because of the same reason as adults. Adults somehow know or have acquired that the truth of the complements of factive verbs is presupposed, which makes adults correctly evaluate sentences such as the one in (7). But the three-year-old children are less likely to have access to this information; therefore, it is very likely for them to rely on pragmatics, i.e., the story and the congruence of the test items with it, concluding that the children as young as three years old are not expected to distinguish factives from non-factives.

This study is important because it has shown that children as young as 3-years of age are able to accurately understand factives and non-factives both in affirmatives and in the presence of negation. Yet we cannot say again for sure that they have mastered non-factives in all conditions and factives in some of the

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[32] In order to give a correct answers for *know* in PP and PN condition, the children should have chosen the mentioned box in the sentence, while for NP they should have opted for the other box. For think, on the other hand, since it is a non-factive verb and cannot presuppose or entail its complement, the children ideally should have opted for both of the boxes explaining that the complement of the verb think wouldn't tell anything to us for sure. Dudley et al. also took this "implicature computation" into account. But they claim that the utterance was told to be a clue so what they were expecting from both child and adult participants not to do an implicature computation, but used these clues as informative as possible and answer accordingly. Yet this could too ideal for a 3-year-old child. So what we can expect from a child for a correct answer for non-factive think is to choose the mentioned box in the PP condition and the other box for the NP and PN conditions.

conditions because in this study there was no false belief. The experimenter and the participants took what the puppet says as granted but non-factives could convey false beliefs. For example, the toy might be in the red box even though the puppet thinks that it is in the blue box. So maybe they should have used a classic false belief task by using the Truth Value Judgement Test. For instance, the child could have seen the content of the boxes and when the puppet uttered a prediction, the children could reward it according to its answers. I am aware of the fact that it is very difficult to do a Truth Value Judgement Test with 3-year-olds, but without the concept of false belief we cannot say for sure that they interpreted factives and non-factives correctly.

Before moving to presentation of previous work on the acquisition and comprehension of negation and modality, let us briefly summarize results of previous studies on comprehension of negation and (non)factivity. The common finding among the studies on this field is that children are observed that they comprehend better and respond more accurately for tasks on factive verbs, such as *know*, than non-factive ones, such as *think*. Among factive verbs, in some studies children are found out to be more successful with cognitive factives than emotive factives (Hopmann & Maratsos, 1978; Léger, 2008), whilst in some studies the results are vice versa (Oiry & Hartman, 2015). Moreover, children also seem to have problems in tackling with negation when there are (non)factive verbs. The results of the studies indicate that children process false negative sentences more accurately and faster than true negative sentences (de Villier & Flusber, 1975; Wason 1965; Slobin, 1966). Besides, the response rates of the children reveal that they are the least successful in tasks where there are complex sentences with (non)factivity including negation both in embedded and matrix verbs, what we call as NN-type sentences (Léger, 2008; Oiry & Hartman, 2015;). Some studies, on the other hand, reveal that children have

more difficulties when the matrix verb is negated in comparison to the situations where the negation is on the embedded clause (Dudley et al., 2010). Furthermore, in some studies it is seen that children have a tendency to treat raise the negation on the embedded verb to the matrix verb (Hopmann & Maratsos, 1978; Léger, 2008). Apart from these, children are also found out to assess the truth value of the sentences by just checking the truth value of the complement clause, without taking the whole sentence into account, yielding in incorrect responses (Hacquard, 2014). Quite interestingly, the correct response rates in these previous studies are very low. The reasons leading to this are considered as syntactic by Sowalsky, Hacquard and Roeper (2008), whilst Aravind and Hackl (2017) argues that pragmatic incongruences causes the low rate.

In the next section I will turn to a discussion of what the recent acquisition literature has shown us with respect to how children handle negation when it interacts with modality.

2.7 Children's comprehension of negation and modal verbs: an overview of previous studies

Although studies that deal with how negation is acquired when it interacts with epistemic modal verbs is limited in number, the findings obtained have provided important insights into the developmental trajectory that children follow in the acquisition of these two taxing concepts and the scope relations that they exhibit. In what follows, I will introduce key concepts and terms and then review the work of Noveck (2001), Moscati (2008), Gualmini and Moscati (2009) and Moscati and

Crain (2014) to provide a glimpse of how children handle negation when it combines with epistemic modal verbs.[33]

As pointed out in Chapter 1, epistemic modality divides into two groups in terms of information strength: (i) Weak modals and (ii) Strong modals (von Fintel, 1994). Yet negation can change the strength of a modal, yielding in either negative strong sentences, where negation takes scope over modality as in "Mary cannot come", or negative weak sentences, in which negation is under the scope of negation as in "Mary may not come". The main issue in this research field is to investigate whether and how children interpret negative strong and weak sentences and to see if they are able to differentiate them.

Noveck (2001), using Truth-Value Judgment Test, tested English-speaking children's understanding of modality and negation. In the experiment she conducted, the experimental setup consisted of three boxes. Two of the boxes were open (Box A and Box B), but the third one was closed. In Box A, there were a bear and a parrot. In Box B, there was only a parrot. Then the child was told that the content of the third box was identical with one of the boxes. There were eight target sentences to be judged by the children as shown below in (8) and (9), categorized under two groups, namely Necessary Conclusion, where the sentence is True or False necessarily and Possible Conclusion, where the children need to make inferences about what the puppet said in order to correctly evaluate it.

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[33] Research suggests that children acquire the concept of modality by the age of 3 (Byrnes & Duff, 1989; Hirst & Weil, 1982; Noveck, Ho, & Sera, 1996).

(8) Necessary Conclusion:

a. There has to be a parrot (T)   c. There might be a parrot (T)

b. There does not have to be a parrot (F) d. There cannot be a parrot (F)

(9) Possible Conclusion:

 a. There has to be a bear (F)   b. There cannot be a bear (F)

 c. There does not have to be a bear (F)   d. There cannot be a bear (T)

That the correct response rates for only three target sentences out of eight sentences were above chance level have indicated that five-year-old children seemed to find this task very difficult. The sentences which they were able to correctly judge were consisted of two positive and only one negative sentence, all of which was under the necessary conclusion group, indicating that the children seemed to be more successful when there is a necessary conclusion. In other words, the children were observed to be seeking for certainty, not possibility.

Supporting the findings of Noveck (2001), the experiments conducted by Moscati (2008) and Gualmini and Moscati (2008) with Italian-speaking children have revealed that children have a tendency to favor strong readings where negation takes scope over modality and to interpret negative-weak sentences as negative-strong.

Moscati and Crain (2014), on the other hand, has argued that Noveck (2001) and Moscati and Gualmini (2008) are far from providing insights whether the children interpreted strong negative reading initially and then generalize it to sentences that yielded negative weak reading because, especially in Noveck (2001), they claimed that the test was too demanding for 5-year-olds and the results for more than half of the test sentences are around chance level. Moreover, they have argued

that the negative sentence (*There does not have to be a parrot*) which children correctly judged as False was a necessary conclusion so it could not reveal anything about the children's comprehension of negative-strong sentences. Moscati and Gualmini (2008), on the other hand, has been criticized because of the experimental design. In the experiment, the children were presented the following story:

There is a farmer who has to feed his animals. He has turnips and carrots and there are three animals: one tiger and two elephants. But the tiger says that she doesn't like carrots. Thus the farmer decides to give a turnip to the tiger. The elephants do not have any preference, and the farmer decides to give a turnip to the first elephant and a carrot to the second one.

Upon presenting the story, the children were asked to judge the sentence (10) uttered by the puppet. According to Gualmini and Moscati (2008), the correct evaluation for (10) is False because it yielded weak reading as in (b), but the results have shown that the children judged (10) as True, indicating that they have favored strong reading.

(10)   Il contadino può non dare le carote all'elefante

the farmer can not give the carrots to-the elephant

a. *It is not possible that the farmer gives carrots to the elephant (*strong reading)

b. It is possible that the farmer does not give carrots to the elephant (weak reading)

However, Moscati and Crain (2014) have argued that this experiment was less likely to show that the children have a tendency to initially acquire and interpret strong reading. According to them, the definite article *the* in the sentence might have misled the children because one of the elephants was given carrot, but the other one wasn't. So what Moscati and Crain (2014) have had in mind is that the children might have associated the elephant with the one who was fed with turnip; so they might have evaluated (10) as True because of this.

In order to reveal whether and how children interpreted negative-strong and negative-weak sentences, Moscati and Crain (2014), conducted an experiment, almost identical with the experimental design employed in Noveck (2001), focusing on the Italian-speaking children's understanding of the scope relations between modality and negation. In the experiment, three types of target sentences, namely positive, negative strong and negative weak, were used. As in Noveck (2001), there were three boxes, two of which were open and one was closed. The child saw the content of open boxes. For example, in Box A, there were a cow and a horse. In Box B there was only a horse. In each case, there was another object (e.g. a strawberry) outside of the boxes. After the child looked at each item in the boxes, s/he was told that the closed box had the same contents as either Box A or Box B. Then, a hand puppet made predictions about what could be the inside of the box and the children were asked to judge statements of the puppet. If the children made a wrong judgment, the puppet asked the reason why they thought that the prediction was false/true. There were four stories, each of which was consisted of six target sentences.

Results show that the children (77%) tend to interpret negative weak sentences as strong suggesting that children favor the inverse scope reading in which

51

negation takes scope over the modal. Surprisingly, children (51.5%) also failed in positive true sentences. They judged the sentence "There may be a car in the box" as wrong and they justified their answer by saying, "There is also a horse in the box". Moscati and Crain (2014) has argued that the reason behind this might be the effect of *covert only*. Children seem not to separate contents of the boxes; rather they perceive the content as inseparable. In order to test this, Moscati and Crain (2014) conduct another experiment which is identical to Experiment 1 with only one difference: At this time there is just one item in each box. In the second experiment, the percentage of children who correctly judge positive true sentences increase to 95%, providing evidence that the low rate of correct response rate for positive condition has stemmed from *covert only*.

What Moscati and Crain (2014) has considered the reason leading to the conclusion that children initially acquire and comprehend better negative strong sentences is Semantic Subset Principle (SSP). SSP, introduced by Crain (1994), is a very prevalent notion among generativists who study language acquisition. Crain et al. (1994) define SSP as the following:

> Sometimes more than one alternative interpretation of a sentence is made available by Universal Grammar (UG). To complicate matters further, the alternative interpretations may sometimes form a subset-superset relationship (i.e., the circumstances that make the sentence true on one interpretation may be a proper subset of the circumstances that make it true on another interpretation). A semantic subset problem arises if the target language includes the subset interpretive option, but not the super- set option. To avoid semantic subset problems, the interpretive options for sentences must be

ordered in the LAD by a principle instructing learners to initially choose the representation that is true in the smallest set of circumstances. This is called the semantic subset principle (Crain et al., 1994; p.117-118).

As it can be seen in the passage above, SSP constitutes to a semantic learnability problem. The opponents of SSP basically claim that if a sentence has two interpretations and one of them entails the truth of the other one, this causes a learnability problem for the children. What Moscati and Crain (2014) have in mind is that when the modals *might* and *can* combine with negation, these modals form a superset-subset relation. Consider the sentences (11) and (12).

(11)   John might not come.

(12)   John cannot come.

In these sentences, although the surface position of the negation seems identical, the scope relations are different from each other. In (11), *might* takes scope over *not*, while in (12) *not* takes scope over *can*. (11) and (12) can be interpreted as in (13) and (14):

(13)   It is possible for John not to come.

(14)   It is impossible for John to come.

So (11) is used in situations in which John is likely to come or not to come. (12), on the other hand, *can* only be used in situations in which it is not possible for John to come. So if (12) is true, then (11) is also true. But (12) entails the truth

condition of (11), but not vice versa. Therefore, Crain concludes that (11) forms the superset and (12) constitutes the subset (Moscati and Crain, 2014).

Crain and other generativists claim that when one reading entails the truth condition of the other, a potential learnability problem occurs. The crucial question here is as the following: Which reading children acquire first? Superset or subset? At that point, Crain argues that in order to avoid such learnability problems, the possible interpretations of sentences must be ordered in LAD (Language Acquisition Device) in accordance with a principle which pushes learners to initially acquire the subset reading which is true in narrower circumstances. This principle is called Semantic Subset Principle (Moscati and Crain, 2014).

Back to the issue of children's understanding of the scope relations between modality and negation, SSP predicts that children will initially adopt strong negative readings (Moscati and Crain, 2014). According to Crain (1994), there are some learnability issues at work in SSP. He claims that if children acquired the weak reading first, it would be really difficult for them to figure out strong reading. In such a situation, the child would assign weak readings (the modal takes scope over negation) to both (10) and (11). The child would get wrong results for (11), but s/he wouldn't be aware of that due to the lack of positive evidence. Since adults consistently use sentence (10) for situations in which John doesn't come, the child would think that the scope relation s/he used is correct, for s/he is used it for situations both John comes and John does not come (Moscati and Crain, 2014).

On the other hand, if children initially adopt strong scope relations, s/he is more likely to acquire weak scope relations later on, for there will be positive evidence. Since adults will use *might not* not only for situations in which John

54

doesn't come, but also for the situations John comes, the child will see that s/he's doing something wrong in time (Moscati and Crain, 2014).

SSP seems logical at first sight, but there are several researchers who have arguments against SSP. Musolino (2006) claims that SSP does not fully explain the issue of children's understanding of scope relations. One of his main arguments is the problematic definition of SSP as shown below.

Suppose that the interpretive component of Universal Grammar makes two interpretations, A and B, available for a sentence, S. If so, then see if S is true in a narrower range of circumstances on interpretation A than on interpretation B. If so, then A will be hypothesized before B in the course of language development. (Crain et al., 1994; p. 118)

He claims that according to the definition above, the child must already know that whether a given sentence is ambiguous or not in order to employ SSP principle. Yet Musolino (2006) has argued that it doesn't make sense to have a learning principle based on a priori possession of the knowledge to be acquired.

Apart from SSP, Musolino (2006) has agreed with Crain in terms of the order of the acquisition of strong and weak scope relations. He has claimed that it would be really difficult to acquire strong scope relations if children initially adopt weak scope relations. Yet, according to Musolino, SSP isn't the correct solution to this learnability issue. He has admitted that there must be some other mechanisms that push children to initially prefer strong scope relations.

To sum up, studies on acquisition and comprehension of negation and epistemic modality have indicated that children have a tendency to favor strong

reading and generate it to weak sentences where weak reading should be interpreted. The reason for children's tendency to initially acquire strong reading is considered as SSP, claiming that when there is a superset-subset relation between two structures, i.e., one of the structures entails the truth of the other, but not vice versa, there could be a potential learnability problem which can be avoided by acquiring the subset initially.

2.8 Summary

Acquisition of negation, in particular how negation unfolds under the operators of (non)factivity and modality has been investigated syntactically, semantically, pragmatically and more recently as a phenomenon that can only be studied thoroughly at the semantics/pragmatics interface. The results of various studies suggest that there are certain discrepancies in the behaviors of children tested which may stem from the experimental design of certain experiments. Various methodologies, such as picture-choice, truth value judgement task, answering who-questions, etc., have been used in various stories. Some of them has no communicative context at all. Thus we can say that there is no comprehensive study which examines the issue by employing cognitive factives, emotive factives and non-factives at the same time in a pragmatically appropriate experimental setup. Secondly the experiment design and the procedure used in these experiments seem a bit tricky and pragmatically not so appropriate for the children to comprehend and respond. We will come back to this issue after going through the previous studies. And finally, most of the studies have tested only 5-year-old children, but only a few of them have had another age group older than 5 and a control group consisted of adults.

In the next section, we will explore the question of how Turkish speaking children interpret negation in complex sentences with (non)factive verbs and with modality. In order to reveal a clearer picture on the comprehension of negation when it combines with factivity and modality in complex sentences, I will be employing an experimental design which has a communicative context, trying to eliminate any confounding effects.

CHAPTER 3

INVESTIGATION OF THE COMPREHENSION OF NEGATION WHEN IT

COMBINES WITH (NON)FACTIVITY IN COMPLEX SENTENCES

3.1 Aims

As discussed in Chapter 2, there is only a number of studies that examine how

children comprehend sentences when negation interacts with (non)factive verbs.

What is more, the handful of studies carried out on the topic are limited to English.

These experiments conducted on English have investigated how children interpret

pairs of verbs belonging to different categories in terms of factivity under negation.

The verbs tested so far and their factivity scale has been as follows: (i) two factive

verbs which behave differently in terms of semantics: *remember* and *forget*; (ii)

factive vs. non-factive verbs: *know* vs. *think;* (iii) simple/cognitive factive vs.

emotionally evaluative/emotive factive: *know* and *be happy* and finally (iv) desire

non-factive verb vs. attitude non-factive verb: *want* and *believe*. As laid out in

Chapter 2, so far there has been only one study, Hopmann and Maratsos (1978), that

has employed five factive verbs (including both cognitive and emotive factives) and

five non-factive verbs in one experiment. Being one of the preliminary studies on the

topic, this research has provided very important insights into the literature, yet there

are a number of points that should be readdressed and reinvestigated because as

discussed in the previous chapter, both a pragmatically and cognitively infelicitous

experimental design might have led to wrong conclusions about children's

performance on (non)factivity and negation. Apart from Hopmann and Maratsos

(1977), there has been no study that attempts to present a comprehensive picture of

to what extent there are similarities or differences in the comprehension of cognitive

factives (such as *know*, *realize*, *forget*), emotive factives (such as *be happy*, *be sad*) and non-factives (such as *think*, *believe*) in one test.

So the first aim of the present study is to uncover how Turkish speaking children comprehend negation when it combines with (non)factive verbs in complex sentences in a test which includes two target verbs from each group, namely cognitive factives, emotive factives and non-factives and present a more exhaustive picture of children's interpretation of (non)factivity and negation. The results obtained will assist us in exploring the nature of the cross-linguistic differences and similarities in the interpretation of the combination of negation and (non)factive verbs (i.e. types of incorrect answers and percentages for correct answers). Before presenting the experiment that we conducted with Turkish-speaking children, it is important to shed light on the (non)factive verbs in Turkish and how it is different from English.

As a head-final language, Turkish differs from English in respect of how complementation is realized. In English, the complement clauses headed by the complementizer *that* is a finite clause and the scope relations of negation is assigned by the syntax as in (1). However, in Turkish, complementation and the scope of negation are determined by bound morphemes as in (2).

(1) Mary does not know that it is raining

(2) Mary yağmur yağ-dığ-ın-I bil-mi-yor

        rain pour-NOM-POSS-ACC know-NEG-PROG.3sg

    "Mary doesn't know that it is raining"

Despite the differences in the complementation strategies and negation structures that languages may employ, unsurprisingly they display semantic/ pragmatic similarities in terms of verb factivity. Tests used in differentiating factives from non-factives in other languages are valid in Turkish, too. As in English, factive predicates presuppose the truth value of their complement, while non-factives do not, as shown in (3) and (4). In (3), it is certain that Ayşe will come, but Ali forgot this. However, in (4) that Ayşe will come is not certain, but Ali thinks that she will probably come.

(3) Ali Ayşe-nin gel-eceğ-in-I unut-tu

      Ayşe-GEN come-NOM-POSS-ACC forget-PAST.3sg

    "Ali forgot that Ayşe will come"

    Presupposition: Ayşe will come

(4) Ali Ayşe-nin   gel-eceğ-in-I düşün-üyor

      Ayşe-GEN come-NOM-POSS-ACC think-PROG.3sg

    "Ali thinks that Ayşe will come"

    Presupposition: Ayşe may or may not come

As in English, when a factive predicate is negated, the truth value of its complement does not change. On the other hand, if a non-factive predicate is negated, the likelihood of the complement changes as shown in (5) and (6). In (5), even when the predicate *forget* is negated, the complement is still true and valid. So Ayşe will definitely come and Ali is aware of this. Whereas in (6), the truth value of the complement, i.e., the likelihood of the incident, changes when the predicate is negated. So Ali thinks that Ayşe most probably will not come.

(5) Ali Ayşe-nin gel-eceğ-in-I unut-ma-dı

     Ayşe-GEN come-NOM-POSS-ACC forget-NEG-PAST.3sg

"Ali did not forget that Ayşe will come"

Presupposition: Ayşe will come

(6) Ali Ayşe-nin gel-eceğ-in-I düşün-mü-yor

     Ayşe-GEN come-NOM-POSS-ACC think-NEG-PROG.3sg

"Ali doesn't think that Ayşe will come"

Presupposition: Ayşe may or may not come. But it is more possible for her

not to come according to Ali.

The fact that the negation test is applicable to Turkish, just like English, is crucially important because negation is considered as "the key diagnostics" by Aravind and Hackl (2017) for an understanding of children's interpretation of (non)factivity. They argue that in order to find out whether a child interprets the presuppositional meaning of factive predicates in an adult like manner, one needs to look into whether the child can "(i) draw the right inferences about the truth of the complements, and (ii) treat this inference as a presupposition", and negation is the tool with which one can meet this challenge (p. 3). So in most of the previous studies on the acquisition and comprehension of factivity, children are tested with sentences which include both factive verbs and negation. As Aravind and Hackl (2017) states, "if the child can reliably draw an inference about the truth of the embedded proposition in negative environments, she may be taken to understand not only that factives take true complements, but also that the truth of the complement is presupposed" (p. 3).

Despite the fact that Turkish and English differ from each other in structures of complementation and negation, they behave similarly in terms of (non)factivity and its semantic and pragmatic relations with negation. Therefore, the aim of the present study is to indicate whether this similarity between two languages will be preserved in the comprehension of the combination of factivity and negation. To do so Turkish-speaking children's understanding of (non)factivity and negation will be investigated by conducting Experiment 1.

In what follows, I will explain the experimental design, including the participants, materials and procedure with sample protocols. Then I will lay out the predictions of the study. The results we have obtained will be presented in Section 3.

3.2 Experiment 1: Comprehension of negation when it combines with (non)factive verbs

In Experiment 1, Turkish-speaking children's comprehension of negation when it is in relation with (non)factive verbs in complex sentences will be investigated. The current study departs from the previous literature on the issue in various ways. In most acquisition studies on factivity children have been tested in a way that that the test items do not constitute a storyline, i.e., there has been no story providing background information to the children in order to make them relate the presupposition in the sentences. What is more, Question Under Discussion (QUD) hasn't been paid attention to other than Arvind and Hackl (2017). In the present study, as I will discuss thoroughly in the ensuing sections the children tested were presented with stories that gave them background information and the test sentences were checked with extra attention to their relatedness to the issue in order not to yield any pragmatically infelicitous situations.

3.2.1 Participants

Ninety monolingual Turkish-speaking children recruited from kindergartens and primary schools participated in the experiment. Participants were divided into two groups according to their ages as shown in Table 2. Eighteen Turkish-speaking adults (mean age: 28;4) also took part in the control group.

Table 2. The Participants in the Experiment

Age Group	Mean Age	Age Range	Number of Children per Group
Group 1 Preschool children	5;6	4;1 – 6;4	60 (28 female, 32 male)
Group 2 Elementary School children	8;6	8;1 – 9;2	30 (13 female, 17 male)
Group 3 (Adults)	28;4	27 – 33	18 (10 female, 8 male)

Parental consent was obtained for all the child participants before the test was administered. Children were tested individually in a quiet room in their own school and rewarded with stickers as a compensation for their participation in the experiment. The test was terminated whenever the child did not want to continue. The control group included eighteen adults ranging in age 27 to 33. All the adult participants are university graduates.

3.2.2 Experiment design and materials

The experiment implemented a Truth Value Judgement Task (Thornton and Crain, 1999) where the children were asked to evaluate the utterances of the main character about the stories, that is Kermit. At the beginning of the task, the children are introduced with the puppet Kermit and told that Kermit has to take an exam. The teacher – who is supposed to give Kermit the exam—however, is experiencing some

problems, as his assistant is sick, so he needs some assistance in administering the exam. At that moment the children are asked if they would be willing to help Kermit's teacher in the exam. Upon children's consent, they are told that together with Kermit they would see some stories about Big Bird, a character from the Sesame Street Children's TV Series. After each story, Kermit would utter a sentence about what happened in the story. The child's task is to judge these utterances as correct/true or incorrect/ false and to provide an explanation as to why Kermit was right or wrong in order to give Kermit some feedback. A grade sheet which has Kermit's picture on it, is also provided to the children and they are told to give Kermit a star for each correct answer and take a point off for each incorrect answers (by putting a minus sign), so that the children would take the task more seriously.

In the experimental setup each child saw eight stories, which in turn corresponded to eight test sentences. The test sentences were complex sentences consisting of an embedded clause and a main predicate as in "*Büyükannesi Minik Kuş'un havuza girdiğini anladı / Her grandmother understood that Big Bird dived into the pool*". In the predicate position, there were a total of six verbs, including both factives and non-factives, each of which has four conditions in terms of (non)factivity and negation, and two truth-value conditions, i.e., True or False. The verbs tested in the experiment are two cognitive factive verbs (*bil- / know* and *anla- / understand*), two emotive factive verbs (*sevin- / be happy* and *üzül- / be sad*) and two non-factive verbs (*san- / suppose/believe* and *düşün- / think*). The place of the negation in the sentence, i.e., whether it is in the embedded clause, in the matrix clause or in both of them, determines the negation and (non)factivity condition. Truth-value condition, on the other hand, was defined in accordance with the story, i.e., the children were provided sufficient information that enabled them to judge an

utterance as True or False. The conditions in the experiment are summarized in Table 3. (Non)factive verbs were always used as the main predicate of the complex sentence and were presented to the children in a way that;

    i.   the predicate of the complement clause and that of the main clause are both positive, i.e., the Positive-Positive (PP)-condition in True and False condition,

    ii.   the (predicate of the) complement clause is positive, the matrix clause is negative, i.e., Positive-Negative (PN)-condition in True and False condition,

    iii.   the complement clause is negative, the matrix clause is positive, i.e., (NP) -condition in True and False condition,

    iv.   the complement clause is negative, matrix clause is negative, i.e., Negative-Negative (NN) condition in True and False condition.

Table 3. Conditions in the Experiment

Complement Clause	Matrix Verb	Truth Value
(1) Positive (P)	Positive (P)	True (T)
		False (F)
(2) Positive (P)	Negative (N)	True (T)
		False (F)
(3) Negative (N)	Positive (P)	True (T)
		False (F)
(4) Negative (N)	Negative (N)	True (T)
		False (F)

To sum up, Experiment 1 included 48 (6 verbs x 4 negation and (non)factivity conditions x 2 truth-value conditions) test sentences. Since the number of the test items was somewhat high, we have decided to divide the items into six test

groups, namely Test A, Test B, Test C, Test D, Test E and Test F.[34] Each test

included 8 test sentences, which meant 8 verbs and 8 stories. Recall that, the total

number of verbs that we intend to test is 6. So each test included all the verbs, which

in turn corresponded to 6 test sentences. The remaining two sentences (and verbs)

were chosen in accordance with the conditions laid out below:

(i)   Each test began with a PP True sentence, which served as a warm up.

(ii)   Each test includes all of the four conditions in terms of negation as

         shown in Table 3.

(iii)   The same verb in a specific negation and (non)factivity condition

         could be included as either in True or False condition. In other words,

         the same verb could not appear in the same negation and

         (non)factivity condition both in True and False conditions. For

         example, if the verb *anla-* was included in Test A as in PP True

         condition, Test A could not have the verb *anla-* in PP False condition

         at the same time. But Test B could have *anla-* in PP False condition.

(iv)   Different conditions are sequenced in each group. If there are same

         conditions in terms of negation and (non)factivity with different

         verbs, their False or True counterparts do not follow each other, for

         instance, NP-True condition is never followed by NP-False condition

         even though they were with different verbs.

(v)   If a verb was used in a test group twice in different conditions, the

         stories provided were changed. For example, Test A included the verb

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[34] Considering that it would be very tiring and ineffective to test a child at one go with more than 8 items, we opted for administering the test in 6 different conditions. Needless to say, this resulted in extra work on part of the experimenter, however, by proceeding in this fashion we were able to test more verbs and more children.

anla- in both PP and NN conditions, but the stories presented for them were different from each other.

