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Declaration

I hereby declare that the thesis entitled "**Acquisition of Sentential Negation and Negative Concord**" has been solely written by myself and with no other sources and aids than quoted.

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List of Abbreviations

XP	Maximal projection
Neg°	Syntactic negative head
3SG	3rd person singular
INF	Infinitive
1SG	1st person singular
2SG	2nd person singular
PL	Plural
NEG	Negation
iNEG	Interpretable Negative Features
uNEG	Uninterpretable Negative Features
iF	Interpretable Formal Features
uF	Uninterpretable Formal Features
CI	Confidence Interval
SE	Standard Error
Dis.p	Dispersion Parameter
VIF	Variation Inflation Factor
LRT	Likelihood Ratio Test
GLMM	Generalised Linear Mixed Methods
SE	Standard English
DN	Double Negation
NC	Negative Concord
CDS	Child Directed Speech

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Chapter 0

Preface

The study of the acquisition of negation has been playing a key role in developing the theory of language acquisition. The current PhD thesis aims at investigating the acquisition of sentential negation focusing on its special features like expressing negation using single or more negative elements in child first language acquisition. This chapter aims at presenting the contributions this dissertation make.

Identifying the gap in the existing knowledge

Natural languages are divided into two main categories with respect to the expression of sentential negation, i) Negative Concord (NC) languages allowing the use of more than one negative elements per clause to yield negation and ii) Double Negation (DN) languages which allow only one negative element per clause to express sentential negation. The current state of knowledge in the field of the naturalistic studies of child language acquisition studying sentential negation mainly stems from a small number of children of a limited age range. Despite the advent of advanced technologies to collect and analyse a wider range of data, the literature appears incomplete, and not packaged in a way that could present a fine grained view of the children's acquisition patterns of negation observed for a wider sample. A few corpora have been used over and over to explore, confirm, and re-confirm certain patterns of negation in child language. The same findings have been reported repeatedly. Existing studies widely rely on the frequency, averaging group data, or the mean length of utterance as methodologies to analyse children's natural utterances and to draw conclusions. It is also important to note that most of the studies of the acquisition of negation have been exploratory in nature and not broadened enough to enlighten on the particular roles of input, age, or the role of children in general.

Furthermore, the acquisition studies for NC even in NC languages have been fewer. The existing few studies are mainly case studies, lacking a greater and cross linguistically view. The literature significantly lacks insightful information about how and when do children acquire NC and what could be the role of the caregivers' input, age, and how far a particular theory of negation or acquisition of language in general can account for child NC data, etc.

In this section, I will avail the opportunity to provide a series of arguments on how this dissertation contributes to significantly less explored areas of the acquisition of negation and NC, providing empirical observations and inferential evidence of cross linguistic child data of a wider span of age, i.e., 1-7 years. I also argue for the importance and need to expand the techniques and evidence used in linguistic research to draw inferences.

Theoretical contributions

The dissertation begins by providing a detailed overview of the literature about the syntax of negation, presenting cross linguistic examples reflecting the syntactic and semantic status of various negative elements, proposed in various anecdotal and contemporary theories advanced over the past five decades. A meta description is also presented for theories, frameworks, and mechanisms which attempt to account for a variety of ways and strategies natural languages apply to express sentential negation. Besides, a detailed critique of theories appreciates the strengths, contributions that these theories make in understanding the nature of negation cross linguistically, as well as highlight the gaps and voids where they lack the tendency to explain a particular kind of phenomenon of sentential negation.

Based on the thorough theoretical, empirical, and inferential evidence presented in this thesis, it is argued that young children acquire sentential negation of their local language in a remarkable way. Children's journey of the acquisition of negation is a rapid one, i.e., once they begin acquiring a negative element, they master it expeditiously, within the span of few months. Only sometimes children have to put extra effort in mastering the use of the negative element in a particular structure. Until then they explore their linguistic competence by using it in some unique ways which are considered untraditional or non-adult-like. It is important to note that on average for children with longitudinal data over the span of 12 months, for the peak first 3 years which project the active acquisition of negation, the use of any negative element in a non-adult-like manner in any sample language remains between 0-3%. Given the accuracy rate up to 97%, this 3% could not be taken as sufficient enough to trigger the complexities in the development of negation in any typically developing child.

The empirical and inferential evidence focuses on the importance of the relevance of the linguistic input in the journey of the acquisition of negation. During the data processing and analyses, it was found that the characteristics found in caregivers' linguistic input for negation are greatly reflected in children's expression of negation too. It is also stressed that the naturalistic language of children is a mirror image of that of their caregivers.

This thesis puts great emphasis on signifying the evidence of presence of a certain feature of negation and amplifying it to understand the presence of the same in the child's language as well. One open example of this constitutes the absence of doubly negated sentences in double negation language, like Dutch. No double negation sentences were found for children and their caregivers' Dutch data. It is argued that the absence of the double negation sentences in the caregivers' input does not exclude the *possibility* of the presence of doubly negated sentences but of course it does exclude the presence of doubly negated sentences in the child's language. The *possibility* of the presence of doubly negated sentences helps keep the linguistic research going.

The argument is further backed by the presence of NC in Italian and Negative Concord English caregivers' speech and that was also found in children's sentences. The findings are not only furnished by empirical but also inferential evidence. Abstracting the possibilities of existence of some particular features from the evidence of absence has not been able so far to provide a clue to find the solution to the open question of why the absence of evidence of a feature in caregivers' input can't predict the presence of the same in children's language. It has only added to the so-called *learnability problem*.

Based on the input, a 1:1 relation between the negative form and meaning in the caregivers' input can be found present, or missing in the child's language, as in Italian, and Dutch, respectively.

In the arena of identifying stages of children's acquisition of negation, it has been argued in this thesis that just by observing a few instances of a particular structure in few children is not sufficient to identify a stage for that structure in children's acquisition path. In all the sample languages investigated in this thesis, not a single pattern was found for a considerable number of children over a period of a few months that could make sufficient evidence to claim it a stage in children's language. The only consistent patterns of negation in children's negation are adult-like and grammatical to a maximum extent.

This study also differs from other studies in specifying the criteria for marking a child's sentence as adult-like/grammatical or non-adult-like/ungrammatical. In this thesis, a sentence is considered only grammatical/adult-like if it contains all the information in the sentence in a correct structural order. If a sentence contained incorrect structural information for any part of the sentences and was not acceptable in the local adult language was taken as non-adult-like and ungrammatical. This gives the most accurate journey of children's acquisition of negation. Previous studies looked mainly at the form and the position of the negative elements only.

Finally it is argued that the strength of this dissertation also lies in the depth of details that explain the negation in children's language and not only in presenting the huge number of negative sentences. Diversity of the evidence is another strong area which makes this thesis different from the existing studies of negation.

Methodological contributions

The naturalistic spoken speech holds importance over the laboratory, controlled, and experimental data for several reasons, i) it allows researchers to study the naturalistic spoken speech of children in a clear way in a real-world context, ii) it allows researchers to detect the changes, unique patterns, new information about any particular structure in children's grammar, iii) it assists in tracing the development of grammar over a larger span of time in the course of children's language development, iv) it helps researchers to study the natural flow of spoken speech of young children and allows them to study richly varied factors like caregivers' input, age, individual differences, etc., that contribute to children's language development. Controlled, experimental, and laboratory spoken data lacks the wide array of benefits that naturalistic spoken data holds.

In this thesis, children's naturalistic spoken negative sentences and their caregivers' are presented, investigated, and analysed, in order to study the acquisition of sentential negation and NC.

The dissertation extensively exploits the use of advanced techniques i.e., Python programming language for data collection, and R programming language for processing, cleaning, and analyses of data which made it possible to study 193294 negative sentences for randomly selected 1423 typically developing children and 318164 sentences for their respective caregivers in total for four languages, spanning over the period of 1-7 years of age, representing several age-groups.

The thesis widely benefits from the use of innovative and powerful statistical methods to make inferences. *Generalised Linear Mixed Methods* (GLMMs) are widely known for their power to handle heavy data sets when response variables are count or binary but not normally distributed. These statistical methods are also known for their ability to model autocorrelation when the response contains repeated observations. The thesis exhibits the use of these models by describing a detailed methodology of model selection and model results following the current recommendations by Bono, et al. (2021) for GLMMs. The model selection is greatly furnished by details of the assumptions of the model i.e., overdispersion, Variance Inflation Factor, and procedure of model stability, etc. The model results are presented in detail, covering the estimates, confidence intervals, significant testing, and effect size.

This thesis offers the use of an innovative analytical and methodological approach of *post hoc multiple comparisons* to compare children of various age-groups in order to see the variation in the estimated average use of a particular sentential negative marker. The post hoc multiple comparison methodology has been extensively used in other fields of research but linguistic research still lags behind in exploring its usefulness. The evidence from the cross linguistic post hoc multiple age-group comparisons shows that after the age of 30 months, just on the age of 2.5 years and 1.5 year journey of active acquisition (beginning from the age of 13 months) of negation, children, on average, use the negative elements similarly. The evidence signifies i) the effect of the power of the input children receive, ii) the positive role of age and iii) a vivid display of competence and performance with respect to the acquisition of negative elements.

This thesis exports another ingenious technique of data science and statistics widely used in research and that is studying the *subgroups* in order to get a detailed and comprehensive overview of child data. Studying subgroups becomes even significant when a subgroup of a population is identified exhibiting certain characteristics that are exclusively different from the rest of the population. This thesis employs subgroup analyses for studying negative concord in child Standard English and Negative Concord English. Studying subgroups helps bring new information and determine the validity of hypotheses.

The author is optimistic that investigation of nearly 5 hundred thousand negative sentences of children covering a wider age range and their caregivers' will contribute to the field on a wider level. It will guide future researchers to a significant extent about the child language, in particular negation, role of the input, and age.

Future Outlook

In this thesis, it has been shown and argued that children's naturalistic spoken language lacks the use of NC e.g., for Dutch and a majority of Standard English but comprehension studies have been showing although on a minor level that during imitation and elicitation tasks, sentences containing more than one negative element were assigned a single negation reading (e.g., NC) by children acquiring German and Standard English, so to say. Assigning the NC reading to truly doubly negated sentences is also reported even for Italian which is an NC language. It is argued that production studies covering a narrow sample of children lack the capacity to be generalisable to a wider population. Similarly, the small sample based comprehension studies also lack the capacity to make a broader generalisation that when NC is absent from the production, it is still present in the comprehension of children. Only a large scale cross linguistics study investigating the comprehension of doubly negated sentences for children covering a wider range of ages could enlighten about this mismatch between the production and comprehension of NC in child language.

Chapter 1

Introduction

This chapter will provide a brief introduction to this dissertation that aims at investigating the acquisition of sentential negation and negative concord in the early language of children acquiring Double Negation and Negative Concord language.

In this chapter, first I will briefly describe the phenomenon that has been the centre of the study of sentential negation for over five decades. After that, I will provide the theoretical background followed in this study. Then, I will elaborate on the empirical part, the motivation for selection, major research questions, predictions, and hypotheses.
Lastly, I will summarise the outline of the thesis presenting a chapter wise summary.

1.1 The phenomenon of sentential negation

Horn (2001: xiii) puts that "all human systems of communication contain a representation of negation". Negation is defined as a universally available linguistic category. Natural languages exhibit various ways of expressing sentential negation. From specifying a special negative verb, auxiliaries, and additional morphological expressions with verbs, to specified negative markers and Negative Quantifiers (NQs), a vast variety of elements used for the expression of negation is found in natural languages. For instance, the negative markers *not* and inflected form *n't* in English, *nicht* in German, *niet* in Dutch, and *non* in Italian are negative markers that are used to express sentential negation. A few examples are shown below in (1).

1).	a.	Ali does *not*/*n't* teach here.	English
	b.	Hans kommt *nicht*.[1]	German
		Hans comes neg.	
		Hans doesn't come.	
	c.	Gianni *non* ha telefonato.	Italian
		Gianni neg has called.	
		Gianni didn't call.	

[1] Cited in Zeijlstra (2004).

Negative markers are distinguished for their position with respect to the sentential verb. Negative markers that precede the sentential verb are considered pre-verbal negative markers. An explicit example is Italian *non*, shown in (1c). English *not* does not follow the main sentential verb but only the auxiliary verb, while *n't* attaches to the auxiliary verb. In spite of their following or attaching to only the auxiliary they are also taken as pre-verbal negative markers.

Negative markers which follow the main sentential verb are called post-verbal negative markers. In (1b), the negative marker *nicht* follows the main sentential verb and is taken as a post-verbal negative marker.

Not only based on the position but negative markers are also distinguished based on their syntactic status in the sentence. Some negative markers can head their own functional projection, called NegP, and some others can be the specifiers of that projection. Negative markers that can host their own functional projection are called Negative head markers or negative heads, specified as Neg°, whereas the negative marker sitting in the specifier position of the NegP are taken to be phrasal negative markers. Italian *non* and English *n't* are examples of negative head markers or Neg°, and German *nicht* and Dutch *niet* are examples of phrasal negative markers.
Other than negative markers shown in (1), Negative Quantifiers (NQs) can also be used to express sentential negation, as shown below in (2).

2).	a.	*Nobody* was playing football yesterday.	English
	b.	*Niemand* heeft Maria gebeld.	Dutch
		Neg-body has Maria called.	
		Nobody has called Maria.	
	c.	*Nessuno* ha telefonato.	Italian
		Neg-body has called.	
		Nobody has called.	

Natural languages differ with respect to the number of negative elements used per clause to express sentential negation. Languages like Dutch and German use one negative element per clause to express sentential negation. The use of more than one negative element e.g., a negative marker and an NQ will always yield double negation reading which ends up giving an interpretation of an affirmation, shown in (3) for Dutch, and also for it's English translation.

3). Jan heeft *niet niemand* gebeld.[2] Dutch

Jan has neg neg-body called

Jan didn't call nobody.

= Jan called somebody.

Furthermore, similar to Dutch and English, Romance languages, e.g. Italian, also allows both *non* and *nessuno* to express sentential negation, separately, as shown in (1c) and (2c). But unlike Dutch and English, Italian allows the use of more than one negative element per clause to express a single sentential negation, an example is shown in (4) for Italian.

4). Gianni *non* ha telefonato a *nessuno.* Italian

Gianni neg has called to neg-body.

Gianni didn't call anybody.

In (1c) and (2c), both *non* and *nessuno* are able to express sentential negation, respectively, but in (4) both of them are used together and still give a single negation reading, unlike the Dutch example shown in (3). It seems like in (3), both of the negative elements are able to yield their negation but in (4) only one of them is expressing negation. Due to this varying behaviour of some of the negative elements and due to the ability of negative elements to express negation in certain contexts and not in some others, natural languages are divided into two groups, i) Double Negation (DN) and ii) Negative Concord (NC) languages.

In DN languages, the use of two negative elements always yields double negation, as shown in (3) above while in NC languages, more than one negative element can be used to express a single negation. Other than Italian, Czech, French, Spanish, Russian, Catalan, and other romance languages are also examples of NC languages. Examples of Czech and Catalan are shown below in (5).

[2] The example is taken from Zeijlstra (2004).

5). a. *No* he vist *mai ninú enlloc.*[3] Catalan

Neg have.1sg seen neg-time neg-person neg-place.

I have never seen anybody anywhere.

b. Milan *nikomu ne*volá.[4] Czech

Milan neg-body neg-call.

Milan doesn't call anybody.

Due to the varying behaviour of NQs in NC languages, they are distinguished from NQs in DN languages and known as neg-words. From now onward in this thesis, the term neg-words would refer to NQs in NC languages and the term NQs will refer to NQs in DN languages.

There have been various theories proposed to account for the behaviour of negative markers, NQs, and neg-words cross linguistically, as discussed in detail in chapter 3. Over the last two and a half decades, the study of sentential negation has caught a lot of the attention and energy of linguist researchers and scientists. Several theories, frameworks, and proposals have been put forth to address the versatile nature of negation and to account for extra negation in NC languages, cross linguistically. These theories mainly have been addressing the adult data or the final stage of expression of negation in natural languages. At the same time, they say less to nothing about this variation in negative elements and grouping of natural languages into DN and NC languages from the perspective of the acquisition of sentential negation by young children. For instance, when do children acquire the negative head or adverbial markers, when do they acquire formal features and how would they distinguish between semantic and formal features of negation, etc., when in the early stages of the acquisition of negation, children have been reported to adopt various patterns and paths until they reach the final adult-like stage of the expression of negation of their local language (Kalima and Bellugi 1966; Bellugi 1967).

1.2 Theoretical background

Among the theories proposed (discussed in detail in chapter 3) to account for the variation in languages with respect to sentential negation, the theory of sentential negation and negative concord presented by Zeijlstra (2004, et seq.) is a major theory in this category that extensively proposes that

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[3] Taken from Haspelmath (1997).

[4] Cited in Zeijlstra (2004).

neg-words are not semantically negative themselves but only non-negative indefinites. Zeijlstra (2004) argues that any language that has a negative marker that is a syntactic head, Neg°, will exhibit NC. Zeijlstra also argues that NC is a clause bound syntactic agreement between more than one elements containing formal features of negation. One of these elements carries [iNEG] which in a c-commanding position checks the [uNEG] feature of the other negative element. Zeijlstra further argues that the projection of the formal features of negation is not a universal phenomenon but languages vary with respect to its exhibition. Zeijlstra (2014) hypothesises the presence of formal features of negation as follows:

6). a. If and only if there are doubling effects with respect to a semantic operator OP_F in the language input, all features of F are formal feature [i/uF].

b. If there are no doubling effects with respect to a semantic operator OP_F in the language input, all features of F are semantic features ([F]).

In explaining (6a), Zeijlstra argues that if a morphosyntactically marked negative element does not correspond one to one to the negative operator, the language will exhibit the formal features of negation and will be a member of the group of NC languages. The absence of the one to one correspondence between the negative form (element) and meaning (negative operator) is reflected in the double marking of negation which he calls *doubling effects with respect to negation*. For instance, the Italian, Czech, and Catalan examples shown above explicitly exhibit the absence of the one to one correspondence between the negative form and meaning and also show the presence of the doubling effects of negation, and represent themselves as NC languages. The (6b) part of the hypothesis suggests that if there are no doubling effects present with respect to the negative operator, the language exhibits the semantic features of negation and will be a member of the DN languages group. Dutch and German examples shown above make their respective languages members of the group of of DN languages.

Along the lines in (6), Zeijlstra (2008) presents a learning algorithm which he elaborates on in Zeijlstra (2014) and predicts a process for the acquisition of negation and NC by young children. Zeijlstra (2008, 2014) argues that children initially hypothesise that every language exhibits the semantic features of negation. Children acquiring any language will assume that every negative element in their language is semantically negative and carries the semantic features of negation. If and only if a language exhibits the doubling effects of negation in the adult input only then children will have to re-assume the value of negation. For instance, children will have to assume that negation is formal in their language and not semantic and only one of the morpho-syntactically marked negative elements carries the semantics of negation and the other one doesn't.

Zeijlstra further argues that the setting of semantic or formal features of negation will be a rapid one since children of both groups of languages will have readily access to the respective input from their caregivers in the Child Directed Speech (CDS). Re-setting the value of negation can only be delayed if children do not get early access to the required input.

In summary, Zeijlstra's (2004, 2008, 2014) theory of negation and NC proposes a multi-step predictive algorithm that not only predicts the process of the acquisition of negation and NC but also raises some questions particularly related to negation in child languages. In the next subsection, I will present those theoretical predictions and research questions this thesis address with regard to the acquisition of sentential negation in child language.

1.3 Predictions and empirical domains

While keeping in view Zeijlstra's theory of negation and NC, research questions that this thesis addresses and predictions that are tested in this study, will be presented in this subsection. The empirical data from four different languages covering both DN and NC groups of languages, presented below in table 1.1 will provide the base for statistical analyses conducted. The motivation for selecting these languages will be stated alongside.

Data	**DN**		**NC**	
	Dutch	**Standard English**	**Italian**	**NC English**
Child	✓	✓	✓	✓
CDS	✓	✓	✓	✓

Table 1.1: Sample languages investigated in this thesis.

The child and adult data consist of naturalistic spoken negative sentences containing the sentential negative marker, NQs, and NC as follows:

- **Dutch:** *niet* and NQs.
- **SE:** *not*, *n't,* NQs and NC.
- **Italian:** *non,* neg-words in specific positions, and NC.
- **NC English:** *not, n't,* NQs, and NC.
- **Age:** The child and CDS data ranges from child age range 13-84 months.

To test the major predictions and to answer the research questions, a multi-step analysis is conducted that mainly collects two types of results or evidence. In testing every prediction or investigating any research question, in the first step, empirical evidence is collected. If the empirical evidence supports the prediction and research question, in the next step inferential statistical analyses are conducted.

The techniques used for empirical and inferential statistical analyses will be as follows:

i). **Empirical evidence:** collected using:

- Categorisation, grouping, and division of child and CDS data
- Descriptive statistics: Summaries, counts, percentages, confidence intervals

ii). **Inferential evidence:** gathered using:

- Generalised Linear Mixed Methods (GLMMs)
- Post Hoc Multiple Age-group Comparisons
- Studying subgroups

Empirical evidence generally refers to finding the presence of the phenomenon under investigation. This type of evidence is usually collected using e.g., categorisation, grouping, and tabulation. The data is presented using descriptive statistics e.g., summaries, counts, proportions, percentages, etc. Empirical evidence gives provides a brief answer if a phenomenon under investigation is present in the data collected, is yes, with what distribution, and in what amount.

Inferential evidence refers to selecting a statistical model using a set of predictor variables and a response variable, specifying a certain distribution of data and a function to compute the effect of predictors on the response variables.[5] There can be a multi-steps process of conducting a statistical inference, as shown above.

[5] In this thesis, the term *predictor(s)* variables refer to independent variables and the term *response* refers to the dependent variables.

For instance, GLMMs are used to estimate the effect of predictors on the response. Post hoc multiple age-group comparisons estimate the variation in the estimated average use of any particular negative expression across children of different age-groups, and help in estimating the earlier or later acquisition or use of that particular negative expression. Studying subgroups helps identify the unique patterns in the sample population deeply.

The inferences and conclusions are exclusively based on inferential evidence. Empirical evidence supports theoretical predictions, inferential evidence, and backs conclusions. At any step only if collecting inferential evidence is simply not possible, the empirical evidence provides support for the conclusion.[6]

Table 1.2 provides the summary of the predictor and response variables used in the statistical modelling. A detailed methodology is presented in chapter 7 and further specific details regarding every statistical model and the phenomenon under investigation are presented in the chapter covering results (chapters 8-11).

Predictor variables	**Response variable**
CDS Data	Child Data
Age	

Table 1.2: table of predictors and response variables.

The nest subsection will present the predictions, hypotheses, and research questions investigated and tested in this dissertation, which are as follows:

1.3.1 The effect of caregivers' language input

Zeijlstra (2008, 2014, 2022) puts much emphasis on the local language input provided by caregivers. Be it a DN language or NC language, for the acquisition of any negative element, for

[6] See chapter 10, for example where CDS and child, both groups of data for Dutch exhibit the absence of doubly negated sentences and collecting inferential evidence is simply not possible to make a conclusion that the absence of doubly negation in CDS predicts absence of the same in child data also. For example, absence of something cannot predict absence or presence of something, but only the possibility of the absence and presence cannot be excluded.

every step in the process of acquisition of negation, the effect or role of CDS input is much emphasised.