(vi)   Same verbs in different conditions in terms of negation could follow each other if the stories provided for them were related. For example, the verb *sevin-* in PP False condition was followed by again the verb *sevin-* but in NN True condition this time. The stories presented for both test items were related to each other. In other words, the story for *sevin-* in NN True condition was a continuation of the story for *sevin-* in PP False condition.

(vii)   True and False conditions were balanced within the test groups.

The content of each test group (A to F) is summarized in Table 4. As the table illustrates each condition involves 8 test items where 6 verbs are tested. Of these 8 test items, two always test the same verb in different truth conditions, i.e., in accordance with the conditions described above. Since there are six test groups, each test item was seen by 10 participants in Group 1 (60 Preschool kids), 5 participants in Group 2 (30 Elementary School kids) and 3 participants in Group 3 (18 Adults). So each participant only saw the test items in the test to which they were assigned. For example, 10 children saw the verb *anla-* in PP True condition as in (7) where the story was compatible with the truth value, i.e., Big Bird ate a lot of chocolates and her grandmother found it out whilst another group of 10 children were presented the verb *anla-* in PP False condition as in (8) where the story the child was presented with was incompatible with the sentence in (8) and Kermit's judgment reflects that, hence the sentence is False

(7) Büyükannesi Minik Kuş'un çok çikolata yediğini anladı (PP True)

"Her grandmother understood/ figured that Big Bird ate a lot of

chocolates"

(8) Büyükannesi Minik Kuş'un çok çikolata yediğini anladı (PP False)

"Her grandmother understood that Big Bird ate a lot of chocolates"

Table 4. Distribution of Test Items with Respect to Matrix Verbs Among Groups

Test A	anla- *PP-T*	anla- *NN-F*	bil- *PN-F*	san- *NP-T*	düşün- *PN-T*	üzül- *NP-F*	sevin- *PP-F*	sevin- *NN-T*
Test B	düşün- *PP-T*	anla- *NN-T*	bil- *NP-F*	sevin- *PN-T*	düşün- *NN-F*	anla- *PP-F*	üzül- *NP-T*	san- *PN-F*
Test C	sevin- *PP-T*	san- *NP-F*	düşün- *NN-T*	anla- *PN-T*	düşün- *PP-F*	bil- *NP-T*	üzül- *PN-F*	sevin- *NN-F*
Test D	bil- *PP-T*	üzül- *NN-T*	anla- *NP-F*	san- *PN-T*	üzül- *PP-F*	bil- *NN-F*	sevin- *NP-T*	düşün- *PN-F*
Test E	san- *PP-T*	üzül- *PN-T*	anla- *NP-T*	bil- *PP-F*	san- *NN-F*	sevin- *PN-F*	bil- *NN-T*	düşün- *NP-F*
Test F	üzül- *PP-T*	anla- *PN-F*	san- *NN-T*	düşün- *NP-T*	üzül- *NN-F*	sevin- *NP-F*	bil- *PN-T*	san- *PP-F*

While choosing target verbs both in complement and matrix positions,

saliency of the verbs for children in their daily lives was a criterion we paid attention

to. The truth value of the utterance is determined in accordance with the matrix verb.

For instance, if the child is exposed to a PN False condition, the story is prepared in

such a way that it is the situation denoted by the matrix verb that is falsified, not the

situation denoted by the complement clause. If the complement clause was also

falsified, it would be difficult to understand whether the child evaluates the utterance

as false because of the complement clause or the matrix verb. Since the aim of the

current study is to unpack what lies at the heart of children's comprehension of

negation when it combines with factive and nonfactive verbs, it is important to

ensure that the child evaluates the truth value of the test items by considering the entire sentence.

3.2.3 Procedure

All child participants were tested individually in a quiet room at their school. A Truth Value Judgment Task was used and children's responses were recorded throughout the experiment. Each test item was presented with a scenario supported by audiovisuals. Audio materials were prerecorded by a native speaker of Turkish and the voice files were superimposed on silent videos of Sesame Street characters who were the main characters in scenarios presented to the children in the test. While superimposing the audio files on videos, it was ensured that mouth movements of the Sesame Street character were in sync with the audios in order not to distract the attention of the children tested.

Each test has been built around the main scenario in which Kermit takes an exam and his teacher, Eddie, asks the children if they would like to help him in grading. Each test begins with the scene where Kermit introduces himself. Then his teacher Eddie appears on the screen as in Figure 1 and gives the children instructions:

Hello! I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me? [Children say 'yes'] Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about

69

what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give Kermit some feedback. So you should explain to him why you think Kermit's answer is true or false. Let's get started if you are ready!
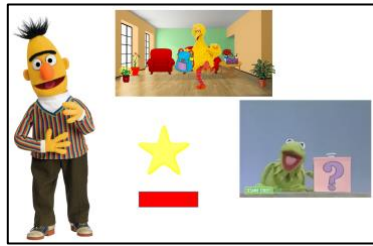
Figure 1. Kermit's teacher is explaining the tasks to the participant

After Kermit's teacher Eddie gives instructions, the experimenter briefly summarizes what he said in order to make sure that the children understand the task. Then the experimenter introduces the first story to the children by saying "Now this is the first story. Listen and watch carefully. After the story, Kermit will utter a sentence about the story and you will tell us whether you think it is true or false". Upon presentation of the story, Kermit utters a sentence and the child evaluates it as True or False against the background provided in the story. The child also comments why s/he judged it so. Then the second story starts and it continues likewise till the end of the experiment.

An important issue to be noted here is that while creating the experimental setup, in order to prevent incorrect or invalid answers that would stem from memory load, in long and complicated scenarios, the experimenter asked children questions as to whether they were able to follow what was going on in the story or briefly summarized incidents or what characters said. For test items which included emotive

factives, a smiling or sad emoticon appeared on the screen in order to prevent children over-empathizing with the scenario and answer accordingly without taking into account what characters said and/or really felt. Now let us consider some sample scenes and scenarios from the test in order to fully lay out the procedure. The complete version of the scenes and scenarios can be found in Appendix A.

After the introduction part, each group had a PP True condition as a warm up because PP True condition is easier to interpret for children (Oiry & Hartman, 2008). For example, Test B started with the non-factive verb *düşün-* 'think' in a PP True condition as in (9). Figure 2 presents the scenario for this target sentence.

(9) Minik Kuş yağmur yağacağını düşünüyor   True

  "Big Bird thinks that it will rain"

Sample Story-I	
	Big Bird wanted to go out. She looked outside the window to see what the weather was like.
	After that, she went to her wardrobe and took her umbrella and rain boots.
	Kermit: *Minik Kuş yağmur yağacağını düşünüyor /* *Big Bird thinks that it is going to rain*

Figure 2. Sample Story-I for the verb *düşün- / to think* in PP True condition

71

In the ensuing pages I will provide an example sentence for each condition tested. Let us continue with the target sentence (10) which is an example for the cognitive factive verb *bil- / to know* in PP False condition presented in Figure 3.

(10)   Minik Kuş evde kek olduğunu biliyor   False

"Big Bird knows that there is cake at home"

Sample Story-II	
	Big Bird was hungry and wanted to eat some cake. When she came back from school, she looked through the kitchen window to see if there was any cake on the counter and saw that there was no cake there.
	Then she headed toward the door to get into the house. Right at that time, her grandmother went into the kitchen and put a cake on the counter.
	Kermit: *Minik Kuş evde kek olduğunu biliyor / Big Bird knows that there is cake at home*

Figure 3. Sample Story-II for the verb *bil-* in PP False condition

For PN True condition, let's consider sentence (11) with cognitive factive verb *anla- / to understand* presented in Figure 4.

(11)   Büyükanne Minik Kuş'un havuza girdiğini anlamadı   True

"Grandmother didn't understand that Big Bird dived into the pool"

Sample Story-III	
	Big Bird was very sick last week. After she went to the doctor she got better and she is ready to go to school again. That day, Big Bird had a swimming class at school. She liked swimming a lot, so she was very excited. Before going to school, her grandmother said to Big Bird: "Big Bird, I know you love I, but you have just recovered. Please don't swim in the pool today. I don't want you to get sick again.
	As Big Bird loves swimming, she couldn't help but dived into the pool during the swimming class. When she got back home, she dried her swimsuit and towel in the garden and put them back in her room so that her grandmother wouldn't find out that she swam.
	Kermit: *Büyükanne Minik Kuş'un havuza girdiğini anlamadı /* *Her grandmother didn't understand that she swam in the pool*

Figure 4. Sample Story-III for the verb *anla- / to understand* in PN True condition

Sentence (12) is an example for the non-factive verb *san- / to think/suppose* in PN False condition presented in Figure 5.

73

(12)   Minik Kuş, annesinin eve döndüğünü sanmıyor

"Big Bird doesn't suppose that her mother came back home"

Sample Story-IV	
	Big Bird's mother is going to a business trip and she will be away for a week. Big Bird will miss her a lot.
	When her mom is away, and Big Bird is at school, a friend of grandma comes to visit the grandma. She comes in and hangs her scarf on the hanging rack at the entrance and put her bag on the floor. Quite surprisingly grandma's friend has the same scarf and bag with Big Bird's mother
	When Big Bird comes home from school she sees the scarf on the rack and the bag on the floor and thinks…
	Kermit: Minik Kuş, annesinin eve döndüğünü sanmıyor / *Big Bird doesn't think that her mother came back home*

Figure 5. Sample Story-IV for the verb *san- / to think/suppose* in PN False condition

For NP True condition, we can consider sentence (13) with the emotive

factive predicate *sevin- / be happy* presented in Figure 6.

(13)   Minik Kuş, Zuzu ile karşılaşmadığına sevindi

         "Big Bird is happy that she didn't run into Zuzu"

Sample Story-V	
	Big Bird is friends with Cookie Monster and Zuzu. She loves Cookie Monster but she does not get along well with Zuzu.
	One day when she is on vacation, she runs into Cookie Monster and Cookie Monster says: "Zuzu is here, too. Have you seen her?" Big Bird: "No, I haven't, and I am glad that I haven't seen her at all!"
	Kermit: *Minik Kuş, Zuzu ile karşılaşmadığına sevindi /* *Big Bird is happy that she didn't run into Zuzu*

Figure 6. Sample Story-V for the verb *sevin- / to be happy* in NP True condition

For NP False condition, let us consider an example with another emotive

factive predicate *üzül- / to be sad* as in (14) presented in Figure 7.

75

(14)   Minik Kuş, babasının işten erken gelmemesine üzüldü   False

"Big Bird is upset that her father won't come home from work

earlier"

Sample Story-VI	
	Before he goes to work in the morning, Big Bird's father says to Big Bird: "Big Bird, if I can come home early, we can go to the cinema. I will call you and let you know."
	While Big Bird is waiting to hear from her father, her grandmother comes in and says: "Big Bird, there is a very good play in the theater. Shall we go together and watch it this evening?" Big Bird says to her grandma: "Maybe we are going to go to the cinema with my father. But it isn't certain, yet. He will call me and let me know if he can leave work early today. If he is not available, we can go to the theatre together."
	Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I can quit from work late today. I am so sorry. Can we go to the cinema another day?" Big Bird says, "Of course, dad, no problem. Grandma wants to go to theater with me. Then I can go with her. We can go to the cinema later."
	Kermit: Minik Kuş, babasının işten erken gelmemesine üzüldü / *Big Bird is upset/sad that her father won't come home earlier*

Figure 7. Sample Story-VI for the verb *üzül- / to be sad* in NP False condition

76

For NN True condition, let's consider sentence (15) explained in Figure 8 below.

(15)   Minik Kuş evde kurabiye olmadığını bilmiyor

"Big Bird doesn't know that there aren't cookies at home"

Sample Story-VII	
	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together " Before she enters home, Big Bird wants to check whether there are any cookies in the kitchen so she looks through the kitchen window and sees grandma holding a plate full of cookies. Grandma puts the cookies on the counter and leaves the kitchen. Big Bird says, "Hooray! There are cookies at home. I shall call Cookie Monster now!"
	While Big Bird is in the living room, calling Cookie Monster, grandma comes back to the kitchen, takes the cookies away and says, "I shall take these cookies to the neighbor. We can eat them together."
	Kermit: *Minik Kuş, evde kurabiye olmadığını bilmiyor /* *Big Bird doesn't know that there are not any cookies at home*

Figure 8. Sample Story-VII for the verb *bil-* in NN True condition

For the NN False condition, let's consider the sentence (16) presented in Figure 9.

(16)   Büyükannesi Minik Kuş'un havuza girmediğini anlamadı   False

"Her grandmother didn't understand that Big Bird didn't swim in the pool"

Sample Story-VIII	
	Big Bird is going to school in the morning. When she is about to leave, her grandma comes and says: "Big Bird, you have a swimming class today! I know you are afraid of swimming, but please try to dive into the pool and swim today, ok? There is nothing to be afraid of."
	Then she goes to school. In the swimming class, all of her friends jump into the pool one after the other. Finally, it is Big Bird's turn. She wants to give it a try, however, she is afraid and cannot dive into the pool.
	When she comes back home, she does not want grandma to think that she did not swim so she wets her swimsuit and towel in the garden. But right at that time grandma was behind the fence and saw what Big Bird was doing. But Big Bird did not see her.
	Kermit: Büyükannesi Minik Kuş'un havuza girmediğini anlamadı / *Grandma didn't understand that Big Bird didn't swim in the pool*

Figure 9. Sample Story-VIII for the verb *anla- / to understand* in NN False condition

78

3.2.4 Scoring and coding

The responses of the participants are first orthographically transcribed and classified by the experimenter. Children's responses are initially classified in three groups, namely (i) correct answers, (ii) incorrect answers and (iii) irrelevant answers. In this section, the criteria used in classifying the types of responses will be explained.

As described in the Procedure section, the task of the children in the test is to evaluate Kermit's predictions, and tell the experimenter whether s/he thinks the sentence uttered by Kermit is True or False and then explain the reasons why his prediction is True or False. Answers including both a correct evaluation of the target sentence, and a reasonable and correct explanation are considered as correct. Let us consider the sample dialogue in Table 5 (see Story for Item 1 in Test B in Appendix A) from the test below to see what kinds of answers are evaluated as correct. As dialogue below shows, the participant correctly evaluates the target sentence and then gives the reason as to why his prediction is correct.

Table 5. Sample Trial-I

Kermit: Minik Kuş yağmur yağacağını düşünüyor / *Big Bird thinks that it is going tol rain*
Participant (5;5): True
Experimenter: Why do you think this is correct?
Participant: Because she took her umbrella and rain boots.

For some test items, children were a bit confused about the scenario and did not understand the storyline well. In these cases, even though they gave an incorrect assessment of the situation, after the experimenter briefly summarized what went on in the slides, it was observed that the children gave correct answers with relevant reasons. These responses are considered as correct, as well. Now consider the sample

dialogue from the experiment with another child (5;6) in Table 6 (see Story for Item 6 in Test A in Appendix A). Even though a smiling or a sad face emoticon appears on the screen for target sentences with emotive factives in order to prevent any misunderstanding, some children, like the one in this item, over-empathize with the scenario and give incorrect answers. In these cases, the experimenter asks the kid if s/he is sure about the judgment s/he provided and if s/he'd like to go through the scenario again. If the child wants to see it again, the experimenter shows the pictures again and briefly summarizes what is going on. After this repeat session, if the child gives a correct evaluation with a relevant reasoning, his/her answer is considered as correct.

Table 6. Sample Trial-II

| **Kermit:** Minik Kuş, babasının işten erken gelmemesine üzüldü / *Big Bird is upset/sad that her father won't come home earlier* |
| **Participant (5;6):** True |
| **Experimenter:** Are you sure? |
| **Participant:** [No answer] |
| **Experimenter:** Would you like to listen again? [They are looking through the scenario again.] |
| **Participant:** False |
| **Experimenter:** Why is it false? |
| **Participant:** Because she didn't get upset because they will go to the cinema later. |

If the explanation provided by the child is irrelevant or the child provides no justification for her/his answer, the answer is considered as invalid regardless of whether the evaluation of the target sentence is correct. Let us consider the sample dialogue in Table 7 (see Story for Item 1 in Test B in Appendix A) with Ece (4;3). She incorrectly evaluates the target sentence as False and provides an irrelevant reason for her evaluation.

Table 7. Sample Trial-III

Kermit: Minik Kuş yağmur yağacağını düşünüyor / *Big Bird thinks that it will rain*
Participant (4;3): False
Experimenter: Why?
Participant: Because it was a duck.

Some incorrect answers appear to have stemmed from lack of Theory of Mind abilities or the children's ethical concerns. Scenarios for some of the test items require participants to understand the mental state of other characters in the test. More precisely, in some scenarios children should put themselves in the characters' shoes in order to evaluate the test items correctly. But a number of children failed in this and their answers are considered as irrelevant or invalid in order to make sure that their judgments did not interfere with what we are interested in unearthing regarding how children tackle the comprehension of factivity and negation, such as interpreting NN as NP. Of course, ToM is an important issue here, but it will be discussed separately from factivity and negation. An example for an irrelevant answer due to the underdeveloped ToM abilities can be seen in the dialogue with a child (6;4) in Table 8 (see Story for Item 4 in Test E in Appendix A) on the target sentence with cognitive factive *bil- / to know* in PP False condition. Here, even though the child appears to have correctly understood the story, she answered incorrectly as she appeared to lack the necessary abilities to interpret things from the perspective of another, i.e. Big Bird in this case.

As stated in the previous paragraph, some of the children gave incorrect or irrelevant answers because they focused on the ethics of the story told. Let us consider the dialogue below with Kerem (5;4) in Table 9.[35] In the story for the

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[35]The story is identical with Sample Story-VIII in Figure 9, so we don't include the whole story in the sample dialogue in Table 9, but only the test sentence.

cognitive factive verb *anla- / to understand* Big Bird tricks her grandmother. Some

of the children have only focused on this presumed unethical behavior and evaluated

the target sentence as false on the grounds that it is unethical to trick one's

grandmother. These answers are also considered as irrelevant or invalid.

Table 8. Sample Trial-IV

Kermit: Minik Kuş evde kek olduğunu biliyor / *Big Bird knows that there is cake at home*
Participant (6;4): True
Experimenter: Why is it true?
Participant: Because while she was looking through kitchen window there was no cake. But her grandmother made it and put it in the kitchen and Big Bird didn't look into the kitchen through the window again.
Experimenter: Then does Big Bird know or not know that there is cake at home?
Participant: She knows (that there is)

Table 9. Sample Trial-V

Kermit: Büyükannesi Minik Kuş'un havuza girmediğini anladı / *Her grandmother understood that Big Bird didn't plunge into the pool*
Participant (5;4): False
Experimenter: Why? Let's tell the reason to Kermit so that he can learn
Participant: Because she did something wrong. She lied.

Finally, incorrect evaluations with reasonable explanations related to issues

about the comprehension of factivity and negation are scored as incorrect. Examples

for incorrect answers will be discussed in the next section which focuses on results.

3.2.5 Hypotheses and predictions

Bearing in mind the results of the previous studies on the comprehension of factivity

and negation, the hypotheses and the predictions of the current study are summarized

in Table 10.

Table 10. Hypotheses

HYPOTHESIS 1 *Correct Response Rate within Verb Categories*	Preschool age group will be more successful with factive verbs, especially emotive factives and they will show the poorest performance on non-factives.
	As opposed to Hopmann and Maratsos (1977), I predict that children will be more successful in interpreting target sentences with emotive factives than cognitive factives. Because with factive verbs one needs to understand the state of mind of the character, so there is a change of perspective. However there is no perspective change in emotive factives, which makes it easier for children to understand.[36]
HYPOTHESIS 2 *Correct Response Rate within Conditions in terms of Negation*	Bearing in mind that the results of the previous studies, the accuracy of children's responses to PP both in True and False conditions will be higher than other conditions
	NN, especially in False condition, will be the hardest condition for preschool group and the accuracy level of answers will be the lowest for this condition.
HYPOTHESIS 3 *Pragmatics*	As suggested by De Villiers and Flusber (1975), false negative sentences will be processed more accurately and faster than true negative sentences.
HYPOTHESIS 3 *Common Error Types*	It is very likely for the preschool age group to only focus on the truth value of the complement instead of the whole sentence and evaluate the sentence according to the truth value of the complement as discussed in Karttunen (1971).

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[36] For example, with the cognitive verb *bil- / to know*, Big Bird has a false state of mind when her grandmother takes the cookies while she isn't there. So Big Bird still thinks that there are cookies, but this is not the case anymore. But in emotive factives, for example *üzül- / to be sad*, Big Bird is sad because she cannot go to the cinema with her father. So there is no false state of mind and also a change of perspective. Moreover, emotive factives could also be understood more easily with the help of facial expressions and emoticons provided in experiment. Due to these, the children are predicted to be more successful with emotive factives.

3.2.6 Results and discussion

As expected, the adults who took part in Experiment I as a control group completed the experiment successfully, with a correct response rate of 100% for each verb in each condition. Yet, there was a significant difference between the performance of Preschool and the Elementary school kids. As laid out in Table 11 (which shows the total percentage where both the T&F conditions are merged), the participants in Group 2 (Elementary School kids) behaved adult-like in almost all conditions, except for the non-factive verbs in PP True, (88%), PN True (90%), NN True (90%) and NN False (88%) conditions where again their correct response rates were very close to the adults' rate. Turkish preschool kids (Group 1) in stark contrast to the performance of their English-speaking agemates also performed relatively well in most of the conditions. Not surprisingly though they have erred significantly more than elementary school kids, hence their correct response rates appear to be lower than Group 2. In particular, they also had troubles with non-factive verbs, especially in the NN condition. Figure 10 below illustrates the correct responses of Preschool kids in PP, PN and NP conditions where children appear to have performed almost adultlike, and NN, where however, their success rate is relatively low.
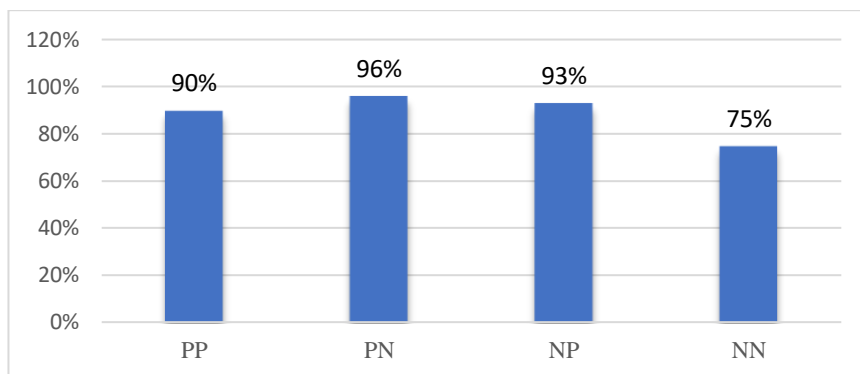
Figure 10. The correct response rates for each condition by preschool kids

Table 11. Proportion of Correct Answers by Three Groups

Condition	Verb Type (CF: Cognitive Factive EF: Emotive Factive NF: Non-Factive)	Preschool kids (mean: 5;6)	Elementary S. kids (mean: 8;6)	Adults
PP True	CF	100%	100%	100%
	EF	100%	100%	100%
	NF	71%	88%	100%
PP False	CF	86%	100%	100%
	EF	100%	100%	100%
	NF	81%	100%	100%
PN True	CF	100%	100%	100%
	EF	100%	100%	100%
	NF	100%	90%	100%
PN False	CF	100%	100%	100%
	EF	94%	100%	100%
	NF	83%	100%	100%
NP True	CF	94%	100%	100%
	EF	100%	100%	100%
	NF	100%	100%	100%
NP False	CF	90%	100%	100%
	EF	100%	100%	100%
	NF	73%	100%	100%
NN True	CF	93%	100%	100%
	EF	100%	100%	100%
	NF	49%	90%	100%
NN False	CF	86%	100%	100%
	EF	64%	100%	100%
	NF	55%	88%	100%

As discussed in Chapter 2, there could be a number of reasons including but not limited to syntactic, cognitive and pragmatic issues causing the children in Group 1 to make more errors. These errors will be examined under four groups below, namely (i) PP related errors, (ii) PN related errors, (iii) NP related errors and finally (iv) NN related errors. Now let us focus on some potential reasons that may have led to the poorer performance of Group 1 in certain verbs and conditions.

3.2.6.1 PP related errors

As predicted, the children in Group 1 performed almost adult-like in PP condition.

The results are shown in Table 12 below.

Table 12. Proportion of Correct Answers by Group 1 for PP True and False
Conditions

Verb Type	Verb	True	False
Cognitive Factive	anla- 'understand'	100%	100%
	bil- 'know'	100%	71%
Emotive Factive	üzül- be sad'	100%	100%
	sevin- 'be happy'	100%	100%
Non-Factive	san- 'suppose'	43%	63%
	düşün- 'think'	100%	100%

The performance of children in Group 1 on cognitive and emotive factives
was almost adult like with a correct response rate of 100% for the cognitive factive
anla- / to understand and the emotive factives for both the PP True and the False
conditions. Children's take on the cognitive factive *bil-*, however, in particular in the
PP False condition, differed remarkably. The reason for the low rate of correct
answers (71%) for *bil- / to know* in PP False condition appears to be stemming from
the fact that children may have paid attention only to the truth value of the embedded
clause and judged the test sentence accordingly. For example, when children are
invited to judge the truth or falsity of Kermit's statement in (17) against the backdrop
of a scenario where Big Bird wants to eat some cakes, looks into the kitchen window
and sees no cake on the kitchen counter; quite upset with the outcome heads to the
entrance door and in the meantime the grandma comes into the kitchen with a plate

of cake and put it on the kitchen counter, they are expected to judge it as Big Bird didn't see her grandmother bringing in a plate of cake to the kitchen.

(17)   Minik Kuş evde kek olduğunu biliyor   False
        "Big Bird know that there is some cake in the house"

The incorrect answers in this condition mostly stemmed from children's evaluation of a sentence with respect to the truth of the complement clause rather than the entire sentence. (17) has been misjudged as True as children appear to have concluded that the sentence must be true as there is cake at home.

This error type could be an example of not only syntactic difficulties, but also conceptual and cognitive difficulties. (17) is a complex sentence, including two affirmations (i.e. the embedded clause and the main clause) at the same time which may causes a syntactic difficulty to process the sentence and also might lead to a memory load. Since children heard the embedded part first, they might have stored only the embedded clause in their short-term memory and answered accordingly. Additionally, this error may be due to as yet underdeveloped Theory of Mind (ToM) abilities. Probably the children who misjudged (17) were not able to attribute to Big Bird a mental state where Big Bird is unaware of the outcome as she has not seen her grandmother with the cake. They have, however, attributed what they saw in the kitchen to Big Bird as if she were there and knew that there was cake.

Let us now turn to a discussion of the non-factives. As Table 12 shows, children's performance with non-factive verbs is somewhat odd. Unlike their English speaking agemates they did well with *düşün- / to think* in both the PP True and False conditions, however, with *san- / to suppose* the success rate drops down to 43% in

True and 63% in False conditions. What would be the reason for this significant difference between children's performance in *düşün-* and *san-* despite the fact that they are both non-factives? First of all, even though both verbs are considered as non-factive verbs, there are important conceptual differences between them. I believe that the non-factive verb *düşün-*, similar to *think* in English, denotes that the speaker, who utters a sentence with *düşün-*, has made some deductions from a possible alternative; has drawn a conclusion, maybe more like a prediction, and expresses this by using this verb. To illustrate what is at issue here let us revisit (18) below uttered by Kermit again, against the story where Big Bird having looked out of the window, decides to take his umbrella and rainboots from the wardrobe.

(18)   Minik Kuş yağmur yağacağını düşünüyor

"Big Bird thinks that it is going to rain"

All the participants agreed with Kermit's True reply for (18) and when they were asked why, they said, "çünkü şemsiyesini ve botunu almış / because she took her rain boots and umbrella". This suggests that the children were able to make an inference, along the lines that Big Bird has either observed that the weather is cloudy or rainy and hence must have deduced that she should wear her rain boots and take her umbrella with her. Even though the verb *düşün-* is non-factive, its usage is based on making inferences about a situation, which makes it relatively closer to the factives because its presupposition is supported by reliable inferences and this increases the certainty and concreteness of the verb *düşün-*.

However, *san-* is way more different, even trickier, than the verb *düşün-*. First of all, *san-* is a verb that has implicit negation, i.e., the complement is very

likely to be considered as False. In other words, we use *san- / to suppose* in situations when we realized that we suppose an incident as it happened even though it didn't happen in fact or vice versa. For example, think of a situation where someone hears a very loud noise coming from the outside of the house. Let's say this person thinks that the noise might be thunder. But then she or he looks outside from the window and see there has happened a car accident and the noise has originated from this. So this person is very likely to say "Gökgürültüsü sandım / I supposed that it was a thunder" when she or he has found out that there has been a car accident on the street. But she or he is the least likely to say, "Gökgürültüsü olduğunu düşündüm / I thought that it was a thunder" when she or he realizes that it hasn't been a thunder, but a car accident. So *san-* attributes a false state of mind to the attitude holder by default.[37] In order to correctly understand this verb, one should be aware that what the speaker is saying or what is attributed to the attitude holder, i.e., the presupposition, isn't really what is happening in fact, but only the speaker's or the attitude holder's misinterpretation of the input. Unlike *düşün-* which expresses possible presuppositions, i.e., deductions or predictions based on inferences, what *san-* expresses is not something deducible or informative, but a misunderstanding of what happened in reality.

To show the difference more clearly, let us focus on sentence (19) where children were told a story, very similar to the rain story that they heard in (18).[38] This time, the children were presented with first a picture in which the grandmother hang out the laundry in the balcony and water drops were falling down from the balcony.

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[37]Tense, aspect and modality features affect the denotation of the verb san. In past and future tense, it expresses false belief, but in present tense it is ambiguous. It could express either false belief or just a belief (Schatz, 2003). But in this study we have created scenarios in such a way that the verb san- in present tense denotes false belief.
[38] Please note that children were not presented with both *düşün-* and *san-* in PP condition or with similar scenarios.

When Big Bird saw these water drops, she took her rain boots and umbrella before going out. Then Kermit uttered the sentence (19).

<blockquote>

(19)   Minik Kuş yağmur yağdığını sanıyor   True

    "Big Bird thinks/belives that it is raining"

</blockquote>

(19) should be judged as True as it was not raining, however, that Big Bird takes her umbrella with her suggests that Big Bird was fooled into believing that it was raining when in fact the water drops resulted from the wet laundry hung in the balcony. The majority of the children correctly judged Kermit's utterance as True, however, when they are asked how they have arrived at this conclusion they replied as "Çünkü yağmur yağıyor. Minik Kuş şemsiyesini ve yağmur botlarını aldı. / Because it is raining. Big Bird took her umbrella and rain boots". Even though the children had seen the clothes hanging in the balcony and water dripping from the clothes they made the inference that it was/ or must be raining outside by looking at what Big Bird was doing without considering the possibility of Big Bird might have had a false belief about the weather. This suggests that children have difficulties with more abstract non-factive verbs, like *san-*, because they seem to be unable to distinguish between what had really happened and what the protagonist in the sentence had understood. As mentioned earlier, in order to fully understand a sentence with *san-*, the children need to first understand that the attitude holder might have understood things incorrectly and second that it does not prove that it is raining because the protagonist of the sentence thinks/believes so. In other words, the children appear not to have complete grasp of the relation between non-factive predicates and their complement clauses. Recall that, non-factives do not presuppose

or entail the truth of their complements. The complement might be false as in the example above. In this situation, what the children should do is to attribute a false belief to the attitude holder instead of a true belief –as they did with factives. But the performance of the children suggests that they are not good at attributing false beliefs to the attitude holders. Rather they took the complement of the non-factives for granted just like they did with factives. In other words, the children are found out to overfactivize the non-factive verb *san-*. Therefore, we can draw the conclusion that because of the conceptual differences between the two verbs, the children were more successful with *düşün-* compared to *san-*. Again, ToM abilities appear to have an important role here, i.e., children appear to be unable to view incidents both from their own perspective and from the perspective of another person.

3.2.6.2 PN related errors

Preschool children performed superbly in the interpretation of factive verbs, the true condition of the emotive factives and the non-factives when the matrix predicate was negated. As laid out in Table 13, 5-year-old Turkish-speaking did not err at all with *anla-*, and *bil-* in True&False; and *üzül-*, *sevin-*, *san-* and *düşün-* in the True condition.

Table 13. Proportion of Correct Answers by Group 1 for PN True/False Conditions

Verb Type	Verb	True	False
Cognitive Factive	anla-	100%	100%
	bil-	100%	100%
Emotive Factive	üzül-	100%	100%
	sevin	100%	88%
Non-Factive	san-	100%	89%
	düşün-	100%	78%

In the False condition, however, their performance was poorer with the nonfactives and the emotive factive *üzül-*. Let us consider (20) below which was mostly judged as True by children below to ponder upon what may be at the heart of this difference in children's performance. The children were invited to judge (20) below, against the backdrop of the following scenario:

> Look, this is Elmo, a friend of Big Bird and Cookie Monster from school. There is a race at their school today. Only Cookie Monster and Elmo will participate in the race because they are the finalists. While Big Bird is sitting on a bench in the park, she sees Cookie Monster. Cookie Monster is working out Elmo however is just walking, not working out rigorously at all. Furthermore he is eating something all the time. Big Bird thinks and says: "Hmm… I know who will win the race–of course the one who works out!"

Then Kermit utters the sentence in (20), which is of course False.

(20)   Minik Kuş, Kurabiye Canavarı'nın yarışı kazanacağını düşünmüyor
         "Big Bird doesn't think that Cookie Monster will win the race"

Before Kermit utters (20), the children are asked who is working out more/regularly and who is not, just to make sure that they remember the names correctly and have understood the scenario. But despite rehearsing the storyline some children, misjudged the sentences as True. Though when the child was asked which protagonist was more athletic, he gave the correct answer. The child was insistent on deeming the sentence as True and his reasoning went as follows: "Çünkü Kurabiye

Canavarı kazanacak / Because Cookie Monster will win". This indicates that some of the children focused only on the truth value of the embedded clause and misjudged test sentences accordingly, yielding an interpretation of PN as PP. Thus what appears to be relevant for the child is not what Kermit thinks but the fact that Cookie Monster is more likely to win the race.

Another reason for the inaccurate answers of Preschool children may have to do with their tendency to consider PN sentences as PP, which is called as over-affirmation tendency (Hopmann & Maratsos, 1978). The children's misjudgments of (21) can be a good illustration for this error type. Before Kermit utters (21), the children are told that Big Bird's mother is away on a business trip (please see Appendix A, Test 4) and be away from home for a week. While her mom was away and Big Bird was at school, a friend of grandmother, whose bag and scarf were identical with Big Bird's mother's, visited them hang the scarf on the coat rack and went to the living room. When Big Bird came home from school, she saw the scarf and the bag. In the next picture, in a thought bubble hanging on top of Big Bird's head the child sees Big Bird dreaming that her mom is back. Then Kermit utters (21).

(21)   Minik Kuş annesinin eve döndüğünü sanmıyor   False
        Big Bird doesn't think/ suppose that her mother came back.

89% of the children judged (21) as False, however 11% of the interpretations were of the type where children misjudged the sentence as True and reasoned it out as "Çünkü annesiyle atkısı ve çantası aynı olduğu için annesi geldi zannetti / Since the friend of grandmother has the same scarf and bag with Big Bird's mother, she thought that her mother came". This explanation suggests that some children though

they have comprehended the scenario well, interpreted the PN sentence as PP. This might be related to their expectations. As De Villiers and Flusber (1975) has pointed out, we have the tendency to first utter an affirmative sentence, which is a PP-type sentence, and then claim a negative sentence. For example, if there is a car in the shape of a ball, we are more likely to claim first that what we see is a car and then we can go ahead and say, "It is not a ball." So it may be the case that the children might have also expected a PP-type sentence, which is "Minik Kuş annesinin eve döndüğünü sanıyor / Big Bird thinks/supposes that her mother came back" instead of a PN-type sentence as in (21). Due to this, they might have interpreted PN as PP.

3.2.6.3 NP related errors

5-year-old Turkish speaking children's performance in NP condition is very close to the performance of the adults, except for the non-factive verb *san-* in NP False condition where they displayed a chance level performance, as shown in Table 14 below. The errors for *san-, anla-* and *düşün-* in the False condition again appear to be related with children's tendency (i) to judge the sentences based on the truth value of the embedded clause and (ii) to interpret NP as PP.

Table 14. Proportion of Correct Answers by Group1 for NP True/False Conditions

Verb Type	Verb	True	False
Cognitive Factive	anla-	100%	80%
	bil-	88%	100%
Emotive Factive	üzül-	100%	100%
	sevin	100%	100%
Non-Factive	san-	100%	57%
	düşün-	100%	89%

Similar to the error types in the PN condition, some children evaluated the truth value of the test sentences by focusing on the truth value of the embedded clause in the NP condition, as well. Let us briefly reconsider the scenario that served as a background for the evaluation of Kermit's utterance in (22) (Test D, Item 3 in Appendix A). Big Bird is afraid of swimming, however, her grandmother wants to make sure that she swims in the swimming class. Big Bird pretends that she swam, in fact when she came home, she wetted her towel and swimsuit in order to make her grandmother not understand that she didn't swim. Then she put them in the laundry basket. When her grandmother saw the wet towel and the swimsuit, she said, "Bravo Big Bird! Apparently, she listened to my word!".

(22) Büyükannesi, Minik Kuş'un havuza girmediğini anladı   False

"Her grandma understood that Big Bird didn't plunge into the pool"

(22) is interpreted as True by some children and whereby their reply is reasoned out as "Doğru çünkü havuza girmedi / True because she didn't dive into the pool". Once again we have evidence indicating that children tend to decide on the truth value of the test sentences on the basis of the truth value of the embedded clause. Hence what appears to be worthy information from the perspective of 20% of the children is that Big Bird did not swim in the pool.

Another error type observed in NP condition is children's misinterpretation of NP as PP. Interestingly, this error type was encountered only with non-factive verbs, especially when judging the sentences with *san-*. Now let us consider the reasons leading to the children's almost chance level performance for *san-* in the NP False condition. Obviously the NP True condition does not pose any challenges to the

children as they performed adult-like, whereas their performance for *san-* in NP False condition was the poorest when compared with other verbs and conditions. What would be the reason for the huge difference between the correct response rates for True and False conditions with the verb *san-* in NP? First consider the scenarios provided for True and False conditions. Even though they are very similar as shown in Table 15, there are some slight differences between them, which might be the possible cause of the low rate of correct answers in the False condition. Before examining the scenarios, consider what Kermit uttered at the end of each scenario in (23).

(23)   Minik Kuş annesinin eve dönmediğini sanıyor

    "Big Bird thinks/believes that her mother didn't come back home"

Sentence (23) is True in Story-A, but False in Story-B. The results show that, 100% of the children who were presented Story-A correctly judged (23) as True, while only half of the children who were told Scenario-B evaluated it accurately as False. But what could be the reason for this outcome? In other words, why did children err more in the False condition, in contrast to the True condition?

As the error rates in Table 14 illustrates, better performance in the NP True condition compared to the NP False condition seems peculiar to the non-factive verb *san-* due to its semantic features. As discussed previously, the complement of the verb *san-* is falsified by its nature. Even though *san-* can be used in substitution for *düşün-* as pointed out in Dudley et al. (2017), it does not have the same meaning because we usually use *san-* in situations where the presupposition is very likely to be false and the subject is not aware of that (Please see Footnote 37 for Tense-

Aspect-Modality features of the verb *san-*). For example, when someone says, "Ali pastanın bittiğini sanıyor / Ali supposes that there is no cake left", it is more likely to be interpreted as, 'Actually there is still some cake', but apparently Ali was told that there is no cake. The same sentence with *düşün-* however does not necessarily imply that there is no cake left.

Table 15. Scenarios for the Verb *San-* in NP True and NP False Conditions

Story-A for NP True Condition	Story-B for NP False Condition
Big Bird's mother is going to a business trip and she will be away for a week. Big Bird will miss her a lot. After Big Bird's mother leaves, a friend of grandma visits them. *Experimenter to the child*: 'Look at her scarf and bag. They are just like Big Bird's mother's scarf and bag, right?' Grandma and Big Bird have a great time with grandma's friend that day. They have fun together while her mother is away. A couple days later… Big Bird's mother makes a surprise and comes home earlier! Big Bird's mum hangs the scarf on the clothes rack and puts the bag on the floor and goes to the living room. Then Big Bird comes home from school and when she sees the scarf and bag, she thinks, "Hımm… There are still 3 days for mum to come. Grandma's friend must have come again" 	Big Bird's mother is going to a business trip and she will be away for a week. Big Bird will miss her a lot. A few days later, while Big Bird was at school, a friend of grandma comes. Look at her scarf and bag. They are the same with Big Bird's mother's scarf and bag, right? Grandma's friend hangs her scarf on the rack, puts the bag on the floor and goes to the living room. When Big Bird comes home from school, she sees the scarf and the bag and says: "Yay! Mum is back!"

This situation is the same for (23) in the NP True condition, as well. We prepared the scenario in such a way that the complement of the verb *san-* is actually

97

false (i.e., her mother is back home), but Big Bird is not aware of that. So all the evidence conveyed in the scenario has shown that there was no reason for Big Bird to think that her mother has come. So she thought that her mother didn't come and the scarf and the bag belongs to her grandmother's friend. So when Kermit uttered (23), the majority of the children judged it as True because it is clear and observable that Big Bird believes in something false to be true.

But in the NP False condition, however, things get more complicated. Recall that *san-* denotes that the presupposition the attitude holder believes in is false, but he or she does not this, yet. So if (23) is true, then it is true that the complement, which is what Big Bird supposes, is false. But if (23) is false, it can only be deemed to be false if what Big Bird believes in to be true is false. Thus, (23) could be false if (i) the complement (annesinin gelmediğini/her mother didn't come) is true and (ii) Big Bird believes in something different than the presupposition, which is false. So in Story-B, Big Bird's mother didn't come in fact; so the complement is true. But when she saw the bag and the scarf on the rack, she thought that her mother came, but actually her grandmother's friend came, which meets the condition (ii) for (23) to be false. Table 16 summarizes this.

Table 16. Conditions for (23) to Be True and False

Sentence	TRUE	FALSE
Minik Kuş annesinin eve dönmediğini sanıyor / *Big Bird supposes that her mother didn't come back home*	*Presupposition:* Complement clause should be False, i.e., her mother came back home	Presupposition: Complement clause should be True, i.e., her mother didn't come back home
	Belief: Big Bird should suppose the complement to be True, i.e., she should suppose her mother not to come, but someone else	*Belief:* Big Bird should suppose the opposite of the complement to be True, i.e., she should suppose that her mother came back home

However, the judgement of this sentence in the False condition appears to be very difficult for the children. First they need to find out that the presupposition is true and then they need to understand from the story that Big Bird believes in something else, which is false, to be true. Since this is too complicated for them, 50% of the children misjudged (23). Some of them focused on the truth value of the complement and misinterpreted (24) as True due to this. For example, one child misjudged (23) as True and explained as "Çünkü annesi evde yok / Because her mother isn't at home". This is a common error type that we encountered in evaluations of other test items, as well. But what is surprising is that only in test sentences with *san-*, the children have been found out to interpret NP as PP. For example, some of the children who misinterpreted (23) as True explained that this sentence is True because Big Bird thinks that her mother came. Even though they were told the story again upon their misjudgment, they didn't change their mind and claimed that Kermit said that Big Bird thought that her mother came, but actually Kermit said that Big Bird thought that her mother didn't come.

As discussed, the reason for this could be the costly process of *san-* in NP False condition. Also the children might focus on the bubble that appears over the head of Big Bird as you can see in the picture in Table 15. In Story-B, in which (23) should be judged as False, Big Bird thinks of her mother's coming and the picture and the embedded clause are contradicting each other. In the picture, the child sees that Big Bird thinks that her mother came. But in the end Kermit says the opposite of this, which is "(…) that her mother didn't come". But since the picture and the subject of the embedded clause are the same person, her mother, the children seemed to be a bit confused and to misinterpret this. In Story-A, where (23) is True, on the other hand, the image in the bubble is the friend of the grandmother. So not only the

picture and the embedded clause are supporting each other, but also the character in the bubble is not the same person in the target sentence. Thus, the children could have understood this scenario more easily with the help of these.

3.2.6.4 NN related errors

In contrast to what we have predicted in Section 3.2.5, children performed well in the NN condition with some verbs, in particular in the True condition, however they did very poorly with some others as can be seen in Table 17. Children's divergent answers in the NN condition was most apparent with the nonfactives where in both the T&F conditions children were at chance. In general children performed poorly in the F condition, and especially with the emotive factive *sevin-* their performance was below chance. Now let us consider the mostly encountered error types.

Table 17. Proportion of Correct Answers by Group 1 for NN True/False Conditions

Verb Type	Verb	True	False
Cognitive Factive	anla-	100%	100%
	bil-	86%	71%
Emotive Factive	üzül-	100%	89%
	sevin	100%	40%
Non-Factive	san-	43%	50%
	düşün-	56%	60%

As in other conditions, children in the NN condition as well appear to have misjudged the sentences according to the truth value of the embedded clauses. For example, in *bil-* NN False condition, some of the children misjudged sentence (24) against the following scenario: Big Bird and Cookie Monster are starving for

cookies. Big Bird looks through the kitchen window and spots a plate of cookies on the kitchen counter. However, her grandma, takes the cookies to her friend.

(24)   Minik Kuş evde kurabiye olmadığını bilmiyor   True

          Big Bird doesn't know that there aren't cookies at home

The correct evaluation for (24) is True because Big Bird didn't see that her grandmother took the cookies. Even though some of the children judged the sentence correctly as True, their answers were coded as incorrect because when they were asked the reason why they considered this sentence as True, they said "çünkü evde hiç kurabiye yoktu / because there are no cookies at home". This suggests that some children paid attention to the truth value of the complement because in the complement it says there are no cookies at home.

The other common error type in this condition is the interpretation of NN as NP. Quite interestingly, most of the children considered a sentence in NN condition as NP, especially with *sevin-* sentences in the False condition. For example, they understood the sentence in (25) as (26). But why did they associate NN with NP with *sevin-*, but not with *üzül-* which is also an emotive factive verb? And quite strikingly why is there such a big difference between their performance on True and False conditions of the same verb? In order to answer these questions, we should look into the differences between the scenarios.[39]

(25)   Minik Kuş Zuzu ile karşılaşmadığına sevinmedi   False

          Big Bird wasn't happy that she didn't run into Zuzu

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[39] This may have something to do with the frequency of occurrence sevin with negative/ positive complement clauses in Turkish. Though we have not looked into the frequency of occurrence of such sequences, it is definitely worth looking into.

(26)   Minik Kuş Zuzu ile karşılaşmadığına sevindi   True

Big Bird was happy that she didn't run into Zuzu

The stories used for *sevin-* in NN True and False conditions are almost the same, except for the changes in the characters as can be seen in Table 18. In the True condition, Big Bird saw Zuzu, whom she didn't like much, and became really unhappy that she didn't run into her dearest friend, Cookie Monster, on the beach even though he was there, too. On the contrary, in the False condition, she saw Cookie Monster, whom she liked the most, on the beach and became very happy that she didn't run into Zuzu who was on the same beach, too.

Table 18. Stories for *Sevin-* in NN True and False Conditions

sevin- in NN True	*sevin-* in NN False
This is Big Bird's classroom. It is the last day of classes today. Big Bird loves Cookie Monster a lot. But she does not like Zuzu that much. That summer, when she was on vacation Big Bird ran into Zuzu on the beach. Zuzu said, "Cookie Monster is here, too. Did you see him?" Big Bird replies [with a sad voice] "No, I didn't, I wish I could see him." [A sad emoticon appears on the screen] Kermit: "Minik Kuş Kurabiye Canavarı ile karşılaşmadığına sevinmedi." (*Big Bird wasn't pleased that she didn't run into Cookie Monster.)* 	This is Big Bird's classroom. It is the last day of classes today. Big Bird loves Cookie Monster a lot. But she doesn't like Zuzu that much. That summer, in the holiday she ran into Cookie Monster on the beach. Cookie Monster said, "Zuzu is here, too. Did you see her?" Big Bird replies [with a happy voice] "No, I didn't, I am so glad for this." [A happy emoticon appears on the screen] Kermit: "Minik Kuş Zuzu ile karşılaşmadığına sevinmedi." (*Big Bird wasn't pleased that she didn't run into Zuzu.)*

Even though the scenarios are very much alike, there is a dramatic difference between the correct response rate for *sevin-* in NN True and NN False conditions. Children performed adult-like in the True condition (with a success rate of 100%), whereas in the False condition the correct response rate dropped down to 40% suggesting that NN sentences were interpreted as NP.

If it is the case that while processing NN-type sentences, we usually use strategies where we either negate both the embedded and the matrix verb so NN turns into PP or only negate the matrix verb NP, the children should have considered *sevin-* in NN True condition as NP as well. So they should have interpreted the sentence as "Minik Kuş Kurabiye Canavarı ile karşılaşmadığına sevindi / Big Bird was happy that she didn't run into Cookie Monster" and should have incorrectly evaluated the sentence as False. But they didn't. So the difference between children's performances in these two conditions should have its origins in the stories presented. In the True condition, there is a sad emoticon on the screen and the verb is "sevinmedi/ was not happy/ pleased". So it might have been easier for them to interpret this as True because the children probably have expected the verb "sevinmedi" due to the sad emoticon. However, in the story of the False condition, there is a happy emoticon, which might have caused children to expect a compatible verb with the emoticon, so it could be that they have understood "sevinmedi" as "sevindi".

Back to the question why there is a significant difference between correct response rate for *üzül-* and *sevin-*, we could say that this distinction might have stemmed from the semantic features of the verbs. *üzül-*, having a negative meaning, could be considered as implicitly negative, whilst *sevin-* is an implicitly positive verb. Thus, when *üzül-* is negated, it might have been much easier for children to

interpret it because of its implicitly negative denotation. On the other hand, it might have been harder for children to process when an implicitly positive verb is negated.

As Table 17 illustrates, non-factive verbs is the category in which the children performed the poorest. Their correct response rates were almost at chance level with *san-* True and False and *düşün-* True condition. They were somewhat better with *düşün-* where in the False condition the correct response rate was 60%. The most common error type observed within non-factive verbs in NN condition is where children misinterpreted NN as NP. For example, most of the children rejected sentence (27) expressing "yanlış, çünkü [Kurabiye Canavarı] çok spor yapıyor ve yarışı kazanabilir / false because [Cookie Monster] works out regularly and he can win the race". This suggests that the majority of the children misunderstood (27) as "Minik Kuş Kurabiye Canavarı'nın yarışı kazanamayacağını düşünüyor / Big Bird thinks that Cookie Monster won't win the race" and misevaluated (27) as False accordingly.

(27)   Minik Kuş Kurabiye Canavarı'nın yarışı kazanamayacağını

düşünmüyor

Big Bird doesn't think that Cookie Monster won't win the race

Children's misinterpretation of NN as NP is the only error type that children made with *düşün-* in NN True and False and *san-* in NN False condition. In the NN True condition of *san-*, however, the only error type observed is where the children have focused on the truth value of the embedded clause and evaluated the whole sentence based on this.

As mentioned earlier NN proves to be the most difficult condition for children especially with the non-factives because non-factive verbs don't preserve or entail the truth of their complements. So it requires higher mental processing skills. In order to correctly understand these sentences, it seems that we exhibit a tendency whereby we turn NN-type sentences with non-factives to PP-type sentences. So for example, we understand (27) as "Minik Kuş Kurabiye Canavarı'nın yarışı kazanacağını düşünüyor / Big Bird thinks that Cookie Monster will win the race". In order to turn a NN-type sentence to PP, one should manage to denegate both the embedded and main clauses. But it turned out that the majority of the children just denegated the main predicate and considered the embedded clause as it is.

Another reason why they considered NN as NP could be related to their expectations. The frequency of NN type sentences in general is likely to be very low, especially in a child's world. So when they were told the story, probably they expected PP, PN or NP type sentences, which are more likely to be more common than NN.[40] When they were presented an NN-type sentence to judge, in particular when the matrix is non-factive, most of the children hesitated for a while and some of them started to think aloud which was a great experience for a linguist to directly observe how they interpreted an NN-type sentence. To exemplify the issue here consider the dialogue in Table 19.

This dialogue is so precious because it shows that a 5;8-year-old child have expected a PP-type sentence instead of a NN-type. Then she became more confused and recalled NN-sentence as PN. When corrected by the experimenter, she finally evaluated (29) as True, but expressed that she wasn't able to express the reason.

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[40] We intend to look into the frequency of occurrence of such forms both in child-directed speech and a representative sample of TV programs and books the children are exposed to in future work.

Table 19. Sample Trial-VI

Participant (5;8): "Eve dönmediğini sanmıyor," ne demek? "Eve döndüğünü sanıyor," deseydi, doğru olurdu. Ama böyle yanlış. "Eve döndüğünü sanmıyor," diyor. Ama o eve döndüğünü sanıyor. *(What does it mean "doesn't think that she didn't come back home? If he said, "She thinks that she came back home," that would be True. But it is False now. He said, "She didn't think that she came back home." But she thinks that she came back home.)*
Experimenter: Yok, ama "Eve dönmediğini sanmıyor," diyor. Ne demek istiyor sence? *(No, he said, "She does not think that she didn't come back home." What does it mean?)*
Participant: O zaman doğru olur *(Then it is true)*
Experimenter: Neden doğru o zaman? *(Why is it true then?)*
Participant: Açıklayamıyorum *(I can't explain)*

Another child (5;10 years old) drew the conclusion that (29) was True after repeating (29) aloud for a while. Then he concluded as "Yani eve döndü sanıyor ama dönmedi demek istiyor, değil mi? / Thus she thinks that she came back home but meant that she didn't come back, right?" It took a long time for the child to process the sentence, but eventually he came up with the right reasoning. He realized that NN-type sentence meant what a PP-type sentence denotes and then he found out that the presupposition should have been false (i.e., it should be 'didn't come back' in fact).

Apart from the error types, we have already gone through, the rate of irrelevant answers reveals a lot as to how children have interpreted the test sentences. 73 out of 480 answers (15% of total number of answers) were coded as irrelevant as children provided either irrelevant reasons or no reasons at all. Table 20 illustrates the distribution of irrelevant answers for each verb in each condition. As it can be seen, the number of irrelevant answers is the highest in the verb *anla-*, which is 20 out of 80 answers, and is followed by the verb *san-* with 16 irrelevant answers out of

80. Emotive factives, on the other hand, is the verb category that has the least number of irrelevant answers.

As indicated in Figure 11, three types of irrelevant answers, namely Theory of Mind (ToM) related irrelevant answers, pragmatics related irrelevant answers and others (which doesn't have a specific cause) were observed during the experiment. Now let us discuss the possible causes of irrelevant answers one by one through associating them with the numbers of irrelevant answers in Table 20.