In order to see the effect of CDS input the focus would be on:

i). Tracing the identical patterns and trends of negation in the child and CDS data.

ii). Finding the contrasts between the child and CDS data.

The to estimate the effect of CDS input, the evidence is collected in two steps as mentioned above:

i). Empirically: Whenever possible, for every aspect of negation i.e., using negation using a single negative element or NC, a brief comparison between CDS input and children's expression of negation is made, for all the sample languages investigated.

ii). Inferentially: The CDS input containing a particular negative element or NC is used as one of the predictor variables in the GLMM model to see its effect on the acquisition of that particular acquisition of negation in children's data. For example, expressing negation using a single negative marker or NC, for every sample language investigated, Dutch, Italian, SE and NC English, the respective CDS data makes a part of the set of predictors.

1.3.2 The effect of age

Zeijlstra (2008, 2014, 2022) also puts much emphasis on the effect of age. He argues that given the input children will acquire a certain expression of negation earlier or later.

In order to see the effect of age, the following evidence is collected from all sample languages in the following steps:

i). Empirically: For every month, children's expression of negation is closely observed in order to see the development in the acquisition, beginning from the age month 13 until the age month 84.

ii). Inferentially: Age as a continuous predictor is used as one of the predictor variables in the statistical model investigating the acquisition of any expression of negation, e.g. expressing negation using a single negative element or NC.

iii). Inferentially: In order to see the estimated average use of any particular negative element between children of different age-groups of 6 months each, post hoc multiple age-group comparisons will be conducted that provides the base for an estimation of children's acquisition of an expression of negation earlier or later.

1.3.3 One to one mapping between negative form and meaning in DN language

Zeijlstra argues that children acquiring a DN language will receive abundant input containing the 1:1 mapping between the negative form and meaning. Based on this input they will also exhibit the presence of the 1:1 mapping between the negative form and meaning. Furthermore, based on the ready access to the input containing the negation, children will acquire it very early. Child and CDS data for Dutch will be investigated to test this prediction.

The analyses are performed following the steps as mentioned below:

i). Empirically: The presence of the use of a single negative element to express sentential negation in child and CDS data.

ii). Empirically: Tracing the absence or presence of sentences containing more than one negative elements to express sentential negation in child and CDS data.

iii). Inferentially: Using a GLMM model estimating the effect of single negation in CDS data as one of the predictors and negation in children as a response variable.

iv). Inferentially: The early or later acquisition of negation will be estimated using post hoc multiple age-group comparisons.

1.3.4 Correlation between Neg° negative marker and NC

Zeijlstra (2004) proposes a correlation between the negative marker that is a Neg° and NC predicting that any language that has a negative marker that is a Neg°, will exhibit NC.

In order to test this prediction, the child and their respective CDS data from three languages, Italian, Negative Concord English, and Standard English will be investigated.

Italian uses the negative marker *non* to express sentential negation which is taken as a syntactic head. Negative Concord English employs the negative head marker *n't* to exhibit sentential negation, along with the adverbial negative marker *not*. Italian and NC English both belong to the NC group of natural languages.

Child and CDS data of both of these languages will be investigated thoroughly focusing on the following questions:

i). Do CDS speakers of Italian and NC English exhibit NC?

ii). Do children acquiring Italian and NC English exhibit the presence of NC? If yes, when, to what extent, and in what patterns?

Standard English is a language that explicitly belongs to the DN languages group when it comes to the adult grammar but SE possesses some of the features of NC languages also. One major feature is the presence of the Neg° negative marker *n't*. So theoretically, SE should also exhibit the presence of NC in CDS and child negation.

In order to see this prediction the focus would be:

i). Do CDS speakers of SE exhibit NC?

ii). Do children acquiring SE exhibit the presence of NC? If yes, when, to what extent, and in what patterns?

1.3.5 Correlation between NC in adults' input and NC in child's grammar

Zeijlstra predicts that if a language exhibits the presence of formal features or the doubling effects of negation in the adults' input provided to children, children will exhibit the presence of formal features or the doubling effects of negation in their grammar.

To test this prediction, children's and their respective caregivers' data from two languages, Italian and Negative Concord English will be investigated. Italian and Negative Concord English are NC languages that clearly exhibits the presence of doubling effects of negation in the CDS language input. The prediction will be tested in two steps:

i). Empirically: Tracing the presence of NC in the CDS input and the presence of NC in children's data of Italian and NC English.

ii). Inferentially: Fitting a GLMM model using NC in CDS as one of the predictors and NC in children's data as a response variable, for Italian and NC, separately.

Step (ii) will provide the bases of whether NC input predicts or has an effect on children's NC.

The predictions listed in subsections 1.3.1 to 1.3.5 specifically predict the acquisition process of negation for L1. The question can arise whether children who are acquiring a DN and an NC language simultaneously as their L1s, will also follow the same procedure for the acquisition of negation or whether the acquisition process would be different for them. In order to see this and answer the questions raised in these subsections and test the predictions broadly, we conducted another study (Arshad and Zeijlstra, in prep) for children acquiring Dutch and Italian together as their L1s. We found that children acquiring both of these languages follow the language-specific patterns to acquire negation in both of their L1s. We did not find evidence for the influence of one of the L1s on the other L1.[7]

1.3.6 Correlation between the NC input and the acquisition of Neg°

It was stated above that Zeijlstra argues that a language that possesses the Neg° negative marker also exhibits the NC and NC is the required input for the acquisition of Neg° negative marker.

In order to test this prediction, the children's acquisition of the negative head marker, Neg°, will be investigated. The target data would be that of Italian, Negative Concord English, and Standard English. Italian and Negative Concord English do exhibit the presence of NC in the adults language, which can guide children to acquire the respective negative head marker for each language.

Standard English does not exhibit NC in CDS input but due to the mixing of NC English and Standard English speaking communities, it is possible that CDS speakers exhibit the presence of NC in the language input.[8] For this reason, all the data by children and CDS speakers of Standard English are red thoroughly and divided into 4 *subgroups* depending upon the presence and absence

[7] In the study investigating children's two L1s simultaneously, Dutch and Italian, we did not find any NC sentence in the Dutch data. We also did not find the use of Dutch negative elements used in Italian data. The positive effect of CDS input for Dutch and Italian negation was found for the acquisition of negation in Dutch and Italian, respectively.

[8] See chapter 8 for details.

of NC. For children of two of the subgroups, group-2, and group-4, the CDS input for NC was found.

The prediction is tested in three steps:

i). Empirically: The presence of NC input in CDS data.

ii). Empirically: The presence of the use of Neg° negative marker in children's data, for Italian, NC English and SE.

iii). Inferentially: Fitting a GLMM model taking NC in CDS as one of the predictors and the use of Neg° negative marker in children's data as a response variable, for Italian, NC English and SE, respectively.

1.3.7 Earlier acquisition of the adverbial negative marker than of the Neg° marker

From Zeijlstra's algorithm it is predicted that children acquiring Standard English do not receive the required input of NC, their acquisition of the Neg° marker *n't* will be a bit delayed in comparison to the adverbial negative marker.
As mentioned above, children acquiring Standard English are divided into 4 subgroups depending on the presence and absence of NC in their and their respective CDS data.

The prediction will be tested in two steps:

i). The acquisition of the adverbial negative marker *not* and Neg° negative marker *n't* of two subgroups for whose no NC input was found in their CDS data will be compared using the post hoc multiple age-group comparisons.

ii). The acquisition of *n't* by these two subgroups of children acquiring Standard English will be compared to their NC English acquiring peers' acquisition of *n't.* The comparison will be based on the results of the post hoc multiple age-group comparisons.

1.3.8 Simultaneous acquisition of adverbial and Neg° negative markers

Zeijlstra's proposed learning algorithm also predicts that if children receive the required NC input from their caregivers, they will acquire the adverbial negative marker *not* and the negative head marker *n't* simultaneously. The target data for testing this prediction will be that of NC English.

To test this prediction:

i). The acquisition or the estimated average use of *not* and *n't* by children acquiring NC English will be compared using post hoc multiple age-group comparisons.

ii). The acquisition or the estimated average use of the adverbial negative marker *not* and the Neg° *n't* of children acquiring NC English will be compared to that of two of the subgroups of Standard English for which CDS NC input was available. The comparison will be based on the results of the post hoc multiple age-group comparisons.

In the next subsection, the procedure of the remainder of the thesis will be presented.

1.4 Procedure of the thesis

In the remainder of this chapter, I will describe the gist of all the chapters which is as follows:

Chapter 2 presents a detailed background of syntactic theories that have been put forth to propose different syntactic statuses of different negative elements. It has been shown that some negative markers are taken as pre-verbal because they precede the sentential verb while some others have been named as post-verbal because they follow the verb of the sentences. Pre-verbal negative markers are analysed as negative heads, Neg°, which can host their functional projection, NegP. Post-verbal ones are taken as adverbial or XP negative markers which posit themselves as the XP of the NegP. The chapter also presents a summary of the tests and syntactic operations that are used to determine the syntactic status of both kinds of negative markers.

Chapter 3 opens up by presenting the division of natural languages as DN or NC languages. DN languages allow only one negative element per clause while NC languages allow the use of more than one morpho syntactically negative element to express sentential negation i.e., sentential negative marker and neg-words together. To date, various syntactic and semantic theories have been presented to account for this varying nature of negation. Among most of the major theories, there exists an agreement on the semantically negative status of the sentential negative marker but disagreement still prevails for neg-words. Theories include the classic theories like Negative Quantifier approach presented by Zanuttini and Haegeman (1991, 1995, et seq.) which analyse NQs and negative markers both as semantically negative and propose an operation of Negative

Absorption which is argued to absorb the negation of one of the negative elements and induces one single semantic negation per clause. De Swart and Sag (2002) also analyse both, the negative markers and neg-words as semantically negative and present a mechanism wrapped in Optimal Theory to account for the negation of more than one negative element. Neg-words have also been analysed as Negative Polarity Items (NPIs) which are not negative themselves but depend on other negative elements to be licensed. Linebarger (1987), Kadmon and Landmon (1993), Krifka, 1991; Krifka, et al. 1994; Krifka (1995), Chierchia (2004, et seq.), Laka and Ladusaw (1990, 1992), and Giannakidou (2000) are among the ones who analysed neg-words as NPIs and negative markers are semantically negative. Neg-words have also been analysed as ambiguous by (Wouden and Zwarts (1993, 1995) and Herburger (2001).

Then there are theories like that of Zeijlstra (2004, et seq.) who takes neg-words as negative indefinites and NC as a syntactic agreement. The major points of Zeijlstra's theory were stated in section 1.2, and theory is discussed in detail in chapter 3.

Chapter 4 describes the syntax of sentential negation i.e., negative marker, NQs and neg-words of the sample languages investigated in this thesis, namely Standard English, Dutch, Negative Concord English, and Italian. It is shown there that the English negative marker *not* is syntactically taken as an adverbial while *n't* is shown as Neg° negative marker. The same syntactic status holds for both varieties of English, Standard English and NC English. Dutch sentential negative marker *niet* is also an adverbial or XP negative marker. *Non*, the Italian sentential negative marker is taken as a negative head marker.

Chapter 5 recounts the detailed theoretical background of the existing literature on the acquisition of sentential negation and negative concord in child language. The chapter begins with presenting the broader perspectives of the acquisition theories by nativists and behaviourists, highlighting their strengths and weaknesses and open questions these theories pose. The chapter briefly reports the significance of the caregivers' provided language input and the poverty of the stimulus. The chapter then narrates the history of the study of negation in child languages, beginning from Bellugi (1966, 1967), characterising major findings and recording a wide range of cross linguistic data, i.e., Standard English, Negative Concord English, Dutch, and Italian, etc.

Chapter 6 advances the consequences and prediction of Zeijlstra's (2004, et seq.) theory of the acquisition of negation and negative concord, particularly. It is shown that Zeijlstra's proposed algorithm predicts that a double negation language like Dutch does not exhibit the formal features or doubling effects with respect to negation in the adult language, and the same will also be reflected in the child language.

It is further predicted that in the negative concord languages, the projection of formal features is projected in the adults' language input in the form of doubling effects of negation and thus this input will lead to the exhibition of the same in the child's language also. Under Zeijlstra's theory of NC a language that possesses a negative marker, Neg°, also allows NC. The predictions looks straightforward for Italian, a NC language. When it comes to Standard English, the situation is different. Standard English does possess a negative Neg° marker *n't* which according to Zeijlstra's theory makes it a negative concord language. For the timely acquisition of the Neg° negative marker, the required input is NC. Adult Standard English does not exhibit negative concord. The adult language input that children receive does not contain formal features of negation which is the required input for the acquisition of the Neg° negative marker. In this case, children have to rely only on the input that exhibit the use of *n't* as the only negative element. Consequently, the acquisition of *n't* is a bit later than the adverbial negative marker, for instance, *not*. Zeijlstra also predicts that similar to NC languages, children acquiring negative concord varieties of English will have early access to the NC or doubling effects input so children will acquire *n't* timely, or simultaneously to *not*.

To test the major predictions presented by Zeijlstra regarding DN and NC languages, children's naturalistic spoken data for Dutch, Italian, Standard English, and Negative Concord English are investigated and analysed.

Chapter 7 presents a detailed methodology used for sampling, data collection, cleaning, processing, and statistical modelling. The chapter also describes the methodology for conducting post hoc multiple comparisons between children of various age-groups in order to see the estimated average use of a particular negative element. The chapter also summarises the importance of studying the sub-groups for Standard English. The detailed and step wise methodology is constructed along the lines of recommendations for the use of Generalised Linear Mixed Models (GLMMs).

Chapter 8 presents the results and statistical analyses for Standard English while presenting more than 400,000 sentences for children and adults combined. Nearly 200,000 negative sentences make a part of children's negative sentences. A detailed view of children's use of various negative elements i.e., *no, not*, negative auxiliaries, NQs, and NC is presented. In order to achieve a comprehensive overview of children's negative sentences, sentences are divided into adult-like/ grammatically correct and non-adult-like/grammatically incorrect sentences, per negative element. The chapter also focuses on presenting the comparisons between children's and Child Directed Speech (CDS)/adults or caregivers' negative sentences.

In order to investigate the acquisition of NC, children are divided into four subgroups depending on the presence and absence of NC in their or their respective CDS sentences. The empirical and inferential support for Zeijlstra's predicted correlation between the Neg° negative marker *n't* and NC is presented. The statistical model results signify the positive effect of CDS language input and age. Post hoc multiple group comparisons are conducted for each subgroups in order to see the average estimated use of both of the negative markers, *not* and *n't*. The inferential support from two of the subgroups backs the prediction that the presence of Neg° *n't* in the adults' language input leads to the presence of negative concord in children's grammar. Only partial support was found for the late acquisition of Neg° negative marker than that of the adverbial negative marker. Inferential results for both of the subgroups who received NC input support the prediction of simultaneous acquisition of adverbial and Neg° negative markers.

Chapter 9 presents the empirical findings, results, and statistical analyses for the acquisition of *non* as a single negative marker and NC in Italian. Children's adult-like and non-adult-like negative sentences are presented along with the comparison between child and CDS negative sentences. It is argued that NC in CDS and age have a significant role in children's acquisition of *non* and NC. The correlation between the Neg° negative marker *non* and NC is also presented. It is also argued that children's negative sentences directly reflect the expression of negation in CDS sentences.

Chapter 10 presents the empirical and statistical analyses of Dutch child data for the acquisition of negation. Along with a comprehensive overview of the acquisition and use of various negative elements, using post hoc multiple group comparisons, it is also shown that children establish the acquisition of sentential negation of their local language soon after the second year of their life. After the age of 24 months, there is not a significant difference found in the estimated average use of the negative marker *niet*. Furthermore, it is also argued that the presence of an XP or adverbial negative marker in the CDS language input will lead to the presence of the same in the child's language. The Dutch children's expression of negation reflects the 1:1 mapping between the negative form and meaning and is in line with that of adults.

Chapter 11 presents the acquisition of negation and NC in Negative Concord varieties of English. The chapter presents a detailed overview of children's acquisition of various negative elements of children acquiring NC English and presents comparisons to their peers acquiring SE and Italian.

Chapter 12 wraps up all the major empirical findings and inferential evidence gathered cross linguistically to argue that the expression of negation in child language is greatly in line with adult's language. The chapter also briefly shows how far Zeijlstra’s presented algorithm could explain the acquisition of sentential negation in a variety of languages. The chapter also presents major conclusions with respect to the role of caregivers’ input, age, and the role of the child in the course of the acquisition of sentential negation and NC. The chapter also raise some questions for future research.

Chapter 2

The Syntax of Sentential Negation

Negation is universal property of natural languages. A variety of negative markers i.e., sentential negative markers like *not/n't* in English, *pas* in French, *niet* in Dutch, *non* in Italian, and *nicht* in German, etc., are used to express sentential negation. Other than these negative markers, negative quantifiers, inflectional morphemes like English *-in* or *-un*, and prepositions, such as *without*, are also used to express sentential negation. To date, numerous studies have been conducted to understand and describe the syntactic means that languages employe to use these negative markers to express sentential negation. Studies also reveal how such negative markers differ from each other, how common they are, and how they relate to other components of syntactic structure.

Over the past few decades, various theories and proposals have been put forth to maintain a unified analysis of the negative markers, negative quantifiers, and other inflectional negative elements. Currently, the use of empirical trends in descriptive and theoretical research has led some of the aspects of negation to be regarded as established facts i.e., negative markers can be heads, they are also adverbials, they can be placed pre-verbally and post-verbally, etc. Others aspects are still under debate i.e., the semantic and syntactic status of negative quantifiers, tendency of negative elements to induce double negation or negative concord, etc.

In this chapter, a brief summary of the research literature on syntax of negation will be presented. In section 2.1, the expression of negation in general will be discussed. In section 2.2, the preverbal negative markers and their syntactic status as negative heads will be discussed. Section 2.3 will contain a brief summary of post-verbal negative markers and their status as phrasal elements. In section 2.4 the functional projection NegP will be discussed and section 2.5 will conclude.

2.1 Expressing negation & negative markers

Dahl (1979) presents a cross-linguistic typology of sentential negation in a sample of 240 languages consisting of 40 language families and genetically isolated languages. Dahl identifies, a) syntactic negation: types of negative markers, i.e., negative particles and auxiliary verbs, b) morphological negation: negative markers that are inflectional, such as prefixes, suffixes, infixes, etc. Dahl (1979) also discusses the placement of negation in the sentence structure and the position of negative marker with respect to the verb. Payne (1985) further elaborates on these and various more aspects of negation, and clearly identifies three main types of negative markers: negative verbs, negative affixes and negative particles. Dryer (1988, 2009) discusses the geographical distribution of these negative markers over the languages. Zanuttini (1997a,b, 2001) divides the negative markers into four types depending on their syntactic status and the semantic effects they give rise to, shown below in (1-6). These four types of negative markers give rise to three ways of expressing sentential negation which will be shown and discussed in subsequent sections and chapters.

The first type of negative markers are negative verbs shown below in (1) for Tongan, a Polynesian language.

1). Na *e ikai* ke alu a Siale.[9]
AspNegAsp-go absolute Charlie
Charlie didn't go.

Negative verb shows the characteristics of a main verb but also differs from it. For instance, the negative verb appears as a combination of a negative marker and an aspect marker while the main verb does not contain the negative marker.

The second type of negative markers consists of negative auxiliaries. An example from Evenki, a Siberian language, is shown below in (2).

2). Bi Ə-Ə-w dukuwun-ma duku-ra.[10]
I-negpast1SG letter obj write Participle
I didn't write a letter.

The negative marker Ə-Ə in (2) is a negative auxiliary which is inflected for some of the aspects of finiteness such as tense, while the main verb *duku-ra* appears in an infinite form. Finnish and Estonian also exhibit such patterns in expressing negation. The patterns of inflection of negative auxiliaries may vary (Dahl 1979).

The third type of negative markers comes in the form of morphological affixes, for example, the Turkish negative marker *me*, as shown in (3a). Ouhalla (1990, 1993) provides a detailed analysis of *me* and Turkish negation. Dahl (1979) argues that morphological inflectional negative markers

[9] Cited in Pyne (1985).

[10] Cited in Pyne (1985).

are realised by the morphological processes of suffixation (3b), infixation, (3c) and reduplication (3d) as in Tabasaran, a North Caucasian language. Inflectional negative markers are also realised by the prosodic modification as in Niger-Congo, an African language, shown in (4).

3). a. John elmalari ser*me*di.[11] Turkish

John apples like neg past 3SG

John doesn't like apples.

b. Ya-fun-*dar.*[12] Tabasaran

He-came-neg

He didn't come.

c. U-*dr*-sub.

To-neg-jump.

Not to jump.

d. I-li-*li*-pub.

To-throw-neg-over.

Not to throw over.

The negative marker *dar* is suffixed to the verb as shown in (3b), and a short form, *dr,* can also be infixed as in (3c). The negative marker can also be generated by reduplicating the second syllable of the verb, as shown in (3d).

The formation of a negative marker through prosodic modification, as in Niger-Congo, is shown below in (4). The subject pronoun *n* is prosodically modified to form a negative sentence while the sentence structure and order remains the same. In some other varieties of Niger-Congo, the word order is also modified to mark negation (Dahl 1979).

4). a. *ή yido.*[13] Niger-Congo

I know.

b. *n΄— yido.*[14]

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[11] Example (3a) is from Ouhalla (1990). Examples (1, 2, 3a) are also cited in Zanuttini (2001) and Zeijlstra (2004, 2013).

[12] Examples in (3b, 3c &3d) are cited in Dixon (2012), initially only mentioned in Dahl (1979).

[13] The examples in (4) for Niger-Congo are from Donner (1965), also mentioned in Dahl (1979).

[14] The dash (—) indicates the modification in accent while pronouncing the negative verb in the sentence. The modification is usually performed by stressing the verb.

I do not know.

The last type of negative markers are negative particles. Examples for Czech and Italian are given in (5a) and (5b) respectively, cited in Zeijlstra (2004).

5). a. Milan *ne*vola. Czech
Milan neg calls
Milan doesn't call.
b. Gianni *non* ha telefonato. Italian
Gianni neg has called
Gianni didn't call.

Negative particles come in different forms. They can attach to the finite verb as Czech *ne* does in (5a) or they can also be a separate morpheme attaching to and preceding the finite verb, as Italian *non* in (5b). Negative particles can also follow the main verb, as German *nicht* does, in (6), cited in Zeijlstra (2004).

6). Hans hat *nicht* gegessen. German
Hans has neg eaten
Hans hasn't eaten.

Besides the above-described negative markers, negation can also be expressed by using the negative constituents like *niemand*, *nessuno*, meanings similar to English *nobody,* shown in (7).

7). a. *Niemand* hat gegessen. German
Neg-body has eaten
Nobody has eaten.
b. *Nessuno* ha telefonato. Italian
Neg-body has called
Nobody has called.
c. *Nobody* has eaten. English

Given all the negative markers just described above, languages vary as to wether they use single negative marker as shown in (1) to (7) or a combination of two (or possibly more), a phenomenon of negation commonly known as negative concord, as shown in (8).

8). a. Milan *nikomu ne*volá.[15] Czech
Milan neg-body neg-call
Milan doesn't call anybody.
b. Gianni *non* ha telefonato a *nessuno*.[16] Italian
Gianni neg has called to neg-body
Gianni didn't call anybody.
c. *Personne n'* aime *personne.*[17] French
Neg-person neg loves neg-person
Nobody loves anybody.
d. Die voorbereiding neem *nie* lank *nie*.[18] Afrikaans
The preparation takes neg long neg
The preparation doesn't take long.