Table 20. Number of Irrelevant Answers

Verb	Truth Value	PP	PN	NP	NN	Total
anla-	True	1	5	0	2	8
	False	0	4	5	3	12
bil-	True	1	2	2	2	7
	False	2	0	0	3	5
üzül-	True	0	3	0	0	3
	False	4	0	1	1	6
sevin-	True	0	0	1	2	3
	False	0	1	1	0	2
san-	True	2	0	1	3	6
	False	2	0	3	5	10
düşün-	True	1	1	3	1	6
	False	2	1	0	0	3
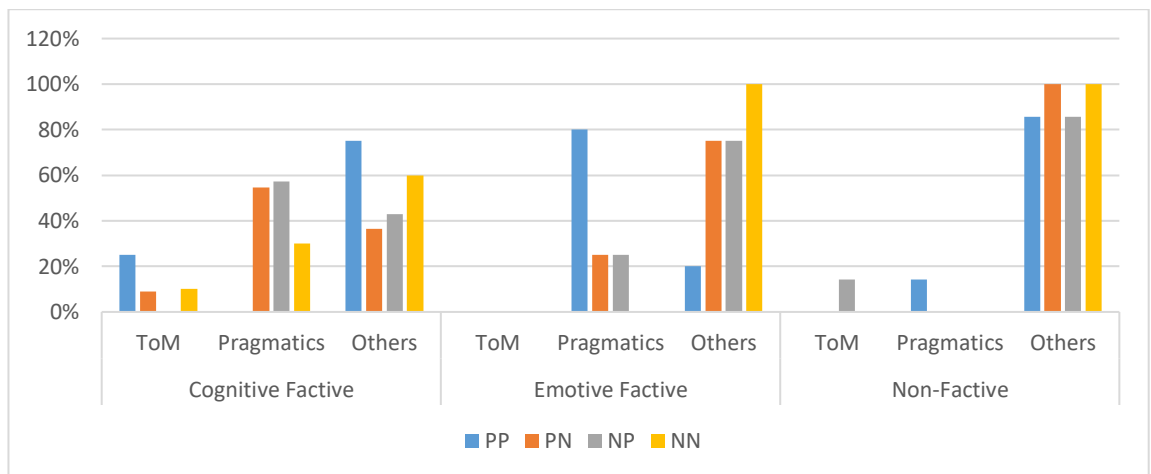
Figure 11. Types of irrelevant answers by verbs and conditions

Theory of mind related irrelevant answers were observed mostly in cognitive factives and non-factives. This error type has occurred when children judged the sentence from their point of view, regardless of considering how much information was available to the characters. The scenario for (28) could be a good example for illustrating the issue. So (28) is being evaluated against the backdrop of a story where at first Big Bird did not see any cake in the kitchen but then the grandma brought some cake – Big Bird, however, is ignorant of this.

(28)   Minik Kuş evde kek olduğunu biliyor   False

Big Bird knows that there is cake at home

Some of the children misjudged (30) as True insisting that Big Bird knows that there was cake. When they were reminded that Big Bird actually didn't see the cakes being brought to kitchen as she was heading towards the entrance door, they said, "Ama hepimiz gördük, Minik Kuş da gördü / But we all saw, including Big Bird". Such types of explanations suggest that some of the children have not mastered ToM abilities yet. Due to this, they may have interpreted things based on what they know or see without paying attention to what is available to others.

Pragmatics related irrelevant answers generally stemmed from the fact that the children did not pay attention to the truth value of the sentences, but judged them according to their morals or biases. So the reason as to why the rate of irrelevant answers is higher with the verb *anla-* potentially appears to stem from the pragmatic infelicity in the stories provided for the verb. In *anla-* stories, Big Bird was either not allowed to dive into the pool or her grandmother insisted that she should dive. For example, in the PN condition, her grandmother told Big Bird not to swim that day

because she had been sick for a while, But Big Bird liked swimming so much that she couldn't help, but dived into the pool. When she got back home, she dried the wet swimsuit and towel in the garden and put them on her bed in order to prevent her grandmother from figuring out that she had swum. Some of the children judged the test sentence for this scenario as False even though it is True, insisting that it is not nice and acceptable to cheat someone or tell a lie to someone. In other words, they morally evaluated what Big Bird did, instead of evaluating the test sentence and most of the irrelevant answers for the verb *anla-* resulted from children's ethical concerns. In order to avoid such responses, the stories should have been designed in a way that there will be no conflicting situation in terms of ethics or pragmatics.

As Table 20 illustrates, the emotive factive verb category has the least number of irrelevant answers. As mentioned in the experiment design section, smiling or sad emoticons were presented in the scenarios of emotive factives in order to avoid any pragmatic concerns that would have an effect on the children's answers. When the results in Table 20 are taken into the consideration, it is obvious that these emoticons seemed to work well. Yet there were a few irrelevant answers though where children didn't pay attention to either the emoticons or how the character really felt, but to their feelings i.e., how they would feel in such a situation. For example, in stories for the verb *üzül-*, Big Bird's father told her they could go to the cinema if he could leave the office earlier. He would call and inform Big Bird. But before his calling, Big Bird's grandmother came and told her she had tickets for a theatre play. In the end, her father called to inform Big Bird that he had a lot of work to do so he had to stay at the office. But Big Bird wasn't sad because she would go to the theatre with her grandmother. Yet some of the children evaluated the test sentences (*Big Bird wasn't sad that her father won't come home from work earlier*)

for this type of scenario all the time because according to them not going to the cinema with one's father is a very good reason to be sad even though Big Bird has another plan (going to the theatre with her grandmother) which was as fun as going to the cinema with his father. Therefore, the children judged some of the sentences, especially the ones which have the potential to be pragmatically illicit, as False regardless of the truth value of the test sentences. In order to avoid this, we should have created the scenarios in a way that none of the incidents would be considered to be pragmatically more acceptable for the child.

In addition to ToM and pragmatics related irrelevant judgments/errors, we also have a third category referred to as 'others' as some of the answers the children produced were irrelevant but did not really belong to the already established categories. The answers of the children who gave no reasons for their judgements or gave irrelevant answers, such as "because Kermit knows everything," or "because he is wrong," and the children who didn't get the scenario at all were considered as irrelevant under the category of 'other irrelative answers'.

When the distribution in Figure 11 is taken into the consideration, it can be seen that the children gave more 'other' irrelative answers for the NN condition, especially for non-factive verbs. This indicates that children have problems in comprehending NN-type sentences. ToM related irrelative answers are generally observed with cognitive factives. Yet there are no ToM related irrelevant answers for emotive factives, which suggests that the children are very successful in figuring out the emotional states of others. Pragmatics related irrelevant answers, on the other hand, are observed in both cognitive and emotive factives, which are the verbs that include potentially pragmatically inappropriate scenarios for the children.

110

After presenting and briefly discussing results, now let us consider the bigger picture, that is cross linguistic similarities and differences in terms of comprehension of negation when it combines with (non)factive verbs.

As presented in Figure 12 and Figure 13 –which serves as a summary of what we have covered so far in this section–, 5-year-old Turkish-speaking children performed almost adult-like in almost all verb types in all conditions, excluding the non-factive verb *san-* in PP and NN conditions, and the non-factive verb *düşün-* in NN condition. The children were most successful in emotive factives, followed by cognitive factives and non-factives, as we have predicted. Moreover, they performed best in the PN condition with an average correct response rate of 96%, followed by NP (92.83%) and PP (89.90%) – though it is quite obvious that the difference between these conditions is far from between statistically significant –and finally NN (77.83%). This result is somewhat incompatible with our prediction where we conjectured that children would perform the best in the PP condition, however, our prediction that NN would be the hardest condition for children to assess is borne out.
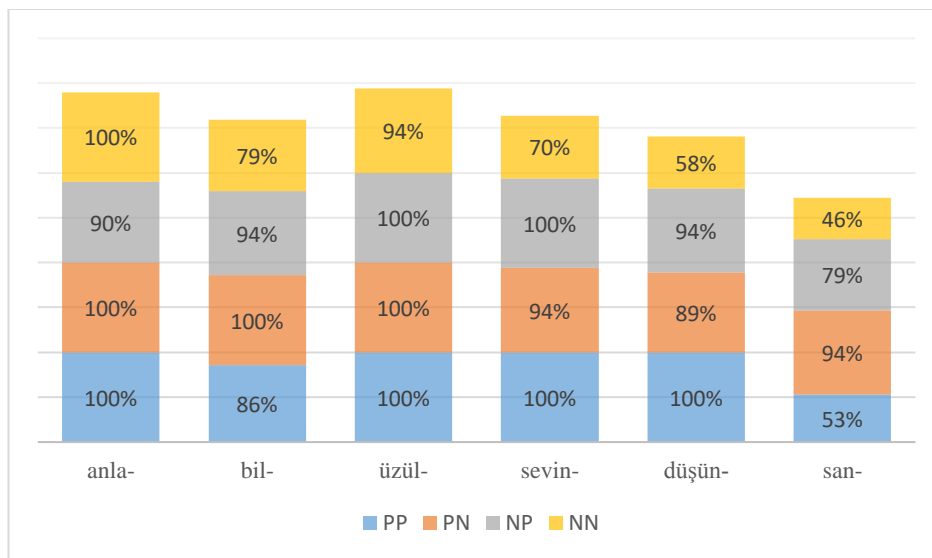
Figure 12. The correct response rates by Group 1 verbs & conditions
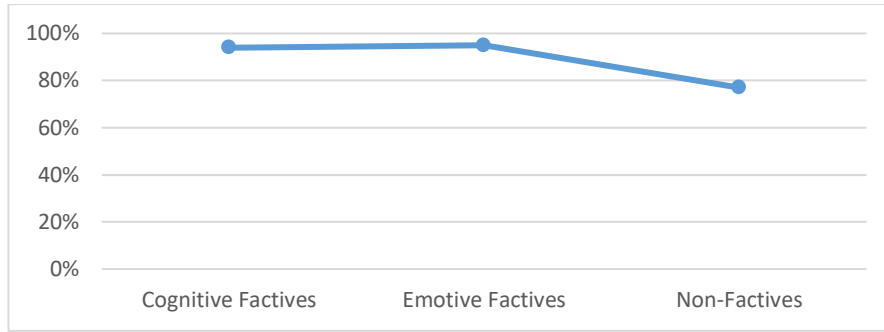
Figure 13. The correct response rates by Group 1 for each verb category

The relatively low correct response rate of PP has stemmed from the children's poor performance on *san-* in PP condition. Before elaborating on possible reasons for this, consider the stories provided for san- in both PP False and True conditions in Table 21 below.

Table 21. Stories Presented for *San-* in PP False and True Conditions

Story A: san- in PP True Condition	Story B: san- in PP False Condition
Big Bird's grandmother hang the laundry out in the balcony and water starting dripping down from the balcony.	Big Bird's grandmother hang the laundry out in the balcony and water drops were falling down from the balcony.
Right at that time, downstairs, Big Bird was preparing to go out. Before going out, she checked the weather by looking out from the window and she saw water drops. Then she took her rain boots and umbrella before going out.	At that time, downstairs, Big Bird was preparing to go out. Before going out, she checked the weather by looking out from the window and water drops. She was about to take her rain boots and umbrella, but then she remembered the laundry in the balcony.
Kermit: Minik Kuş yağmur yağdığını sanıyor / *Big Bird supposes that it is raining*	Kermit: Minik Kuş yağmur yağdığını sanıyor / *Big Bird supposes that it is raining*

112

The stories presented for the non-factive verb *san-* in both PP True and False conditions, as Table 21 shows are very similar to each other. The only difference is that in Story A, Big Bird didn't have the knowledge that her grandmother hang the laundries in the balcony and when she saw the water drops, she thought that it was raining. In Story B, on the other hand, we found out that Big Bird had known that her grandmother hang the laundries in the balcony because she remembered the event and didn't take her umbrella and rain boots. So in Story A, Big Bird had a false belief that it was raining, but not in Story B. This has reflected to the results, as well. It has been observed that children's correct response rate for the True condition which was presented with Story A (43%) is relatively low compared to the False condition (63%). This suggests that when there is a false belief in the story, the children have difficulties in attributing reality-incongruent state of mind to the protagonist, as claimed in Nagel (2017). Moreover, there are also some pragmatic infelicities in the stories that could be taxing. In both of the stories, we should have presented the picture of grandmother while hanging out the laundry in order to make sure that the children understood the situation. Then, in Story B, it is too demanding to expect children to understand that Big Bird has prior knowledge that her grandmother hang the laundries by just saying and showing that she had 'remembered' it. We should have presented pictures in which Big Bird saw her grandmother while she was hanging the laundries or while Big Bird was helping her out. Moreover, we should have also emphasized that the washer was broken so the laundries were wetter than usual –just like they were hand-washed –in order to create an appropriate background for Big Bird's misperception of water dripping from the clothes as rain drops. To summarize, difficulty in attributing false belief to attitude

holders could be a reason for relatively low rate of correct responses for *san-* in the PP condition, yet the deficiencies in the stories might have also led to this.

Apart from this, Figure 12 also reveals a very important finding regarding the correct response rates of non-factives, that is children were better at interpreting the test sentences with the non-factive verb *düşün-* in almost all conditions, other than the NP condition. As discussed in Section 3.2.6.1, the reason for this could be the semantic differences between *düşün-* and *san-*. Even though, traditionally both of them belong to the non-factive verb category, they have different semantic properties. First of all, the complement of the verb *san-* is usually considered as false if *san-* is the matrix verb in the sentence and not negated. As explained previously, when someone utters a sentence like "Ayşe babasının evde olduğunu sanıyor / Ayşe supposes that her father is home", we in fact deduce that Ayşe's father isn't at home, but Ayşe somehow believes that he is at home. But if the same sentence is created with *düşün-* as "Ayşe babasının evde olduğunu düşünüyor / Ayşe thinks that his father is at home", we cannot deduce anything about the truth of the complement, i.e., her father may or may not be at home. This shows that when *san-* is in the matrix clause and positive, it attributes a false state of mind to the attitude holder, whilst *düşün-* doesn't have any such property.

But what would be the situation if *san-* is a negated matrix verb? Well, when it is negated, it seems to lose its feature/property of false belief attribution and becomes more like *düşün-*. For example, if someone says "Ayşe babasının evde olduğunu sanmıyor / Ayşe doesn't suppose that her father is at home", we cannot deduce that the complement is false, but we take the verb *san-* in this sentence as *düşün-* and think that Ayşe has some reliable reasons to think so. As discussed previously, the verb *düşün-* seems to be more reliable than *san-* in terms of the

114

message it conveys because I believe that *düşün-*, mostly used to denote "the performance of a mental activity" as in Schatz et al. (2003), is an expression of a based on concrete inferences. For example, when someone says, "Ayşe'nin bugün bize gelebileceğini düşünmüyorum / I don't think that Ayşe will be able to come today", we are very likely to think that the attitude holder has some reasons or inferences in order to utter a sentence with *düşün-* and to expect that the attitude holder will continue her speech as "Because she had an appointment with her dentist at 4 pm and she had to pick up her son from kindergarten at 5 pm. So she is very unlikely to join us today". Yet when someone utters the same sentence with the verb *san-* as in "Ayşe'nin bugün bize gelebileceğini sanmıyorum / I don't suppose that Ayşe will be able to come today", we again expect a chain of reasons after this because the verb *san-* here is used as a substitution for *düşün-*.

If we return back to the results, we can say that the reason why the children appear to perform better with *san-* in PN condition compared to *düşün-* is that in this condition the verb *san-* is more like the verb *düşün-*. Consider the story for the verb *san-* in NP True conditions in Table 22 below.

Table 22. The Story Presented for *San-* in NP True Condition

Scenario for *san-* in NP True Condition	
	Big Bird's mother is going to a business trip and she will be away for a week. Big Bird will miss her a lot. After Big Bird's mother leaves the home, a friend of grandma comes. Look at her scarf and bag. They are the same with Big Bird's mother's scarf and bag, right? Grandma and Big Bird have a great time with their neighbor that day. They have fun together while her mother is away from home. They have tea parties… They play together… Until… Big Bird's mother makes a surprise and comes home earlier than a week! Big Bird's grandma and mum hook up scarf and the bag and go to the living room. Then Big Bird comes home from school and when she sees the scarf and bag, she thinks as, "Hımm… There are still 3 days for mum to come. Grandma's friend must have come"

As can be seen, when Big Bird saw the scarf and the bag in the entrance of the house, the children were provided Big Bird's chain of thoughts. She said to herself that there were still three days until her mom's arrival, so it must be the friend of grandma who has visited them. So we can conclude that despite the fact that both *san-* and *düşün-* are non-factive verbs, they behave differently. When *san-* is used more like the verb *düşün-* and the chain of reasons is presented, children are equally successful, or even more in some cases, in the verb *san-* compared to *düşün-*.

Besides yielding these important results, I believe this experiment has also contributed to the literature in this field. It would be great if we compare and contrast the results of this experiment with the previous studies. Let us begin with similarities first. 5-year-old Turkish-speaking children, like their English-speaking counterparts, had problems with the non-factives in the NN condition, which was also observed to be the case in the previous studies (Leger, 2008; Oiry & Hartman, 2015). Moreover, the error types of Turkish-speaking children were almost identical with the errors described in the previous studies. For example, both Turkish- and English- speaking children have used the strategy to evaluate the truth value of the sentence by just looking at the truth value of the complement (Hopmann & Maratsos, 1978), assigning the negation in the main predicate to the embedded and interpreting NN as NP (Léger, 2008; Oiry & Hartman, 2015) and overaffirmizing the NN condition as PP (Hopmann & Maratsos, 1978). Furthermore, since Turkish-speaking children were better at factive verbs, we can draw the conclusion that the children comprehend factives before non-factives as argued in Hacquard (2014).

When we come to the differences, the first observation to mention is Turkish-speaking children have been observed to be more successful in emotive factives as

opposed what Hopmann and Maratsos (1978) has argued.[41] This is because of the fact that the experiment design we have used is more pragmatically and cognitively appropriate than Hopmann and Maratsos (1978), which will be discussed in detail later in this chapter. Furthermore, the results of our study haven't shown any significant difference between the comprehension and correct response rates of true negative sentences and false negative sentences as opposed to the claim that true negative sentences were harder to process than false negative ones (Wason, 1965; Slobin, 1966; De Villier & Flusber, 1975). There is also not an important difference in the children's interpretation and rates of correct responses between positive and negative sentences contrasting with the argument that children more often rejected negative (non)factives than affirmative (non)factives (Hopmann and Maratsos, 1977). Moreover, some of Turkish-speaking children appeared to interpret PN and NP as PP, while their English-speaking agemates considered PN as NP (Oiry and Hartman, 2008). Yet Turkish-speaking children haven't been observed to raise negation from embedded clause to the matrix verb, i.e., interpretation of NP as PN, as laid out in Léger (2008), but the reason why Turkish-speaking children have interpreted NN type sentences as NP could be the raising of negation from embedded verb to the matrix verb. In other words, in a NN-type sentence, the children might have assigned the negation in the embedded clause to matrix verb and yielded a positive matrix verb by negating the negated predicate. This type of error has been observed with the verbs *bil-*, *düşün-*, *san-* and *sevin-*, indicating that maybe the children have considered these verbs as neg-raising verbs.

Apart from these cross-linguistic similarities and differences, Turkish-speaking children both in Group 1 and Group 2 have been observed to be more

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[41] But in a more recent study conducted by Oiry and Hartman (2008) the English-speaking children were also observed to be more successful with emotive factive *be happy* than *know*.

successful when compared with the results of previous studies with English-speaking children. I think, this difference has its origins in the experimental design. As laid out in Chapter 2, the experiment design of most of the studies was problematic both cognitively and pragmatically. In most of them, there were no reasonable connections within the stories and no background information was presented to the children, which is crucially important when testing their understanding of (non)factive verbs because as claimed in Aravind and Hackl (2017) the complement of a (non)factive sentence cannot be new information, but should be based on prior knowledge. Moreover, the test sentences in most of the experiments were like uttered out of nowhere. It seemed that the relatedness of the test sentence to the story wasn't paid much attention to. Adults can accommodate when there is a pragmatic infelicity in terms of the relation between the test sentence and the story, yet the children are observed not to able to do so (Aravind and Hackl, 2017). So it is crucially important to establish pragmatically felicitous connections between the story and test sentences.

In the present study, we paid full attention to the experiment design in order to come up with a pragmatically and cognitively congruent test for the children. First of all, in order to make children take the test seriously and to be engaged, we came up with an exam scenario in which Kermit took an exam and the children's task to grade Kermit's answers, which was very likely to be a serious and important task in a child's world. We even provided a grade sheet that had a photo of Kermit and star and cross/minus stickers to the children so that they not only said true or false, but interactively took part by giving a star or a cross/minus to Kermit in accordance with his responses.

Second, all of the test sentences and stories presented in the experiment were about one character, Big Bird, which I think made children more curious because they established a connection with her so that they waited for the next story/question with excitement. This is very important because if the children were to get bored, you cannot expect them to judge sentences with full attention.

Third, instead of a hand puppet and toys, we used a slideshow including videos and audiovisuals of the characters which made it possible to convey stories in a more realistic way by using animations in PowerPoint. For example, when Big Bird chose her umbrella and rain boots among other staff, we used the animation that moved objects to Big Bird. By using a slide show with different pictures, we managed to keep the children's attention alive, which is most probably very difficult to do so with a hand puppet and toys because they are very likely to distract children's attention.

Moreover we made sure to construct stories which are very likely to be encountered in a child's daily life such as going to the cinema, swimming with friends at school, etc. Before presenting test sentences, we carefully placed the background knowledge with which the children can relate the information in the (non)factive sentences. In other words, as Aravind and Hackl (2017) has claimed, we paid extra attention to establish the Question Under Discussion (QUD) by providing scenarios as related as it could be with the test sentences. Additionally, we created the scenes in such a way that they were compatible with the story. For example, if the story indicated that Big Bird was sad, Big Bird's facial expression was changed accordingly.

3.3 Summary

In this experiment, 60 children were tested in order to see how they comprehend factive verbs, including both cognitive and emotive factives, and non-factives when they combine with negation in complex sentences. There were 8 conditions (PP, PN, NP and NN x True and False) for each verb. Results have shown that 5-year-old Turkish-speaking children performed very well, even almost adult-like for some conditions, as opposed to the results of previous studies carried out in English. According to this, 5-year-old Turkish-speaking children are most successful in emotive factive verbs, followed by cognitive factives and non-factives. For both cognitive and emotive factive verbs, they performed almost adult-like, with an average correct response rate of 94%, while the average correct response rate is around 70% in non-factive verbs, including chance-level results for some conditions. 8-year-olds, on the other hand, performed adult-like for almost all verbs in all conditions, indicating that the Turkish speaking children appear to have completed the acquisition of (non)factivity and more specifically (non)-factivity when it interacts with negation between the ages of 6 and 8.

CHAPTER 4

EPISTEMIC MODALITY AND NEGATION:

HOW CHILDREN TACKLE THE INTERACTION

4.1 Aims

In the previous chapter we have examined how Turkish-speaking children handle negation and (non)factive verbs. This chapter turns to an investigation of the interpretation of negation when it interacts with epistemic modal verbs. As laid out in Chapter 2, there are only a handful of studies looking at the acquisition and comprehension of negation when it combines with epistemic modality. In these studies, the researchers have mainly focused on children's comprehension of negative-weak and negative-strong sentences in English and in Italian and the results have revealed that children have a tendency to interpret negative-weak sentences as strong, i.e., 'may not be' sentences are interpreted as 'cannot be' when epistemic modal verbs interact with negation (Noveck, 2001; Gualmini and Moscati, 2009; Moscati and Crain, 2014).

Given that both English and Italian are head initial languages that have a relatively simple modal paradigm and that assign scope relations of negation and modality by syntax, it would of course be quite interesting to investigate how negation in Turkish behaves under modality and how Turkish children would comprehend such sentences. Thus this chapter intends to explore the following questions:

i.   In a head final language, like Turkish where the scope relations of negation and modality are assigned by morphology through bound morphemes, how do Turkish children interpret negative-weak and negative-strong sentences?

ii.   What would be the order of the acquisition and comprehension of negative-weak and negative-strong sentences in a head-final language? Would it be similar to head initial languages (in which children appear to be competent first in the comprehension of the strong reading 'cannot be', the comprehension of the weak reading 'may not be' is achieved much later), such as English and Italian, or would the head finality and the determiner of the scope relations affect the order of acquisition?

Turkish embodies a more complex picture in terms of modality and scope relations. In what follows, I will first briefly discuss how modality and negation interact cross linguistically and in Turkish, then I will lay out the design and the procedure of the experiment that aims to uncover how Turkish-speaking children interpret negative-weak and negative-strong epistemic sentences. The predictions of the study will be presented in Section 4.3.5, which will then be followed by the discussion of the results.

4.2 Epistemic modals and negation

Modality in general has been investigated through using "possible world semantics" (Portner, 2009). Under the Possible World Semantics, it is assumed that modal expressions choose one possible state among sets of possible worlds. For example, when someone utters the sentence "Mary might come", the modal *might* chooses a state in which it is possible for Mary to come among a set of possible states in a range between impossibility of Mary's coming and certainty of Mary's coming. So the meaning denoted by modality could be constructed with the help of some key

notions, namely (i) accessibility relation, (ii) quantificational force, (iii) informational strength and (iv) logical scope (Moscati & Crain, 2014).

Let us first focus on the *accessibility relation*. In cases where we need to interpret sentences with an epistemic modal, we deduce the meaning of the sentence based on the evidence or information that is available to us. Therefore, as pointed by Moscati and Crain (2014), "in formal semantics, the likelihood or certainty of a proposition being true in some world W (e.g., the actual world) depends on the truth of the proposition in worlds that are accessible to W" (p. 350). In other words, while we are interpreting epistemic modality, our knowledge defines the set of possible worlds and a proposition can be true according to this. For example, when your roommate utters the sentence, "There might be some cheese in the fridge," while you are grocery shopping, you can evaluate the truth value of this sentence on the basis of what you know or remember about the content of the fridge.

By *quantificational force*, on the other hand, the strength of the modality can be interpreted. If we want to increase the force of a statement, we use *must* instead of *might*. But the truth value of this statement is determined quantitatively. For example, as stated above, *must* is stronger than *might.* Think of a situation in which Mary entered the apartment with her friend. While climbing the stairs, they realized that a delicious smell was coming from the floor where Mary lives and Mary says, "John might have cooked". This statement is true if John cooked before in some accessible worlds, i.e., in some possible states of the actual world. If it is true, then we probably think that John cooks sometimes. But if Mary says, "John must have cooked", this statement is true in every state of the actual world and we interpret what Mary says as "John always cooks".

Logical scope and information strength are the most important notions on modality for this research as they are relevant to the combination of negation and epistemic modal verbs and also they help to obtain an understanding of the hypothesis and target sentences in this study. Let us start with 'information strength'. Information strength of a pair of modals can be evaluated on a scale of strength. Consider sentences in (1) and (2) below.

(1) Mary might have lied.

(2) Mary must have lied.

The statement in (2) is stronger than the one in (1). So if (2) is true, then (1) should be true, as well, but not vice versa. Moreover, the statement in (1) can be true, while (2) is false at the same time because the fact that Mary might have lied doesn't make us draw the conclusion that Mary must have lied. This is called asymmetric entailment and explained by Moscati and Crain (2014) as "stronger expressions asymmetrically entail weaker ones" (p. 350).

As mentioned above, via the notion of information strength, it is possible to interpret modals by aligning them on a scale. The scale of *might* and *must* is in fact like in (3) where the mark ">" shows that the expression on the left is stronger than the one on the right.

(3) necessity (must) > possibility (might)

However, as Moscati and Crain (2014) have pointed out, this asymmetric relationship is not absolute. The information strength of a modal can change, if the

modal combines with another logical operator, like negation. In the scope of negation, the information strength of a modal can be reversed. For example, consider the statements in (1) and (2) together with their negated counterparts as in (4) and (5). Recall that the statement in (2), which includes *must*, is stronger than the statement in (1) with *might.* In contrast to the earlier alignment relation, in the negated versions, it can be seen that the statement in (4) with *might* is stronger than the statement in (5) with *must.*

(4) It is not the case that Mary might have lied.

(5) It is not the case that Mary must have lied.

Thus when negation precedes the modal *might* as in (4), the statement turns out to mean that even the possibility of Mary's lying is not the case, which makes the statement in (4) stronger than (5). So it can be concluded that the information strength can change when modality is under the scope of negation and the scale in (3) could be revised as (6).

(6) not possible > not necessary

At this point, we need to define how negation and modality can be combined. This brings us to the notion of logical scope. As discussed by Moscati and Crain (2014), negation can combine with a modal in two ways: It can take either (i) wide scope over modality or (ii) narrow scope under modality.

When negation takes wide scope, the interpretations *not possible* and *not necessary* are generated. But when it is assigned narrow scope, the readings *possible*

not and *necessary not* are deduced. To sum up, it can be concluded that when modal expressions are combined with negation, their strength can change according to the scope of negation. So if a sentence includes both negation and modality and the scope of negation is wider than the scope of modality, this sentence is referred to as a negative-strong sentence as in (7). But if modality has wider scope over negation and negation is assigned narrow scope, the sentence is a negative-weak sentence as in (8).