The examples for Czech (8a) and Italian (8b) show the use of a combination of the negative marker *ne* and *non* with the negative constituents like *nikuma* and *nessuno*, respectively. The French example in (8c) shows the combination of three negative markers, the pre-verbal *ne* and *personne* and a post-verbal *personne*. Afrikaans does the same using two negative markers *nie* and *nie*, as shown in (8d). All the combinations in (8) yield a single semantic negation together.

In the following subsections, the categorisation of negative particles will be briefly described into pre-verbal negative markers and post-verbal negative markers. The negative constituents like *nessuno*, *niemand*, and *nobody* shown in (7) and negative concord, shown in (8) will be discussed in the next chapter.

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[15] The example is cited in Zeijlstra (2004).

[16] Cited in Zeijlstra (2004).

[17] The example is taken from De Swart & Sag (2002).

[18] Cited in Biberaur and Zeijlstra (2011).

2.2 Pre-verbal negative markers

Zanuttini (1997) based on the empirical investigations of Romance languages argues that negative markers are broadly categorised into a) pre-verbal and b) post-verbal negative markers. In this subsection, the pre-verbal negative markers will be discussed briefly.

The categorisation in pre/post-verbal negative markers itself indicates that the position of negative marker is assumed central to the main verb. Pre-verbal negative markers are exemplified in (9) for Romance languages, cited in Zanuttini (1997, 3).

9). a. Gianni *non* ha telefonato a sua madre. Italian
Gianni neg has called his mother
Gianni hasn't call his mother.

b. Juan *no* ha llamado a su madre. Spanish
Juan neg has called his mother
Juan hasn't called his mother.

c. *Non* quero xantar. Galician
Neg want to-sing
I don't want to sing.

d. *Non* leggere articoli di sintassi e un vero peccato. Italian
Neg to-read articles of syntax is a real shame
Not to read syntax articles is a real pity.

Pre-verbal negative markers always precede the main verbs, finite as shown in (9a-c) or non-finite, as in (9d).

2.2.1 Pre-verbal negative markers as heads (Neg°)

Zanuttini (1991, 1997, 2001) extensively discusses the syntactic status of negative markers. The author argues that to determine the syntactic status, the interaction of negative marker with other sentential elements must be taken into account. The interference of a negative marker with a syntactic operation like movement is also used as a diagnostic to determine the syntactic status. A negative marker is viewed as a negative head if it shows the similar characteristics that other functional heads show. Based on Kayne's (1989) observation of pronominal clitics and their similarities with negative markers, researchers (Zanuttini, 1991, 1997, 2001; Zeijlstra, 2004; Haegeman, 1995, among others) view pre-verbal negative markers as negative heads.

To determine the syntactic status of a negative marker as a head, its interaction is observed, with, a) head movement of the pronominal clitic, b) long clitic climbing, c) verb movement from I to C, and, d) the application of *why not* test. Each of them will be discussed below briefly.

According to Zanuttini (1991, 1997) pronominal clitic is assumed to be a head. The interaction of a negative marker with a pronominal clitic in a context where the pronominal clitic has to undergo the head movement from its base position to another position, is observed. If a negative marker is present in the way of moving (of a clitic) to a certain position, the movement becomes illicit. Kayne (1989) suggests that French *ne* and Italian *non*, for this reason, are heads. The interference of French negative marker *ne* with the head movement of *la* is shown in (10). The pronominal clitic *la* which is argued to be an argument of the embedded clause, cliticises onto the main verb *fait* in the matrix clause in causative sentences, as shown in (10a). The presence of the negative marker *ne* in the embedded clause yields ungrammaticality by blocking the movement of the clitic *la* from the embedded clause into the matrix clause, as shown in (10b).

10). a. Jean *la*$_{1}$ fait manger t$_{1}$ à Paul.[19] French

Jean it makes eat to Paul

Jean makes Paul eat it.

b. *Jean *l*$_{1}$'a fait *ne pas* manger t$_{1}$ à l'enfant

Jean it has made neg neg eat to

Jean has made the child not eat it.

Based on the argument that only heads interfere with head movement, *ne* is taken to be a negative head.

In the second diagnostic, the interaction of the negative marker with long clitic climbing is observed, in a context where a pronominal clitic in infinitive embedded clause can remain either in the embedded clause as in (11a) or has to climb to the matrix verb in the main clause as in(11b). The presence of the negative marker *non* in the embedded clause yields ungrammatical results. The grammatical construction in (11c) shows that *non* and *li,* both are fine in the embedded clause, but the clitic *li* cannot move to the matrix clause, due to the presence of *non,* as shown in (11d).

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[19] Examples are cited in Zanuttini (2001).

11). a. Gianni vuole veder*li*.[20] Italian

John want-s to see them

John wants to see them.

b. Gianni *li* vuole vedere.

c. Gianni vuole *non* veder*li*.

Gianni wants neg to see them

Gianni doesn't want to see them.

d. *Gianni *li* vuole *non* vedere.

Both the diagnostics are used to determine the syntactic status of negative marker as a head because no such effects arise with post-verbal negative markers. The problem with these tests is that they are only applicable in languages that allow long clitic climbing.

Another different test that Zanuttini discusses is whether the preverbal negative marker intervenes with verb movement from I to C in a language that exhibits such movement. The author argues that if the negative marker is a head and its structural position is higher than the VP headed by V but lower than C, then the pre-verbal negative marker should block the movement of the verb to C. The Romance variety Paduan exhibits verb movement from V to C in yes/no interrogatives, as in (12a). If the negative head marker is present between C and I, it blocks movement of the verb to C in yes/no interrogatives, as exemplified in (12b), an instance of the Head Movement Constraint (Travis 1984).

12). a. Vien-lo?[21] Puduan

Comes-he?

Is he coming.

b. **No* vien-lo?

Neg comes-he?

Isn't he coming?

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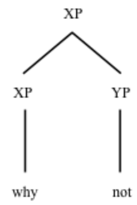
[20] Examples taken from Zanuttini (2001), also cited in Zeijlstra (2004).

[21] Example is taken from Zanuttini (1991)

Zanuttini argues that such blocking of movement generally occurs between the elements of the same phrasal category: if the verb is the head of VP and the blocking effect is caused by the negative marker, then the negative marker must be the head of NegP.

Merchant (2001) develops and applies the *why not* test to a number of languages belonging to different language families. Merchant argues that if the negative marker is a head, it cannot adjoin to the phrasal element *why* to form a constituent *why not?.* The central idea is that phrasal elements can only attach to phrasal elements, *why* is a phrasal element and it can only attach to a negative marker that is also a phrasal element, forming a structure like the one shown in (13).

13).



Merchant (2001) shows that *why not* collocation cannot occur if the negative marker is a head. A few of the examples are given below in (14), showed in Merchant (2001), also cited in Zeijlstra (2004).

14).	a.	*Perche *non*?	Italian
	b.	*Giati *dhen*?	Greek
	c.	*Why *n't*	English
		Why neg	
		Why not.	

Merchant further shows that in all such languages where *why not* constructions are not possible, a negative polar particle, similar in meaning to *no* in yes/no questions is used, as shown in (15), also cited in Zeijlstra (2004).

15).	a.	Perche *no*?	Italian
	b.	Giati *oxi*?	Greek
		Why no	

According to Merchant, this test also has its limitation as it cannot be applied to languages that have a phonologically similar negative marker and polar particles. For example, *no* in Spanish and Catalan show this property, (16).

16). a. ¿Porqué *no*? Spanish

b. Per què *no*? Catalan

Why no

Rowlett (1998) criticises the approaches that take pre-verbal negative markers as negative heads. For details, see Rowlett (1998) and for its discussion Zeijlstra (2004).

2.3 Post-verbal negative markers.

The second group of negative markers is categorised as post-verbal negative markers. Post-verbal negative markers are exemplified in (17). The negative markers *nen* in Piedimonte, *inte* in Swedish, French *pas,* and *nicht* in German all follow the main verb. Zanuttini reports that post-verbal negative markers in some romance languages also show variation whether they follow the main or auxiliary verb. If the main verb is the finite form, the negative marker follows it, as shown in (17a-c).

17). a. Maria a mangia *nen.*[22] Piedimonte

Maria eats neg

Maria doesn't eat.

b. Jan köpte *inte* boken. Swedish

John bought neg books

John didn't buy books.

c. Jean *ne* les mange *pas*. French

John neg clitic eats neg

John doesn't eat them.

d. Er kommt heute *nicht*.[23] German

He come today neg

[22] Examples (17a) is cited in Zanuttini (1991). Examples (17c, 17c) are cited in Zanuttini (2001).

[23] Cited in Zeijlstra (2004).

He doesn't come today.

When the verbal form consists of an auxiliary and a past participle, the negative marker follows the auxiliary but precedes the past participle verb, as in (18a). In contrast, in other languages, i.e., Milanese, the negative marker obligatorily follows the auxiliary and past participle verb, as shown in (18b).

18). a. Maria a 1'ha *nen* parla tant.[24] Piedmontese
Mary Sub.clitic has neg talked much
Mary hasn't talked much.

b. El 1'ha scrivuu *no*. Milanese
he Sub.clitic has written neg
He hasn't written.

2.3.1 Post-verbal negative markers as maximal projections (XP)

The interaction of negative marker with respect to other phrasal syntactic categories is noticed to determine if a certain post-verbal negative marker is a phrasal element. The diagnostics used to form the evidence are gathered from a) the lack of interference with head movement process, b) evidence of interference with the movement of phrasal elements, and c) *why not* constructions.

A post-verbal negative marker does not interfere with the movement of a verb from VP to a higher projection. French finite verbs and infinite auxiliaries can raise to a higher position following the presence of the negative marker *pas*. *Pas* does not seem to have any blocking effect on the movement of the verb. Catalan, some varieties of Italian, and the Germanic languages also allow the verb movement to a higher position from its base position in the presence of a negative marker. The examples in (19) show that the negative marker *inte* which precedes the verb in linear order in embedded clauses does not block the verb movement to matrix clause in V2 position. Similar examples from Dutch and German are given in (20) and (21).

19). a. . . . om Jan *inte* köpte boken.[25] Swedish
that John neg bought books

[24] Examples in (18) are cited in Zanuttini (1997).

[25] Examples (18) is cited in Zanuttini. Examples in (19-20) are taken from Zeijlstra (2004).

. . . if John didn't buy books.

b. Jan köpte *inte* boken.

John bought neg books

John didn't buy books.

20). a. … dat Jan *niet* liep. Dutch

… that Jan neg walked

that Jan didn't walk.

b. Jan liep *niet.*

Jan walked neg

Jan didn't walk.

21). a. Hans kommt *nicht.* German

Hans comes neg

Hans doesn't come.

b. . . . dass Hans *nicht* kommt.

. . . that Hans neg comes

. . . that Hans doesn't come.

From all these examples above, it follows that the negative marker does not interfere with the movement of the verb to a higher projection. The evidence that a maximal projection interferes with the movement of another maximal projection comes from the example (22), cited in Zanuttini (2001).

22). a. Il *n*'a [*pas* [résolu *beaucoup* de problèmes]]. French

He neg has neg solved many of problems

i. Many problems are such that he didn't solve them.

ii. Not many problems are such that he solved them.

b. Il *n*'a [*pas* [*beaucoup* résolu [e de problèmes]]].

He neg has neg many solved of problems

Not many problems are such that he solved them.

Zanuttini (2001) argues that in (22a) the quantifier phrase *beaucoup de problèmes* does not move and gives rise to two readings: a reading in which the quantifier phrase takes a wide scope with respect to the negative marker *pas*, as in (22ai). The second reading is the one in which it takes a narrow scope with respect to the negative marker *pas*, as shown in (22aii). Zanuttini (2001) argues that the wide scope reading as in (22ai) is only available if the phrase *beaucoup* does not move in narrow syntax but undergoes LF movement, its trace being theta-governed by the verb.

Zanuttini further argues that in (22b), the quantifier phrase *beaucoup de problèmes* has moved to a non-argument position (A' position), and the sentence has only the narrow scope reading since the moved phrase cannot govern its trace because of the intervening element *pas* in A' position. The wide scope reading is only available if the phrase remains in situ, as in (22a). For details, see Zanuttini (1997, 2001), Rizzi (1990, 1993), and Ross (1984).

As it was shown in the previous subsection that Merchant argues that the *why not* test is not possible with the negative head but it can be applicable for the negative markers that are phrasal. Few examples are shown in (23), cited in Merchant (2001) and also in Zeijlstra (2004).

23).	a.	Why *not*?	English
	b.	Warum *nicht*?	German
	c.	Waarom *niet*?	Dutch
	d.	Varför *inte*?	Swedish
		Why neg?	
		Why not?	

Based on the observations of the phrasal movement and the outcomes of the *why not* test it can be concluded that negative adverbs are maximal projections, see also (Ross, 1984; Rizzi, 1982/2013; Haegeman, 1995; Zanuttini, 1991, 1997, 2001; Merchant, 2001; Zeijlstra, 2004) among others.

English *not* has been subject to a discussion that either it occupies the syntactic status as an XP or a head (Pollock, 1989,1997; Laka, 1990; Haegeman, 1995; Potsdam, 1997; Merchant, 2001). It has been argued in Zanuttini (1991, 2001) and Pollock (1997) that English *not* is a head due to the fact that its presence in the sentence blocks the affix lowering and the movement of the verb to C. Thus in the presence of negative marker *not*, *do*-support is included in the TP to realise T above the negative marker, as shown in (24). However, it has also been argued that auxiliary verbs can move across the negative marker in English, (25a-b) (Zeijlstra, 2004). See also Zwicky, et al. (1983).

24). a. *She *not* likes eggs.

b. She does *not* like eggs.

25). a. John has *not* been ill.

b. John is *not* ill.

The examples in (25a-b) show that the verb *be* is generated in VP, but *is* in (25b) further shows that it has moved from its position (inside VP) to a higher position (TP), and *not* does not seem to block this movement. Based on such evidence, Zeijlstra (2004) argues that *do*-support is not a strong argument concerning the head status of *not*. He also indicates that *not* can also be adjoined with the phrasal element *why* to form *why not,* as shown in (23a). So, according to Zeijlstra (2004) and Haegeman (1995) *not* must be an XP. Along with an adverbial negative marker *not,* English can also express negation by employing the contracted form of *not, n't.* Haegemam (1995), Zanuttini (1991), Pollock (1997), and Zeijlstra (2004) among others, adopt the analysis that *n't* is a negative head that attaches to the auxiliaries and moves to T, forming an inflected negative auxiliary verb, as shown in (26a) below. It yields ungrammatical results when *n't* is left behind while forming interrogatives, as shown in (26b).

26). a. Has*n't* he delivered the speech?

b. *Has he *n't* delivered the speech?

Despite the uniqueness of *n't* that it follows auxiliary verbs, still, Zeijlstra (2004) assumes that *n't* is a pre-verbal negative marker, similar to the pre-verbal negative markers in Czech and other Slavic languages. Zeijlstra argues that left-right distinction does not raise any problems for pre-verbal negative markers.

2.4 The functional projection NegP

As indicated in the previous section, a pre-verbal negative marker is a head that can project its own functional projection called NegP. Over the past three decades, the research literature on NegP has greatly evolved. In this subsection, the author will briefly summarise some of the significant conclusions and some of the questions that are still under debate such as whether the functional projection NegP is universally present, and what its position is in the syntactic structure of the sentence.

2.4.1 The syntactic position of NegP

Pollock (1989) argues for a separate syntactic functional projection for negation. Basing his observation on auxiliaries and lexical verbs of English and French, Pollock argues that both, auxiliaries and lexical verbs occupy different syntactic positions on the surface structure. English auxiliaries *be* and *do* can move across the negative marker *not,* (27a-b) but the lexical verb *sleep* cannot (27c). The same holds for the French auxiliaries in infinite negative sentences, as shown in (28a). The auxiliary *être* can precede the negative marker *pas*, but in infinitival lexical verb, *sembler* cannot move past the negative marker *pas*, (28b).

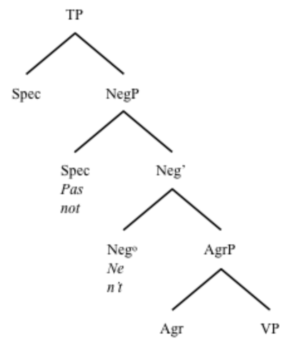
27). a. Aleen *does not* sleep longer.
b. Aleen *is not* sleeping.
c. *Aleen *sleeps not*.

28). a. *N'*être *pas* heureux est une condition pour écrire des romans.
Neg.be neg happy is a prerequisite for write of the novels
Not to be happy is a prerequisite for writing novels.
b. **Ne* sembler *pas* heureux est une condition pour écrire des romans.
Neg seem neg happy is a prerequisite for to write of the novels
Not to seem happy is a prerequisite for writing novels'

Pollock (1989) argues that the difference between the two different syntactic positions of the auxiliaries and verbs reflect that the negative marker intervenes between the TP, which is assumed as a landing site for auxiliaries and the VP, the base position of the lexical verb. Pollock argues that there must be a different functional projection present between TP and VP. Based on these observations, Pollock suggests that TP should be split into a TP, an AgrP, and a NegP. NegP consists of a Neg° and a Spec NegP positions, as shown in (29), adapted from Pollock (1989).

The analysis put forth by Pollock has been accepted, adopted and adapted widely in various aspects of negation, focusing on the internal structure of NegP, its clausal position, and whether more than one position in the clause can be specified for NegP. (cf. Laka, 1990; Zanuttini, 1991; Ernst, 1992; Chomsky, 1995/2014; Lasnik, 1995; Haegeman, 1995; Potsdam, 1997; Rowlett, 1998; Zeijlstra, 2004). It is not possible to discuss all the developments in the literature in one subsection, so it will only be summarised briefly here.

29).



Laka (1990), providing evidence from English and Basque, argues that NegP can host both, negation and emphatic affirmation, and names the functional projection as SigmaP (ΣP). Laka argues that ΣP is structurally present above TP. The negative marker or an abstract negative/emphatic affirmative head can project ΣP. Ouhalla (1991) argues that NegP can occupy two different positions in the cause. He bases his observation on the data of Turkish and Berber, which use negative affixes to express sentential negation. In Turkish, negative affixes are located in between the verb and tense affixes (30a), while in Berber, the negation is in the outer layer of the complex verb, (30b). Based on such observations of these languages, he argues that NegP should be assumed to be located above TP or below TP.

30). a. John elmalar-i ser-*me*-di. Turkish
John apples like neg past 3SG
John doesn't like apples.
b. *Ur*-ad-y-xdel Mohand dudsha.[26] Berber
Neg Fut-Mus arrive Mohand tomorrow
Mohand will not arrive tomorrow.

On this ground, Ouhalla formulates his Neg parameter as in (31) and argues that the same parameter holds for Romance languages like French where the NegP is above TP and Germanic languages, like Dutch or German, where the NegP is above VP.

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[26] Example taken from Ouhalla (1991), also cited in Zanuttini (1991, 2001) & Zeijlstra (2004).

31). **NEG Parameter**

a. NegP selects TP

b. NegP selects VP

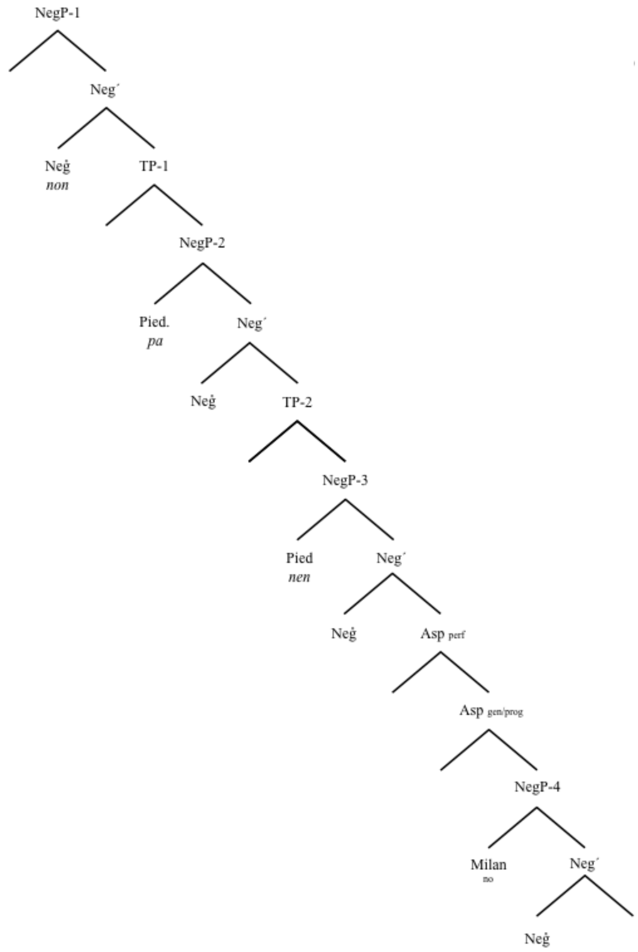
Zanuttini (1991, 1997, 2001), criticising previous approaches (Pollock, Laka, Ouhalla), and based on the empirical investigations of mainly Romance languages, provides a detailed analysis of sentential negation and NegP. She argues that Romance languages exhibit variation with respect to expressing sentential negation. Cross-linguistically, negative markers show different behaviours such as sensitivity to mood. Additionally, one particular negative marker can induce negation independently, e.g., Italian *non* but some other cannot, e.g., French *ne.* Consequently, it is not possible that the clausal position for NegP is fixed and that there is only one position available in the clause, universally.

To account for such variations, she argues that at least four different positions for NegP are available which can host a considerable amount of varieties of negative markers cross-linguistically. Zanuttini's proposed four positions for NegP are illustrated below in (32), adapted from Zanuttini (2001).

Following Cinque's (1999) proposal for adverbial projections, Zanuttini indicates four different positions for NegP as shown in (30). NegP1 hosts the negative markers which precede the finite verb, e.g., Italian *non,* Spanish *no*, and English *n't*. NegP2 hosts the negative markers that follow the finite verb, e.g., French *pas*, Piedmontese *pa*, English *not*. NegP3 and NegP4 host e.g., Piedmontese *nen* and Milanese *no*, respectively. Zanuttini's analysis lead to a rise of extensive debate and criticism due to its flexible nature for the different and more than one positions of NegP. At the same time, her proposal for more positions for NegP is widely accepted by subsequent researchers.

Zeijlstra (2004, et. seq.) argues extensively that the syntactic distribution of NegP is relatively free due to independent syntactic and semantic constraints. He argues that the varieties of negative markers and their distribution over the natural languages suggest that the position of NegP should be assumed as syntactically free.

32).



For Zeijlstra (2004), NegP is located below TP in Czech, but above TP in Hindi/Urdu which shows that negative polarity (NPI) subjects are licensed by the pre-verbal negative marker, as shown in (33) below, from Vasishth (1999) and also in Zeijlstra (2004).

33). Koi bhii *nahi* aayaa. Hindi/Urdu

Anybody neg came

Nobody came.

Zeijlstra (2004) further argues that negation binds the event variable introduced by the verb. For such an analysis for negation, the locus of negation is best assumed located above vP. Secondly, he argues that a negative marker cannot be positioned as high as C in order to remain in the scope of illocutionary force operators.[27] He argues that these assumptions suggest a syntactic middle field position for negative markers. Zeijlstra also argues that the position of NegP is not syntactically driven but rather it is determined on the basis of the semantic properties of negative markers. The position of NegP is independent and flexible cross-linguistically. Zeijlstra, in line with Ernst (2001), Svenonius (2001), and Nilsen (2003) also argues that the fixed order of adverbials, arguments, discourse particles, etc., does not mirror the pre-invented syntactic structure but reflects that the alternative orders will yield semantic effects.