(7) Mary cannot come

(not possible – negative-strong sentence)

(8) Mary might not come

(possible not – negative-weak sentence)

A summary of scope relations between negation and modality according to information strength is as the following:

A. STRONG   B. WEAK
not possible   >   possible not

Although both (7) and (8) have modals denoting possibility and these modals precede negation, the interpretation of these sentences are different from each other. In (7), negation is assigned wide scope over the modal *can* and the associated reading is "not > possible". In contrast, the modal *might* takes scope over negation and the sentence yields "possible not" reading in (8). This meaning difference cannot

be explained by surface word order, but by polarity restrictions employed in the modal paradigm of English (Moscati & Crain, 2014).[42]

To sum up, even though both *might* and *can* denote the same meaning, which is possibility, when they combine with negation in a sentence, the interpretations of them change based on scope relations with negation. In *might,* the surface structure determines its scope relations with negation and it has scope over negation, which results in a *not possible* reading and the sentence is considered as negative-weak sentence. On the other hand, *can* is lowered in the deep structure in a position under negation so that it can be under the scope of negation where it can yield *not possible* reading and the sentence is called as negative-strong sentence.

As discussed previously in this chapter, if the statement in (7) is true, then the statement in (8) should also be true. But it is not the case in the reverse order. In other words, (7) entails the truth of (8), but not vice versa. When a statement entails the truth of another one, it is called as the superset. A sentence whose truth is entailed by another sentence is considered as the subset. So the superset entails the truth of the subset, but not in reverse order. This is referred to as asymmetric entailment, which is deemed to be the cause of a potential learnability problem as discussed in Chapter 2.

According to Moscati and Crain (2014), the learnability problem might arise based on the order of children's acquisition of weak (possible > not) and strong readings (not > possible) of the combination of modality and negation. As laid out in

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[42] What polarity restrictions do is that they determine the scope relations between certain logical operators and negation. For example, Moscati and Crain (2014) proposed that the modal *can* is under the effect of a polarity restriction encoded by a lexical parameter R as they have called it. Parameter R is not valid for only *can,* but also for *might*. According to this parameter, scope relations of *might* are determined by the surface word order. Since there is no movement, it can be concluded that *might* have [-R] value as in "Mary might$_{[-R]}$ not come". On the contrary, *can* have a [+R] value, which means that it should be under the scope of negation, so it is moved to a lower position than negation in the deep structure in order to have the "not > possible" reading as indicated in "Mary ~~can~~$_{[+R]}$ not can come".

Chapter 2, if children acquired the weak reading first, it would be really difficult for them to figure out the strong reading later. In such a situation, children would assign weak reading (possible > not) to both (7) and (8) and incorrectly interpret (7) as "Mary might not come", but they would not be aware of this mistake due to lack of positive evidence. As mentioned previously, when the sentence in (8) is uttered, both of the readings 'Mary has come' or 'Mary has not come' are possible. But when (7) is uttered and comprehended correctly in an adult-like way, this means it is not possible for Mary to come. As (9) and (10) below illustrate, the conditions in which (8) is used also includes the condition where (7) is used. If we revisit the example above, when children hear a sentence like "Mary cannot come", they would generalize the weak reading and interpret the sentence as "Mary might not come". Even though Mary has not come in the end, children would not think that they incorrectly interpret "Mary cannot come" because the weak reading is used by adults in both conditions where Mary has come or has not come. So there will be no positive evidence to show children that they are interpreting the scope relations of epistemic modality and negation correctly. Eventually, according to Moscati and Crain (2014), they would probably never get the strong reading of modality and negation.

(9) Mary might not come   (possible > not)

                                   (negative-weak sentence)

    Condition 1: Mary has come in the end
    Condition 2: Mary has not come in the end

(10)   Mary might not come (not > possible)

(negative-strong sentence)

Condition: Mary has not come in the end

On the other hand, if children initially adopt strong scope relations, they are more likely to acquire weak scope relations later on because there would be positive evidence. Adults utter sentences like "Mary cannot come" for cases in which it is impossible for Mary to come. If children acquire the strong reading first, they would apply this to sentences like "Mary might not come" and interpret them as "it is impossible for Mary to come". But in some situations, when adults say, "Mary might not come", Mary might show up and children would understand that they assign the incorrect reading to *might* and would realize that *can not* and *might not* should be handled separately (Moscati and Crain, 2014).

Bearing in mind the results of previous studies on the issue, in order to uncover the path the Turkish-speaking children follow in the comprehension of weak and negative-strong sentences, Experiment 2 has been conducted.

4.3 Experiment 2: Comprehension of negation when it combines with epistemic modals

As discussed in Chapter 2, Noveck (2001) studies English-speaking children's interpretation of modality and negation and Moscati and Crain (2014) examines Italian-speaking children's understanding of how modality and negation interact by implementing the Truth-Value Judgment Task (TVJT, Thornton & Crain, 1999). For example, in Italian, the modal *potere* denotes both possibility and ability. In the experiment, Moscati and Crain (2014) used the epistemic *potere*, which denotes

possibility. When the modal *potere* interacts with negation, the intended scope is reflected in the surface order as in (11) and (12).

(11)	Gianni puo non venire	(possible > not)
	Gianni MOD NEG come	(negative-weak)
	"Gianni might not come"	

(12)	Gianni non puo venire	(not > possible)
	Gianni NEG MOD come	(negative-strong)
	"Gianni cannot come"	

As (11) and (12) indicate, there is just one possible reading for each sentence, which is the surface reading. In other words, an inverse scope reading where (11) is interpreted as "Gianni cannot come" is not possible in Italian, at least for adults. Moscati and Crain (2014), however, finds out that 5-year-old Italian-speaking children prefer inverse reading for a sentence like (11) and interpret it as "Gianni cannot come".

Similar to the Italian *potere*, the modality marker *-Abil* in Turkish denotes both possibility and ability. When *-Abil* interacts with negation, the intended scope is provided by the surface structure. Let us consider sentences (13) and (14) to illustrate how modality interacts with negation in Turkish. As the tree diagram in Figure 14 illustrates, the modal *–Abil* takes scope over negation in the surface structure and the sentence is assigned possible > not reading in (13). Whereas negation takes scope over modal in (14) and the sentence yields not > possible reading, as shown in Figure 15.

(13) Kutuda araba ol-ma-yabil-ir   (possible > not)

      "There may not be a car in the box"   (negative-weak)

(14) Kutuda araba ol-a-ma-z   (not > possible)

      "There cannot be a car in the box"   (negative-strong)
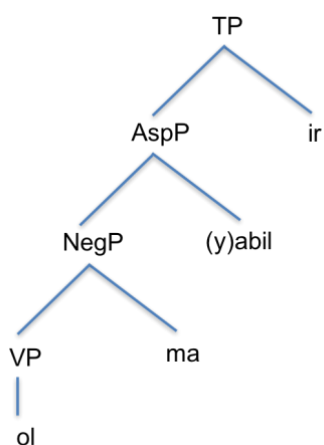
Figure 14. Syntactic tree for sentence (13)
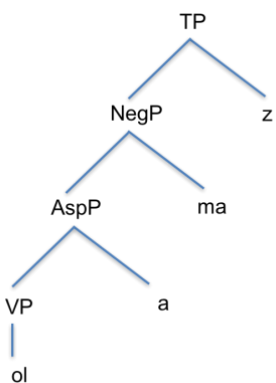
Figure 15. Syntactic tree for sentence (14)

4.3.1 Participants

Fourteen typically developing monolingual Turkish-speaking children ranging in age 4;7 to 6;3 (mean: 5;4) took part in the experiment. The control group consisted of ten adults ranging in age 24 to 38 (mean: 31;7). All the adult participants are university graduates.

4.3.2 Experiment design and materials

The experimental setup implemented in this study is similar to the one that is described in Moscati and Crain (2014), however rather than opting for the use of cardboard boxes where the experimenters have acted out in placing or replacing the toys, I gamified this task by creating a guessing game scenario with Sesame Street characters. I have used a PowerPoint slideshow enriched with audios and videos to present the scenarios/stories, both to ensure a less cognitively demanding setup and make the experiment more fun for children.

Each test item was presented with a story. In the experiment, there are four stories (see Appendix B for the stories and the test sentences). Similar to the experiment conducted by Moscati and Crain (2014), three types of target sentences, namely positive, negative-weak and negative-strong are used. Each story has a total of six test sentences –two positive, two negative-weak and two negative-strong–, hence a total of 24 sentences constitute the test items. The structure of the stories was very similar to each other. In each story, one character from Sesame Street prepared a guessing game for his/her friend. As will be laid out in Figure 16 below, the experiment began with the story where Kermit and Cookie Monster played the guessing game.

	While Kermit was sitting all alone at home, he came up with an idea. He would prepare a guessing game for his dearest friend Cookie Monster. He immediately called Cookie Monster and told him that he was bored and asked if he would like to come over to play a game. Cookie Monster accepted the offer.
	While Cookie Monster was on his way to Kermit's place, Kermit prepared the game setup. He took three boxes. In the first box, he put a teddy bear and a car. In the second box, he placed only a teddy bear. And finally in the third box he put either the content of the first box or the second box. We did not see what he put in the third box. As you can see there is also a ball outside of the boxes on the floor.
	The Experimenter turning to the child: "Now Kermit will tell you something." *Kermit to the child*: "The game boxes are ready! O-oh! Someone knocks on the door.! It must be Cookie Monster! Before he comes in, can I ask for a favor? Would you like to help me in the game we will be playing with Cookie Monster?' [Upon the child's 'Yes' answer] Kermit: 'Great! Please watch the game and listen to what Cookie Monster says carefully and tell me whether what he says is True or False. At the end of the game there is a surprise for you!"
	After Cookie Monster came in, Kermit explained the game to him and then Cookie Monster started guessing what the closed box may contain.

Figure 16. Sample Story-I

As can be seen in Figure 16, children's judgments on target sentences were evaluated in a game scenario. In the game in Story-I for example, there were three boxes. Kermit puts a teddy bear and a toy car in the first box. In the second box, however, he puts only a teddy bear. After this, a closed box appears. The child does not see what Kermit puts in the closed box. There is also a ball outside of the boxes, which cannot be the content of the closed box. The child's task is to listen to Cookie Monster's predictions about the content of the closed box and then judge whether they are True or False. In each story, it was ensured that the children understand the game. They were asked questions like "What can be in the closed box?" to make sure that they correctly understood that the closed box includes either the items in the first box or the second box.

Upon presentation of the closed box, the child is invited to evaluate the following sentences (15)-(20), summarized in Table 23, uttered by Cookie Monster.

Positive True/False:

(15)   Kutu-da araba ol-abil-ir   True

         box-LOC car be-ABİL-AOR.3sg

         "There may be a car in the box"

(16)   Kutu-da top ol-abil-ir   False

         box-LOC ball be-ABİL-AOR.3sg

         "There may be a ball in the box"

Negative-Weak True/False:

      (17)   Kutu-da araba ol-ma-yabil-ir   True

                      box-LOC car be-NEG-ABİL-AOR.3sg

                      "There may not be a car in the box"

      (18)   Kutu-da ayıcık ol-ma-yabil-ir   False

                      box-LOC teddy bear be-NEG-ABİL-AOR3sg

                      "There may not be a teddy bear in the box"

Negative-Strong True/False:

      (19)   Kutu-da top ol-a-ma-z.   True

                      box-LOC ball be-ABİL-NEG-AOR.3sg

                      "There cannot be a ball in the box"

      (20)   Kutu-da ayıcık ol-a-ma-z   False

                      box-LOC teddy bear be-ABİL-NEG-AOR.3sg

                      "There cannot be a teddy bear in the box"

Table 23. Conditions in Experiment 2

Positive Sentences	Negative-weak Sentence	Negative-strong Sentences
1.True	3. True	5. True
2. False	4. False	6. False

Story-I is followed by Story-II in which Cookie Monster prepares a guessing game for his friend Elmo. In short, in each story, a character prepares a guessing

game for his/her friend and asks for the child's help in finding out what the box may contain. The game setups in each story are similar to the one that is prepared by Kermit. At the end of each game scenario, both the child and the character (who makes predictions) are rewarded with stickers.[43]

4.3.3 Procedure

The children were individually tested in a quiet room at their school. Stories presented for each test item were supported by audiovisuals. Audio materials were prerecorded by two native speakers of Turkish and the voice files were superimposed on silent videos of Sesame Street characters who were the main characters in the stories presented to the children in the experiment. While superimposing the audio files on videos, it was ensured that mouth movements of Sesame Street characters were in sync with the audios in order to attain a more natural outcome. Throughout the experiment, stories were mostly conveyed to participants with audiovisuals. Only in some cases the experimenter intervened and explained the content of the story.

4.3.4 Scoring and coding

The responses of all the child and adult participants are orthographically transcribed and classified by the experimenter. The responses of the children are initially classified in three groups, namely (i) correct answers, (ii) incorrect answers and (iii) irrelevant answers. In this section, the criteria used in classifying the types of responses will be explained.

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[43] The most important difference of this experiment from the previous studies (Noveck, 2001; Moscati and Crain, 2014) is that instead of using cardboard boxes and puppets, I have opted for the use of slideshows to present the scenario. I believe this has prevented the children from looking into the boxes and made the experiment more fun for them where they feel more willing to answer the questions.

Recall that the task of the children in the test is to evaluate the predictions of the characters with respect to the truth or falsity of the test sentences and then to provide justifications as to why a particular prediction is True or False. Answers including both the correct evaluation of the target sentence and a reasonable and correct explanation are considered as correct. Now let us consider some of the target sentences in the experiment and provide examples for correct, incorrect answers and irrelevant answers. We start with a positive false sentence in (21) presented with Story-I. Table 24 shows the sample trial with (21)

(21)   Kutu-da top ol-abil-ir   False

          "There may be a ball in the box"

Table 24. Sample Trial-I

Cookie Monster: Kutuda top olabilir / There may be a ball in the box
Participant (4;7): False
Experimenter: Why is it false?
Participant: Because the ball is outside of the boxes.

As seen in Table 24, the correct answer is False as the content of the closed box is identical either with the first box or the second box. Since the ball does not belong to any of the boxes, there cannot be a ball in the closed box. The participant not only evaluated the sentence correctly, but also explained the reason. So this answer was considered as a correct answer. Now consider Table 25 for another test sentence in (22) which is a negative-strong sentence again presented with Sample Story-I.

(22)　　　　Kutu-da top ol-a-ma-z　　　　　　　True

"There cannot be a ball in the box"

Table 25. Sample Trial-II

Cookie Monster: Kutuda top olamaz / There cannot be a ball in the box
Participant (5;1): True
Experimenter: Why is it true?
Participant: Because the ball is outside of the boxes.

Again since the ball is outside of the boxes, it cannot be in the closed box. So this child's answer was coded as correct.

If both the evaluation and the justification provided for a particular test sentence is incorrect and the explanation is relevant and reasonable, the answer is considered as incorrect. For instance, consider the test sentences in (23) and (24). The story for these sentences is Story-I again. Thus, only the predictions of Cookie Monster and the participants' answers will be given in Table 26 for (23) and Table 27 for (24) to illustrate two incorrect answers.

(23)　　　　Kutu-da araba ol-ma-yabil-ir　　　　　True

"There may not be a car in the box"

Table 26. Sample Trial-III

Cookie Monster: Kutuda araba olmayabilir / There may not be a car in the box
Participant (4;7): False
Experimenter: Why is it false?
Participant: Because there can be a car in the box. But he says there is no.

(24)   Kutu-da araba ol-abil-ir   True

They may be a car in the box

Table 27. Sample Trial-IV

Cookie Monster: Kutuda araba olabilir / There may be a car in the box
Participant (4;7): False
Experimenter: Why is it false?
Participant: Because there is not *only* a car, but also a teddy bear.

The test sentence in (23) is a negative-weak sentence, where modal *-Abil* takes scope over negation. Recall that the content of the closed box is identical with either the first box including a teddy bear and a car or the second box which only has the teddy bear. So what Cookie Monster states in (23) is true as the content of the closed box can be identical with the second box that does not have a car. But the child evaluated the sentence as False and her justification suggests that a strong reading has been assigned to (23) whereby the sentence is interpreted as "There cannot be car in the box". Since the participant evaluated the sentence incorrectly and gave a reasonable explanation, this answer is coded as incorrect.

In (24), we have a positive sentence, which is True because the closed box might include the content of the first box where a car and a teddy bear are located. But some of the children judged this sentence as False and when the reason for this was asked, they indicated that there is not *only* a car, but also a teddy bear in the box. This suggests that children assume that there is a covert *only* in (24) and they evaluate the sentence incorrectly based on this.

If the explanation provided by children is irrelevant or they give no explanation as to why they deem a statement True or False, the answer is considered as irrelevant, irrespective of whether the evaluation of the target sentence is correct.

Consider negative-weak target sentence in (25) which was presented with Sample Story-II in Figure 17 and Sample Trial-V in Table 28.

(25)   Ceylan-ın tabağ-ın-da elma ol-ma-yabil-ir   True

"There may not be an apple on the gazelle's plate"

	Cookie Monster and Elmo love animals. On Sunday, they went to the zoo to see some animals. They saw a giraffe, an elephant and a gazelle there.
	They watched the animals for a while, then Elmo went to the restroom. While Elmo was away, the zookeeper came and fed the animals. Right at that moment, Cookie Monster came up with an idea: 'He would play the guessing game with Elmo that he played with Kermit before.'
	The Experimenter turning to the child: "Now Cookie Monster will tell you something." *Cookie Monster to the child*: "Hello my friend! Can you help me in this game? You just need to tell me whether Elmo's predictions about the closed box is true or not. Now I will tell the game to Elmo. Listen carefully. At the end of the game, there will be a surprise for you!"
	So when Elmo came back, Cookie Monster explains the game as follows: "Look Elmo, we will play a guessing game. If you make correct predictions, there will be a surprise for you. Now listen to me carefully. While you were gone, the zookeeper fed the animals. She gave an apple and a carrot to the giraffe. She gave only a carrot to the elephant. On gazelle's plate she put either what she gave to the giraffe or the elephant. Now guess what can be on gazelle's plate?"

Figure 17. Sample Story-II

140

Table 28. Sample Trial-V

Elmo: Ceylanın tabağında elma olmayabilir / *There may not be an apple on the gazelle's plate*
Participant (6;1): False
Experimenter: Why is it false?
Participant: Because apple is round

The correct evaluation for the target sentence in (25) should be True because the gazelle's plate can be identical with either the giraffe's plate or the elephant's plate and the elephant has no apple. So it is possible that there may not be an apple on the gazelle's plate. But the participant evaluated the sentence as False and gave an irrelevant justification. Due to this, his answer was coded as irrelevant.

Besides irrelevant justifications, some children have evaluated the target sentences not according to the story, but by focusing on other things in the pictures. Consider the sentence (26) based on Sample Story-III in Figure 18.

(26)   Kapalı paket-te çanta ol-abil-ir   True

"There may be a bag in the closed gift box"

One of the participants evaluated (26) as False, as in Sample Trial-VI in Table 29 explaining that the bag was too big for the gift box and if there were a bag, the gift box would be deformed.

Table 29. Sample Trial-VI

Zuzu: Kapalı pakette çanta olabilir / *There may be a bag in the closed gift box*
Participant (5;7): False
Experimenter: Why is it false?
Participant: If there were a bag [in the closed gift box], the gift box would be deformed.

	While Big Bird was preparing gift boxes for her friends Kermit, Cookie Monster and Elmo, her friend Zuzu dropped by and asked what Big Bird was doing. Big Bird answered: "I am preparing gift boxes for Kermit, Cookie Monster and Elmo. Please come in and help me!" At that time, she came up with an idea: She would play a guessing game with Zuzu that she previously played with Elmo.
	The Experimenter turning to the child: "Now Big Bird will tell you something." *Big Bird to the child*: "The gift boxes are ready. Can you help me in this game? You just need to tell me whether Zuzu's predictions about the closed box is true or not. Now I will explain the game to Zuzu. Listen carefully! At the end of the game, there will be a surprise for you!"
	When Zuzu came, Big Bird told her about the game: "Look, Zuzu. We will play a guessing game together. I prepared three gift boxes. In the first box, as you can see, I put a bag and a book. In the second box, I put only a book. And the content of this closed basket is identical with either the first box or the second box. You will guess the content of the closed basket. If you guess correctly, there will be a surprise for you. Now let's start."

Figure 18. Sample Story-III

4.3.5 Hypotheses and predictions

If Turkish speaking children behave like their Italian speaking peers and if what

Crain and Moscati (2014) observe and suggest is a universal trend, we would expect

children to err in the comprehension of negative-weak sentences and to do relatively

well in the negative-strong sentences. Thus bearing in mind the results of the

142

previous studies on the comprehension of modality and negation, I conjecture that (i) Turkish-speaking children's comprehension of negative-weak and negative-strong sentences may resemble that of their Italian-speaking peers, hence Turkish-speaking children may favor negative-strong sentences and apply a "negation > modality" reading to negative-weak sentences. More precisely 5-year-old Turkish-speaking children may incorrectly judge negative-weak sentences (modality > negation) as negative-strong sentences (negation > modality) thus judge sentences like "Kutuda araba olmayabilir / *There may not be a car in the box*" to be false, for they will take the inverse scope relations and interpret this sentence as "it is impossible that there is a car in the box".

Since children are reported to start using epistemic modality at around age 4 (Shatz and Wilcox, 1991; Papafragou, 1988) and 5-year-olds have been found not to understand the differences between the epistemic modals *may* and *have to* and also the difference between a sentence with *may* (e.g. Mary might come) and *plain* assertion (e.g. Mary comes) (Noveck et al., 1996; Byrnes & Duff, 1989), I also predict that (ii) Turkish children will have no problem at all with the positive sentences because children acquire epistemic modality at relatively young age. 3-year-old children are reported to acquire epistemic modality and to start using it when they reach the age of 4 (Shatz and Wilcox, 1991; Papafragou, 1988). Moreover, 5-year-olds have been found not to understand the differences between the epistemic modals *may* and *have to* and also the difference between a sentence with *may* (e.g. Mary might come) and *plain* assertion (e.g. Mary comes) (Noveck et al., 1996; Byrnes & Duff, 1989). Therefore, I think that Turkish-speaking children will have no problem at all with positive sentences including epistemic modality.

Moreover, due to the fact that children have a tendency to choose strong readings over weak ones (Chierchia et al., 2001; Noveck, 2001; Ozturk & Papafragou, 2015), (iii) I believe that children's performance in negative-strong condition will be very close to the adults' performance. My hypotheses and predictions are summarized in Table 30 below.

Table 30. Hypotheses

HYPOTHESIS 1 *Negative-strong reading over negative weak one*	It is expected that Turkish-speaking children, like their Italian-speaking counterparts, will favor negative-strong sentences and then they will apply "negation > modality" reading to negative-weak sentences.
	Children will perform adult-like with negative-strong sentences
HYPOTHESIS 2 *Positive sentences*	Children will have no problems at all with the positive sentences.

4.3.6 Results and discussion

In this experiment, so far seventeen children have been tested. Fourteen of them managed to complete the test. The experiment sessions with the remaining three children were terminated at some point, for the children seemed not to understand the game, gave irrelevant answers or no answers and lost focus quickly. Among the group of children who completed the test, irrelevant answers were excluded from the analysis. Table 31 shows the overall results for six conditions for both adults and children.

As Table 31 illustrates, adults gave incorrect responses only in the Negative-Weak True condition. Quite strikingly, children also erred remarkably more in that condition (error rate 35%) compared to all the other conditions of the experiment.

Children's performance was relatively good in Positive True, Positive False, Negative-Strong True, Negative-Strong False and Negative-Weak False sentences. Yet the proportion of correct answers for Negative-Weak True condition is very low. Furthermore, the percentage of correct answers given in the Positive True condition is significantly lower than that of the Positive False condition.

Table 31. Proportion of Correct Answers by Condition for the Two Groups

Conditions	Positive		Negative-Weak (possible > not)		Negative-Strong (not > possible)	
Truth-Value	True	False	True	False	True	False
Children	75%	98%	35%	85%	83%	92%
Adults	100%	100%	97.50%	100%	100%	100%

A quick look at the results given in Table 31 immediately shows that Turkish-speaking children are quite competent in comprehending the negative-strong sentences and they seem to have generalized the scope relations that they have computed in negative-strong sentences (negation > modality) to negative-weak ones. For example, consider the content of the boxes from Story-I again in Figure 19 and recall that the closed box includes either the stuff in the first box or the second one. When Cookie Monster utters the sentence in (27), it should be judged as True because the closed box may be identical with the second box.

(27)   Kutu-da araba ol-ma-yabil-ir   (Negative-Weak - True)

"There may not be a car in the box"

First Box:	Second Box:
Outside of the boxes:	Third Box:
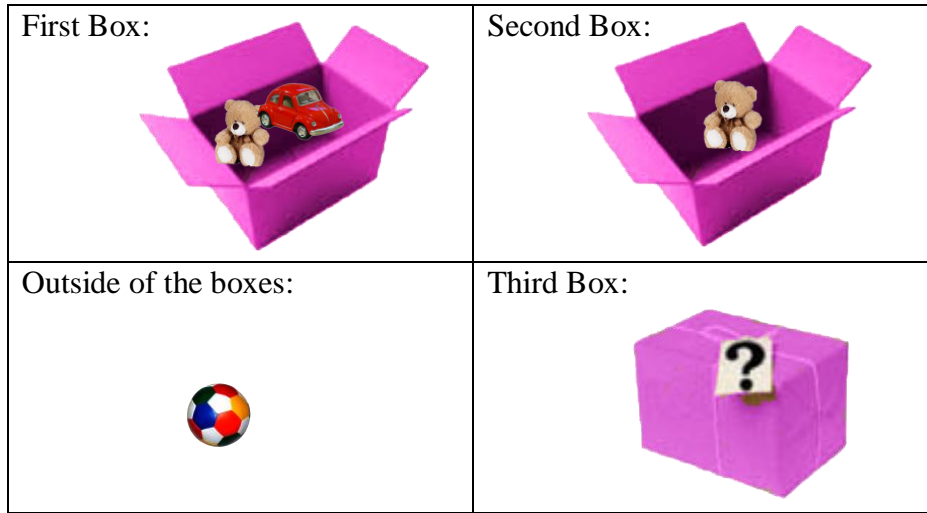
Figure 19. Content of the boxes in Story-I

Almost all adult participants correctly evaluated test items like the one in (27), but only 35% of the children participants gave a correct answer for this type of test sentences, i.e., around 65% of the children tested evaluated target sentences like (27) incorrectly. The explanations of children for their incorrect evaluations have indicated that the majority of children assigned a strong reading (negation > modality) to negative-weak sentences.

Whenever a character in the story uttered a sentence like (27), which is True, the majority of the children judged this as False and reasoned it out mostly as the following: (consider *x* as the item that is the stuff inside or outside the boxes in the story and *y* as the container that can be a box, a plate, a picnic basket or a gift box): "Çünkü olabilir. Ama o, 'x yok' dedi / Because there can be (an x in the box), but it (Kermit) said 'there is no x (in the box)'" and "Olabilir. Çünkü bir y'de de x var / It can be because there is x in one of the y's."

These explanations suggest that children treated negative-weak epistemic sentences as negative-strong ones. When someone uttered a negative-weak sentence, they do not get the "weak" possibility there because they had a tendency to choose

certainty over possibility; therefore, they favored the strong reading. Due to this, they interpreted the sentence "Kutuda araba olmayabilir / There may not be a car in the box" as "Kutuda araba olamaz / There cannot be a car in the box."

Unlike the True Condition, children's performance in Negative-Weak False condition is near adult like. As Table 31 illustrates, 88.88% of the child participants judged sentences in negative-weak False condition correctly. The percentage of incorrect answers for False-condition (around 12%) is significantly lower than those given in the True-condition (around 67%). This is a clear indication of how the truth value of a sentence may impact the way it is comprehended and evaluated by the children. Let us revisit what weak-negative True / False and strong-negative True / False sentences presuppose by considering sentences from Story-I

(28)   Kutuda ayıcık olmayabilir

Presupposition under False: There must be a teddy bear in the box

Presupposition under True: There may not be a teddy bear in the box. (If misjudged as True then there may be or may not be one in the box.)

Recall the content of the boxes from Figure 6. Both the first box and the second box include a teddy bear. So the closed box has to have a teddy bear, too. So the sentence in (28) is False and the reason for this is that there must be a teddy bear in the box. Most probably children interpreted (28) as "There cannot be a teddy bear in the box." But this time there is no possibility for the teddy bear not to be in the closed box, so their misinterpretation doesn't lead them to an incorrect evaluation.