Zeijlstra further argues that if a NegP dominates TP and negation is projected from above TP, then the NPI subjects must be licensed by this higher projection of negation no matter if the NPI subject occurs higher or lower than the canonical position of the negative marker. Zeijlstra shows that this is not the case, at least for Czech. The Czech example in (34a) shows that the NPI subject *petnik* cannot be licensed by the negative marker *ne* that is attached to the finite verb, but it is licensed when it is in object position, as shown in (34b).

34). a. *Petnik by za to *ne*byl dan
A nickel would for it neg be given
A single cent wouldn't be paid for it.

b. Petnik by za to *ne*dal
A nickel-NPI would for it neg pay 3SG
He wouldn't pay a single cent for it.

As it was pointed out above that Pollock (1989), Laka (1990), Ouhalla (1990), and Zanuttini (1991, 1997) among others argue that NegP is universally present such that in some languages NegP can take TP as a complement and in some others it can take VP as a complement. Zeijlstra (2004) adopts a different view for the presence of NegP arguing that its presence vary cross-linguistically. Zeijlstra's theory of negation will be discussed in details in section 3.3.7.

2.5 Conclusion

Summarising, it is shown that all natural languages express negation using varieties of negative markers. The negative markers are categorised into several groups like negative heads and phrasal elements according to their syntactic properties. Negative markers are also divided into

[27] See Zeijlstra (2013) for the detailed analysis.

groups like pre-verbal and post-verbal negative markers, depending on their position with respect to the verb since typically the verb is marked for tense, aspect, etc., in the sentence. In a particular language, the understanding about the nature of the negative markers can also be related to the understanding of the tense, verb, aspect, etc. Negative head markers can project their own functional projection NegP, and may interact with other heads present in the sentence structure while the adverbial negative markers may occupy the specifier position of NegP or can also be posited as the adjunct of the vP. Adverbial or phrasal negative markers are also argued to be interfering with phrasal movements in the syntactic structure.

Languages differ whether they express negation using a single negative marker or two (possibly more). Languages that express sentential negation using a single negative marker are best known as double negation languages, and the ones that use more than one negative markers are known as negative concord language.

In the next chapter, different theories and approaches put forth for addressing double negation and negative concord will be discussed.

Chapter 3

Double negation and negative concord

In this chapter, the author will discuss the much debated phenomenon of double negation (DN) and negative concord (NC). In the subsection 3.1, I will briefly discuss double negation, in subsection 3.2 negative concord will be discussed in detailed.

After that the author will discuss several approaches that have been brought forward to account for the varying behaviour of neg-words and negation cross-linguistically. Some approaches take neg-words as semantically negative quantifiers while some others argue that neg-words are semantically non-negative. The first approach which takes neg-words to be semantically negative quantifiers is put forward by Zanuttini (1991, 1997) and Haegeman and Zanuttini (1995, 1996) and adapted by De Swart & Sag (2002). This approach will be discussed in sections 3.3 and 3.4. This approach has been extensively criticised by Giannakidou (2000, 2006), Penka (2011), Zeijlstra (2004, 2008), among others, who argue that neg-words are semantically non-negative. The approaches that take neg-words as semantically non-negative and assume them as plain NPIs are initiated by Laka (1990) and further elaborated by Ladusaw (1992) and Giannakidou (1997, 2000). The NPI approaches will be discussed in section 3.5.

In section 3.6, the third approach, which takes neg-words ambiguous between semantically negative and non-negative, advocated by Zwarts & Van der Wouden (1993) and Van der Wouden (1997) and Herburger (2001), will be discussed. A fourth approach that takes neg-words to be carriers of an uninterpretable [uNEG] feature that needs to be checked by an element that carries interpretable negative feature [iNEG] in a c-commanding position, is put forward by Zeijlstra (2004). For Zeijlstra, NC is a syntactic agreement between multiple negative elements. Zeijlstra’s approach will be discussed in section 3.7. Section 3.8 provides an overview and the conclusions of the chapter.

Natural languages exhibit the universal property of being able to express negation. Almost every language possesses some elements that are specific to mark negation in a sentence. However, languages exhibit variation in the way they use their negative elements in expressing negation. For example, other than the sentential negative marker, languages may or may not use negative indefinites like *nobody,* to express negation. Languages also differ in taking the number of negative elements; single or multiple negative elements in a clause to induce a single semantic negation. Based on these differences, natural languages are divided into two groups: i) Double negation and ii) Negative Concord languages.

In the next section, double negation will be discusses.

3.1. Double negation (DN)

In DN languages every morpho-syntactically negative element is semantically negative. Every single negative element is able to induce its own semantic negation. In a case where two negative elements appear in a clause, both induce an independent semantic negation of their own. together yielding a double negative reading. In DN languages, the number of morpho-syntactically negative elements corresponds to the number of semantic negations. The relevant examples are given below for German, Standard English (SE), and Dutch. In the example in (1), the negative marker *nicht*, *didn't/did not* and *niet* yield sentential negation in German, SE, and Dutch respectively. The negative marker is the bearer of semantic negation and serves as a negative operator which takes the entire proposition in its scope.

1).	a.	Hans kommt *nicht*.[28]	German
		Hans comes neg	
		Hans doesn't come.	
	b.	John *didn't/did not* see you.	English
	c.	Jan heeft Maria *niet* gebeld.[29]	Dutch
		Jan has Maria neg called.	
		Jan has not called Maria.	

In DN languages, negative elements consist of sentential negative markers shown in (1) and negative quantifiers as shown in (2). Negative quantifiers like *niemand* in German, *nobody* in SE, and *niemand* in Dutch are also able to render the sentence negative.

2).	a.	*Niemand* kommt zur party.	German
		Neg-body coming to party	
		Nobody is coming to the party.	
	b.	*Nobody* is ill today.	English

[28] Cited in Zeijlstra (2004).

[29] Cited in Zeijlstra (2004).

c. *Niemand* heeft Maria gebeld. Dutch

Neg-body has Maria called.

Nobody has called Maria.

The example of DN can be found in (3) in which a negative marker and a negative quantifier appear together and both yield their semantic negative force in the sentence, and the result is a DN reading which is equivalent to a positive statement.

3). a. N*iemand kommt* heute *nicht*. German

Neg-body come today neg

Nobody doesn't come today.

= Somebody comes today.

b. *Nobody* did*n't* come.[30] English

= Somebody has come.

c. Jan heeft *niet niemand* gebeld.[31] Dutch

Jan has neg neg-body called

Jan didn't call nobody.

= Jan called somebody.

The co-occurrence of two negative quantifiers also yields DN reading, as shown in (4). The examples (4a-c) yield a DN reading that is equivalent to (4d) which is a positive reading of the same utterance.

4). a. *Niemand* hat *nichts* in der Taschen. German

Neg-body has neg-thing in the pocket

Nobody has nothing in pockets.

b. *Nobody* has *nothing* in pockets. English

c. *Niemand* heeft *niets* in zijn zakken. Dutch

Neg-body has neg-thing in the pockets

Nobody has nothing in pockets.

d. Everybody has something in pockets.

---

[30] Cited in Penka (2007).

[31] The example is taken from Zeijlstra (2004).

In DN languages, negative quantifiers are always taken semantically negative and meaning like the one in (5) is assigned, cited in Zeijlstra (2004).

5). [[**nobody**]] = $\lambda P.\neg\exists x[\text{person}(x) \& P(x)]$

Negative quantifiers will be discussed in more detail in the subsequent sections.

3.2 Negative concord (NC)

In NC languages, two or more morpho-syntactically negative elements yield one single semantic negation together. In NC languages, similar to DN languages, the negative marker is the major sentential negative marker, as shown in (6).

6). a. Milan *ne*volá.[32] Czech
Milan neg-call
Milan doesn't call.

b. Gianni *non* mangia. Italian
John neg eats
John doesn't eat.

In DN languages, negative quantifiers are always semantically negative and never co-occur with the sentential negation but in NC languages they are not always negative, and may or may not require the presence of the sentential negative marker. Due to the varying behaviour of negative quantifiers, they are dubbed as neg-words (or n-words, Laka,1990) in NC languages. Neg-words further divide NC languages into two groups, namely Strict NC and Non-Strict NC languages (Giannakidou, 2002). In Strict NC languages neg-words always co-occur with the sentential negative marker. In Non-Strict NC languages, neg-words may or may not require the presence of another negative element to yield an NC reading. Czech is an example of a Strict NC language. In Czech, both, a pre-verbal, as in (7a), and a post-verbal neg-word, as shown in (7b) always co-occur with the sentential negative marker *ne.*

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[32] Examples in (6) are cited in Zeijlstra (2004).

7). a. Milan *nikomu ne*volá.[33] Czech

Milan neg-body neg-call

Milan doesn't call anybody.

b. Dnes *ne*volá *nikdo.*

Today neg-calls neg-body

Today nobody is calling.

In Non-strict NC languages, for example, in Italian, a neg-word in a pre-verbal position never requires the presence of the sentential negative marker *non,* as shown in (8a). On the other hand, a neg-word in post-verbal position always requires the presence of the sentential negative marker *non,* as shown in (8b) or another neg-word in pre-verbal position, as shown in (8c). Furthermore, the presence of the negative marker *non* with a pre-verbal neg-word yields ungrammaticality as it is clear from examples (8a and 8c).

8). a. *Nessuno* (**non*) ha telefonato. Italian

Neg-body neg has called

Nobody called.

b. Gianni *non* ha telefonato a *nessuno.*

Gianni neg has called to neg-body

Gianni didn't call anybody.

c. Ieri *nessuno* (**non*) ha telefonato (a *nessuno*).

Yesterday neg-body neg has called to neg-body

Yesterday nobody called.

Furthermore, in Italian, a pre-verbal neg-word can only occur with the negative marker *non* if it is intonationally prominent. Pre-verbal neg-words with heavy stress can co-occur with the negative marker *non*, but such constructions do not give rise to an NC reading but yield a DN reading or falsify the previous proposition. An example is shown in (9).

9). a. *NESSUNO/non* ha telefonato.[34]

Neg-person neg has called

---

[33] Cited in Zeijlstra (2004)

[34] Examples are cited in Penka (2007).

Nobody didn't call.

b. *NESsuno NON/*ha telefonato.

Neg-person neg has telefonato

It is false to say that nobody called.

Other than the variation in terms of Strict and Non-Strict, NC also exhibits variation in being obligatory or optional. In Slavic languages, NC is obligatory while in West Flemish, it can be optional. An example of optional NC for West Flemish is given in (10a) below, taken from Zeijlstra (2004). The example in (10a) shows that the negative marker *nie* can also be removed without losing the grammaticality of the sentence. Another property of NC is that several neg-words can co-occur in a sentence. One such example is given below from Catalan in (10b).

10). a. Valère *niemand* (*nie*) ken. West Flemish

Valère neg-body neg knows

Valère doesn't know anybody.

b. *No* he vist *mai ninú enlloc.*[35] Catalan

Neg have.1sg seen neg-time neg-person neg-place.

I have never seen anybody anywhere.

Summarising, the data presented so far, it can be noted that in Strict NC languages, neg-words obligatorily occur with the combination of a negative marker, yielding a single semantic negation. While in Non-strict NC varieties, neg-words only in post-verbal position obligatorily co-occur with the negative marker or with another neg-word in a pre-verbal position. Preverbal neg-words in Non-strict NC languages combined with a negative marker may yield ungrammaticality or a DN interpretation. NC exhibit variation not only in terms of Strict and Non-Strict but also in being obligatory or optional or even partial and full (Zeijlstra, forthcoming). The theory of NC put forth by Zeijlstra will be discussed in detail in section 3.7). Table 3.1 summarises the inventory of negative elements in some of the sample languages discussed above in the above two sections.
In the next subsection, the Neg-Criterion and negative quantifier approaches will be discussed.

[35] Taken from Haspelmath (1997).

	DN languages = Negative quantifiers			NC languages = Neg-words Non-Strict	Strict
	German	**English**	**Dutch**	**Italian**	**Czech**
Neg-person	*niemand*	*nobody*	*niemand*	*nessuno*	*nikdo*
Neg-thing	*nichts*	*nothing*	*nichts*	*niente*	*nic*
Neg-place	*nirgendwo*	*nowhere*	*nergens*	*da nessuna parte*	*nikde*
Neg-time	*nie*	*never*	*nooit*	*mai*	*nikdy*
Neg-det	*kein*	*no*	*geen*	*nessun-0/a/o*	*no*
Negative Marker	***nicht***	***not/n't***	***niet***	***non***	***ne***
Occurrence with the negative marker	never co-occur with the negative marker			only post-verbal neg-words co-occur with the negative marker	always co-occur with the negative marker

Table 3.1: Inventory of negative elements of some languages.[36]

3.3 The Neg-Criterion and the negative quantifier (NQ) approach

The cross-linguistic data presented in the previous sections show that negative indefinites show quite divergent behaviour with respect to sentential negation. It is clear that for German, SE, and Dutch they are always negative themselves and never co-occur with the negative marker. In Italian, they may co-occur with the negative marker but in Czech, they always have to. This varying behaviour of neg-words suggests that neg-words carry a different semantic-syntactic status in DN and NC languages. In German and SE, they are semantically negative, but in Czech, they look like NPIs which are always dependent on negation for their correct grammatical interpretation in a negative sentence. But when it comes to Italian, they seem ambiguous between a semantically negative quantifier and an NPI; pre-verbal neg-words can occur independently in a sentence and yield semantic negation but post-verbal neg-words obligatorily require the presence of sentential negation or another neg-word in pre-verbal position. To account for this varying behaviour and to develop a unified analysis for neg-words, various syntactic and semantic approaches have been proposed. One such approach is the negative quantifier approach proposed by Zanuttini (1991)

[36] Summarised from Haegeman (1995), Haspelmath (1997), and Zeijlstra (2004). See also Falls (2008).

Haegeman (1995) & Haegeman and Zanuttini (1996, 1997), and elaborated by De Swart & Sag (2002). The negative quantifier approach takes neg-words as semantically negative universal quantifiers (NQs) and NC as the result of a negative absorption mechanism. In the next subsection, first I will discuss the Neg-Criterion and its application on West Flemish and Italian and then status of neg-words as NQs.

3.3.1 Neg-Criterion

Zanuttini (1991) and Haegeman (1995) & Haegeman & Zanuttini (1991) put forth the Neg-Criterion to account for the workings of sentential negation and NC. They base their analysis of NC on the alleged similar behaviour that Wh-elements and negative quantifiers show in some respects. For one, both trigger subject auxiliary inversion as shown in (11a-b), both are able to license NPIs as in (12a-b), both can occur more than once in a sentence, and are able to yield one semantic reading as shown in (13a-b).

Both, interrogative and negative elements give rise to subject auxiliary inversion. In (11a) the interrogative element *what* gives rise to the auxiliary *did* from a VP internal position to a pre-subject position, and in (11b) the negative adverb *never* causes the same for the auxiliary *will*.

11). a. What did you see?

b. *Never* in my life will I do this again.

In English, both, negative elements and interrogatives can license polarity items such as *anything* or *anyone* in the (12a-b) examples. Polarity items are licensed by a c-commanding negative or interrogative operator. In (12a), a c-commanding Wh-phrase licenses the polarity item *anything* (the negative polarity items will be discussed in detail in section 3.5 and in (12b) the negative element *no one* c-commands the polarity item, *anyone*. These are not the only licensers of polarity items, as it will be shown in section 3.5.

12). a. Who said anything?

b. *No* one see anyone.

Example (13a) is an example of pair listing reading. It is well known that in various languages, multiple question words can receive two types of answers, known as “single-pair” and "pair-list". A question like (13a) in English normally receives a pair-list reading; it elicits for an answer of a list of people and what each one of them said, in response to some offers, etc., given in (13aA). A single-pair answer like the one "Ali said yes" is restricted in English.

13). a. Q: Who said what?

A: Ali said yes, and, Aleen said no.

b. Ieri *nessuno* ha telefonato a *nessuno.* Italian

Yesterday neg-body has called to neg-body

Yesterday nobody called anybody.

Zanuttini and Haegeman argue that (13a) illustrates Wh-Absorption, as the sentence contains two Wh-question words but the interpretation of the sentence contains only one question operator which binds two variables and a pair-listing reading emerges. Wh-Absorption for (13a) is shown in (14).

14). For which x, y [x: a person; y: a thing] [x said y]

In the same vein, Zanuttini and Haegeman account for the example (13b), an instance of NC. In (13b) there are two negative elements; a pre-verbal *nessuno* and another *nessuno* in the post-verbal position. Both do not express their independent negative force, rather they enter into an NC relation, and, jointly express a single negation. NC can also be analysed as an instantiation of absorption (Zanuttini, 1989, 1991). Just like Wh-Absorption where a Wh-Operator binds *n* variables such that the question operator ranges over a number of Wh elements, in the same manner, one negative operator ranges over to a number of variables, and NC is yielded. Negative absorption for (13b) is shown in (15).

15). a. $[\forall x\neg][\forall y\neg]([\forall z\neg]) = [\forall x,y(,z)]\neg$

b. No x, y [x: a person, y: call] [x called y]

The process of absorption combines two or more unary negative quantifiers into one n-ary quantifier, binding n-ary variables. Multiple negative quantifiers recursively move to Spec-NegP to enter in Spec-head agreement with an abstract negative head and undergo Neg-Absorption. From this complex process, a complex negative operator in Spec-NegP factors out an instance of negation that takes sentential scope.

It is argued that the application of Wh-Absorption varies across languages; in the same way, languages also vary whether negative absorption is allowed in a particular language or not. For example, English and French allow Wh-Absorption but Italian does not, and, Italian allows negative absorption but SE does not. Some other varieties of English do allow (Labov, 1972; Ladusaw, 1992).

Based on the above-discussed similarities between Wh-elements and negative elements, Haegeman and Zanuttini introduce the Neg-Criterion as in (18), similar to the Wh-Criterion proposed in May (1985, 17), as shown in (16) and, later elaborated by Rizzi (2000), given in (17).

16). The Wh-Criterion:

a. Every [+Wh] COMP must dominate a wh-phrase.

b. Every wh-phrase must be dominated by a [+Wh] COMP.

17).

a. A Wh-operator must be in a Spec-head configuration with an X^o [+ Wh].

b. An X^o [+ Wh] must be in a Spec-head configuration with a Wh-operator.

18). The Neg-Criterion

a. A neg-operator must be in a Spec-head configuration with an X^o neg.

b. An X^o neg must be in a Spec-head configuration with a neg-operator.

The following definitions obtain:

a. Neg-operator: a negative phrase in a scope position.

b. Scope position: left-peripheral A'-position (an XP-adjoined position or a specifier position).

Haegeman argues that according to the Neg-Criterion, any negative element that has a sentential scope can be a negative operator. The negative elements that fail to express the sentential negation but express only the constituent or local negation cannot qualify as negative operators.

Following Pollock (1989) and Ouhalla (1990), Haegeman (1995) argues that sentential negation is expressed through a universal functional projection NegP, consisting of a specifier and a negative head.[37] Languages exhibit variation to the extent that either the specifier is overtly realised or the head or both. In a language like German, only the specifier is overtly realised while the head is always non-overt or abstract. On the other hand, in French and West Flemish, both the head and specifier are overtly realised. English is a unique language that has both, a specifier and a head but only one of them is overtly realised, at a time, in a sentence.[38]

Summarising, the Neg-Criterion is proposed to account for the grammatical occurrence and correct interpretation of sentential negation. It follows from the Neg-Criterion that sentential negation is expressed through a functional projection NegP which consists of a specifier and a negative head. There is a variation among languages in the lexical realisation of the Specifier and head of this NegP. Only one of them (e.g., in DN languages) or both (e.g., in NC languages) may be overtly realised. In the case of an overt realisation of only one, the other one is assumed to be present as an abstract morpheme, as it will be shown in the next subsection. It also follows from the Neg-Criterion that a negative operator must be a phrase, occupying the specifier position of NegP. The Neg-Criterion requires a Spec-head relation between the negative operator and a negative head with the feature NEG. Down below, the application of the Neg-Criterion in various languages will be demonstrated.

3.3.2 Application of the Neg-Criterion and NC

This section illustrates the application of the Neg-Criterion. As languages do not share the same type of elements and strategies to express sentential negation, there is a question as to whether the Neg-Criterion is also subject to cross-linguistic variation or it is applied the same way across languages. The application of Neg-Criterion varies across languages to the extent wether the

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[37] Some of the theorists do not agree with the approach that NegP is universally available. For example, Zeijlstra (2004). He argues that NegP is available only if a language has a negative marker that is a syntactic head. Zeijlstra's theory will be discussed with details in section 3.7.

[38] See chapter 1 for the detailed discussion of pre & post-verbal negative markers, their position in the NegP, the availability of NegP, and the variation languages exhibit about all these aspects of negation.

negative specifier is overtly realised and moved from its base position to Spec-NegP, or whether it is base generated in Spec-NegP. Besides, languages also vary in taking the abstract material, an abstract negative operator or a head in the NegP, in order to fulfil the requirement of Spec-head agreement. But languages do share a relevant Spec-head configuration to ensure the correct application of Neg-Criterion.

A cross-linguistic view of the application of Neg-Criterion will be presented to get a clear picture of the sentential negation in different languages. Firstly, the application of the Neg-Criterion to West Flemish will be shown, as Zanuttini (1991) and Haegeman (1995) argue that the Neg-Criterion applies in West Flemish at S-structure. In West Flemish the Neg-Criterion triggers the movement of the negative operator, this movement is called Neg-movement. Multiple Neg-movements can also occur.

3.3.2.1 West Flemish

West Flemish is an NC language. Negation is projected through a NegP headed by the negative head *en,* and a negative adverb *nie* that occupies the Spec-NegP.

19). a. Da ze nor us *nie en*-goat.[39] West Flemish

That she to home neg en goes

That she does not go home.

b. Da Valere *niemand en*-kent.

That Valere neg-one en knows

That Valere does not know anyone.

c. [$_{\text{NegP}}$ NEG-operator [Neg^{o}] ...]]

In (19a), the negative marker *nie* is the sentential negative marker and functions as the negative operator that is assumed to be base generated in Spec-NegP. The negative marker *en* is a Neg°, both elements are lexically realised. *Nie* and *en* establish a Spec-head configuration and the Neg-Criterion is fulfilled. (19b) shows that it is not only the *nie* that can co-occur with the negative head *en* but also the negative constituent *niemand,* that also have a sentential scope. The application for the Neg-Criterion for (19a-b) is shown in (19c).

Haegeman (1995: 139) claims “NC is a by-product of Neg-Criterion”. In a sentence where multiple negative elements co-occur with the Neg° like the one in (20a), the negative element *van*

[39] The example is taken from Haegeman (1995, 128).

niemand has to move out of VP to the Spec-NegP in order to fulfil the Spec-head configuration with the Neg°. If the PP *van niemand* does not move from its base position (VP-internal), the result is a DN reading, as shown in (20b). Haegeman calls such movement of any negative element a Neg-Movement: a movement that is triggered by the Neg-Criterion.

20). a. Da Valere *nooit van niemand* ketent (*en*)-was.[40]
That Valere never of neg-one contented en was
That Valere was never pleased with anyone.
b. *Da Valere nooit ketent *van niemand* (*en*)-was.
That Valere never contented of neg-one en was
That Valere was never satisfied with no one.