The rate of correct responses by adults, on the other hand, is 100% for almost every condition, except Weak-Negative True condition as shown in Figure 20. One of the adult participants misjudged a sentence like (27) as "Kutuda araba olmayabilir / There may not be a car in the box." This suggests that Negative True condition seems to create a difficulty even for adults. As De Villiers and Flusber (1975) has shown children can process faster and give more accurate answers for false negative sentences than true negative ones. That is probably due to children's coding of negation with falsity. As Choi (1988) has defined, the very first negative utterances that children are exposed to are prohibitions, such as "Don't touch that". So actually children start to hear their first negated sentences when they do something wrong. Thus when the truth value of the negated sentence is false, children are very likely to comprehend the story and sentences more accurately.

The observation that children comprehend and evaluate false negative sentences more accurately than true negative ones is also valid for the negative-strong condition. As conjectured in Section 4.3.5, children are more successful in Negative-Strong conditions than Negative-Weak. But even in this condition, the percentage of correct answers for Negative-Strong False condition (92%) is a little bit higher than Negative-Strong True (%83), supporting the suggestion that children encode negation with falsity.

In section 4.3.5, I have also conjectured that children may give adult-like responses for both the positive condition and the negative-strong condition. But it has turned out that the rate of children's correct responses for Positive True condition is relatively low even lower than the rate of Negative-Weak False condition as shown in Figure 21. Yet the explanations children provided for their incorrect answers have indicated that the reason for the relatively low rate of correct answers

for Positive True condition is a "covert only". That is they misjudged sentences like "Kutuda araba olabilir / There may be a car in the box" as "Kutuda *sadece* araba olabilir / There may be *only* a car in the box." Recall the setup again. First box includes both a car and a teddy bear and if the closed box is identical with the first box, the sentence "Kutuda araba olabilir / There may be a car in the box" should be considered as True. But around 25% of children incorrectly evaluated it as False and reasoned it out as "Kutuda *sadece* araba olamaz. Ayıcık *da* var / There cannot be *only* a car in the box. There is *also* a teddy bear." The presence of *only* and *also* in their explanations suggests that they consider a covert *only* in the test sentence and judge its truth value accordingly.
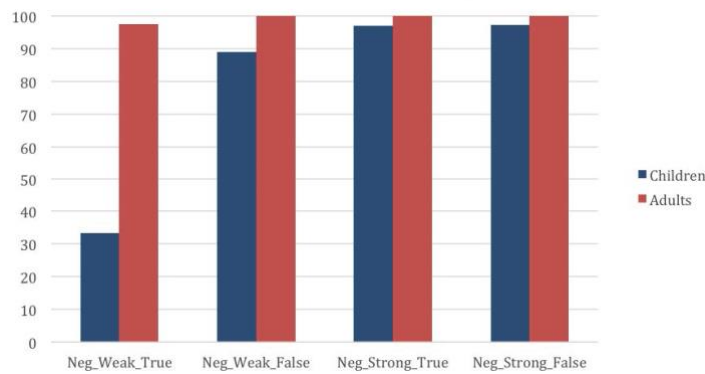
Figure 20. Proportion of correct answers for negative sentences
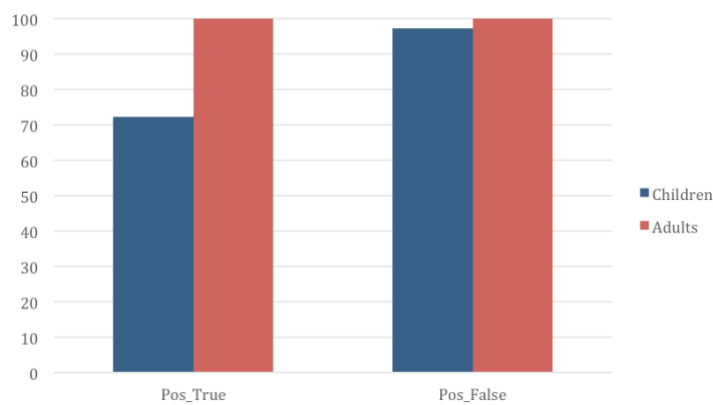
Figure 21. Proportion of correct answers for positive sentences

149

In short, the findings obtained from Experiment 2 can be summarized as follows:

(i) 5-year-old Turkish-speaking children like their Italian-speaking age mates have a tendency to favor negative-strong sentences (e.g. Kutuda ayıcık olamaz / There cannot be a teddy bear in the box) and generalize the strong reading where negation takes scope over modality to negative-weak sentences in which modality takes scope over negation. So they misjudged a negative-weak sentence like "Kutuda araba olmayabilir / There may not be car in the box" as a negative-strong sentence like "Kutuda araba olamaz / There cannot be a car in the box."

(ii) Quite strikingly, the percentage of correct answers for Negative True condition is lower than Negative False condition even with Negative-Strong sentences at which children were relatively good and gave more accurate responses.

(iii) Furthermore, the rate of correct answers for Positive True condition by children is relatively low because it seems that they consider a covert *only* in positive true sentences and misjudge a sentence like "Kutuda araba olabilir / There may be a car in the box" as "Kutuda sadece araba olabilir / There may be only a car in the box."

To sum up, Experiment 2 was based on a study reported in Moscati and Crain (2014) and the aim was to uncover whether Turkish-speaking children behave like their Italian- and English-speaking counterparts in terms of comprehension and evaluation of positive, negative-weak and negative-strong epistemic sentences. The

results obtained in this study appear to be analogous with the findings of previous studies on this issue (Noveck, 2001; Moscati and Crain, 2014). So this study has indicated that the type of incorrect answers the 5-year-old Turkish speaking children gave and their explanations are very similar to their Italian-speaking peers' incorrect responses and their reasons for these. Yet, it can be observed that Turkish-speaking children's rate of accurate responses is a little bit higher than the results of Noveck (2001) and Moscati and Crain (2014) in Positive True and False, Negative-Weak False and Negative-Strong True and False. This difference might have originated from the experimental design. Recall that both studies used white cardboard boxes which were grouped in the sets and all the boxes were in the same room. The test sentences were uttered by a hand puppet hold by the experimenter. There were 4 sets, and in each set the child was exposed to 6 target sentences. At the end, the child evaluated 24 target sentences. In each set, the story is the same, only the toys change. For example, in the first set there are a toy horse and a toy donkey in the first box, only a toy horse in the second box and there is a strawberry outside of the boxes. In the second set, the first box has a pig and a rooster, while the second one has only the rooster. And there is a dog outside of the boxes. Since the children are always exposed to the same setup with different toys, they could easily get bored and pay little attention to the test sentences. Moreover, a hand puppet is very likely to distract their attention and to be ignored because children know that the experimenter is the one who is dubbing the puppet. Then the same experimenter asked them if the puppet is right or wrong. It is very likely for the children to deduce that the experimenter is the one who holds the hand puppet and speaks on behalf of it by changing her/his voice, s/he must have known the answer. So the child may find it pointless to be asked to evaluate what the puppet said.

On the other hand, in the Turkish version of the experiment, instead of cardboard boxes, a Power Point slide show was used. There were again 4 sets and 24 target sentences in total. But each set has different characters and places. For example, in the first set, it was Kermit who prepared a guessing game for his friend Cookie Monster by using boxes at his home. In the second set, Cookie Monster and Elmo, a new character, went to the zoo where they played the game by guessing what the zookeeper fed the animals. Elmo and Big Bird were on a picnic in the third set, where Big Bird tried to guess the content of the picnic baskets. Finally, in the last set, Big Bird and her friend Zuzu were in her house and the game scenario was based on gift boxes that Big Bird was preparing for her friends. Thus, in the experimental design of the current study, each story is connected to the other through the character from the previous set and the place, the content and the container used are different in each set. Obviously this design of the current study appears to have attracted the children's attention, hence make them interested in the test and keep their interest alive.

Moreover, the experimenter talked a little during the experiment. All the stories were conveyed to the children with audio-visual materials. On each screen, there were pictures of characters and embedded audios for their speech. For example, in the first story, Kermit appeared on the screen and introduced himself. Then he continued as, "I am too bored today. I will prepare a guessing game for Cookie Monster." After that he told children the rules of the game. So each story was told by the characters themselves, not by the experimenter, which appears to have increased the persuasiveness of the experiment.

For Negative-Weak sentences, the rate of correct answers of both Turkish- and Italian-speaking children is very close (around 35%). As laid out in Chapter 2,

Moscati and Crain (2014) has explained this with the Semantic Subset Principle (SSP)--when there is an asymmetric entailment between two propositions, i.e., one proposition (superset) entails the truth of the other (subset) yielding a learnability problem. To avoid this, SSP proposes that if children initially acquire the superset, it will be easier for them to acquire the subset later. But if they acquire the subset first, it would be almost impossible for them to acquire the superset because there will be no positive evidence (as discussed earlier).

Furthermore, the unexpected low rate of accurate answers for Positive True condition in Experiment 2 was also observed in the experiment conducted by Moscati and Crain (2014). Italian speaking children also rejected positive true sentences by providing similar reasons with Turkish-speaking children. They argued that the lower percentage of correct answers in the Positive true condition might be related to focus and *covert* only. The presence of *also* in children's justifications shows that they assign a covert only to positive true sentences and they understand a sentence like "Kutuda araba olabilir / There may be a car in the box" as "Kutuda sadece araba olabilir / There may be only a car in the box." But the important issue is that even when there is no specific intonation, children added a sentence covert *only* and enriched the meaning of that sentence. But what is the reason for this?

According to Moscati and Crain (2014), the reason why children added a covert *only* to sentences has its origins in information strength again. As laid out in Section 4.2 in this chapter, information strength is a kind of scale on which the meaning of certain operators, such as modality, are aligned. Consider the sentences in (29) and (30) and the corresponding situations (content of the box) that would support their truth-conditions. As proposed by Moscati and Crain, since (30) is true in a narrower set of circumstances, (30) is stronger than (29). Moreover, the word

only adds some kind of certainty to the meaning of the sentences which make them stronger. Since children initially acquire the strong reading first, they applied this not only to Negative-weak sentences, but also to Positive sentences.

> (29)   Kutu-da araba ol-abil-ir
>
> "There may be a car in the box"
>
> Box Content: (Car) or (Car + Teddy Bear)
>
> (30)   Kutu-da sadece araba ol-abil-ir
>
> box-LOC only car be-ASP-AOR.3sg
>
> "There may be only a car in the box"
>
> Box Content: (Car)

In short, Moscati and Crain (2014) have considered SSP as the only notion behind the finding that children incorrectly assign strong reading to the sentences which actually have a weak reading. Yet this might not be the case. SSP might be a parameter of Universal Grammar and it might not leave children no other choice but to initially presume that there is only a strong reading for each sentence. But there can be some other reasons leading to this phenomenon.

Comprehension of semantic and pragmatic aspects of modality might be one of the reasons why the children chose the strong reading over the negative one. In order to comprehend the stories and judge sentences accurately, the children should have acquired the semantics of modality (i.e., possibility and necessity) by deducing and making indirect inferences from the sentences that include epistemic modals. Previous research on the acquisition and comprehension of modality have indicated that children have problems with the sentences when there is an epistemic possibility, especially when there is more than one possible outcome (Noveck, 2001;

Shtulman and Carey, 2007; Ozturk and Papafragou, 2015). Noveck (2001) can provide us with important insights about the issue of modality. In the experiment, she run, there are four groups, namely 5-, 7-, 9-year-old children and adults. Each group were shown three boxes. As in Experiment 2 in this thesis, two of the boxes were open and the third box is closed. There is a parrot in one of the open boxes. The other open box includes a parrot and a bear. The participants were told that the closed box was identical with one of the open boxes. Then a puppet made predictions about the closed box. For example, it said "There has to be a parrot in the box." The task of the participant is to judge whether the puppet is right or wrong. Results have indicated that 7- and 9-year-olds were quite successful and seemed to master epistemic modality. But 5-year-olds had problem in evaluating the sentences correctly. What is surprising is that according to Noveck (2001), 5-year-olds performed above chance while reasoning about an inevitable conclusion, but had a very poor performance when there was an epistemic possibility. For example, both of the boxes have parrot in this experiment. So the children were more successful with modal expressions including the parrot like "There could be a parrot" and "There had to be a parrot." But their performance was around chance levels when they were requested to judge the truth value of a simple possible outcome. For example, only one of the boxes includes the bear. In order to correctly evaluate a sentence "There could be bear in the box" (which is True), children need to draw the conclusion that the closed box can be identical with the box that includes both the parrot and the bear, so in this case the sentence is True. Yet the results have indicated that the rate of children's responses for this kind of sentences including epistemic possibility is very low. This suggests that 5-year-olds seem not to have mastered epistemic modality, especially if there is a possibility that needs to be deduced from the context.

Children's not being able to draw a conclusion among alternative possible outcomes explains the low rate of correct responses by Turkish-speaking children for Negative-Weak True and Positive True conditions and their adult-like performance in Positive False, Negative-Weak False and Negative-Strong True/False conditions in Experiment 2 in this thesis. In Negative-Weak True and Positive True conditions, there are always statements about possible outcomes in each story, as shown in (31) and (33) for Story-I. Recall once again that, there are three boxes and the closed box had the same content with one of the open boxes. Also there is a ball outside of the boxes. Then Cookie Monster uttered some predictions and the children were asked to judge them. Negative-Weak True conditions (e.g. There may not be a car in the box) uttered by Cookie Monster are the ones that children gave more incorrect answers because in order to evaluate this accurately, they needed to assess the possibility of the closed box's being identical with the box that included a car and a teddy bear. Positive True condition has also the same issue. For example, in order to correctly judge the sentence in (31), the children had to deduce a possible conclusion in which the closed box is identical with the box which has a car and a teddy bear, not with the other one including a teddy bear. Since 5-year-old children find it difficult to deduce possibilities, as previous studies have revealed, the rate of the inaccurate responses were relatively high in this study as well.

Positive True:

> (31)   Kutuda araba olabilir.
>
> "There may be a car in the box."
>
> Possible Conclusion

Positive False:

> (32)   Kutuda top olabilir.
>
> "There may be a ball in the box."
>
> Necessary Conclusion

Negative-Weak True:

> (33)   Kutuda araba olmayabilir.
>
> "There may not be a car in the box."
>
> Possible Conclusion

Negative-Weak False:

> (34)   Kutuda ayıcık olmayabilir.
>
> "There may not be a teddy bear in the box."
>
> Necessary Conclusion

Negative-Strong True:

> (35)   Kutuda top olamaz.
>
> "There cannot be a ball in the box."
>
> Necessary Conclusion

Negative-Strong False:

> (36)   Kutuda ayıcık olamaz.
>
> "There cannot be a teddy bear in the box."
>
> Necessary Conclusion

In Positive False, Negative-Weak False and Negative-Strong True/False conditions, on the other hand, there is just one conclusion, not more than one possible conclusion. For example, in (35) it is certain that a ball cannot be in the closed box because none of the boxes has it. Since there is one necessary conclusion,

the children might have evaluated it more accurately than Positive True sentences. In Negative-Weak False condition, children are more successful in evaluating sentence (34) than Negative-Weak True condition because both of the boxes include a teddy bear, so the children didn't have to deduce alternative possible outcomes (i.e. there is no possibility and they don't need to choose a possible box for the closed box to be identical with). The same situation could be observed in Negative-Strong True and False conditions. In (36), similar to (35) there is only one conclusion, that is, it is impossible for the ball to be in the closed box. There is also just one necessary conclusion in (36). Since both of the boxes included a teddy bear, the closed one had to include it, as well. So the children did not need to choose possible contents for the closed box in order to evaluate (36).

To sum up, children seem not to be successful with the conditions where they need to choose one conclusion among alternative possible outcomes by making inferences. Because of this, in conditions which include more than one possible conclusion/ inference, children's performance is relatively low as shown by previous studies. This might be the reason for the low rate of correct answers for Positive True and Negative-Weak True conditions in this study because these conditions include epistemic modal expressions with possible outcomes in each story. On the other hand, Positive False, Negative-Weak False, Negative-Strong False and True conditions have epistemic modal expressions including one necessary conclusion in each story, which might lead to the result that children are more successful in these conditions.

The results of the experiment on children's comprehension of epistemic modality conducted by Özturk and Papafragou (2016) also shows that the children are after certain/necessary outcomes instead of making inferences among possible

conclusions. In the experiment, the participants were shown short animated stories on the computer. An animal was hiding in a box in each story. After watching the animated story, the experimenter uttered a statement about where the animal is hiding and the child would judge it as True or False. There were four types of stories in the experiment. In Type 1, there is only one box and the participants needed to conclude that the animal was hiding there. In Type two, there were two boxes and one of the boxes was opened and the participants saw that it is empty. So the animal must have hidden in the other box. In type 3, there are also two boxes, but this time none of them was opened. Finally Type 4 is identical with Type 2. The results have shown that children made more errors in Type 3. The target sentence for Type 3 was a sentence like "The cat has to be in the yellow box." Since none of the boxes was opened in the story, it is possible for the cat to be under yellow box, but not necessary. This suggest once again that children have troubles in judging situations that have multiple possible outcomes instead of one necessary conclusion.

Related to the discussion above, children's understanding of (un)certainty might be another reason as to why they chose strong reading initially. Studies on the topic have shown that infants start to discriminate uncertainty from certainty as early as 2;8 years of age (Shatz et al., 1983) by using *think* and *know* to show the level of certainty. Yet they begin to express (un)certainty through modality around the age of 4 (Shatz and Wilcox, 1991; Papafragou, 1988). The mean age of the participants of both the experiments carried out on Turkish and Italian-speaking children is around 5. So one year might not be sufficient for a child to master epistemic modality with all the meanings denoted by it. I mean they might need more time and more input to correctly evaluate test sentences. Even we accept that they gave incorrect responses because they didn't fully complete the modality in their mind, it is still interesting

why they choose the strong reading initially and generalize it to other sentences. Maybe this can be explained the notion of uncertainty or possibility. Even though infants start to provide some evidence that they can distinguish uncertainty from certainty as young as the age of 2;8, uncertainty/possibility is still a complex notion for them.

Moreover, the saliency and the frequency of the usage of negative-weak sentences should be taken into the consideration, as well. Maybe negative-weak sentences are less frequent than negative-strong sentences in the input and this might be the reason why children are more successful with negative-strong sentences than negative-weak ones.

Another reason might be concerned with meronymy and Theory of Mind (ToM) abilities. Recall that some of the children misjudged a sentence like "Kutuda araba olabilir / There may be a car in the box" as "Kutuda sadece araba olabilir / There may be only a car." Moscati and Crain (2014) has tried to explain this with information strength again. Since sentences with covert *only* are stronger than the ones that don't include any focus particle, children initially choose strong reading for positive sentences, as well, and generalize it to the other sentences. This might be true, but also there can be other factors affecting this. Remember Figure 5 which shows the content of the boxes. Children might consider the content of the first box as a whole because of their underdeveloped meronymy abilities. In other words, they may have difficulties in establishing a healthy part-whole relationship and because of this they might have difficulties in thinking about the content of the box individually and might think that a car and a teddy bear exist in that box together. So when someone utters the sentence "There may be a car in the box," children might misjudge this sentence as False because the content of the first box is inseparable for

them. Since their ToM abilities are still developing, they might not understand what the characters in the experiment has in mind when they utter such predictions. They might not get if characters focus on items one by one because the content of the first box cannot be separated for them and also they are very likely not to get if someone can have another option.

This is also supported by the second experiment conducted by Moscati and Crain (2014.) They prepared a second test in order to be sure that children interpreted a covert only in Positive True sentences. Different from the first experiment, there is only one object in each box as shown in Figure 22.

In this case, when the puppet makes a prediction which is positive and true, the child was expected not to invent a covert *only* because there in only one animal in each box. So when the puppet utters a sentence like "There may be a cow in the box", 95.5% of children evaluated the positive true sentence correctly.[44] This suggests that the relatively low rate of correct answers for Positive True sentences in the first experiment might have stemmed from children's nonadult-like part-whole relations. They misjudged Positive True sentences in the first experiment because they cannot separate the content of the boxes. Since there in only one item in this case, they judge sentences in an adult-like manner.

Figure 22. Typical scenario in Experiment II conducted by Moscati & Crain (2014)

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[44] Results of Experiment II has shown that children gave less inaccurate responses for Positive True condition. For Negative-weak sentences, there is no significant difference between Experiment I and II, so they argued that children assign strong readings to weak sentences.

That children's underdeveloped part-to-whole relations cause them to misjudge sentences is also supported by the answers of children for Negative-Strong condition. Recall the sentence in (24), which is "Kutuda ayıcık olamaz / There cannot be a teddy bear in the box." Majority of children judged negative-strong sentences as false, which is correct. But when their reasons for their evaluations are taken into consideration, it can be seen that they only focus on the box where there is only a teddy bear. Let us consider again Sample Trial-II. As you can see, when the participant is asked the reason why he evaluated this sentence as false, he explained as, "Çünkü bu ayıcık [ikinci kutuda] tek olduğu için bu kutuda da olması gerek / Because this teddy bear is alone [in the second box] so it must be in the closed box, too." The teddy bear is alone only in the second box. When the target sentence included only the teddy bear, it seems that the participant paid attention only to the second box, which has only teddy bear, and judged the sentence according to this, as if the closed box was identical with the second box. This suggests that children seem not to separate individual parts from the whole and when an individual part is the focus of the sentence (teddy bear in this instance), they only focus on the box where this individual item takes place on its own, not a part of a whole.

In addition to the aforementioned cognitive abilities and the frequency of the input, children also should be able to comprehend *ya… ya da…/either… or…* and *sadece/only* in order to be able to judge the predictions with respect to the content of the closed box. Although the aim of this study has not been to test children's comprehension of disjunction (i.e., the experiment didn't include test items with disjunction) or focus particle *only*, the whole procedure and the experimental design was based on disjunction as laid out in Section 4.3.3. Let us start with disjunction. The main aim of the guessing game was to evaluate the predictions of Sesame Street

characters about the content of the closed containers, which were identical with either the first box or the second box. Therefore, in the experiment while explaining the story, the children were told that the third box includes *either* the content of the first box *or* the second box. In other words, even though the disjunctive words do not directly take part in the test items, the story and the procedure are conveyed to the children by using disjunctive words. But what if the children have not mastered disjunction yet? Studies have shown that children generally understand disjunctive sentences as conjunctive ones (Singh et al., 2016; Geçkin et al., 2016). Even though it was ensured that the children correctly grasped that the closed box is identical with one of the boxes, their understanding of *ya… ya da…/either…or…* could have effects on their performance.

Apart from these, there are also evidences revealing that children find disjunction problematic because disjunction leads to possible outcomes, which is discussed above. For example, in an experiment conducted by Robinson et al. (2006), 5-year-old children were shown a toy wall which has a green, a yellow and a black door. There were also two bags. One of them is black and contains only black blocks. The other one is green-and-yellow and have green and yellow blocks. Then the participants were told that the experimenter would pick up a block in the bags and push it through the door which is the same color with the block that s/he chose. The task of the child was to put trays under the doors and get the blocks. When the experimenter took a block from the black bag, the children immediately draw the conclusion that the block would come out through the black door. But when the experimenter chose a block from the green-and-yellow bag, they put trays under one of the two doors (green or yellow door) instead of placing it under both of them. This has indicated that the children are unable to compute that the block can be either

yellow or green and they missed that it would be better to put trays under both the green door and the yellow door so that they could definitely catch them. Instead of assessing the possibilities created by disjunction, they immediately focus on one door as if they had to have one necessary conclusion, which reveals that children's abilities are very limited in tackling with epistemic possibility especially when it combines with disjunction.

Comprehension of focus particle *only* is also an important issue in order to correctly understand the story and to evaluate the sentences. As mentioned above, children's understanding of *only* is not tested in this study. Yet it has an important role in conveying the story and the task to the children. As described in Section 4.3.3, while Kermit was explaining the game, he told the children that the first box has a car and a teddy bear. And the second box has *only* a teddy bear. The third box has the items either in the first box or in the second box. Topaloğlu and Nakipoğlu (2017) have indicated that 5-year-old Turkish-speaking children have a tendency to interpret subject-focus readings as object focus readings especially if there is an exclusive focus particle *only*. For example, the children tested understood a sentence like "Sadece kedi balık yedi / Only the cat ate the fish" as "Kedi sadece balık yedi / The cat ate only the fish." In this case, it could be conjectured that if children incorrectly assign the scope of *only*, they will be very likely to understand a sentence like (37) as (37b) which is unavailable for adults. The visual materials, however, are designed in such a way to prevent children from assigning the incorrect scope relations with regard to *only*. Since the teddy bear is the object in common between the first box and the second box, the children are less likely to interpret (37) as (37b).

(37)   İkinci kutuya sadece ayıcık koymuş.[45]

"He put only a teddy bear in the second box."

a. The second box is the box that includes only a teddy bear

b. *The second box is the only box that includes a teddy bear

What I tried to uncover in this experiment is the reason why children apply strong scope relations (where negation takes scope over modality) to negative-weak sentences might be SSP, as laid out in Moscati and Crain (2014). But there might be other reasons, such as children's understanding of (un)certainty, exposure to sufficient input on the issue and underdeveloped meronymy and Theory of Mind (ToM) abilities. Future research on children's understanding of the combination of modality and negation should consider this potential causes to see the big picture.

4.4 Summary

Acquisition and comprehension of interaction of negation with modality is one of the topics in semantic-pragmatic interface of acquisition of negation studies. Yet there is a limited number of studies on this topic and only English and Italian have been investigated so far. Thus in this thesis I aimed to investigate Turkish-speaking children's understanding of negation when it combines with modality. Results suggest that Turkish-speaking children, like their Italian- and English-speaking counterparts, incorrectly interpret the inverse scope of negative-weak sentences and get the strong reading. The reason for this is considered as SSP by Moscati and Crain (2014). Yet there could be other reasons, namely children's limited abilities in

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[45] This is not a test sentence in the experiment, but a part of the instruction conveyed to the children while explaining the game scenario. Yet this is as important as the test sentences because it can affect their understanding of the game and might lead to incorrect answers. For example, if they understand (37) as (37b), it affects their responses for the test sentences.

handling epistemic possibility, their undeveloped understanding of (un)certainty, part-to-whole relation and ToM abilities, the frequency of the input and their comprehension of disjunction, that can lead to children's favoring negative-strong sentences and generalize its scope relations to negative-weak ones.

CHAPTER 5

CONCLUSION

5.1 Summary of the proposals and findings

In this thesis, I have attempted to investigate how Turkish-speaking children interpret negation when it combines with other logical operators, namely (non)factivity and epistemic modality, in complex sentences. Factive verbs presuppose and entail the truth of their complements even if they are negated, while non-factive verbs neither presuppose nor entail the truth of their complements; they just express the belief or the hope of the attitude holder about the possibility of an event. When non-factives are negated, they do not preserve the possibility of their complements, even the likelihood of the complement changes. Epistemic modality, on the other hand, is another logical operator which gives rise to a meaning change, in terms of information strength, under negation. Weak epistemic modals could turn into stronger ones when they combine with negation. In other words, even though both *may* and *can* are weak modals, when they are negated their information strength changes and *cannot* turns out to be stronger than *may not*. The current study has explored Turkish-speaking children's take on these logical operators when they are in relation with negation in complex sentences.

Experiment 1 investigated the interaction of (non)factivity with negation and has shown that with factive verbs, 8-year-old Turkish children had a ceiling-level accuracy in the interpretation of negation. 5-year-old Turkish-speaking children, however, while performing well with most factive verbs (cognitive and emotive) showed a poor performance with non-factives, especially with the verb *san-* where their accuracy levels were below chance on all four conditions. The nonfactive *san-*

167

has proven to be challenging even for the 8-year-old group as children failed to access the right interpretation for the PP, PN, and NN True and NN-False conditions with error rates ranging from 20 to 25%. Hence, the findings suggest that interpretation of negation is taxing when it combines with non-factivity. The discrepancy between children's performance on factives and non-factives mostly stemmed from children's tendency to take the truth of the complements for granted regardless of whether the verb is factive or non-factive and children's failure to attribute a false belief to the attitude holder with non-factives. Overall we can say that Turkish-speaking children master the relation between factivity and negation somewhere between the ages of 6 and 8, however, problems especially with the non-factive *san-* persist well into 9 years-of-age.

Research on the acquisition of the interaction between modality and negation, i.e., the results of Experiment 2, have indicated that 5-year-old Turkish-speaking children have a tendency to favor negative-strong readings over negative-weak sentences. Moreover, children exhibited a tendency to interpret a covert only with positive true sentences. This suggests that children appear to be good at the test items when there is a necessary conclusion, but performed very poorly on the test sentences including possible outcomes. The results of both Experiment 1 and 2 have revealed that 5-year-old children are very likely to be after certainty and are less successful when they have to deal with possible outcomes.

The results of both Experiment 1 and 2 appear to be incompatible with previous studies conducted with English- and Italian- (for the modality part) speaking children in respect of the overall accuracy rates observed in all three languages. Turkish children appeared to have outperformed their age-mates and we believe that what made this possible is in fact the experiment design in the Turkish

study. Compared to most other works in the literature both of the experiments of this study were pragmatically felicitous without leaving much room for variant interpretations. Experiment 1 has been designed in such a way that (non)factivity and negation have been stripped off from any confounding effects that would distract children's attention from the main focus of the thesis. Experiment 2, on the other hand, has been created in a way that it would keep the children's attention alive. Even though it is a replication of the experiment in Moscati and Crain (2014), we have enriched it by adding stories and gamification.

5.2 Future directions

As pointed out in the previous section, even though both Experiment 1 and 2 have contributed to the literature by providing data from Turkish on the issue of comprehension of negation when it associates with other logical operators, i.e., (non)factivity and modality, we believe the thesis in fact has a few shortcomings which we hope to resolve in future work. We have not run statistics on the results, and given the findings only in percentages. Needless to say, differences among groups need to be proven statistically. Furthermore, the group size should be extended for both of the experiments. Experiment 1 does not have a younger group (mean age: 3;06) tested and Experiment 2 lacks results on an older group. By extending the participant pool of both Experiments we would be in a stronger position to report on the developmental trajectory of Turkish children.

Another issue that we have to keep in mind in future work is to make sure not to use stories that appear to go against children's moral judgements. As laid out in Chapter 3, there is a number of answers in Experiment 1 coded as irrelevant due to the fact that some stories presented to the children have turned out to be ethically and

pragmatically inappropriate for the children. For example, in *anla-* stories, where Big Bird wetted her swimsuit and towel in order to make her grandmother think that Big Bird dived into the pool even though she didn't because she was afraid of doing it, most of the children evaluated the target sentence as false because what Big Bird did, i.e., cheating her grandmother, was inappropriate. In order to prevent this and decrease the number of irrelevant answers, the stories should not include any content that would be inappropriate in terms of ethics and pragmatics in a child's world.

Moreover, as laid out in Chapter 3, semantic features of the verbs seem to have a crucial role in interpreting negation. For example, as previously discussed, *san-* and *üzül-* are implicitly negative verbs and *sevin-* is an implicitly positive verb, so this appear to affect how the children interpret these verbs when they combine with negation. In order to explore this issue more thoroughly, more verbs with or without implicit negation have to be included in the experiment. So, for example one of the future goals of this study will be to investigate how children handle the verbs *hatırla- / to remember* and *unut- / to forget* in Turkish which have implicit negative denotations.

Experiment 2, on the other hand, should have been designed in such a way that there is no disjunction in the scenario. As discussed in Chapter 4, the disjunction in the stories presented to the children might have affected the results because it could be that children have not mastered disjunction, yet. Moreover, in order to prevent children's difficulties in separating the content of a box when there are two items in the box and their failure in the positive true sentences because of this, a second experiment should have been conducted where each box has only one thing in it. Furthermore, in order to make it possible to compare and contrast results, there
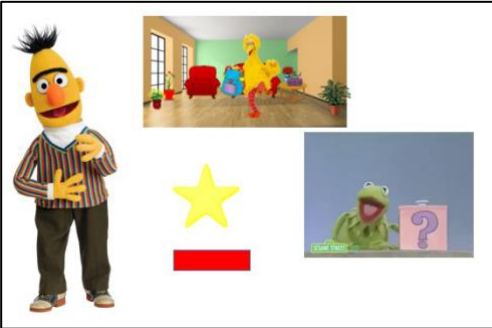
should have been also a second group of participants at the elementary school age which we hope to realize in future work.

STIMULI FOR THE EXPERIMENT 1

Test A

Introduction	
	The Experimenter turning to the child: "Do you know who this is? Let's see!" Kermit: "Hello. I am Kermit!"
	The Experimenter turning to the child: "Look! This is Kermit's teacher Eddie. Now he will tell you something." *Kermit's teacher Eddie to the child:* "Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?" [Children say 'yes']
	Kermit's teacher Eddie to the child: "Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

Story for Item 1	
	Big Bird will eat some chocolate in the kitchen. At that time her grandma comes to the kitchen and says to her: "Big Bird! You won't eat these two chocolates, right? It is not good for your health."
	So Big Bird puts one chocolate back in the cupboard.
	She eats the chocolate and puts the package in the bin.
	Then she eats one more.
	She puts the package in the bin, but she wants to eat one more.

	She takes one more chocolate and eats it. Then throws the package to the bin and leaves the kitchen.
	Then her grandma comes, sees the trash bin and says, "It seems that Big Bird didn't listen to my advice."
	Item 1: Kermit: "Büyükannesi Minik Kuş'un çok çikolata yediğini anladı." (*Grandma understood that Big Bird ate a lot of chocolates.*) (Positive-Positive – True)
Story for Item 2	
	Big Bird is preparing for the school in the morning.
	Then her grandma comes and says, "Big Bird, you have a swimming class today! I know you are a bit afraid of swimming, but please try to plunge into the pool today, ok? There is nothing to be afraid of." Big Bird says, "Ok, grandma!" and goes to the school.

	In the swimming class, all of her friends plunge into the pool one by one.
	Finally it is Big Bird's turn. She comes by the pool. But…
	She cannot plunge into the pool because she doesn't want to do.
	When she comes back home, she does not want grandma to think that she did not swim so she wets her swimsuit and towel in the garden.

	But right at that time grandma is behind the fence saw what Big Bird is doing. But Big Bird doesn't see her.
	Item 2: Kermit: "Büyükannesi Minik Kuş'un havuza girmediğini anlamadı." (*Grandma didn't understand that Big Bird didn't plunge into the pool.*) (Negative-Negative – False)
Story for Item 3	
	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together "
	Before coming in home, Big Bird looks into the kitchen through the window and sees her grandma is holding a plate full of cookies.
	Grandma put the cookies in the cupboard and left the kitchen. Big Bird says, "Hooray! There are cookies at home. I should call Cookie Monster now!"

	Big Bird: "Cookie Monster! Grandma has made delicious cookies!" Cookie Monster: "Oh! Really? I will be there in a minute!"
	<u>Item 3:</u> Kermit: "Minik Kuş evde kurabiye olduğunu bilmiyor." (*Big Bird doesn't know that there are cookies at home.*) (Positive-Negative – False)
Story for Item 4	
	Big Bird's mother is going to a work trip and she will be away for one week.
	Big Bird will miss her a lot.
	After Big Bird's mother leaves the home, a friend of grandma comes.

	The Experimenter turning to the child: Look at her scarf and bag. They are the same with Big Bird's mother's scarf and bag, right? [Child says 'yes'.] Grandma and Big Bird have a great time with their neighbor that day.
	Then they have fun together while her mother is away from home. They have tea parties…
	They play together…
	Until… Big Bird's mother makes a surprise and comes home earlier than she tells them.
	Big Bird's grandma and mum hook up her scarf and bag and go to the living room.

	Then Big Bird comes home from school and when she sees the scarf and bag, she thinks…
	Big Bird says, "Hımm… There are still 3 days for mum to come. Grandma's friend must have come again."
	Item 4: Kermit: "Minik Kuş annesinin eve dönmediğini sanıyor." (*Big Bird supposes / thinks that her mother didn't come back to home.*) (Negative-Positive – True)
Story for Item 5	
	Look, this is Elmo, friend of Big Bird and Cookie Monster from school. There is a running race at their school. Only Cookie Monster and Elmo will attend to the race because they are the finalists.
	While Big Bird is sitting on the bank in the park, she sees Elmo while he is playing tennis…

	…running…
	…and playing basketball. *The Experimenter turning to the child*: Elmo is doing exercise, right? [Child says 'yes'.]
	But she sees Cookie Monster while he is just walking…
	…doing no exercise and eating continuously. *The Experimenter turning to the child*: Does Cookie Monster do exercise? [Child says 'no'.]
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" *The Experimenter turning to the child*: The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [Child gives the correct answers.] Now let's see what Kermit says.

	<u>Item 5:</u> Kermit: "Minik Kuş Kurabiye Canavarı'nın yarışı kazanacağını düşünmüyor." (*Big Bird doesn't think that Cookie Monster will win the race.*) (Positive-Negative– True)
Story for Item 6	
	Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."
	While Big Bird is waiting the call from her father, her grandmother comes and says, "Big Bird, there is a very nice play in this evening. Shall we go together and see it?" Big Bird says, "Maybe we can go to the cinema with my father. But it isn't certain, yet. He will call me and let me know if he can quit work early today. If he quits the work late, we can go to the theatre together."
	Then her father calls her and says, "Hello Big Bird! I have lots of work today. Unfortunately I will leave the office late today. I am so sorry. Can we go to the cinema another day?" Big Bird says, "Of course, dad, no problem. Grandma wants to go to theater with me. Then I can go with her. We can go to the cinema later."
	<u>Item 6:</u> Kermit: "Minik Kuş babasının işten erken gelmemesine üzüldü." (*Big Bird was sad that her father won't come home from work earlier.*) (Negative-Positive– False)

Story for Item 7	
	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.
	But she doesn't like Zuzu that much.
	In that summer, in the holiday Big Bird runs into Zuzu on the beach.
	Item 7: Kermit: "Minik Kuş Zuzu ile karşılaştığına sevindi." (*Big Bird was happy that she ran into Zuzu.*) (Positive-Positive– False)
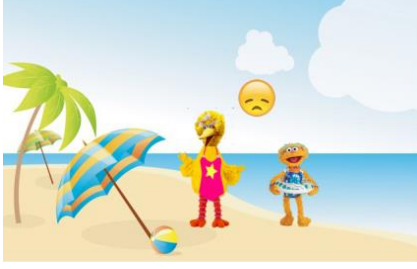
Story for Item 8	
	Remember Big Bird runs into Zuzu at the beach. Now Zuzu says, "Cookie Monster is here, too. Did you see him?" Big Bird replies [with a sad voice], "No, I didn't, I wish to see him."
	Item 8: Kermit: "Minik Kuş Kurabiye Canavarı ile karşılaşmadığına sevinmedi." (*Big Bird wasn't happy that she didn't run into Cookie Monster.)* (Negative-Negative– True)
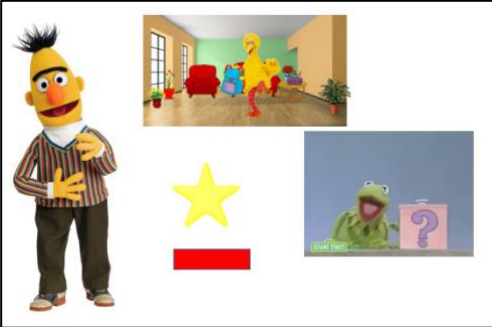
Test B

<table>
<tr><td colspan="2">Introduction</td></tr>
<tr>
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The Experimenter turning to the child:

"Do you know who this is? Let's see!"

Kermit: "Hello. I am Kermit!"

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The Experimenter turning to the child:

"Look! This is Kermit's teacher Eddie. Now he will tell you something."

Kermit's teacher Eddie to the child:

"Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?"

[Children say 'yes']

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Kermit's teacher Eddie to the child:
"Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

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</table>

Story for Item 1	
	Big Bird wants to go out. She looks outside the window to see how the weather is like.
	After that, she goes to her wardrobe and takes her umbrella and rain boots.
	Item 1: Kermit: "Minik Kuş yağmur yağacağını düşünüyor. (*Big Bird thinks that it is going to rain.*) (Positive-Positive – True)
Story for Item 2	
	Big Bird is preparing for the school in the morning.
	Then her grandma comes and says, "Big Bird, you have a swimming class today! I know you are a bit afraid of swimming, but please try to plunge into the pool today, ok? There is nothing to be afraid of." Big Bird says, "Ok, grandma!" and goes to the school.

	In the swimming class, all of her friends plunge into the pool one by one.
	Finally it is Big Bird's turn. She comes by the pool. But…
	She cannot plunge into the pool because she doesn't want to do.

	When she comes back home, she does not want grandma to think that she did not swim so she wets her swimsuit and towel in the garden.
	Then Big Bird decides to put wet swimsuit and towel in the laundry basket in order to make her grandmother to think that she swam.
	And she puts them in the basket and leaves the bathroom.
	When her grandmother sees these, she says to herself, "Well done, Big Bird! It seems she listened to my advice!
	Item 2: Kermit: "Büyükannesi, Minik Kuş'un havuza girmediğini anlamadı. (*Her grandmother didn't understand that Big Bird didn't plunge into the pool.*) (Negative-Negative – True)

Story for Item 3	
	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together "
	Before coming in home, Big Bird looks into the kitchen through the window and sees her grandma is holding a plate full of cookies.
	Grandma puts the cookies in the cupboard and leaves the kitchen. Big Bird says, "Hooray! There are cookies at home. I should call Cookie Monster now!"
	And she goes to call Cookie Monster.
	While Big Bird is in the living room, calling Cookie Monster, grandma comes back to the kitchen, takes the cookies away and says, "I shall take these cookies to the neighbor. We can eat them together."

	The Experimenter turning to the child: There are no cookies now, right? [The child says 'yes'.]
	Meanwhile, Big Bird calls Cookie Monster and says: "Cookie Monster! Grandma has made delicious cookies!" Cookie Monster: "Oh! Really? I will be there in a minute!"
	<u>Item 3:</u> Kermit: "Minik Kuş evde kurabiye olmadığını biliyor." (*Big Bird knows that there aren't any cookies at home.*) (Negative-Positive – False)
Story for Item 4	
	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.

	But she doesn't like Zuzu that much.
	In that summer, in the holiday she runs into Zuzu on the beach.
	Item 4: Kermit: "Minik Kuş, Zuzu ile karşılaştığına sevinmedi. (*Big Bird is not happy that she ran into Zuzu.*) (Positive-Negative – True)

Story for Item 5

	Look, this is Elmo, friend of Big Bird and Cookie Monster from school. There is running race at their school. And only Cookie Monster and Elmo will attend to the race because they are the finalists.
	While Big Bird is sitting on the bank in the park, she sees Elmo while he is playing tennis…

	…running…
	…and playing basketball. *The Experimenter turning to the child*: Elmo is doing exercise, right? [The child says 'yes'.]
	But she sees Cookie Monster while he was just walking…
	…doing no exercise and eating continuously. *The Experimenter turning to the child*: Does Cookie Monster do exercise? [The child says 'no'.]
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" *The Experimenter turning to the child*: The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [The child gives correct answers.] Now let's see what Kermit says.

191

	  Kermit: "Minik Kuş, Kurabiye Canavarı'nın yarışı kazanamayacağını düşünmüyor." (*Big Bird doesn't think that Cookie Monster won't be able to win the race.*) (Negative-Negative – False)

Story for Item 6

	Big Bird will eat some chocolate in the kitchen. At that time her grandma comes to the kitchen and says to her: "Big Bird! You won't eat these two chocolates, right? It is not good for your health."
	So Big Bird puts one chocolate back in the cupboard.
	She eats the chocolate and puts the package in the bin.
	Then she eats one more.

	She puts the package in the bin, but she wants to eat one more.
	She takes one more chocolate and eats it. Then throws the package to the bin.
	But before leaving the kitchen, she takes two packages from the bin because she doesn't want her grandmother think that she eats a lot of chocolate.
	Then her grandma comes, sees the trash bin and says, "Bravo Big Bird! It seems she listened to my advice."
	Item 6: Kermit: "Büyükannesi, Minik Kuş'un çok çikolata yediğini anladı." (*Her grandmother understood that Big Bir ate too many chocolates*.) (Positive-Positive – False)

193

Story for Item 7	
	Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."
	Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I can quit from work late today. I am so sorry. Can we go to the cinema another day?"
	Item 7: Kermit: "Minik Kuş babasının işten erken gelmemesine üzüldü." (*Big Bird is sad that her father won't come home earlier.*) (Negative-Positive – True)
Story for Item 8	
	Big Bird's mother is going to a work trip and she will be away for one week.
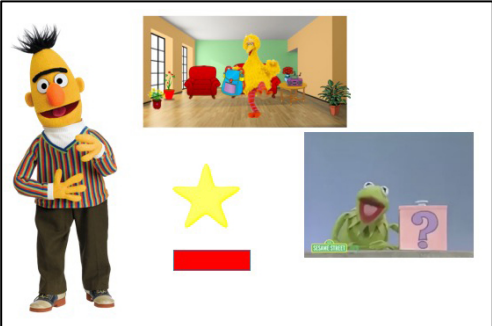
	Big Bird will miss her a lot.
	When her mom is away, and Big Bird is at school, a friend of grandma comes to visit the grandma.
	She comes in and hangs her scarf on the hanging rack at the entrance and put her bag on the floor. Quite surprisingly grandma's friend has the same scarf and bag with Big Bird's mother.
	When Big Bird comes home from school she sees the scarf on the hanging rack and the bag on the floor and thinks…
	Item 8: Kermit: "Minik Kuş annesinin eve döndüğünü sanmıyor." (*Big Bird doesn't suppose / think that her mother came back home.*) (Positive-Negative – False)

Test C

Introduction	
	The Experimenter turning to the child: "Do you know who this is? Let's see!" Kermit: "Hello. I am Kermit!"
	The Experimenter turning to the child: "Look! This is Kermit's teacher Eddie. Now he will tell you something." *Kermit's teacher Eddie to the child:* "Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?" [Children say 'yes']
	Kermit's teacher Eddie to the child: "Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

196

Story for Item 1	
	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.
	But she doesn't like Zuzu that much.
	In that summer, in the holiday she ran into Cookie Monster on the beach.
	Item 1: Kermit: "Minik Kuş Kurabiye Canavarı ile karşılaştığına sevindi." (*Big Bird is happy that she ran into Cookie Monster.*) (Positive-Positive – True)
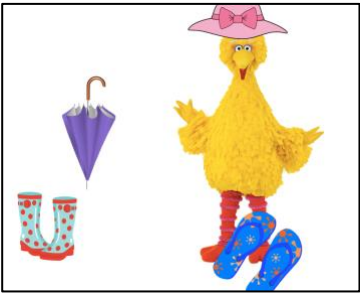
Story for Item 2	
	Big Bird's mother is going to a work trip and she will be away for one week.
	Big Bird will miss her a lot.
	When her mom is away, and Big Bird is at school, a friend of grandma comes to visit the grandma.
	She comes in and hangs her scarf on the hanging rack at the entrance and put her bag on the floor. Quite surprisingly grandma's friend has the same scarf and bag with Big Bird's mother.
	When Big Bird comes home from school she sees the scarf on the hanging rack and the bag on the floor and thinks…

	Item 2: Kermit: "Minik Kuş, annesinin eve dönmediğini sanıyor. (*Big Bird supposes / thinks that her mother didn't come back home.*) (Negative-Positive – False)
Story for Item 3	
	Look, this is Elmo, friend of Big Bird and Cookie Monster from school. There is a running race at their school. And only Cookie Monster and Elmo will attend to the race because they are the finalists.
	While Big Bird is sitting on the bank in the park, she sees Cookie Monster while he is doing sports…
	But she sees Elmo while he was just walking…

	…doing no exercise and eating continuously. *The Experimenter turning to the child:* Does Elmo do exercise? [The child says 'No'.]
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" *The Experimenter turning to the child:* The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [The child gives the correct answer.] Now let's see what Kermit says.
	Item 3: Kermit: "Minik Kuş, Kurabiye Canavarı'nın yarışı kazanamayacağını düşünmüyor." (*Big Bird doesn't think that Cookie Monster won't be able to win the race.*) (Negative-Negative – True)
Story for Item 4	
	Big Bird is very sick.

	She goes to the doctor and then finally…
	She gets better and goes to the school! That day, Big Bird has a swimming class at school. She likes swimming a lot, so she is very excited.
	Before going to school, her grandmother says, "Big Bird, I know you love swimming, but you have just recovered. Please don't swim in the pool today. I don't want you to get sick again." Big Bird says, "Ok, grandma!" and goes to the school.
	But Big Bird likes swimming a lot, so she can't help, but plunges into the pool.
	When she gets back home, she dries her swimsuit and towel in the garden and puts them back in her room so that her grandmother won't find out that she swam.

	When her grandmother sees the dry swimsuit and towel on her bad, she says, "Bravo Big Bird! It seems she listened my advice!"
	Item 4: Kermit: "Büyükannesi, Minik Kuş'un havuza girdiğini anlamadı." (*Her grandmother didn't understand that Big Bird plunged into the pool.*) (Positive-Negative – True)

Story for Item 5

	Big Bird wants to go out. She looks outside the window to see how the weather is like.
	After that, she goes to her wardrobe and takes her hat and flip flops.
	Item 5: Kermit: "Minik Kuş yağmur yağacağını düşünüyor." (*Big Bird thinks that it is going to rain.*) (Positive-Positive – False)

Story for Item 6	
	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together "
	Before she enters home, Big Bird wants to check whether there are any cookies in the kitchen so she looks through the kitchen window and sees her grandma eating the last piece of cookie.
	Then she calls Cookie Monster and says, "Hello Cookie Monster. Unfortunately, there are no cookies at home."
	Item 6: Kermit: "Minik Kuş evde kurabiye olmadığını biliyor." (*Big Bird know that there are no cookies at home.*) (Negative-Positive – True)
Story for Item 7	
	Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."
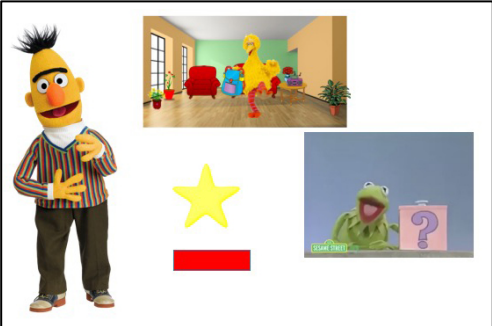
	Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I will leave the office late today. I am so sorry. Can we go to the cinema another day?"
	Item 7: Kermit: "Minik Kuş babasının geç gelmesine üzülmedi." (*Big Bird isn't sad that her father will come home late.*) (Positive-Negative – False)

Story for Item 8

	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.

	But she doesn't like Zuzu that much.
	In that summer, in the holiday she runs into Cookie Monster on the beach. Cookie Monster says, "Zuzu is here, too. Did you see her?" Big Bird replies [with a happy voice], "No, I haven't, and I am glad that I haven't seen her at all!"
	Item 8: Kermit: "Minik Kuş Zuzu ile karşılaşmadığına sevinmedi" (*Big Bird isn't happy that she didn't run into Zuzu.*) (Negative-Negative – False)

Test D

Introduction	
	The Experimenter turning to the child: "Do you know who this is? Let's see!" Kermit: "Hello. I am Kermit!"
	The Experimenter turning to the child: "Look! This is Kermit's teacher Eddie. Now he will tell you something." *Kermit's teacher Eddie to the child:* "Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?" [Children say 'yes']
	Kermit's teacher Eddie to the child: "Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

Story for Item 1	
	Big Bird is hungry and would like to eat some cake.
	When she comes back from school, she looks through the kitchen window to see if there is any cake on the counter. She sees that her grandmother has newly baked delicious cakes and she is about to put them in the cupboard.
	Big Bird says, "Yippee! Grandma has baked cakes!"
	Item 1: Kermit: "Minik Kuş evde kek olduğunu biliyor." (*Big Bird knows that there is cake at home.*) (Positive-Positive – True)

Story for Item 2
Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."
While Big Bird is waiting the call from her father, her grandmother comes and says, "Big Bird, there is a very nice play in this evening. Shall we go together and see it?" Big Bird says, "Maybe we can go to the cinema with my father. But it isn't certain, yet. He will call me and let me know if he can quit work early today. If he quits the work lately, we can go to the theatre together."
Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I can quit from work late today. I am so sorry. Can we go to the cinema another day?" Big Bird says, "Of course, dad, no problem. Grandma wants to go to theater with me. Then I can go with her. We can go to the cinema later."
Item 2:   Kermit: "Minik Kuş, babasının işten erken gelmemesine üzülmedi." (*Big Bird isn't sad that her father won't come home earlier.*)   (Negative-Negative – True)

Story for Item 3	
	Big Bird is preparing for the school in the morning.
	Then her grandma comes and says, "Big Bird, you have a swimming class today! I know you are a bit afraid of swimming, but please try to plunge into the pool today, ok? There is nothing to be afraid of." Big Bird says, "Ok, grandma!" and goes to the school.
	In the swimming class, all of her friends plunge into the pool one by one.

	Finally it is Big Bird's turn. She comes by the pool. But…
	She cannot plunge into the pool because she doesn't want to do.
	When she comes back home, she does not want grandma to think that she did not swim so she wets her swimsuit and towel in the garden.
	Then Big Bird decides to wet swimsuit and towel in the laundry basket in order to make her grandmother to think that she swam.
	And she puts them in the basket and leaves the bathroom.

	When her grandmother sees these, she says to herself, "Well done, Big Bird! It seems she listened to my advice!
	<u>Item 3:</u> Kermit: "Büyükannesi Minik Kuş'un havuza girmediğini anladı." (*Her grandmother understood that Big Bird didn't plunge into the pool.*) (Negative-Positive – False)

Story for Item 4	
	Big Bird's mother is going to a work trip and she will be away for one week.
	Big Bird will miss her a lot.
	After Big Bird's mother leaves the home, a friend of grandma comes.

211

	Experimenter turning to the child: Look at her scarf and bag. They are the same with Big Bird's mother's scarf and bag, right? [The child says 'yes'.] Grandma and Big Bird have a great time with their neighbor that day.
	Big Bird and her grandmother have fun together while her mother is away from home. They have tea parties…
	They play together…
	Until… Big Bird's mother makes a surprise and comes home earlier than she tells them!
	Big Bird's grandma and mum hook up scarf and the bag and go to the living room.

	Then Big Bird comes home from school and when she sees the scarf and bag, she thinks…
	Big Bird: "Hımm… There are still 3 days for mum to come. Grandma's friend must have come"
	Item 4: Kermit: "Minik Kuş annesinin eve döndüğünü sanmıyor." (*Big Bird doesn't suppose / think that her mother came back home.*) (Positive-Negative – True)

Story for Item 5

	Cookie Monster and his family come to visit Big Bird's family.

	Big Bird and Cookie Monster have great time together. They drink tea in the kitchen…
	… play for hours in Big Bird's room. Then suddenly they hear Cookie Monster's mum calling him: "Cookie Monster! We are going to home!" Cookie Monster says to Big Bird, "I don't want to go home." Big Bird says, "Then why don't you ask your mother if you can stay here with us?"
	Cookie Monster says to his mum, "Mum, can I stay here tonight?" His mum says, "That would be great but you have a lot of homework. You should go home with us and do your homework. Big Bird says, "Your mother is right, Cookie Monster. I have a lot of homework, too. Come and stay with us when both of us don't have any homework."
	"Bye!"

	Big Bird says [with a happy voice], "Now it is time to do my homework!"
	Item 5: Kermit: "Minik Kuş Kurabiye Canavarı'nın gitmesine üzüldü." (*Big Bird is sad that Cookie Monster left.*) (Positive-Positive – False)

Story for Item 6

	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. Cookie Monster would like to eat some cookies. Big Bird says, "Maybe grandma has baked some cookies. I will check and call you."
	Before coming in home, Big Bird looks into the kitchen through the window and sees her grandma is holding a plate full of cookies.