The examples in (20) does not contain the negative marker *nie*, it further suggests that any neg-word with a sentential scope can move to Spec-NegP to get Spec-head configuration and the Neg-Criterion is applied.

In the presence of the negative marker *nie,* in order to be interpreted semantically, all neg-words qualifying for negative operators have to establish a Spec-head relation with the negative head. As there is only one NegP available per clause, multiple specifiers undergo negative absorption and convert into one single operator that sits in Spec-NegP, and Spec-head configuration is achieved. All neg-words that are available in a sentence must undergo absorption in order to enter in NC with each other and also with *nie,* and they all must move to Spec-NegP. Haegeman (1995) argues that they adjoin to NegP recursively in order to meet the Neg-Criterion. A relevant example is given in (21) below, cited in Haegeman (1995).

21). Da Valere *nooit* an *geen mens niets nie* gezeid (*en)*-oat.
That Valere never to neg-person neg-thing neg said en had
That Valere had never told anything to anyone.

Summarising for West Flemish, the Neg-Criterion applies at Surface Structure in West Flemish. The negative operator and the negative head must appear in a Spec-head configuration for the application of Neg-Criterion. Any negative element i.e. a negative marker *nie*, *niemand* or *nooit* can be negative operator if they have a sentential scope. Neg-words like *niemand* must move out of

[40] Examples are taken from Haegeman (1995, 140, 133).

their VP-base position to Spec-NegP. The failure of this movement cause DN readings. Multiple negative elements undergo negative absorption with each other and with the negative marker and together yield a single semantic negation.

In all the discussion above so far, the two things that have been playing a key role in the development of discussion are the a) semantic status of neg-words like *nobody* or *niemand* and b) negative absorption.

The application of Neg-criterion for Italian , which is different from West Flemish in the way that it does not allow overt Neg-movement, will be discussed below.

3.2.2.2 Italian

Haegeman (1995) argues that the Neg-Criterion applies at Surface structure universally. Taking into account that Italian does not show scrambling (sentence-internal leftward movement of negative elements) or Neg-Movement, Haegeman argues that the successful application of the Neg-Criterion relies on abstract material: an abstract negative operator or an abstract head. Abstract negative operators can be i) an abstract negative morpheme and ii) an abstract operator CHAIN.

An abstract negative operator is assumed to be present in the Spec-NegP, to establish a Spec-head configuration with the lexically realised negative head *non,* which licenses its presence. For the representational operation CHAIN, an (abstract) negative operator in Spec-NegP builds a chain relation with all the other neg-words present in the sentence and this operator CHAIN creates a Spec-head configuration with the head of NegP.

Presenting the data from Italian: in a sentence which has a bare negative marker *non* as in (22a), an abstract negative operator is assumed to appear in Spec-NegP that creates a Spec-head configuration with the negative head *non.* The application of Neg Criterion for (22a) is shown in (22b).[41]

22). a. Gianni *non* mangia broccoli.

b. [$_{\text{NegP}}$ NEG-operator [$_{\text{Neg}^{\text{o}}}$ *non* [mangia broccoli]]]

John doesn't eat broccoli.

In a sentence like (23), a post-verbal neg-word which is not in Spec-head configuration co-occurs with the negative head marker *non*. For the Neg-Criterion to be applied at Surface structure,

[41] All the examples for Italian in this section have already presented in section 3.2 also.

an abstract negative operator must be postulated in Spec-NegP, which forms a representational CHAIN with the post-verbal neg-word. The co-indexation shows CHAIN formation like: < NEG-operator$_i$, *nessuno*$_i$ >.

23). a. Gianni *non* ha telefonato a *nessuno.*

b. [$_{NegP}$ [NEG-operator$_i$] [$_{Neg^o}$ *non* [ha telefonato *nessuno*$_i$]]]

Gianni has not called anybody.

In a sentence like (24a), Haegeman (1995) argues that the pre-verbal negative subject *nessuno* occupies the Spec-AgrP, and NegP is projected through an abstract negative head. The abstract negative head moves to the head position of Agr. *Nessuno* and the *abstract negative head* stand in Spec-head agreement and the Neg Criterion is fulfilled. If a post-verbal negative element is also present, as in (24c) then the negative operator will form a representational CHAIN with the post-verbal negative element, and this representational CHAIN will agree in a Spec-head configuration, a representation is given in (24d).

24). a. *Nessuno* ha telefonato.

b. [$_{AgrP}$ NEG-operator [$_{Agr^o}$ Neg^o [...]]

Nobody has called.

c. N*essuno* ha telefonato *nessuno.*

d. [$_{AgrP}$ [NEG-operator$_i$] [$_{Agr^o}$ Neg^o [ha telefonato *nessuno*$_i$]]]

Nobody has called anybody.

Summarising, the Neg-Criterion applies at Surface structure in Italian and an abstract negative operator is assumed to be present in the Spec-NegP in order to get the required Spec-head configuration. The abstract negative operator in Spec-NegP can also form a representational chain with the other neg-words (if) present in post-verbal position, which cannot move out of their base position to Spec-NegP. This representational chain agrees in Spec-NegP with the negative head. Pre-verbal neg-words are themselves considered as negative operator that get Spec-head configuration with the abstract negative head, because in Italian the negative head cannot be lexically present with pre-verbal neg-words.

3.2.2.3 English

English is a language that expresses negation using a negative head marker, *n't*, or a negative adverb, *not*, and also negative quantifiers, *nobody* and *nothing*, etc. English is different from Italian and West Flemish. It will be shown that the application for the Neg-Criterion in English is very interesting in the sense that either the negative operator or the negative head or even both of them can also be abstract at the same time. The inclusion of abstract forms for both the negative operator and negative head at a time is not available for other two languages discussed above.
The data for English are presented below in (25).

25). a. Ela does*n't* study linguistics.

b. [$_{\text{NegP}}$ NEG-operator [$_{\text{Neg}^{o}}$ does*n't* [study linguistics]]]

c. He did *not* score good in exam.

d. [$_{\text{NegP}}$ *not* [$_{\text{Neg}^{o}}$ [score good in exam]]]

e. He said *nothing*.

f. [$_{\text{NegP}}$ [NEG-operator$_{i}$] [$_{\text{Neg}^{o}}$ [said *nothing*$_{i}$]]]

In English, the Neg-Criterion can be applied in three ways. First, in an example like (25a), the negative operator is assumed to be present as an abstract form which establishes the Spec-head configuration with the overtly present negative head *n't*, as shown in (25b). Second, in a sentence like (25c) the negative head is present in an abstract form while the negative operator is present overtly. The Spec-head configuration of (25c) is shown in (25d).

Thirdly, and most interestingly, in (25e), in contrast to Italian, only the post-verbal *nothing* is overtly realised, being the only negative element of the sentence. Haegeman (1995) argues that post-verbal *nothing* licences the presence of an abstract negative operator in Spec-NegP that forms a CHAIN with *nothing*, this CHAIN operator gets in a Spec-head configuration with an abstract negative head in NegP, and the Neg-Criterion is fulfilled. In this way, in a sentence like (25e), both, the Spec and the head are abstract.

This third way of the application of the Neg-Criterion cannot be applied to a language like Italian or Spanish where post-verbal neg-words obligatorily need the presence of another overt negative element, as has been discussed and shown for Italian in the sections above, although, in both the languages, Italian and English, an abstract negative operator is postulated for post-verbal neg-words.

A detailed overview of the sentential negation in English and why English does not exhibit NC will be presented in subsection 3.7. In the next subsection I will discuss the semantic status of neg-words under negative quantifier approach. Neg-absorption for neg-words will also be discussed.

3.3.3 Neg-words as negative quantifiers

Based on the data presented in section 3.1 and 3.2, it is observed that neg-words do not show uniform behaviour cross-linguistically, also within one and the same language, for example in Italian. Their distribution varies with respect to their sentential position. To account for their uniform distribution, Zanuttini (1991) proposes an analysis, according to which neg-words are negative quantifiers. First, the data to account for their status as negative quantifiers will be presented and then it will be shown how can they appear together with the sentential negative marker and other neg-words.

Zanuttini (1991) argues that neg-words are negative quantifiers that consist of two semantic components, a quantificational and a negative one. Given that, in a sentence, a pre-verbal neg-word can be the only sentential negative operator (no negative marker is required, at least for Italian), Zanuttini argues that neg-words are semantically negative quantifier. In order to take sentential scope neg-words must enter into a Spec-head configuration with a functional head that contains the negative feature.

Another piece of evidence that neg-words are semantically negative, is derived from data where neg-words can be used as fragmentary answers to questions like the one given in (26a). Zanuttini argues that there is no negative absorption involved in such a construction and an empty negative head is assumed in the structure to satisfy Spec-head configuration and Neg-Criterion. Based on these data, Zanuttini assigns neg-words the interpretation like the one given in (26b).

26). a. Q: Chi hai visto?[42] Italian

To who saw.2SG

Who have you seen?

A: *Nessuno* *Alcuno.

[42] Cited in Zanuttini (1991).

To neg-person. *anybody

Nobody. *Anybody

b. $[[\text{nessuno}]] = \lambda P.\forall x[\text{person}(x) \rightarrow \neg P(x)]$

The interpretation of neg-words given in (26b) cannot be easily applied to neg-words where they seem to induce no negation at all and behave as an existential negative quantifier i.e., co-occurring with the sentential negative marker and in non-negative contexts, e.g. complement clauses of adversative predicates or matrix, and embedded yes/no questions.

Zanuttini (1991) argues that post-verbal neg-words while co-occuring with a negative marker yield a single negation reading due to the Spec-head configuration, as was shown in (23). She argues that "the negative features of the head and those of the specifier instantiate an instance of Spec-head agreement and contribute only one instance of sentential negation to the interpretation of the sentence" (1991: 138). Post-verbal neg-words can appear in a non-negative context, namely complement clauses of adversative predicates (27a), or matrix (27b), and embedded yes/no questions as shown in (27c).

27). a. Dubito che venga *nessuno.*[43]

Doubt.1SG that come.3SG.subj neg-person

I doubt that anyone will come.

b. Ha telefonato *nessuno?*

Has called neg-person

Has anybody called?

c. Mi domando se verra´ *nessuno.*

Me ask if come.3SG.fut neg-person

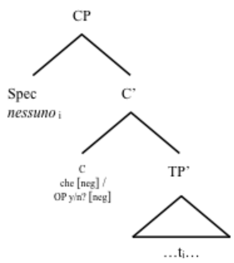
I wonder whether anyone will come.

Zanuttini considers these data by proposing "it does not reflect that they (neg-words) lack negative force but rather they enter a configuration of Spec-head agreement with a negative X^{o} element. In such a configuration, the specifier and head will make the same semantic contribution to the interpretation of the sentence" (1991, 138-139). She argues that neg-words can also enter in a Spec-head agreement with other operators like a yes/no question operator or the negative

[43] All examples in (27) are taken from Zanuttini (1991).

complementiser (which are assumed to head their own embedded clause in adversative verbs). These operators contain a negative feature, but what is crucial in the interpretation of neg-words and these heads, is the Spec-head agreement. Zanuttini assigns the syntactic structure in (28) to (27a &b).

28).



The assumption that only the Spec-head configuration is crucial in the correct interpretation of neg-words is not enough since Spec-head configuration cannot maintain the uniform analysis for pre-verbal and post-verbal neg-words. In pre-verbal positions and in fragmentary answers neg-words give rise to an interpretation of a negative universal quantifiers but in post-verbal positions and non-negative contexts, they give rise to a reading of existential quantifiers. The meanings of the existential and that of universal quantifiers are shown below in (29a) and (29b) respectively.

29). a. $[[\textbf{nessuno}]] = \lambda P.\neg\exists x[\text{ person}(x) \;\&\; P\,(x)]$

b. $[[\textbf{nessuno}]] = \lambda P.\forall x[\text{person}\,(x) \rightarrow \neg\, P\,(x)]$

Haegeman and Zanuttini's proposed analysis faces several problems when it comes to the interpretation of NC resulting from a combination of a sentential negative marker and (multiple) neg-words. Taking into account the suggested analysis for *non* in (22) and *nessuno* in (24), two options emerge for (23). i) An abstract negative operator can be postulated in Spec NegP which can stand in a Spec-head configuration with an abstract negative head in NegP, and the post-verbal *nessuno*, being the only negative element, can yield a single semantic negation, similar to the pattern shown for English *nobody* in (25e-f). And, no additional mechanism for Neg-Absorption should be needed. But this cannot be the case, because post-verbal *nessuno* obligatorily requires the lexical realisation of another negative element above it. ii). Neg-words are not semantically negative. If they are negative then they must be able to express the required negation as suggested in i).

Additionally, there is a further asymmetry in the proposed analysis for post-verbal neg-words. A post-verbal neg word can establish Spec-head configuration with *an empty negative head* through a chain relation in Non-strict NC languages, but this is not possible in Strict NC languages where the negative marker obligatorily needs to be present.

Summarising, Zanuttini and Haegeman propose that neg-words consist of two parts: a negative and a quantificational part. For the multiple occurrences of neg-words in an NC construction, they propose Neg-Absorption and factorisation, a process through which multiple negative quantifiers are bound together and together they factor out one single semantic negation. The proposed analysis can account for the multiple occurrences of only neg-words in an NC construction but it does not hold for a construction where (multiple) neg-words co-occur with a sentential negative marker. It remains unexplained that if neg-words themselves are negative why they obligatorily need the presence of a sentential negative marker. The analysis requires a further mechanism to account for the co-occurrence of the sentential negative marker and neg-words. It also follows from the analysis that in a sentence where neg-words and sentential negative markers co-occur, there are two scope markers in the sentence, because Zanuttini (1991, 1997) and Haegeman (1995) analyse neg-words as universal negative quantifiers that take scope over the entire proposition for the sake of negation and for the quantification. The sentential negative marker is also a scope marker in their proposed framework. The proposed analysis needs further modification to count the obligatory presence of negative marker and two scope elements in NC. De Swart and Sag (2002) further elaborate on the analysis proposed by Zanuttini and Haegeman that is being discussed in the next section. Also see Iordăchioaia and Richter (2015).

3.4 De Swart & Sag (2002) and De Swart (2010)

The analysis proposed by Haegeman and Zanuttini cannot explain how neg-words loose their semantic negation when they appear in non negative contexts and behave like negative polarity items? It also remains unclear that why two scope elements are present in Strict NC languages? De Swart and Sag (2002), and De Swart (2010) propose some additional mechanism of resumptive polyadic quantification. In resumptive polyadic quantification, neg-words do not loose their semantic negation, and they are free to participate in both, DN and NC readings. This section will discuss the analysis of polyadic quantification proposed by De Swart and Sag (2002) and its implication in the framework of Bi-directional Optimality Theory (OT) proposed in De Swart (2010).

3.4.1 NC in Bi-directional OT model (De Swart, 2010)

OT, originated by Prince and Smolensky (2004) proposes that the 'final or the optimal' form of a language is the outcome of the optimal satisfaction of constraints that a language poses upon its users (also see Kataoka, 2012). In the OT framework, it is argued that the lexicon (words) is saved as an input in the brains of the human beings, and outputs are generated using the connectionist cognitive neural frameworks of the brain. OT provides three basic components to produce the final form of a language by the human brain, a) Generator (GEN): takes the input and generates the possible candidates for output, b) Constraint component (CON): forms constraints that help in choosing the correct output generated by (GEN), c) Evaluator (EVAL): chooses the most optimal output that satisfies the constraints. Figure 3.1 illustrates the flow of the framework proposed by OT.

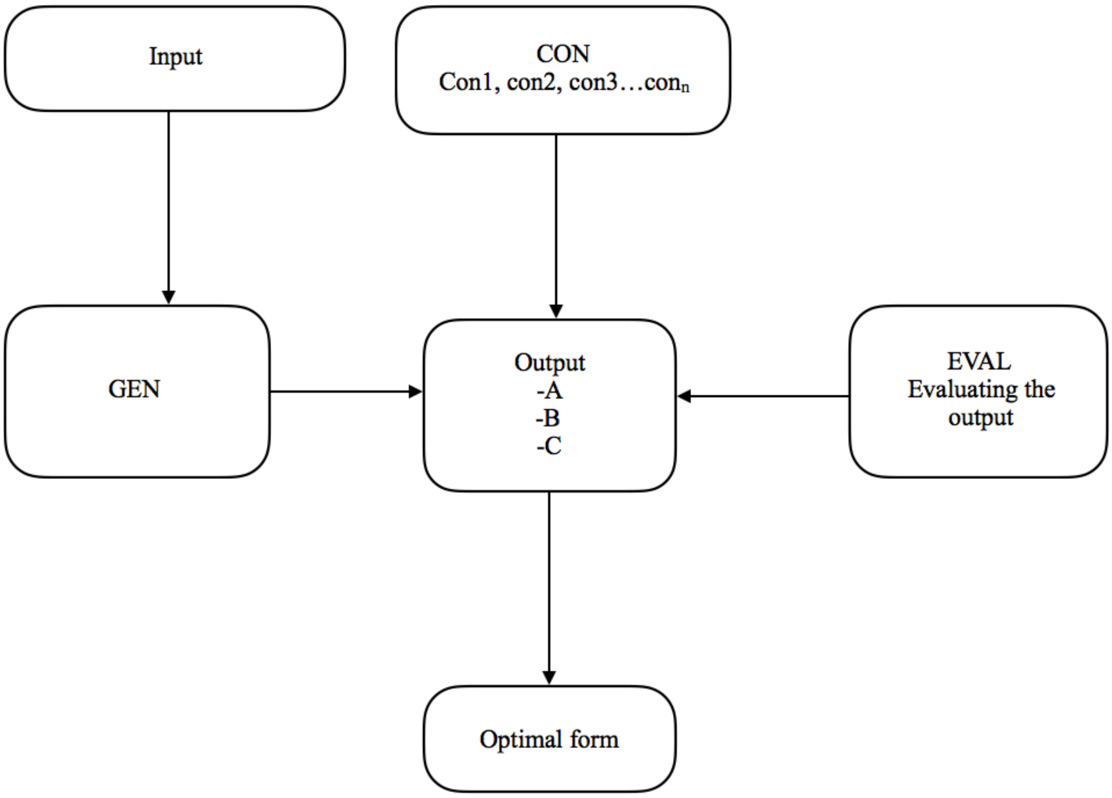


Figure 3.1: Flow of the framework of negation in Optimal Theory.

Figure 3.1 illustrates that input is provided to GEN which generates a number of candidates as the output for any linguistic form. Once the output candidates are generated, the other two components begin working on the output. CON generates the possible constraints in a hierarchical manner to be applied on the output candidates. EVAL evaluates the application of constrains on the output candidates. If a candidate does not satisfy the hierarchy of constraints, it is removed and the next option is verified, and this operation keeps on working out until EVAL finds the optimal form which obeys all the constraints and hierarchies, and which is also acceptable in the pragmatic world.

OT framework proposes linguistic constraints as universal but their ranking may differ cross-linguistically. For example, the knowledge of a language (or negation) is universal but what makes any language different (DN or NC) from other languages is the ranking of universal constraints in its grammar.

Incorporating sentential negation, NC, and DN in an OT framework, De Swart (2010) argues that negation is a universal category that is present in all natural languages and also is a part of human cognition. De Swart (2010) argues that some universal and language specific constraints prevent the incorrect formation of linguistic structures. One such pair of universal constraints is FNEG and *NEG. FNEG reads as 'be faithful to negation' and it allows the negation to be overtly marked in the sentence. *NEG reads as 'avoid negation' in the input that assures the formation of affirmative sentences. De Swart argues that FNEG is universally ranked above *NEG, to ensure that negation is always marked overtly.

For the interpretation of neg-words, she argues that all the negative expressions (neg-words, negative quantifiers, sentential negative markers) are collected into a store (lexicon) as 'negative variables', and interpreted upon retrieval such that if the constraint INTNEG (interpretation of negative variables) is ranked above the constraint *NEG like (INTNEG >> *NEG), DN reading arises. If *Neg is ranked higher than IntNeg like (*NEG >> INTNEG), a sequence of multiple negative variables leads to a single negation by resumption. De Swart (2010) argues that the difference between DN and NC resides in grammar and not in the lexicon. She argues that when a grammar does not decide between an DN and NC reading, ambiguity arises, just similar to the example shown below in (30). In such cases, the worldly knowledge or 'pragmatic factors' confirm for the most preferred reading. In the example below, the pragmatic factor confirms that the preferred reading is the DN reading.

30).		*Personne n*'est le fils de *personne*.[44]	[ambiguous]
		Neg-body *ne* is the son of neg-body	
		Nobody ne is the son of *nobody*.	
	a.	= No one is the son of anyone.	[NC]
	b.	= Everyone is the son of someone.	[DN]

To explain the co-occurrence of the negative marker or a pre-verbal neg-word with a post-verbal neg-word, De Swart (2010) argues that Non-strict languages obey NegFirst, that means, negation should be placed as early as possible (or before the finite verb) in the sentence. A post-verbal neg-word does not meet this constraint, so another negative element is required in the sentence above the post-verbal neg-word to meet the NegFirst constraint. NegFirst constraint can be met by adding any negative element in the sentence, be it a pre-verbal neg-word or a negative marker, it does not matter. For Strict NC languages, the NegFirst constraint does not apply directly but 'harmonically bound' by MaxSN (a negative clause must bear a marker of sentential negation),

[44] Cited in De Swart and Sag (2002).

that means that NegFirst is satisfied when MaxSN is.[45] A relevant example is shown for Czech in (31).

31). Milan *nikomu ne*volá. Czech
Milan neg-body neg-call
Milan doesn't call anybody.

3.4.2 De Swart and Sag (2002)

Criticising the inclusion of abstract negative morphemes proposed by Haegeman and Zanuttini in their framework, and an abstract meaning of the overt negative element (*no*) in Puduan exclamative sentences proposed by Portner and Zanuttini (2003), De Swart (2010) argues that negation is not such a sentential force that can be hidden or abstract. Sentential negation must always be overtly present and marked. De Swart and Sag (2002) and De Swart (2010) do not suggest any abstract material in their proposed analysis for negation and NC. They base their analysis of neg-words mainly on the typology suggested by Haspelmath (1997). They extensively focus on NC and exploit the idea of quantifier resumption elaborated by May (1985), and others. First, their proposed analysis for the co-occurrence of multiple neg-words will be discussed and then for a combination of neg-words and a sentential negative marker.

Co-occurrence of multiple neg-words

De Swart and Sag (2002) and De Swart (2010) argue that most of the researchers including Ladusaw (1992), Zannuttini (1991 and later), Haegeman (1995 and later), Déprez (1997), Zeijlstra (2004), among others have ignored the double negation readings of multiple neg-words available in romance languages because an NC reading for a sentence like the one in (32) is strongly preferred over the DN reading. De Swart and Sag (2002) base their analysis presenting the extensive amount of data from French and claim that their proposed approach can equally be accounted for other languages too.

32). *Personne n*' aime *personne*.[46] French
Neg-person neg loves neg-person

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[45] For details, see De Swart (2004).

[46] The example is taken from De Swart & Sag (2002)

a. Nobody loves anybody. [NC]

b. ¬∃x∃y love (x, y): No pair of people is such that one loves the other.

c. Nobody loves nobody [DN]

d. ¬∃x¬∃y love(x, y): Nobody is such that they love nobody

The fact that both, a DN and an NC reading is available for (32) leads them to propose such an analysis that can be accounted for both readings.

According to De Swart and Sag, the DN and NC reading of (32) can be accounted for under the polyadic quantifier framework. They argue that neg-words are anti-additive DPs, and DN and NC readings are the result of the way neg-words are interpreted. DN reading arises when two neg-words enter in a scopal relation as an iteration of two monodic quantifiers.[47] While NC arises when two neg-words build a presumptive polyadic quantifier. To analyse NC, their proposal relies on polyadic resumptive quantification. Polyadic quantification arises when binary resumption applies to k-ary quantifiers and results in a polyadic presumptive quantifier Q' of type $\langle 1^k,k\rangle$[48] as given below in (33a), while the definition of anti-additivity is shown in (33b), cited in De Swart and Sag (2002).

33). a. k-ary resumption

$$Q'^{A_1,A_2,\ldots A_k}_{E}(R) = Q_{Ek}^{A_1\times A_2\times\ldots A_k}(R)$$

where $A_1 \ldots A_k$ are subsets of the universe of discourse E, $A_1 \times A_2 \times \ldots A_k$ and R are subsets of E^K.

b. A function is anti-additive iff $f(X \cup Y) \Leftrightarrow f(X) \cap f(Y)$.[49]

The application of K-ary resumption of two or more anti-additive quantifiers yields NC, shown in (34) for (32). The NC reading of (32) which is equivalent to the first-order logic representation as shown in (34d) is derived after the resumption of two negative quantifiers as in (34a) and turning them into one polyadic quantifier as in (34b), which is interpreted as quantification over tuples as in (34c).

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47 Here I will focus only on the NC. For details about DN, see De Swart & Sag (2002).

48 In $\langle 1^k,k\rangle$, 1^k identifies the semantic characterisation of the neg-words or concord items that they are (^{k}) monodic quantifiers of type 1; binding just one variable. *K* denotes that multiple concord items (2, 3, …k) in a sequence can build NC relation together through resumption. The sequence is $\langle 1^k,k\rangle$is interpreted as one polyadic quantifier binding *k* variables.

49 Cited in De Swart & Sag (2002, 385).

34). a. $\text{Res}([\text{NO}^{\text{HUMAN}}, \text{NO}^{\text{HUMAN}}])([\text{LOVE}])$

b. $\text{NO}_{E}{}'^{\text{ HUMAN, HUMAN}}]([\text{LOVE}])$

c. $\text{NO}_{E^2}{}^{\text{HUMAN X HUMAN}}([\text{LOVE}])$

d. $\neg\exists x \exists y[\text{person}(x) \ \& \ \text{person}(y) \ \& \ \text{love}(x, y)$ [NC]

The DN reading of (32) is derived over the iteration of monodic quantifiers, as shown in (35).

35). a. $([\text{NO}^{\text{HUMAN}}, \text{NO}^{\text{HUMAN}}])([\text{LOVE}])$

b. $\neg\exists x \neg\exists y[\text{person}(x) \ \& \ \text{person}(y) \ \& \ \text{love}(x, y)$ [DN]

The mechanism of polyadic quantifier predicts that every sentence with two or more neg-words would be able to contain both, a DN and an NC reading. De Swart and Sag argue that DN readings are available in NC language (e.g., French, and with some specific intonation in Italian) and NC readings (with some specific speech contexts) are available in DN languages, so the suggested polyadic framework that can account for both readings is the most successful analysis.

Giannakidou and Zeijlstra (2017) criticise this point and argue that both readings can be available for French and English, but that this ambiguity is not available in most other NC languages. For example, two negative quantifiers in a sentence never yield an NC reading in DN language like German. Furthermore, in Strict NC languages, DN is not attested or it is marked with some special intonation pattern. In Non-strict NC languages like Catalan an NC reading is preferred.

So whether multiple neg-words in a sentence will be interpreted as iterated monadic quantifiers or will go under polyadic quantification in a certain language remains unspecified. De Swart and Sag (2002, 390) argue that this is "really a question about the relation between language system and language use." In their proposed framework both readings are available, and what is the most prevalent in the language is a matter of preference.

Co-occurrence of the sentential negative marker and neg-words

As for the sentential negative marker and its role in NC is concerned, De Swart & Sag argue that negative marker shares the feature "anti-additivity with the negative quantifiers" (Sag 2002, 399). So the new definition of resumption would be that "it can deal with a mixture of sentential operators such as negation and variable binding quantifiers such as *personne*, (*nessuno)*, etc." (Sag, 2002, 400).

They take neg-words as type ⟨1⟩ quantifiers, while the sentential negative marker is assumed to be a non-variable binding operator, a quantifier of type ⟨0⟩. So, given that the sentential negative marker does not bind any variable, it does not add any new variable to the already bound variables and the resumptive quantification remains the same. As shown below in (36) for Greek, the sentential negative marker *dhen* being a zero place quantifier can participate in presumptive quantification.

36). a. *KANENAS *(Dhen)* ipe *TIPOTA*.[50]
Neg-person neg talk.3SG neg-thing
Nobody said anything.
b. Res([NO ^{HUMAN}, DHEN, NO ^{THING}]) ([SAID])
c. $NO_E^{\prime HUMAN,THING}$] ([SAID])
d. $NO_{E^2}^{HUMAN\ X\ THING}$ ([SAID])
e. ¬∃x∃y[person(x) & thing(y) & said(x, y)

For the mechanism that De Swart & Sag propose that the sentential negative marker does not affect the polyadic quantifier and is taken as semantically empty and redundant in an NC context. De Swart (2010) argues that no separate mechanism is required to account for the combination of a sentential negative marker and neg-words because a polyadic quantifier framework can account for both combinations i.e., negative marker/neg-words and multiple neg-words. Based on the data from French in which *pas* does not participate in NC, they argue that languages are free to include or exclude simple sentential negation from the NC system.

They also take the data from Non-Strict NC languages as support for their claim that neg-words are semantically negative and the sentential negative marker is not needed when a preverbal neg-word itself can induce sentential negation and can also serve as a scope marker, (37a). They argue in line with Zanuttini (1991) and Ladusaw (1992) that a sentential negative marker is a scope

[50] The example is taken from Giannakidou (2000).

marker and only required in a sentence where a post-verbal neg-word cannot take sentential scope out of its VP-internal position, as shown in (37b).

37). a. *Nadie* (**no*) vino. Spanish

Neg-person neg came

Nobody came.

b. *(*No*) vino *nadie*.

Neg came neg-person

Nobody came.

Under their proposed system, the sentential negative marker is semantically empty and redundant in NC, but they do not explain why the negative marker *dhen* cannot be removed from (36) without yielding ungrammaticality, and why a pre-verbal neg-word cannot sustain without the sentential negative marker if it is a negative quantifiers and a scope marker.

Similar to Haegeman and Zanuttini's proposed analysis, the analysis based on the polyadic quantifier framework can account for the presence of a sentential negative marker with neg-words but it does not explain why the sentential negative marker *must* obligatorily participate in NC in Strict NC languages, e.g., Greek and Czech. What De Swart (2010, 159) answers is that " in these languages, both, the scope and focus of negation are marked".[51]

For neg-words in non-negative contexts, where they do not give rise to an interpretation of a negative quantifier, the mechanism proposed does not account for why and how neg-words lose their semantic negation and give a meaning of an NPI? It is also predicted that in (38) each negative quantifier is behaving like a zero place operator; binding no variable, similar to sentential negation. De Swart & Sag do not address the status of neg-words in such contexts, neither they address if neg-words can also undergo resumption with the yes/no operator or complementiser, etc.

38). a. Dubito che venga *nessuno.*[52] Italian.

Doubt.1SG that come.3SG.subj neg-person

[51] I will not go in details of syntax of scope and focus of negation here, for details, see De Swart and Sag (2002), De Swart (2004, 2010). For analysis of Polish n-words, see Btaszczak (2020).

[52] The examples in (38) are already discussed in section (3.3), cited in Zanuttini (1991). See also Abraham (2000).

I doubt that anyone will come.

b. Ha telefonato *nessuno?*

Has called neg-person

Has anybody called?

c. Mi domando se verra´ *nessuno.*

Me ask if come.3SG.fut neg-person

I wonder whether anyone will come.

Summarising, the approach advocated by De Swart & Sag, explains NC in a framework that is built upon the resumption of negative quantifiers and absorption of negation. This approach keeps the option of NC and DN opened for all languages, and predicts that choosing the option of either an NC or a DN is quite a choice of language users. In De Swart and Sag's proposed system (2002), NC is semantic agreement and the central role is given to neg-words while the negative marker is assumed to be optional and semantically empty that serves as a scope marker. They argue that their approach can be used cross-linguistically but as we saw above that it does not cover all aspects of negative concord. It faces problems in proposing a unified analysis for neg-words irrespective of their syntactic and sentential position.

3.5 Neg-words as NPIs

In this subsection a brief but comprehensive view of theories that argue for the Negative Polarity Item (NPI) status of neg-words would be presented.

3.5.1 NPIs and their licensing contexts

It is not possible to do justice to the wide research literature on NPIs and their licensing requirements by discussing here. It will be summarised very briefly only.

To define what is an NPI, why is it licensed and what licenses it, several approaches have been put forth. Syntactic approaches assume that NPIs carry some syntactic features which need to be checked by some licenser, e.g., negation. If the syntactic features are not checked, the sentence is ungrammatical. The semantic/pragmatic approaches assume that NPIs introduce alternatives which must be exhaustified, failing to which, ungrammaticality is yielded. Lexical approaches for NPIs argue that due to their lexical properties, NPIs are subject to some licensing requirements. Before discussing these approaches in detail, I will briefly elaborate what elements are considered as NPIs.

Haspelmath (1997) provides a detailed overview of the languages that contain NPIs. Other than that, NPIs are known to be present in almost every language that has been under research investigation (Giannakidou, 1999; Zeijlstra, 2013). Kadmon and Landmon (1993) argue that an NPI is taken as a carrier of the semantics of an indefinite with existential meaning. They argue that '*any potatoes*' in (39b & b') should be regarded as the corresponding indefinite *potatoes* in (39a & a') with some additional characteristics attributed to *any* (as it will be shown later in this subsection). The NPI *any* scopes below negation and gives an interpretation of an existential quantifier, just like the indefinite *potatoes*.

39). a. I do*n't* have potatoes.[53]

a' ¬∃x [potatoes (x) & I have(x)]

b. I do*n't* have any potatoes.

b' ¬∃x [potatoes(x) & I have(x)]

Besides language-specific and inherent lexical characteristics of NPIs, their distinguishing feature is their inclusion in negative assertions. English *any*, Greek *tipota*, Dutch *ook maar iets* (meaning *even*), are some examples of well known NPIs. Their distribution in positive and negative assertions show that they are illicit in positive assertions but licit in negative ones, as exemplified in (40). NPIs are not restricted to only these items but also include nominals (e.g., *a red cent*, *a thin dime*), adverbs (e.g., *much*, *yet*, *in years*), verb phrase idioms (e.g., *budge an inch*, *hold a candle*), Dutch and German modal verbs *brauchen/hoeven* meaning (need), and *even* particles, etc. NPIs also consist of minimisers i.e., *lift a finger* or *say a word* (Giannakidou and Zeijlstra, 2017). Some examples are shown in (40).

40). a. I did*n't* see *any* bird in the park. English

*I see any bird in the park.

b. *LIJI* fitites ipan *tipota.*[54] Greek

few students said.3PL anything

Few students said anything.

b' *Liji fitites ipan tipota.

[53] Cited in Kadmon & Landmon (1993:1).

[54] Example is cited in Giannakidou, (2000).

c. *Niemand* heeft *ook maar iets* gezien.[55] Dutch

Neg-body has even something seen

Nobody saw anything.

d. Marry didn't *lift a finger* to help bill.[56] English

*Marry *lifted a finger* to help bill.

e. John is *too* tired to *give a damn*.

*John is tired enough to give a damn.

f. He *refused* to *budge an inch*.

*He promised to budge an inch.

g. There has*n't* been an incident *in years*.

*There has been an incident *in years*.

The context-dependence of NPIs has been known as licensing of NPIs: NPIs must be licensed by negation or some kind of negative environments that scope over NPIs (Giannakidou, 2011). NPI licensing has been a key issue being discussed over the decades. Cross-linguistic research has highlighted a) the varying distributional nature of NPIs; why certain kind of NPIs do occur in a specific kind of environments and others do not, b) NPIs' licensing requirements: why NPIs are sensitive to some constraints for their existence, c) the set of NPIs' potential licensors; environments that can license one set of NPIs but not the other, and d) the underlying relation between NPIs and their licensors. To account for this variation, various syntactic (Klima, 1964; Progovac, 1993) and semantic/pragmatic approaches (Linebarger, 1987; Kadmon and Landmon, 1993; Zwarts, 1995, Gianakidou, 1995, 2000; Gianakidou and Zwarts, 1999; Krifka, 1995; Chierchia, 2006, 2013, among others) have been put forth.

NPIs also have their counterparts that are not sensitive to negation or other NPI licensors but appear in assertive contexts and induce a reading of a free-choice item. See, for example, *any* in (41a) and its Greek counterpart *opjadhipote* in (41b).

41). a. *Any* student of linguistics should read Syntactic Structures.[57] English

b. *Opjadhipote* ghata kinigai pondikia.[58] Greek

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[55] Cited in Zeijlstra (2004) Giannakidou (2011).

[56] Examples (d)-(g) are taken from Linebarger (1987).

[57] Cited in Zeijlstra (2013: 807)

[58] Cited in Giannakidou (2008: 3)

Any cat hunts mice
Any cat hunts mice.

Kadmon and Landmon (1993) describe *freedom of choice* as domain widening and capture it through scalarity, on which original NPIs like *any* in (41a) cannot be captured.[59] For Kadmon and Landmon (1993), the only difference between the use of *any* as a plain NPI and as a free choice item lies in the interpretation of the indefinite NP such that in the case of free choice item, *any* is interpreted generically and seems to have universal quantificational force.[60]
Below, the licensing contexts for NPIs described in a hierarchy of negative contexts (Zwarts, 1995; Giannakidou, 1999) will be discussed briefly.

Licensors of NPIs

It is established that other than negation, NPIs are also licensed in contexts that are downward entailing (DE) (Ladusaw, 1993), or even non-veridical (Giannakidou, 2002; Giannakidou and Zwarts, 1999) which extend to interrogatives, disjunctions, and modals, etc., which may be neither negative or DE. NPIs are licensed in a series of contexts and operators which will be briefly summarised below.

Anti-morphic operators or environments represent the most strong level of negativity. The characteristic of being an anti-morphic is equal to classical propositional negation (Giannakidou, 2008). NPIs that are licensed by anti-morphic operators are considered super strong NPIs (Zwarts, 1995). The definition of the anti-morphic operator is given in (42).

42). A function f is anti-morphic iff it is anti-additive, and additionally $f(a \wedge b) = fa \vee fb$.[61]

Anti-morphic operators can license NPIs like *even*, *either, anybody, anything,* etc., as shown below in (43). The exclusion of classical negation from the sentences (43a-d) will yield the presence of NPIs illicit.

43). a. They *(did*n't*) let him read *even* syntactic structures. English
b. John *(did*n't*) come *either*.[62]

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[59] For details of FCIs, see Zeijlstra (2013).

[60] I will constrain myself to discuss only the NPI *any* in this subsection.

[61] Cited in (Zwarts, 1993).

[62] Examples (b)-(e) are taken from Giannakidou and Zwarts, (2008).

c. *(*Non*) ho visto *nessuno*. Italian

Neg has seen neg-body

He didn't see anybody.

d. *(*Dhen)* theli na dhi *KANENAN*. Greek

Neg want.3SG subj see.1SG neg-person

He doesn't want to see *anybody*.

The next layer of negativity consists of anti-additivity. Anti-additivity is weaker than anti-morphic but stronger than mere DE. Negative quantifiers like *no* and *nobody* denote anti-additive functions.

44). A function f is anti-additive if and only if for all x,y in its domain: $f(x \vee y) \Leftrightarrow f(x) \wedge f(y)$.[63]

The definition in (44) states that anti-additivity can be tested by looking at if the wide scope conjunction equals to narrow scope disjunction. For example in (45a-b), the entailment is valid in both directions.

45). a. *No* child ate lunch or an afternoon snack ⇔ *no* child ate lunch and *no* child ate an afternoon snack.

b. No(child ate lunch *or* child ate an afternoon snack) ⇔ No (child ate lunch) *and* no (child ate an afternoon snack).

Anti-additive licensors can license NPIs like *anything* or *anybody,* as shown in (46) below.

46). a. *Nobody* talked to anybody.

b. *Niemand* heeft *ook maar* iets gegeten.[64] Dutch

Neg-body has something eaten

Nobody ate anything.

Anti-additivity is followed by the next characteristic, DE. Ladusaw (1980) presenting a syntactic-semantic account of NPIs and their licensing argues that not only negation but any

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[63] Cited in Giannakidou (2011).

[64] Cited in Zeijlstra (2013)

expression that contains the logical property of downward entailment (monotone decreasing) with regard to elements in their scope, can license NPIs. The licensors of NPIs may contain entailment in their truth-conditional meanings: 'the property of being a trigger [licensor] is a completely predictable from the truth-conditional meaning of an expression' (Ladusaw: 1980: 162). For the grammatical occurrences of NPIs, Ladusaw argues that 'a negative polarity expression is acceptable only if it is interpreted in the scope of a downward-entailing expression' (1980: 9), and an expression can be licensor for NPIs ' iff it licenses inferences in its scope from supersets to subsets' (1980:13). A DE operator or environment allows inferences from general to specific. A formal definition of DE is defined as in (47).

47). A function f is downward entailing iff for all X,Y in the domain of f: $X \subseteq Y \rightarrow f(Y) \subseteq f(X)$

According to Ladusaw, negation is not a single expression that is DE but it is one of many DE expressions. *Few* and the restrictor of *every* are also among such DE operators which show entailment from more specific to more general. An example containing *few* is given in (48).

48). *Few* students like linguistics → *Few* students like syntax.[65] [DE]

In the example (48), DE explains that the structure of the universe is such that the set of students who *like syntax* is a subset of the set of students who *like linguistics* (Zwarts, 1993); that means *Few students like linguistics* entails *few students like syntax*.

Ladusaw's DE theory has been considered a hallmark in the literature on NPIs licensing. Later empirical and cross-linguistic research proved that DE is one characteristic that most NPI licensers consist of but still there are some environments that can license NPIs but are not DE themselves. Giannakidou (1997, and later) and Linebarger (1987) among others argue that only being a DE licensor is not sufficient for the licensing of certain NPIs. NPIs are also licensed in environments that are neither DE or negative in any sense. For instance, NPIs also occur in

[65] Cited in Giannakidou (2008).

questions quite often, examples for Greek *tipota,* Dutch *ook maar iets*, and English *any* are shown in (49).[66]

49). a. Idhes *tipota*? Greek
Saw.2SG anything
Did you see anything?
b. Heb je *ook maar iets* gezien? Dutch
Have.2SG you anything seen
Did you see anything?
c. Did you see anything? English
d. Pijes *pote* sto Parisi? Greek
Went.2SG ever in the Paris
Have you ever been to Paris?

The examples in (49) show that interrogatives can license NPIs i.e., *anything* or *ever*. It cannot be inferred from the examples in (49a-c) that *you have actually seen something* or that *someone has actually visited Paris*.

Besides questions, NPIs are also licit in imperatives (50a), modals (50b), and propositional attitudes (50c), to name a few.

50). a. Patise *kanena* pliktro.[67]
Press any key.
b. O Janis bori na milisi me *kanenan*.
John may talk to anybody.
c. O Janis ine prothimos na milisi me kanenan.
John is willing to talk to anybody.

The examples in (50) can also be interpreted as FCI reading for the polarity items. Giannakidou and Zeijlstra (2017) argue that Greek, German and English *kanenan/irgendei*n/*any* give rise to both an NPIs and FCIs readings in the contexts exemplified in (50). Furthermore, not all

[66] Cited in Giannakidou (2008).

[67] Cited in Giannakidou (2008).

NPIs give FCI readings in such contexts, e.g., Italian *mai*, and English *ever* do not give rise to FCI reading (Giannakidou and Zeijlstra, 2017; Chierchia, 2006).

Based on the data shown in (49-50) Giannakidou (1997 and later) and Zwarts (1995) argue that NPI licensors must have a characteristic different from being mere DE; non-veridicality. Veridicality is related to truth. If an operator is veridical, it entails the truth of the proposition, but if it is non-veridical, it does not entail it. NPIs are excluded from veridical but they are allowed in non-veridical contexts. In Giannakidou (2008), non-veridical operators are defined as given in (51).

51). A propositional operator *F* is veridical iff *Fp* entails or presupposes that *p* is true in some individual's epistemic model $M_E(x)$; otherwise *F* is non-veridical.[68]

Non-veridicality is considered as the weakest layer of negativity and a semantic property of NPI licensors. Based on the varying nature of NPIs and a wide variety of contexts that they appear in, Zwarts (1995) presents a hierarchy of types of negative contexts and NPIs. He divides NPIs in super weal, weak, strong, and super strong NPIs. In the figure below, the types of context as per kind of their entailments that NPIs are licit in is presented.

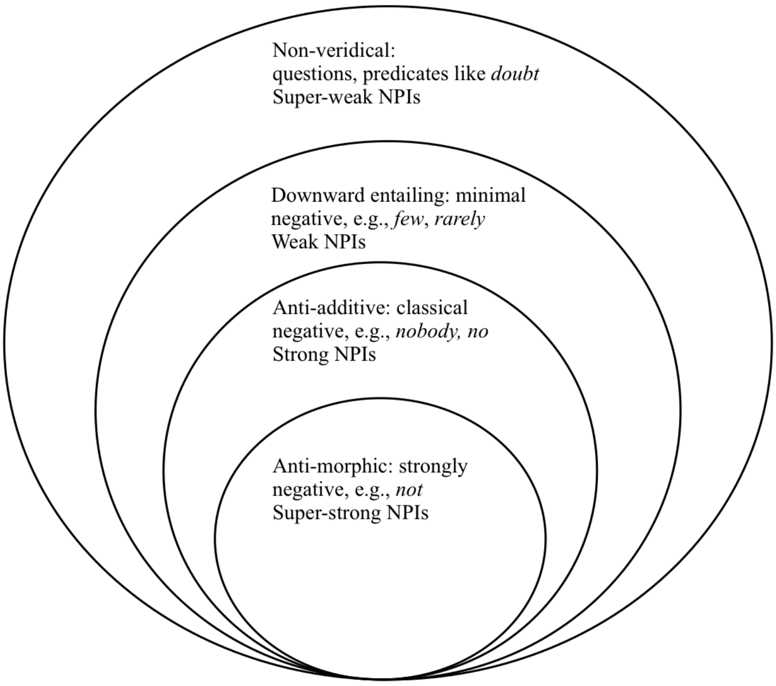

Figure: 3.2 Hierarchy of negative contexts and NPIs licensed in.[69]

[68] Cited in Giannakidou (2008).

[69] Based on Zwarts (1993), adapted from Giannakidou (2008).

The hierarchy presented in figure 3.2 shows subset relations between the different sets of licensers. A context being a subset of the superset of some contexts contains not only the logical properties of its superset but also some unique properties. For example, anti-morphic environments can be anti-additive but anti-additive environments need not be anti-morphic, anti-additive environments are also DE but not every DE is anti-additive, likewise, every DE is also non-veridical but not every non-veridical is DE.