	Grandma put the cookies in the cupboard and left the kitchen. Big Bird says, "Hooray! There are cookies at home. I should call Cookie Monster immediately!"
	But at that moment, grandma comes back to the kitchen, takes the cookies away and says, "I shall take these cookies to the neighbor. We can eat them together."
	The Experimenter turning to the child: There are no cookies now, right? [The child says 'yes'.]
	Item 6: Kermit: "Minik Kuş evde kurabiye olmadığını bilmiyor." (*Big Bird doesn't know that there aren't any cookies at home.*) (Negative-Negative – False)
Story for Item 7	
	This is Big Bird's classroom. It is the last day of classes today.

	Big Bird loves Cookie Monster a lot.
	But she doesn't like Zuzu that much.
	In that summer, in the holiday she runs into Cookie Monster on the beach. Cookie Monster says, "Zuzu is here, too. Did you see her?" Big Bird replies [with a happy voice] "No, I haven't, and I am glad that I haven't seen her at all!"
	Item 7: Kermit: "Minik Kuş Zuzu ile karşılaşmadığına sevindi" (*Big Bird is happy that she didn't run into Zuzu.*) (Negative-Positive – True)
Story for Item 8	
	Look, this is Elmo, friend of Big Bird and Cookie Monster from school. There is running race at their school. And only Cookie Monster and Elmo will attend to the race because they are the finalists.

	While Big Bird is sitting on the bank in the park, she sees Cookie Monster while he is doing sports…
	But she sees Elmo while he is just walking…
	…doing no exercise and eating continuously. T*he Experimenter turning to the child:* Does Elmo do exercise? [The child says 'No']
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" The Experimenter turning to the child: The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [The child gives correct answers.] Now let's see what Kermit says.

	Item 8: Kermit: "Minik Kuş Kurabiye Canavarı'nın yarışı kazanacağını düşünmüyor" (*Big Bird doesn't think that Cookie Monster will win the race.*) (Positive-Negative – False)

Test E

Introduction	
	The Experimenter turning to the child: "Do you know who this is? Let's see!" Kermit: "Hello. I am Kermit!"
	The Experimenter turning to the child: "Look! This is Kermit's teacher Eddie. Now he will tell you something." *Kermit's teacher Eddie to the child:* "Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?" [Children say 'yes']
	Kermit's teacher Eddie to the child: "Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

Story for Item 1	
	Big Bird's grandmother hangs out the laundry in the balcony and water drops are falling down from the balcony.
	At that time, downstairs, Big Bird is preparing to go out. Before going out, she checks the weather by looking out from the window and sees water drops.
	Then she takes her rain boots and umbrella before going out.
	Item 1: Kermit: "Minik Kuş yağmur yağdığını sanıyor" (*Big Bird supposes that it is raining.*) (Positive-Positive – True)
Story for Item 2	
	Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."

	While Big Bird is waiting the call from her father, her grandmother comes and says, "Big Bird, there is a very nice play in this evening. Shall we go together and see it?" Big Bird says, "Maybe we can go to the cinema with my father. But it isn't certain, yet. He will call me and let me know if he can quit work early today. If he quits the work lately, we can go to the theatre together."
	Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I can quit from work late today. I am so sorry. Can we go to the cinema another day?" Big Bird says, "Of course, dad, no problem. Grandma wants to go to theater with me. Then I can go with her. We can go to the cinema later."
	Item 2: Kermit: "Minik Kuş babasının geç gelmesine üzülmedi." (*Big Bird isn't sad that her father will come home late.*) (Positive-Negative – True)

Story for Item 3

	Big Bird is preparing for the school in the morning.
	Then her grandma comes and says, "Big Bird, you have a swimming class today! I know you are a bit afraid of swimming, but please try to plunge into the pool today, ok? There is nothing to be afraid of." Big Bird says, "Ok, grandma!" and goes to the school.

	In the swimming class, all of her friends plunge into the pool one by one.
	Finally it is Big Bird's turn. She comes by the pool. But…
	She cannot plunge into the pool because she doesn't want to do.

	When she comes back home, she does not want grandma to think that she did not swim so she wets her swimsuit and towel in the garden.
	But right at that time grandma is behind the fence saw what Big Bird is doing. But Big Bird doesn't see her.
	Item 3: Kermit: "Büyükannesi Minik Kuş'un havuza girmediğini anladı." (*Her grandmother understood that Big Bird didn't plunge into the pool.*) (Negative-Positive – True)
Story for Item 4	
	Big Bird is hungry and would like to eat some cake.
	When she comes back from school, she looks through the kitchen window to see if there is any cake on the counter. But there is no cake.

	Then she headed toward the door to get into the house. Right at that time, her grandmother went into the kitchen and put a cake on the counter.
	Item 4: Kermit: "Minik Kuş evde kek olduğunu biliyor." (*Big Bird knows that there is cake at home.*) (Positive-Positive – False)
Story for Item 5	
	Big Bird's mother is going to a work trip and she will be away for one week.
	Big Bird will miss her a lot.
	After Big Bird's mother leaves the home, a friend of grandma comes.

	The Experimenter turning to the child: Look at her scarf and bag. They are the same with Big Bird's mother's scarf and bag, right? [The child says 'yes'.] Grandma and Big Bird have a great time with their neighbor that day.
	On the following days, they have fun together while her mother is away from home. They have tea parties…
	They play together…
	Until… Big Bird's mother makes a surprise and comes home earlier than she tells them.
	Big Bird's grandma and mum hook up her scarf and bag and go to the living room.
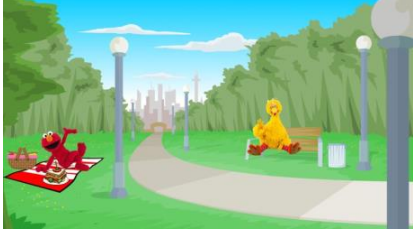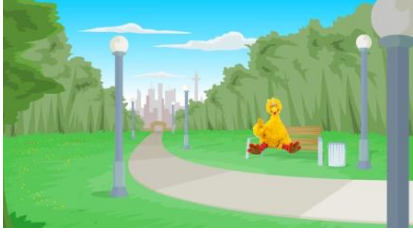
	Then Big Bird comes home from school and when she sees the scarf and bag, she thinks…
	Big Bird: "Hımm… There are still 3 days for mum to come. Grandma's friend must have come"
	Item 5: Kermit: "Minik Kuş annesinin eve dönmediğini sanmıyor." (*Big Bird doesn't suppose / think that her mother didn't come back home.*) (Negative-Negative – False)

Story for Item 6

	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.

	But she doesn't like Zuzu that much.
	In that summer, in the holiday she runs into Cookie Monster on the beach.
	Item 6: Kermit: "Minik Kuş Kurabiye Canavarı ile karşılaştığına sevinmedi." (*Big Bird isn't happy that she ran into Cookie Monster.*) (Positive-Negative – False)

Story for Item 7

	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together "
	Before coming in home, Big Bird looks into the kitchen through the window and sees her grandma is holding a plate full of cookies.

228

	Grandma puts the cookies in the cupboard and leaves the kitchen. Big Bird says, "Hooray! There are cookies at home. I should call Cookie Monster now!"
	And she goes to call Cookie Monster
	While Big Bird is in the living room, calling Cookie Monster, grandma comes back to the kitchen, takes the cookies away and says, "I shall take these cookies to the neighbor. We can eat them together."
	The Experimenter turning to the child: There are no cookies now, right? [The child says, 'yes'.]
	Meanwhile, Big Bird calls Cookie Monster and says: "Cookie Monster! Grandma has made delicious cookies!" Cookie Monster: "Oh! Really? I will be there in a minute!"

	Item 7: Kermit: "Minik Kuş, evde kurabiye olmadığını bilmiyor." (*Big Bird doesn't know that there aren't any cookies at home.*) (Negative-Negative – True)
Story for Item 8	
	Look, this is Elmo, friend of Big Bird and Cookie Monster from school. There is running race at their school. And only Cookie Monster and Elmo will attend to the race because they are the finalists.
	While Big Bird is sitting on the bank in the park, she sees Cookie Monster while he is doing sports…
	But she sees Elmo while he is just walking…

	…doing no exercise and eating continuously. T*he Experimenter turning to the child:* Does Elmo do exercise? [The child says 'No']
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" The Experimenter turning to the child: The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [The child gives correct answers.] Now let's see what Kermit says.
	Item 8: Kermit: "Minik Kuş, Kurabiye Canavarı'nın yarışı kazanamayacağını düşünüyor." (*Big Bird thinks that Cookie Monster won't be able to win the race.*) (Negative-Positive – False)

Test F

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<tr>
<td colspan="2">Introduction</td>
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The Experimenter turning to the child:

"Do you know who this is? Let's see!"

Kermit: "Hello. I am Kermit!"

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The Experimenter turning to the child:

"Look! This is Kermit's teacher Eddie. Now he will tell you something."

Kermit's teacher Eddie to the child:

"Hello. I am Kermit's teacher. Kermit will take an exam today. But my assistant is sick, so I need an assistant. Can you help me?"

[Children say 'yes']

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Kermit's teacher Eddie to the child:
"Great! I am so glad that you accepted to help me out! What I request from you is to assess and grade Kermit's answers in the exam. In the exam, there will be pictures of Big Bird engaged in doing something. Both Kermit and you will see these pictures. At the end, Kermit will utter a sentence about what happened in the story. And your task is to tell us whether his utterance is True or False. If it is True, you will give Kermit a star. If it is not, you will have to take a point off. You should also give feedback to Kermit. So you should explain him why you think Kermit's answer is true or false. Let's get started if you are ready!"

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</table>

Story for Item 1	
	Cookie Monster and his family come to visit Big Bird's family.
	Big Bird and Cookie Monster have great time together. They drink tea in the kitchen…
	… play for hours in Big Bird's room. Then suddenly they hear Cookie Monster's mum calling him:

"Cookie Monster! We are going to home!"

Cookie Monster says to Big Bird, "I don't want to go home."

Big Bird says, "Then why don't you ask your mother if you can stay here with us?" |
| | Cookie Monster says to his mum, "Mum, can I stay here tonight?"

His mum says, "That would be great but you have a lot of homework. You should go home with us and do your homework." |

	Item 1: Kermit: "Minik Kuş Kurabiye Canavarı'nın gitmesine üzüldü." (*Big Bird is sad that Cookie Monster left.*) (Positive-Positive – True)
Story for Item 2	
	Big Bird is very sick.
	She goes to the doctor and then finally…
	She gets better and goes to the school! That day, Big Bird has a swimming class at school. She likes swimming a lot, so she is very excited.
	Before going to school, her grandmother says, "Big Bird, I know you love swimming, but you have just recovered. Please don't swim in the pool today. I don't want you to get sick again." Big Bird says, "Ok, grandma!" and goes to the school.

	But Big Bird likes swimming a lot, so she can't help, but dives into the pool during the swimming class.
	Then Big Bird puts her wet swimsuit and towel in the laundry basket.
	And she leaves bathroom.
	Then her grandmother comes in the bathroom and sees the wet swimsuit and towel.
	And she says, "It seems that Big Bird didn't listen to my advice."

	Item 2: Kermit: "Büyükannesi, Minik Kuş'un havuza girdiğini anlamadı." (*Her grandmother didn't understand that Big Bird plunged into the pool.*) (Positive-Negative – False)
Story for Item 3	
	Big Bird's mother is going to a work trip and she will be away for one week.
	Big Bird will miss her a lot.
	They have fun together while her mother is away from home. They have tea parties…

	They play together…
	Finally one week is over! Before going to school, Big Bird says, "Yippee! My mother will come today!"
	While Big Bird is at school, her mother calls and says, "Hello mum. I have some extra works to do. So I will be here for 2 more days."
	When Big Bird comes homes from school, she says, "Mum must have come!"
	Item 3: Kermit: "Minik Kuş annesinin eve dönmediğini sanmıyor." (*Big Bird doesn't suppose / think that her mother didn't come back home.*) (Negative-Negative – True)

Story for Item 4	
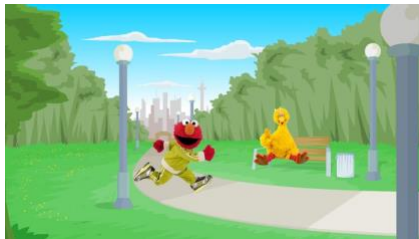
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<td>…running…</td>
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<td>…and playing basketball. Elmo is doing exercise, right?</td>
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<td></td>
<td>But she sees Cookie Monster while he was just walking…</td>
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</table>

	…doing no exercise and eating continuously. Does Cookie Monster do exercise? No.
	Big Bird thinks and says, "Hımm. I know who will win the running race. Of course the one who does exercise!" *The Experimenter turning to the child:* The one who does exercise will win the race, right? Now tell me, who is doing exercise? Who isn't doing? [The child gives correct answers.] Now let's see what Kermit says.
	Item 4: Kermit: "Minik Kuş, Kurabiye Canavarı'nın yarışı kazanamayacağını düşünüyor." (*Big Bird thinks that Cookie Monster won't be able to win the race.*) (Negative-Positive – True)
Story for Item 5	
	Before going to work in the morning, Big Bird's father says, "Big Bird, if I come back from work to home early, we can go to the cinema. I will call you and let you know."

	Then her father calls and says, "Hello Big Bird! I have lots of work today. Unfortunately I can quit from work late today. I am so sorry. Can we go to the cinema another day?"
	Item 5: Kermit: "Minik Kuş, babasının işten erken gelmemesine üzülmedi" (*Big Bird isn't sad that her father won't come home earlier.*) (Negative-Negative – False)
Story for Item 6	
	This is Big Bird's classroom. It is the last day of classes today.
	Big Bird loves Cookie Monster a lot.

	But she doesn't like Zuzu that much.
	In that summer, in the holiday she runs into Zuzu on the beach. Zuzu says, "Hello Big Bird. Cookie Monster is also here. Did you see him, as well?" Big Bird with a sad voice says, "No, I didn't see him. I wish I had."
	Item 6: Kermit: "Minik Kuş Kurabiye Canavarı ile karşılaşmadığına sevindi." (*Big Bird is happy that she didn't run into Cookie Monster.*) (Negative-Positive – False)

Story for Item 7

	Look, this is Big Bird's house. Big Bird and Cookie Monster are coming back from school. They are both hungry. Big Bird says to Cookie Monster: "Maybe grandma has baked some cookies. I will check the kitchen. If she has I will give you a call. You can come over and we can eat the cookies together "
	She comes in the kitchen and sees there are no cookies.

	After she leaves the kitchen, her grandmother comes with newly baked cookies.
	And she puts them in the cupboard.
	Meanwhile, Big Bird calls Cookie Monster and says, "Hello Cookie Monster. Unfortunately there are no cookies at home."
	Item 7: Kermit: "Minik Kuş evde kurabiye olduğunu bilmiyor." (*Big Bird doesn't know that there are cookies at home.*) (Positive-Negative – True)

Story for Item 8	
	Big Bird's grandmother hangs out the laundry in the balcony and water drops were falling down from the balcony.
	At that time, downstairs, Big Bird was preparing to go out. Before going out, she checked the weather by looking out from the window and water drops.
	While she is about to take her umbrella, she remembers that these water drops are falling from the laundries.
	Item 8: Kermit: "Minik Kuş yağmur yağdığını sanıyor" (*Big Bird supposes that it is raining.*) (Positive-Positive – False)
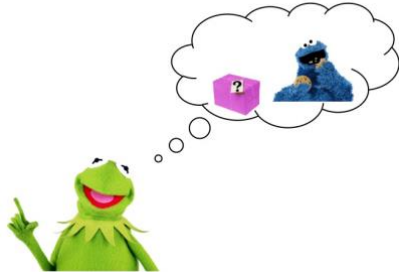
Story-I	
	Kermit was sitting all alone at home and he was very bored.
	Then he came up with an idea. He would prepare a guessing game for his dearest friend Cookie Monster.
	He immediately called Cookie Monster and told him that he was bored and asked if he would like to come over to play a game. Cookie Monster accepted the offer.
	While Cookie Monster was on his way to Kermit's place, Kermit prepared the game setup. He took three boxes. In the first box, he put a teddy bear and a car. In the second box, he placed only a teddy bear. And finally in the third box he put either the content of the first box or the second box. We did not see what he put in the third box. As you can see there is also a ball outside of the boxes on the floor.

	The Experimenter turning to the child: "Now Kermit will tell you something." *Kermit to the child*: "The game boxes are ready! O-oh! Someone knocks on the door! It must be Cookie Monster! Before he comes in, can I ask for a favor? Would you like to help me in the game we will be playing with Cookie Monster?' [Upon the child's 'Yes' answer] Kermit: "Great! Please watch the game and listen to what Cookie Monster says carefully and tell me whether what he says is True or False. At the end of the game I will have a surprise for you!"
	Then Cookie Monster came in. Cookie Monster: "Hello!"
	When Cookie Monster came, Kermit explained the game to him as follows: "Look, Cookie Monster. We will play a guessing game together. I prepared three boxes for this. In the first box, as you can see, I put a teddy bear and a car. In the second box, I put only a teddy bear. And the content of this closed box is identical with either the first box or the second box. You will guess the content of the closed box. If you guess it correctly, I will be having a surprise for you. Now let's start."
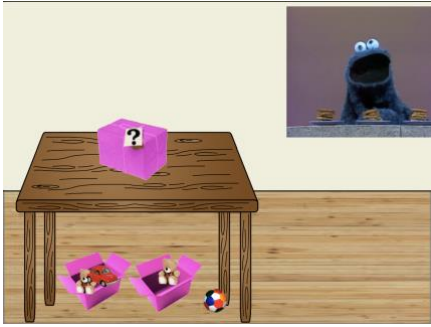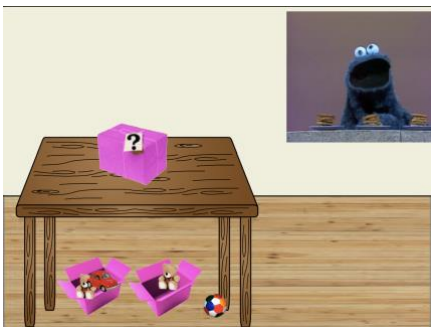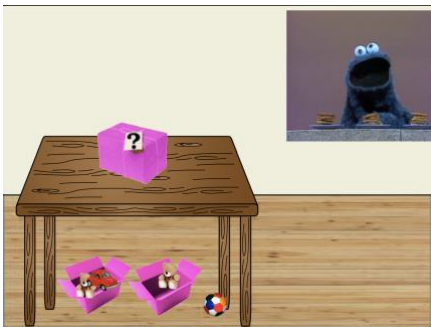
	<u>Item 1:</u> *Cookie Monster:* "Kutuda araba olabilir" (*There may be a car in the box.*) (Positive – True)
	<u>Item 2:</u> *Cookie Monster:* "Kutuda ayıcık olmayabilir" (*There may not be a teddy bear in the box.*) (Negative-Weak – False)
	<u>Item 3:</u> *Cookie Monster:* "Kutuda top olamaz" (*There cannot be a ball in the box.*) (Negative-Strong – True)
	<u>Item 4:</u> *Cookie Monster:* "Kutuda araba olmayabilir" (*There may not be a car in the box.*) (Negative-Weak – True)

	<u>Item 5</u>: *Cookie Monster:* "Kutuda top olabilir" (*There may be a ball in the box.*) (Positive – False)
	<u>Item 6</u>: Cookie Monster: "Kutuda ayıcık olamaz" (*There cannot be a teddy bear in the box.*) (Negative-Strong – False)
	Kermit: "Bravo Cookie Monster! Here is your gift!"
	Cookie Monster: "Yay! Cookies!"
	Kermit: "Thank you very much for your help, my friend. Here is your surprise!" [The child is rewarded with a sticker.]

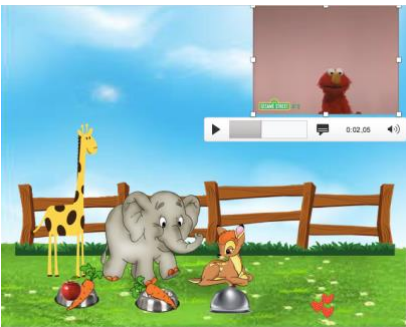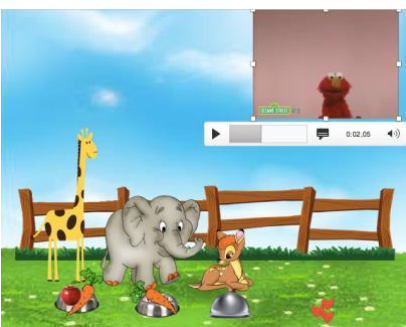| Story-II	
	Cookie Monster and Elmo love animals. On Sunday, they went to the zoo to see some animals.
	They saw a giraffe, an elephant and a gazelle there.
	They watched the animals for a while, then Elmo went to the restroom. While Elmo was away, the zookeeper came and fed the animals. Right at that moment, Cookie Monster came up with an idea: He would play the guessing game with Elmo that he played with Kermit before.
	The Experimenter turning to the child: "Now Cookie Monster will tell you something." *Cookie Monster to the child*: "Hello my friend! Can you help me in this game? Please tell me whether what Elmo says about the content of the closed box is true or not. Now I will tell the game to Elmo. Listen carefully. At the end of the game, I will have a surprise for you!"

	When Elmo came back, Cookie Monster explains the game as follows: "Look Elmo, we will play a guessing game. At the end of the game, I will have a surprise for you. Now listen to me carefully. While you were gone, the zookeeper fed the animals. She gave an apple and a carrot to the giraffe. She gave only a carrot to the elephant. In gazelle's bowl (which is closed) she put either what she gave to the giraffe or the elephant. We did not see what she put in it. Look there is also a strawberry here! Now guess what can be in gazelle's bowl?"
	<u>Item 1:</u> Elmo: "Ceylanın kabında havuç olamaz" (*There cannot be a carrot in the gazelle's bowl.*) (Negative-Strong – False)
	<u>Item 2:</u> Elmo: "Ceylanın kabında elma olabilir" (*There may be an apple in the gazelle's bowl.*) (Positive – True)
	<u>Item 3:</u> Elmo: "Ceylanın tabağında çilek olabilir" (*There may be a strawberry in the gazelle's bowl.*) (Positive – False)

	Item 4: Elmo: "Ceylanın tabağında elma olmayabilir" (*There may not be an apple in the gazelle's bowl.*) (Negative-Weak – True)
	Item 5: Elmo: "Ceylanın tabağında çilek olamaz" (*There cannot be a strawberry in the gazelle's bowl.*) (Negative-Strong – True)
	Item 6: Elmo: "Ceylanın tabağında havuç olmayabilir" (*There may not be a carrot in the gazelle's bowl.*) (Negative-Weak – False)
	Cookie Monster: "Bravo Elmo! Here is your gift!"

	Elmo: "Yay!"
	Cookie Monster: "Thank you very much for your help, my friend. Here is your surprise!" [The child is rewarded with a sticker.]

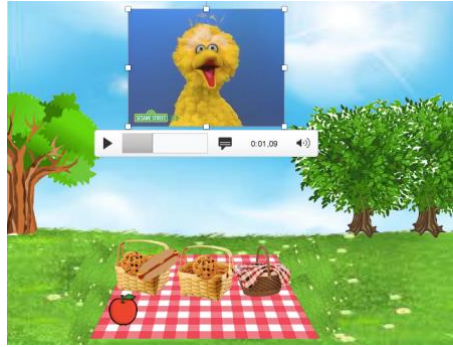|	
Story-III	
	Elmo was sitting at home all alone and he was bored.
	Then he came up with an idea: He would go on a picnic with Big Bird and play the guessing game with Big Bird that he played with Cookie Monster at the zoo.
	He prepared the picnic baskets. He put a cookie and a sandwich in the first basket. Then he put only a cookie in the second basket. And finally in the third basket he put either the content of first one or second one. We didn't see what he put in it. There is also an apple outside of the baskets.
	The Experimenter turning to the child: "Now Elmo will tell you something." *Elmo to the child*: "Hello my friend! Can you help me in this game? You just need to tell me whether Big Bird's predictions about the closed box is true or not. Now I will tell the game to Big Bird. Listen carefully. At the end of the game, I will have a surprise for you!"

252

	When Big Bird came, Elmo explained the game as follows: "Look, Big Bird. We will play a guessing game together. I prepared three baskets for this game. In the first basket, as you can see, I put a cookie and a sandwich. In the second basket, I put only a cookie. And the content of this closed basket is identical with either the first box or the second basket. You will guess the content of the closed basket. If you guess correctly, I will have a surprise for you. Now let's start."
	Item 1: Big Bird: "Kapalı sepette sandviç olabilir" (*There may be a sandwich in the closed basket.*) (Positive – True)
	Item 2: Big Bird: "Kapalı sepette elma olamaz" (*There cannot be an apple in the closed basket.*) (Negative-Strong – True)
	Item 3: Big Bird: "Kapalı sepette kurabiye olmayabilir" (*There may not be a cookie in the closed basket.*) (Negative-Weak – False)

	Item 4: Big Bird: "Kapalı sepette elma olabilir" (*There may be an apple in the closed basket.*) (Positive – False)
	Item 5: Big Bird: "Kapalı sepette sandviç olmayabilir" (*There may not be a sandwich in the closed basket.*) (Negative-Weak – True)
	Item 6: Big Bird: "Kapalı sepette kurabiye olamaz" (*There cannot be a cookie in the closed basket.*) (Negative-Strong – False)
	Elmo: "Bravo Big Bird! Here is your gift!"
	Elmo: "Thank you very much for your help, my friend. Here is your surprise!" [The child is rewarded with a sticker.]

Story-IV	
	While Big Bird was preparing gift boxes for her friends Kermit, Cookie Monster and Elmo, her friend Zuzu popped in and said to her, "Hello Big Bird! What are you doing?" Big Bird answered: "Hello Zuzu! I am preparing gift boxes for Kermit, Cookie Monster and Elmo. Please come in and help me!"
	At that time, she came up with an idea: She would play a guessing game with Zuzu that she previously played with Elmo.
	The Experimenter turning to the child: "Now Big Bird will tell you something." *Big Bird to the child*: "Hello my friend! Can you help me in this game? You just need to tell me whether Zuzu's predictions about the closed box is true or not. Now I will tell the game to Zuzu. Listen carefully. At the end of the game, there will be a surprise for you!"
	When Zuzu came, Big Bird explained the game as follows: "Look, Zuzu. We will play a guessing game together. I prepared three gift boxes. In the first box, as you can see, I put a bag and a book. In the second box, I put only a book. And the content of this closed basket is identical with either the first box or the second box. And there is teddy bear on the floor. You will guess the content of the closed basket. If you guess correctly, I will have a surprise for you. Now let's start."
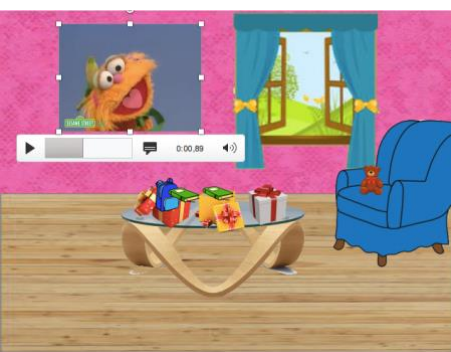
255

	Item 1: Zuzu: "Kapalı pakette kitap olmayabilir" (*There may not be a book in the closed box/ package.*) (Negative-Weak – False)
	Item 2: Zuzu: "Kapalı pakette ayıcık olabilir" (*There may be a teddy bear in the closed box.*) (Positive – False)
	Item 3: Zuzu: "Kapalı pakette çanta olabilir" (*There may be a bag in the closed box.*) (Positive – True)
	Item 4: Zuzu: "Kapalı pakette kitap olamaz" (*There cannot be a book in the closed box.*) (Negative Strong – False)

	<u>Item 5:</u> Zuzu: "Kapalı pakette ayıcık olamaz" (*There cannot be a teddy bear in the closed box.*) (Negative-Strong – True)
	<u>Item 6:</u> Zuzu: "Kapalı pakette çanta olmayabilir" (*There may not be a bag in the closed box.*) (Negative-Weak – True)
	Big Bird: "Bravo Zuzu! Here is your gift!"
	Big Bird: "Thank you very much for your help, my friend. Here is your surprise!" [The child is rewarded with a sticker.]

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