3.5.2 Linebarger (1987)

Another theory, contrasting to Ladusaw's DE theory of NPIs, is presented by Linebarger (1987). Linebarger's theory of Negative Implicature proposes a syntactic-pragmatic account of NPIs licensing. Negative implicature is defined as 'a grammatically stated contextual requirement on negative polarity items' which is used by language users. Presenting the data like (52) where NPIs are licensed without any overt licensor, Linebarger argues that NPIs can be licensed directly or indirectly. Direct licensing is syntactic but the indirect analysis is pragmatic licensing. If NPIs are in the immediate scope of negation, they are directly licensed. But if NPIs are licensed in a sentence which implicates another sentence in which NPIs are in the immediate scope of negation and licensed directly, they are taken to be licensed indirectly. Linebarger also argues that not all NPIs are licensed in all DE environments or operators containing truth-conditional meanings alone. Other pragmatic factors, for instance, a negative implicature that is DE can also play a role in the licensing of NPIs. One such case includes NPI licensing in non-immediate scope of negation, as shown in (52).

52). I'm surprised we had *any* potatoes.

In the sentence (52), *any* is not in the immediate scope of negation. The sentence in (52) gives rise to the negative implicature as in (53) where *any* is directly licensed under negation.

53). Negative implicature: I thought that we do*n't* have *any* potatoes.

On the basis of such evidence, the NPI *any* is acceptable in (52) despite the positive implicature that there were potatoes in the refrigerator. NPIs are also licensed embedded in complement clauses of a negative matrix clause, e.g., in (54), cited in Linebarger (1987). This example of long-distance licensing of NPIs will also be related to an analysis of neg-word in NC under the NPI approach in the next subsection.

54). a. I did*n't* realise that there was *any* food in the refrigerator.
 b. Negative Implicature: I thought there was *not any* food in the refrigerator.

Linebarger argues that such data of NPI licensing suggests that NPIs are subject to a locality constraint i.e., NPIs require the presence of a licensor, either in the same clause (direct licensing) or in the matrix clause (indirect licensing).

3.5.3 Kadmon and Landmon (1993)

Based on Heim's (1982) idea that NPIs denote indefiniteness with stronger instances of substitution, the lexical accounts of NPIs licensing suggest that NPIs derive their licensing requirements from their inherent lexical and semantic properties (Kadmon and Landmon, 1993; Krifka, 1995; Lahiri, 1998; Chierchia, 2006) and universal conditions on their use (Hoeksema, 1997, 2010/2012). NPIs are best understood from their 'expression': converting from the intended meaning to a meaningful form, and this happens through the process of grammaticalization. Studies on the lexical accounts suggest that the lexical semantics of NPIs determine whether they become a positive or a negative polarity item. Merchant (2011) argues that NPIs or neg-words are allomorphs which are lexically realised depending on the syntactic environment.

Kadmon and Landmon (1993), in their analysis for the best studied NPI *any*, argue that the distribution of *any* depends upon the interaction of its lexical semantics and universal constraints on its acceptability. They argue that the context of an utterance provides a set of domains of quantification, containing possible exceptions, and the NPI *any* reduces the tolerance of the possible exception in a given context.

They view *any* lexically a domain widener in the sense that *any potato* conveys the same meaning as *potatoes* does, but *any potato* rules out a wider set of possible exceptions in a given context. For example, a context where somebody is asking for potatoes and gets the answer as in (55b).

55). a. Speaker A: Do you have potatoes?

b. Speaker B: I do*n't* have potatoes.

It might be possible that speaker B's answer is correct in case he does not have healthy potatoes to cook but he has some rotten potatoes in the cabin. So there remains some exceptions to the possibilities that the speaker B's answer may entail. But if he answers as in (56b) in a context when someone is asking for some golden potatoes.

56). a. Speaker A: Do you have golden potatoes?
b. Speaker B: I do*n't* have *any* potatoes.

The proposition in (56b) illustrates that speaker B does not have *any* potatoes: golden, red, small, big, rotten, healthy, etc. So *any* widens the interpretation of potatoes in a given context and rules out all the possible exceptions, yielding a stronger statement that speaker B does not have any possible kinds of potatoes in a given context. It is the lexical-semantic property that *any* introduces widening and yields a stronger statement, a phenomenon called strengthening. This strengthening requirement can only be licensed in some sort of DE context. It is that is why NPIs are not licit outside DE environments. Kadmon and Landmon also propose an additional locality constraint on the NPI licensing arguing that the strengthening effect induced by NPIs must be satisfied locally in the proposition that *any* occurs in, as pointed out by Linebarger (1980, 1987).

3.5.4 Krifka (1994)

Krifka (1994) presents a semantic/pragmatic analysis for NPIs and argues that scalar NPIs are associated with the lowest endpoint of the scale. Krifka introduces a scale operator ASSERT which when applied to a scalar NPI, falsifies all the stronger propositions associated with the sentence.

For example, the example in (57), cited in Krifka (1994) asserts that Mary likes a person that can be anyone.

57). *Mary likes *anyone*.

The proposition in (57) introduces several stronger propositions such as shown in (58a-c).

58). a. Mary likes her mother.

b. Mary likes her student fellows.

c. Mary likes her neighbour.

When the operator ASSERT is applied to the proposition in (57) containing the scalar item *anyone*, it falsifies all the stronger propositions (i.e., in 58). It turns out that all the stronger propositions are falsified and there is no one that Mary likes. But the proposition in (57) still means that Mary likes someone, but there is no specific person that Mary likes. So, a contradiction is generated. According to Krifka (1994), the contradictory proposition cannot assert anything and thus is regarded as bad and unacceptable in the pragmatic discourse.

Krifka argues that NPIs are acceptable under any DE environment and negation, and yield acceptable readings. For example, *anyone* as in (59).

59). Mary did*n't* like *anyone*.

All the alternatives of (59), shown in (60) are weaker than (59).

60). a. Mary did*n't* like her mother.

b. Mary did*n't* like her fellow students.

c. Mary did*n't* like her neighbour.

The ASSERT operator when applied to the proposition (59), cannot compute any contradiction because all the alternative propositions in (60) are already entailed by (59). This way the scalar elements like *any* NPIs are licensed and accepted under negation.

3.5.5 Chierchia (2004, 2006, 2013)

Chierchia (2004, 2006, 2013) criticises the approaches taken by Kadmon and Landmon (1993) and Krifka (1994) arguing that their proposed pragmatic and context driven analyses cannot determine the strict morphosyntactic patterns of NPIs. These analyses cannot explain why NPIs are the way they are. Why must they be licensed? Why must they occupy a specific position in the sentence, e.g., a position closer to their licenser or sometimes a bit farther away from it?

He further argues that under the existing analyses, two different mechanisms are suggested for NPIs. For instance for *any,* one for its use as an NPI and another for its use as an FCI.

Furthermore, the underlying relationship between the mechanisms of domain widening is not fully embedded in the grammar of NPIs, but only stipulated based on pragmatic mechanisms.

Chierchia develops a different semantic approach for NPI licensing and proposes an analysis based on domain widening that can constitute a semantic insight which would be able to unify all the uses of NPIs (NPIs and FCIs).[70] He claims that his proposed analysis would also be able to embed domain widening into the computational as well as the pragmatic system of the language. Following the previous accounts, he assumes that NPI licensing is related to certain pragmatic processes and scalar implicatures and it can occur at any level of embedding (2006: 544). Given that natural languages are used for communication, the pragmatic processes involved in it are accessible to the computational system of the language. The scalar implicatures introduced by NPIs are computed recursively and compositionally, on a par with other grammatical and semantic computations.

Chierchia argues that NPIs activate more informative alternatives and these alternatives reinforce meaning through an exhaustification operator. NPIs like *any* activate the largest domain associated with a discourse context, and introduce subdomains as their domain alternatives. These alternatives must not be left out but factored into the meaning. To do this, Chierchia proposes a vacuous exhaustifier that checks the uninterpretable σ-feature of *any*.

The σ-feature is a lexical semantic feature of scalars because it marks the focus of a proposition, and it is also a formal feature because it motivates syntactic checking by the abstract exhaustifier operator. The function of the abstract exhaustifier is to restrict the possible alternatives. The application of the abstract exhaustifier operator falsifies all more informative alternatives of the propositions and generates the most salient reading of the proposition.
Chierchia follows the basic idea of Kadmon and Landmon and Krifka that *any* has the same meaning as other indefinite like *a*/*some*, etc., with an additional quality of domain widening.

61). a. I saw *a*/*some* boy.

b. $\lambda w \exists x \in D_W [boy_W(x) \wedge saw_W(I, x)]$

In (62a) any_D introduces a quantificational domain D associated with the DP, *boy*, and a set of domain alternatives D_w; D_1-D_3 in this case. The denotation is given in (62b), and domains in (63a) with a denotation in (63b).

[70] The NPI use of *any* will be discussed here only.

62). a. I saw *any*$_D$ boy.

b. $\exists w'\exists x\in D_{w'}$ [$boy_{w'}(x) \wedge see_w(I, x)$]

Domains alternatives and the set D contains the elements as shown below in (63).

63). a. D = {a, b, c} = widest domain

D_1 = {taller boys}

D_2 = {shorter boys}

D_3 = {baby boys}

b. $\exists w'\exists x\in D_{iw'}$ [$boy_{w'}(x) \wedge saw_w(I, x)$], where $1 \leq i \leq 3$

D is the domain containing all the elements that *I saw*, and D_1 constitutes only the set of *shorter boys*, D_2 the set of *taller boys*, and D_3 the set of *baby boys*. In the conversational pragmatics, if the statement D is chosen, and if it is true (with a meaning of *any* as an indefinite, e.g., a boy), to enrich this an exhaustifier operator O with a semantics in (64a) is applied. O asserts p and excludes all the alternatives of C that p does not entail. O is applied to the sentence as in (64b),

64). a. $O_C(p) = p \wedge \forall q\in ALT(p)[p \not\Rightarrow q \rightarrow \neg q]$

b. [Exh OC [I saw [any$_D$ boy]] = $O_C[\exists x\in\{a, b, c\}[boy'(x) \wedge saw'(I,x)]]$

(64b) is equivalent to (65):

65). $\exists x\in\{a, b, c\}[boy'(x)\wedge saw'(I, x)]\wedge\forall p\in ALT[[\exists x\in\{a, b, c\}[boy'(x) \wedge saw'(I, x)$
$\not\Rightarrow q] \rightarrow \neg q]$

The interpretation in (65) means that the assertion "I saw a boy of the set {a, b, c}" does not entail that "I saw a boy who exist in any of the alternative sub domains". So, if someone have seen a boy not existing in any subdomain, it means he has not seen any boy. This way, a logical contradiction arises.

This contradiction does not arise when *any* occurs in a context that contains negation, as shown in (66).

66). a. I didn't see *any*$_D$ boy.

b. $\neg\exists w'\exists x\in D_{W'}$ [$boy_{W'}(x) \wedge saw_W(I, x)$]

Some alternatives of (66a) are shown in (67).

67). {$\neg\exists x\in\{a, b\}[boy'(x) \wedge saw'(I, x)], \neg\exists x\in\{b, c\}[boy'(x) \wedge saw'(I, x)], \neg\exists x\in\{a, c\}[boy'(x) \wedge saw'(I, x)]$}

Exhaustifying (66a) will not yield a stronger assertion as there is no stronger domain that must be false, as shown in (68b).

68). a. O_C[I didn't see any$_D$ boy] = $O_C[\neg\exists x\in\{a, b, c\}[boy'(x) \wedge saw'(I, x)]]$

b. $\neg\exists x\in\{a, b, c\}[boy'(x) \wedge saw'(I, x)] \wedge \forall q\in ALT[[\neg\exists x\in\{a, b, c\}[boy'(x) \wedge saw'(I,x) \not\Rightarrow q] \rightarrow \neg q]$

Here, exhaustification applies vacuously, (68a) entails its alternatives and no contradiction arises. Scalar alternatives or variants can be deactivated by the context of the conversation between its participants, but the domain alternatives that are part of the grammar system and lexical semantics of a scalar item, cannot be. For their use and factorisation in the sentence meaning, the abstract operator σ which checks the uninterpretable domain feature of the scalar item and enriches or exhaustifies it, is proposed.

He further argues that NC can also be accounted for by the same mechanism. Similar to NPIs, Neg-words are also taken as domain widening NPIs, whose uninterpretable σ-feature can only be checked in the presence of overt negation, but the locality conditions and range of heads hosting the abstract operator may vary from that of original NPIs. Language-internal properties of neg-words can also play a role in their licensing in NC. Neg-words, for example, *nessuno* meaning *no one* has an overt negative morphology and can be used as the only negative elements in the sentence. Due to their negative morphology they also exhibit narrow distribution than their NPI counterpart, which do not possess negative morphology, e.g., *any, anything, anyone*, etc.

It is argued that cross-linguistically not all neg-words have an overt negative morphology, even within a language some neg-words do possess negative morphology but some others don't. Italian and Serbo/Croatian *nessuno/nista* (meaning neg-person) possess negative morphology but their French and Greek counterparts *KANENAN/personne* do not. Within Catalan, *ningu* (meaning neg-person) possesses it but *res* (meaning neg-thing) does not (Giannakidou, 2008; Chierchia, 2013).

Chierchia claims that his theory does not propose any additional or stipulated material but it is in line with the universal grammar and general computational rules of a language. The semantics of *any* is placed in the general theory of implicature projection based on alternatives and multi-dimensional semantics. Given that NPIs exist in all natural languages, universal grammar provides access to (a), the alternatives that a scalar item introduces and (b), whether or not weak alternatives for any scalar items are available. How these domain alternatives and weaker variants work and interact in a language, makes a part of a certain language's computational system and grammar.

The discussion above indicates to several established facts that NPIs show varying behavior within and across languages. Various syntactic, semantic, and pragmatic approaches have been put forth to provide detailed analyses of NPIs. In the next section the approach that takes neg-words as NPIs will be discussed. Laka (1990) and Ladusaw (1992) are known as the pioneers of NPI approach for neg-words, and later Giannakidou (2000) is the one who elaborated in detail on the NPI approach to neg-words.

3.5.6 Laka (1990)

Laka (1990) assumes a universal constraint that requires sentential negation to be c-commanded by the Tense at S-structure, and proposes that cross-linguistic variation may be observed in the underlying relationship between Tense and (placement of) negation (TP internal/ external). For Laka (1990), the inherent properties of functional items are important in the way that they play a role in the selectional properties of these items. Also see Lakoff (1996).
Criticizing Zanuttini's (1989) analysis of neg-words as negative universal quantifiers, Laka (1990) assumes that previously proposed analyses divide neg-words into two groups. One group that always appears in the presence of an interrogative or some other licensor and shows behaviour of an existential quantifier (69a), and the other group that always shows up in declarative sentences yielding the interpretation of negative universal quantifiers (69b).

69). a. Ha telefonato *nessuno*?[71] Italian

Has called neg-body

Has anybody called?

b. *Nessuno* ha telefonato.

Neg-body has called

Nobody has called.

Laka argues that a neg-word can behave as a negative universal quantifier even in interrogative contexts as shown below in (70a), and non-negative existential in a simple declarative sentence, as shown in (71b-f).

70). a. Me preguntaron si *nadie* sabia la repuesta.[72] Spanish

Me asked they if neg-body knew the answer

They asked me whether nobody knew the answer.

b. Quien derribo el *nunca* terminado puente de la magdalena.

Who demolished the never ending bridge of the magdalena

Who knocked down the never-ending Magdalena Bridge.

Based on such data, Laka argues that the task of a language learner would be to figure out to which group each of the neg-word belongs and how could they be used correctly, provided that neg-words in both groups are phonologically the same for Spanish or Italian, for example. Laka argues that there is only one set of neg-words and that they are NPIs, existential quantifiers. First, Laka's analysis for the contexts where neg-words do not induce any negative force and then some contexts where neg-words seem to induce their negative force, will be discussed.

3.5.6.1 Neg-words inducing no semantic negation

Laka argues that neg-words behave as existential quantifiers and these items are licensed in all contexts where English NPIs are licensed; interrogative contexts (69a), negative contexts (71a),

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[71] Cited in Laka (1990; 110)

[72] Cited in Laka (1990).

inherently negative verbs (71b), conditionals (71c), comparatives(71d), predicates involving polarity licensors e.g. the adverb *against* (71e) and the preposition *without* (71f), etc.[73]

71). a. *No* vino *nadie.* Spanish
No came neg-body
Nobody came.

b. Pedro duda que venga *nadie.*
Pedro doubts that come neg-body
Pedro doubts that anyone will come.

c. Voleva spere se *nessuno* ha telefonato. Italian
Wanted-she hope if neg-body has called
She wanted to know if anybody has called.

d. Maria canta mero que *ninguna* de vosotros.
Maria sings more than neg-one of you
Maria sings better than any of you.

e. Antonio estaba en contra de ir a *ninguna parte.* Spanish
Antonio was in against the going neg-where
Antonio was against going anywhere.

f. Sin *nada* que comer, los prisioneros murieron de hambre. Spanish
Without neg-thing eat, the prisoners died of hunger
Without anything to eat, the prisoners died of hunger.

Taking the evidence presented in (69-71), Laka argues that there is no special or language-specific task that a language learner will have to consider while figuring out the correct distribution of neg-words except conforming to the universal requirements on polarity licensing. For Laka, the distribution of neg-words is the same as that of other NPIs.

3.5.6.2 Neg-words inducing semantic negation

72). *Nadie* ha venido. Spanish
Neg-body has arrived.
Nobody has arrived.

[73] All the example are taken from Laka (1990).

Laka argues that neg-words behave as semantically negative only in pre-verbal positions, as shown in (72). In the proposed analysis, *Nadie* occurs in Spec-ΣP, headed by an abstract polarity Σ head that carries a negative feature that is structurally higher than TP. The negative feature on the abstract head licenses the neg-word via the Spec-head agreement and this results in sentential negation. Distinguishing the realisation of the empty head in ΣP, Laka argues that it can only be assumed if an overt neg-word is present in Spec ΣP. A VP-internal neg-word cannot license the presence of the abstract negative head neither itself can be licensed by the empty head. This explains why post-verbal neg-words require the presence of another neg-word in the pre-verbal position to be licensed by the abstract negative head. Additionally, when there is no neg-word present in Spec ΣP, the negative marker has to appear lexically realised, as shown in (73a). But this does not explain why the lexical negative marker *no* cannot head the projection ΣP if a pre-verbal neg-word is present in Spec ΣP, (73b), in Non-strict NC languages. Laka does not address this point.

73). a. *No* vino *nadie.* Spanish
Neg came neg-body
Nobody came.
b. **Nadie no* vino.
Neg-body neg came
Nobody came.

3.5.7 Ladusaw (1992)

Ladusaw further discusses Laka's analysis and focuses on 'licensing the expression of negation' in general, no matter if it is expressed by the presence of a negative marker or a neg-word. He treats all the expressions of negation as anti-additive functions and treats them alike. He argues that it is not necessary that any visibly negative element at S-structure will express negation. A non-lexical structural negative operator carrying a feature [neg] is assumed in the interpretation of the clause, whose presence is licensed by the lexical presence of a negative marker or a neg-word. In this way, neg-words and also the negative marker are self-licensed, which do not express negation but license the structural presence of negation. In Ladusaw's analysis, a lexical negative marker is an NPI, like other NPIs, and only neg-words can license it, as shown below in (74b), but not plain NPIs (74a).

74). a. **Anybody* will *not* come. English

b. *KANENAS* *(*dhen*) ipe *TIPOTA*.[74] Greek

Neg-person not said.3SG neg-thing

Nobody said anything.

Summarising, under Laka and Ladusaw's analysis, all expressions of negation are NPIs. Like other NPIs, negation has to satisfy licensing conditions. Negation is self-licensed in simple sentential negation or it is c-commanded by a neg-word in Spec-NegP. In the case of NC, multiple occurrences of neg features, each neg feature is viewed under the agreement as a trigger for the expression of negation but interpreted only once. Under Ladusaw's analysis, the role of a negative marker gets weakened because all the instances of negative elements expressing negation are taken as NPIs and the negation is expressed through an abstract structural negative operator.

3.5.8 Giannakidou (2000)

Giannakidou criticises the status of neg-words as semantically negative quantifiers and argues that Neg-absorption is a mechanism that is specifically proposed to interpret NC, and therefore cannot be a part of the grammar of any NC language. In addition, languages with semantically negative quantifiers do not express NC, for example, English, Dutch, German, etc. Giannakidou's proposed analysis for NC and neg-words seems a hybrid analysis in nature because it contains some features from the universal quantifier approach and some other from the NPI approach. Giannakidou calls neg-words as NPI-universals because neg-words need an anti-veridical operator, for example, negation, for their correct interpretation (just like plain NPIs) and scope above negation (like standard universals).

Giannakidou argues that neg-words are NPIs that are sensitive expressions and depend on some contexts in order to be interpreted correctly. She also argues that 'NC is nothing more than a subcase of negative polarity'. She discusses many syntactic and semantic distributional differences between NPIs and neg-words of Greek, where NPIs and neg-words are graphically the same but only emphatically stress marked NPIs participate in NC (I will refer emphatically stress marked Greek NPIs as neg-words and non-emphatics as general NPIs in this text). Giannakidou argues that neg-words and NPIs both are construed with negation but neg-words cannot be licensed under a

[74] Cited in Giannakidou (2000).

broad array of other licensors where NPIs are licensed. She defines neg-words as affective items that are licensed only by an anti-veridical operator. The definition of an NPI is shown in (75).

75). An affective polarity item α is a *negative polarity item* iff it is licensed by *anti-veridical* operators.[75]

Neg-words are licensed under the anti-veridical operators since that anti-veridical operators are negative such that they entail the falsity of the proposition they embed. Negation is one such operator and it can thus license neg-words. Giannakidou argues that similar to non-negative universals, neg-words can also undergo modification with *almost/absolute*. Both universals also differ to each other in that neg-words combine with only negative predicates but other universals can combine with both negative and positive predicates.

Giannakidou argues that NC is clause-bound which involves a locally restricted movement of neg-words. Neg-words as universal quantifiers take scope within the entire clause.

76). a. *Dhen* irthe *KANENAS.*[76]

Neg came.3SG neg-person

Nobody came.

b. *KANENAS*$_i$ [*dhen* irthe t_i]

c. $\forall x[\mathbf{person}(x) \rightarrow \neg\mathbf{came}(x)]$

For the correct interpretation of *KANENAS* as a universal negative negative quantifier in (76), it must undergo quantifier raising in order to take scope over the entire predicate and also above its licensors i.e., negation. This movement of quantifier is motivated by its requirement to combine with its anti-veridical licenser and also to yield the interpretation ∀¬. *KANENAS* is interpreted above negation and gives rise to a universal quantifier outscoping negation, as shown in in (76c). Additionally, in the linear order negation precedes *KANENAS*, so the universal quantifier over negation reading is assumed to be available at LF.

Multiple neg-words undergo cyclic adjunction to Spec-IP/NegP and do not give rise to DN reading, for example, (77). In Giannakidou's analysis, the presence of NegP is not necessary, neither

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[75] cited in Giannakidou (2000). Anti-veridical operators are anti-morphic operators. See section 3.5 for details.

[76] Cited in Giannakidou (2000).

her analysis makes any specification for the syntactic status of negative marker, be it a head or a phrase, doesn't matter for the correct interpretation of NC.

77). a. *Dhen* ipe *KANENAS TIPOTA.* Greek

Neg said.3SG neg-person neg-thing

Nobody said anything.

b. *KANENAS*$_{ii}$ *TIPOTA*$_{i}$[*dhen* ipe t_{ii} t_{i}]

Giannakidou also argues that NC can be a weak dependency: existential reading similar to that of an NPI, as in (78a-b), and a strong dependency: neg-words yield universal reading, as in (78c-d). Both are truth conditionally equivalent but the difference between both lies in pragmatics in which both contain different discourse statuses.

78). a. *Dhen* agorasa *kanena* vivlio.[77]

Neg bought.1SG neg-book

I didn't buy any book(s).

b. $\neg\exists x[\mathbf{book}(x) \wedge \mathbf{bought}(I, x)]$ [Existential reading]

c. *Dhen* agorasa *KANENA* vivlio.

Neg bought.1SG neg-book

I bought no book(s).

d. $\forall x[\mathbf{book}(x) \rightarrow \neg\mathbf{bought}(I, x)]$ [Universal reading]

Both readings are considered truth conditionally equivalent. The question arises why is one reading is preferred over the other? For this, Giannakidou argues that it is not the case that universal reading is chosen out of the blue but it is chosen contextually and pragmatically. Neg-words and NPIs do not share the same discourse statuses. Not NPIs but only neg-words consist of a topic and a comment And the universal reading of neg-words is selected when they are being stressed and described as topics of the utterance uttered by the language user. That is also why only neg-words can be topicalised or pre-posed. One such common example is the use of neg-words in pre-verbal or subject positions where NPIs cannot be used. In Giannakidou's analysis, both the existential and

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[77] Examples are cited in Giannakidou (2000).

universal negative readings are possible in NC as well as DN languages, depending upon the availability of number of neg-words, NPIs and existential/universal paradigms under negation.

Giannakidou proposes that Dutch *niemand* or English *nobody* are indeed universal negative quantifiers that always express negation on their own and never co-occur with a sentential negative marker.

79). a. Heeft Frank *niemand* gezien?[78] Dutch
Have.3SG Frank neg-body seen
Is it true that Frank saw nobody?
b. [[niemand]] = $\lambda P\ \forall x[\text{person}(x) \rightarrow \neg\ P(x)]$

The difference between universal negative quantifiers of Dutch/English and Greek neg-words lies in the fact such that Dutch/English negative quantifiers are semantically negative as well as an element of DN languages, while the Greek neg-words are semantically non-negative and make members of an NC language.

Giannakidou further proposes that due to clause-boundedness of NC, neg-words in embedded clauses cannot take scope over the entire proposition and render ungrammatical results in Greek, as in (80a), cited in Giannakidou (2000).

80). a. I Ariadhni *dhen* ipe oti idhe {*tipota*/* *TIPOTA*}. Greek
The Ariadne not said.3SG that saw.3SG neg-thing
Ariadne didn't say that she saw anything.
b. **No* dije que hab´ıa *nada* en el frigor´ıfico.[79] Spanish
Neg said.1SG that there-was.ind neg-thing in the fridge
I did*n't* say that there was *anything* in the fridge.

Greek and Spanish examples in (80) also show that neg-words cannot be licensed long distanced or in negative implicature, unlike plain NPIs, as shown in section 3.5.2.

[78] Giannakidou (2002: 484).

[79] Cited in Penka (2007:27).

Zanuttini also provides analysis for the popular cases i.e., fragmentary answers and conjunctions, (disjunctions) where neg-words seem to induce negation in the absence of any other overt negative marker, for example, in (81).[80]

81). a. Q: Ti idhes?[81] Greek

What saw.2SG

What did you see?

A: *TIPOTA*. * *tipota*

Nothing. * *anything*

b. Thelo na pandrefto ton Petro i *KANENAN* (alo).

Want.1SG subj marry.1SG the Peter or neg-person (else)

I want to marry either Peter or nobody (else).

Giannakidou argues that neg-words in fragmentary answers and disjunctions are a by-product of ellipsis in which the negative phrase is elided and only the neg-word is spelled out. The ellipsis process consists of two steps as shown in (82) below.

82). a. 1) Fronting of TIPOTA:

TIPOTA$_i$ [*dhen* idha t_i].

neg-thing not saw.1sg

I saw nothing.

b. 2) Ellipsis of TP:

TIPOTA$_i$ [~~*dhen* idha~~ t_i].

The analysis proposed by Giannakidou and the NPI approaches faces problems in several respects that will be discussed briefly below.

Since, Giannakidou argues that only universal quantifiers can be topicalised or preposed as shown for Greek in (83a), where they explicitly appear before their licenser, but actually a plain NPI in Urdu/Hindi always appear before its licensor as in (83b) (Vasishth, 1999). Besides, neg-

[80] In Romance Non-strict languages, e.g, in Italian (Zanuttini, 1991), and Spanish (Herberger, 2001) neg-words in fragmentary answers and disjunctions also seem to induce negation independently (already shown in section 3.3-3.4).

[81] Cited in Giannakidou (2000).

words in Italian or Spanish can never occur before their licensor, e.g., negation, if they do, they only generate DN readings, (83c).

83). a. *KANENAN dhen* idha. Greek
Neg-person not saw.1SG
I saw nobody.
b. Main ny *kisi* ko *nahin* dekha. Urdu/Hindi
I erg any-one erg neg saw
I didn't see anyone.
c. **Nessuno non* ha telefonato. Italian
Neg-body neg has called
Nobody has not called.
d. *Nessuno* ha telefonato *nessuno*.
Neg-body neg has called neg-body
Nobody has called anybody.

Furthermore, unlike Greek, stressing the pre-verbal neg-word in (83d) also generates DN reading.

Quite often in the paper, Giannakidou refers to the pragmatic and discourse factors without alluding to any technical details of pragmatic mechanisms. She does not provides any pragmatic analysis for neg-words except stressing the 'emphatic stress'. She refers to some of the Scanadavian languages too that exhibit the stress patterns for neg-words, but not all NC languages do exhibit the stress marking for neg-words participating in NC.

Giannakidou also admits that her proposed analysis can be problematic for pre-verbal neg-words in Non-strict NC languages which do not co-occur with a sentential negative marker. Giannakidou suggests that somewhat 'ambiguous' analysis for the pre-verbal neg-words (in Non-strict languages) can work best.[82]

She also does not clarify that how a pre-verbal or multiple neg-words can be interpreted grammatically in the absence of any overt licenser, and from where the negation comes? e.g., in (83d). She further argues that her analysis does not propose any additional mechanism like Neg-absorption simply for the sake of NC (the Neg-absorption which is proposed by NQ approaches,

[82] Giannakidou does not provide the mechanism for the ambiguity analysis but only refers to the term 'ambiguous'.

Zanuttini and Hagemann, discussed in section 3.3-3.4) to account for the combination of a negative marker and a neg-word(s). Rather, her analysis embeds neg-words in the existing grammar and lexical semantics of neg-words such that the movement of the neg-word at LF is its interpretive requirements (as being an NPI, it must occur in the presence of a negative marker, and as a universal quantifier, it must move to a higher position in order to take wider scope).

For the question why the analysis proposed cannot be extended to the original NPI like *any*, **Anybody didn't come*, she argues (footnote 14) that *any* is not a universal quantifier but an indefinite and cannot take scope above negation, and also NPIs do not constitute a topic.

NPI approaches for neg-words also face problems when it comes to accounting for neg-words where they seem to induce negation by themselves.

Giannkidou's analysis for fragmentary answers faces problems in three areas a) the elided part of the fragment answer, b) a c-commanding licensor condition of NPIs, c) plain NPIs cannot be used as fragment answers but neg-words and universal quantifiers can be.

For a), Merchant (2011) argues that the elided material is subject to a condition that it has to be syntactically and semantically identical to its antecedent. Elided material is argued to be syntactically present but not pronounced. The ellipsis that includes deletion of a higher node than VP (i.e., TP), negation cannot be ignored. For example, in the following sentence in (84a), the elliptical part of the sentence does not contain negation and it means (84ai) that *Mary did see someone,* and it is not equal to the preceding sentence which says that *John didn't see anyone*. The elided part cannot contain the NPI *anyone* without negation, as it is shown in (84aii). Furthermore, the elided part of the sentence in (84b) contains negation, and it means (84bi) that *Mary didn't see anyone* which is similar to the preceding sentence that *John didn't see anyone*. It cannot contain *someone* in the presence of *neither*, as it is shown in (84bii). NPIs are taken as structure dependent elements as compared to non-NPI elements.

84). a. John did*n't* see *anyone*, but Mary did.
- i. …but Mary did see someone.
- ii. …*but Mary did see *anyone*.

b. John did*n't* see *anyone*, *neither* did Marry.
- i. …Marry did*n't* see *anyone*.
- ii. …*neither Marry saw someone

Furthermore, Merchant shows that the negative questions in (85) show that negation can be elided in the negative question as in (85a-b) but not in the positive one as it is in the Greek example in (81a). The elided sentence in (85aA) means (85aAi) that *I didn't invite Mark*. The same holds for (85bA).

85). a. Q: Who did*n't* you invite?[83]

A: Well…Mark.

i. = I did*n't* invite Mark.

ii. ≠ I did invite Mark.

b. Q: When was *no-one* in the shop?

A: Between 5 and 6 o'clock.

= *No-one* was in the shop between 5 and 6 o'clock.

The examples (84 & 85) provide evidence that elided material must be identical to its antecedent and negation cannot be ignored in ellipsis containing NPIs. It must also be a part of the elided material.

Concerning b), Zeijlstra (2008) and Giannakidou (2000, 2007) propose that polarity items are subject to a c-commanding licensor e.g., negation for their correct interpretation. The notion of c-commanding licensor raises counter facts for polarity items in fragmentary answers as there is no overt licensor for neg-words in fragmentary answers, as it is shown in (81).

The problem mentioned in c) states that the NPI analysis for neg-words proposed by Giannakidou (2000) cannot account for the presence of plain NPIs in fragmentary answers. The example below in (86) shows that universal and negative quantifiers both are acceptable in fragmentary answers but not the plain NPIs, e.g., *kanenan*/*anyone*.

86). Who did you see?[84]

a. Every one.

b. *No-one*.

c. **Anyone/Kanenan.*

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[83] Examples are cited in Merchant (2011).

[84] Cited in Giannakidou (2000), footnote 6.

It is also an established fact that original NPIs cannot be used in contexts where neg-words are used, for instance, pre-verbal positions, fragmentary answers, in the absence of any negative marker, at post-verbal positions with narrow scope, etc.

Summarising, from the discussion above it is evident that neg-words are only licensed in a subset of a set of NPI licensors, for instance, anti-additive or anti-veridical operators. NPIs are licensed in many other environments where neg-words cannot be licensed, e.g., in non-veridical or DE environments. NPIs have also been shown to be domain wideners but neg-words do not seem to widen the domain of quantification they denote and they never occur in the absence of classic negation, especially in Strict NC languages.

Concluding, the advocates of the approach that takes neg-words to be non-negative argue that neg-words are NPIs that must be licensed by some anti-veridical operator or context. Neg-words, like other NPIs are selective for their environments due to their inherent lexical properties. This approach faces some problems in implementing its proposed analysis on neg-words due to their varying behaviour across NC languages. Furthermore, neg-words do not behave as NPIs in all contexts where true NPIs are licit. Furthermore, NPIs also cannot occur in many contexts where neg-words do occur e.g., neg-words in pre-verbal positions in Non-strict NC languages in the absence of any licensor, or fragment answers.

3.6 Neg-words as ambiguous

In the previous section, the approaches that take neg-words as NPIs were discussed. In this section, the approaches that take neg-words as underspecified or ambiguous will be discussed. Van der Wouden and Zwarts (1993) argue that neg-words are underspecified, while Herburger (2001) argues that neg-words are lexically ambiguous between being negative quantifiers or NPIs. Both of the approaches will be discussed briefly in the subsequent subsections below.

3.6.1 Van der Wouden and Zwarts (1993) & Van der Wouden (1994/1995)

Van der Wouden and Zwarts (1992/1993, 2008) and Van der Wouden (1995) (WZ-W, henceforth) present a semantic theory to explain the under discussion phenomenon of negative concord. Basing their analysis on compositional or context-sensitive semantic values, WZ-W argue that the semantic contribution of lexical items builds upon the semantics of the sentence they are used in. The denotation of neg-words can also vary depending on the context. For instance, neg-words are interpreted as existential quantifiers when they are in the scope of a negative element, and universal negative quantifiers in all the other contexts.

Keenan (1974) and Partee (1984) argue that the multiple meanings of an adjective, e.g., *red,* depend upon the context of its use. For example, in *a red car*, *red* means colour, differently than it is in *red-handed,* where it is used idiomatically and means *with proof.* The same is the case for a verb like *bake* in *baking a potato* or *baking a cake*. A potato is already produced and is just cooked by baking, while a cake does not exist before baking it. Pustejovsky (1989) argues that such verbs are underspecified: they are acute to the individual properties of the arguments they take. WZ-W argue that similar to certain verbs and adjectives, neg-words are also underspecified.

WZ-W (1993) argue that negative concord comes about in two forms: negative spread and negative doubling. In negative spread, the negative feature is spread over a multiple numbers of expressions in its scope i.e., two or multiple neg-words. Negative doubling exhibits the use of a negative marker with neg-words. Negative doubling is associated with the formulation of a marked verbal projection containing a negative marker which can identify the feature +NC. An example of the negative doubling form of NC is shown in (87). WZ-W argue that the semantic properties of negative expressions may vary cross-linguistically but they must be licensed in the downward monotonic environment.[85]

87). *Non* ha telefonato *nessuno.* Italian
Neg has called neg-body
Nobody has called.

Negative doubling may occur with pre-verbal neg-words, as in Afrikaans (88a), and with post-verbal neg-words (88b), as in French.

88). a. Hulle het *nooit* gesing *nie.*[86] Afrikaans
[…VP[+NC] …VP[+NC]]
They have neg-ever sung neg.
They have never sung.
b. Jean *n*'a *rien* dit. French
John neg has neg-thing seen

[85] The definition of DE is given and discussed in section 3.5.

[86] All the examples are cited in WZ (1993, 7)

John hasn't seen anything.

The negative marker in each sentence in (88) yields the verbal projection VP and is marked with the feature +NC. Both types of anti-additive expressions, the pre-verbal and post-verbal can trigger negative doubling, and license the negative marker. In negative doubling, neg-words are interpreted as semantically negative.

Negative spread contains the context-sensitive assignment of semantics for neg-words. All the neg-words that occur in the scope of an anti-additive universal negative quantifier are interpreted as existential quantifiers. A relevant example is given in (89) for French.

89). *Personne n*'a *rien* dit.[87] French

Neg-body neg has neg-thing said

Nobody has said anything.

Negative spread freely occurs in Non-strict NC languages. In the appropriate contexts, neg-words give rise to a shift of meaning from universal negative to an existential quantifier, as shown in (90). In (90), The first *nessuno* generates a anti-additive context and in this context, the second *nessuno* is interpreted as an existential quantifier. WZ-W (1993) argue (fn, 21) that they are not sure about the contexts that can potentially trigger the occurrence of negative spread.

90). *Nessuno* ha parlato con *nessuno.*[88] Italian

Neg-body has spoken with neg-body

No one has spoken with anyone.

Afrikaans does not exhibit negative spread and two negative universal quantifiers always yield double negation, as shown in (91).

91). *Niemand* het *niks* geseg *nie.* Afrikaans

Neg-body has neg-body said neg.

Nobody has said nothing.

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[87] Cited in Van der Wouden and Zwarts (1993).

[88] Cited in Van der Wouden and Zwarts (1993).

WZ-W (1993) argue that children must acquire the productive semantic rules based on pragmatic principles which map the universal negative quantifier meaning or an existential meaning of neg-words, depending on the context they are used in. All things being equal, the child must learn the Italian negative marker and neg-words in Italian in the following way as shown in (92).[89]

92). a. *Nessuno* ha telefonato.
[used with no other negative element, pre-verbal *nessuno* receives negative meaning]

b. *Ha telefonato *nessuno*.
[pragmatically not acceptable, post-verbal *nessuno* yields ungrammaticality)]

c. *Non* ha telefonato.
[used with no other negative context, *non* receives negative meaning]

d. *Non* ha telefonato *nessuno*.
[*non* yields a negative context, post-verbal *nessuno* receives existential meaning]

e. *Nessuno* ha telefonato nessuno.
[pre-verbal *nessuno* yields a negative context, post-verbal *nessuno* receives existential meaning.]

f. *Nessuno non* ha telefonato.
[pre-verbal *nessuno* and *non* both yield negative contexts, and double negation arises]

Criticising the previous approaches, WZ-W argue that other than negation, DE or even non-DE environments (e.g., the verb *doubt*) can also give rise to NC. For them, neg-words cannot be simply NPIs, because NPIs do not trigger NC. Neg-words can also not be simply semantically negative quantifiers because in DE and anti-additive contexts they do not always give rise to semantic negation.

WZ-W's proposed not much detailed analysis grants super flexibility to natural languages when it comes to express sentential negation. They argue that languages may exhibit only the negative spread, only the negative doubling, both of them, or even none of them. Due to the flexible nature of the analysis, it also faces some problems.

First, for a language which can have both, the negative spread and negative doubling, WZ-W present French as an example. In French, two multiple neg-words are argued to be generating

[89] All the examples for Italian are originally from Ladusaw (1992), also cited in WZ (1993). As all the examples are well discussed in the thesis so the glosses and their English translation are skipped in order to save time and space.

ambiguous readings (Giannakidou and Zeijlstra, 2017). Furthermore, there is a debate whether the French negative marker *ne* is a negative marker or an NPI (Penka, 2007; Zeijlstra, 2004; Giannakidou, 2000; De Swart and Sag, 2002, among others, see section 3.7 for more details). It may also be left out in spoken or colloquial French. Besides, in standard French, neg-words always appear with *ne*. In the case of standard French, instead of being a language that can have negative doubling and spread, it seems more of a kind of negative doubling language, similar to Czech or Greek where neg-words obligatorily need the presence of a negative marker. But the negative marker in Czech or Greek is clearly taken as a negative marker and is never left out, unlike French.

Second, in the analysis by WZ-W, neg-words are given prime importance; they may be universal negative quantifiers or behave like NPIs. The sentential negative marker is taken as ambiguous, identifying an NC feature. It is semantically empty in French and only performs an identity function. In Afrikaans, it can be negative itself (with post-verbal neg-words) or only performs an identity function for +NC (with pre-verbal neg-words) and behaves like an NPI. In WZ-W's term, the negative marker, the 'morphological shape of a negative element' takes 'meaning shifts' between being semantically negative and identity marker.

Third, they also do not clarify the status of the negative marker when it is used in plain negative declarative speech and seemingly servers as the only negative marker, e.g., as in (93).

93). Gianni *non* ha visto Maria.[90] Italian
John neg has seen Maria
John hasn't seen Maria.

In the account of WZ-W, the distinction between pre/post-verbal neg-words and strict/Non-strict NC is reduced to the option that NC languages may involve the negative marker obligatorily or optionally in NC or not at all. Neg-words are neither only negative nor only NPIs, but underspecified. WZ-W do not provide much detail of the framework of their analysis.

3.6.2 Herburger (2001)

Herburger argues that the negative quantifier approaches consider neg-words as semantically negative based only on the data where neg-words induce negation on their own. The NPI approaches consider neg-words as NPIs, based only on the evidence where neg-words do not

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[90] Cited in Ladusaw (1991), also in WZ-W (1993).

induce negation but are licensed in the presence of another negation. The approaches that take neg-words underspecified do not take any side but argue that the meaning of neg-words depends upon the context they are used in.

Herburger argues that all three approaches are unable to explain that why negative quantifiers cannot occur in post-verbal positions, being the only negative element in the sentence and why are they unable to induce sentential negation, as in (94a). The existing approaches also do not explain why the NPIs are not able to occur in pre-verbal positions. If they do, they induce ungrammaticality, as in (94b). Herburger argues that the existing approaches are also not fully able to account for the ambiguity generated in NC, exemplified in (100-104) below.

94). a. *Vino *nadie*.[91] Spanish

Came neg-body

Nobody came.

b. *Nadie* comio´ *nada.*

Neg-person ate neg-thing

(i) *Anybody ate nothing.

(ii) Nodody ate anything.

Herburger attempts to explain why a particular instance of neg-word is a negative quantifier and another is an NPI, but not the other way round. Furthermore, she claims that her proposed analysis explains why both occurrences of neg-words are not available simultaneously. Herburger argues that the ambiguity approach looks the least interesting among all, but it is not less elegant.

Neg-words as negative quantifiers.

Presenting data where neg-words induce negation on their own, mainly from fragment answers, pre-verbal positions, and disjunctions, Herburger argues that neg-words are negative quantifiers. Additionally, neg-words can also be negative in post-verbal positions when there is an event described, as in (95a). According to Herburger (2001, 305) in such sentences, "post-verbal neg-words take a narrow scope concerning the event quantifier that binds the event variable of the verb". For the example in (95), it is argued that an event of which the baby is an agent is taking

[91] All the examples cited in section 3.6.2 are taken from Herburger (2001), unless mentioned otherwise.

place but that there is not a theme assigned to this event i.e., there is nothing present which the baby is looking at. The same is the case with neg-words in nominal domains, as shown in (95b).

95). a. They fear the baby is autistic. He spends his time looking at *nothing*.[92]

b. El *nunca* terminado puente de los Remedios.

The neg-ever finished bridge of los Remedios

The never finished Los Remedios bridge.

Neg-words in post-verbal positions are unable to induce negation if there is no occurrence of any event described, as in (96). In such cases, to yield a wide-scope reading of the negation, neg-words in post-verbal positions require the presence of an additional negative marker, as shown in (97).

96). *Vino *nadie*. Spanish

Came neg-body

Nobody came.

97). *No* vino *nadie*.

Neg came neg-body

Nobody came.

Based on the examples listed above, Herburger argues that Spanish neg-words can occur as semantically negative, freely, as long as they take scope from their surface position. In pre-verbal positions, neg-words are semantically negative because of their wide scope over the event quantifier, as in (98). Furthermore, for pre-verbal neg-words when there is no overt licensor that can license their presence as NPIs, they must yield a negative reading.

98). *Nadie* comió. Spanish

Neg-body ate

Nobody ate.

Neg-words as NPIs

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92 This is the English translation of the Spanish example, cited in Herburger (2001, 302-303).

In the presence of an anti-additive (andDE contexts NPI, neg-words give rise to a reading of an existential NPI (99).

99). a. *Nadie* comio´ *nada.* Spanish

Neg-body ate neg-thing

Nobody ate anything.

b. Dudo que vayan a encontrar *nada*.

Doubt-lSG that will.2SG.Subj find neg-thing

I doubt they'll find anything.

Neg-words as being ambiguous

Presenting the data as in (100), Herburger argues that neg-words are ambiguous between being a negative quantifier and an NPI. The ambiguity can arise only if the negative-neg-words and NPI-neg-words are not in complementary distribution. For example, with post-verbal neg-words taking narrow scope, adding a licensor actually generates ambiguity, generating both readings, a DN, and an NC.

100). El bebé *no* está mirando a *nadie.* Spanish

i. The baby is not looking at anybody. [NC]

ii. The baby is not looking at nobody. [DN]

She argues that the NC reading is the most salient one. The DN reading in (100ii) will only be valid if the negative marker *no* is stressed marked.

Adding another neg-word in the pre-verbal position also yields ambiguity, (101i) is an NPI reading of pre-verbal *nunca*, and (101ii) is a negative reading of the same neg-word.

101). *Nadie (nunca)* volvió a Cuba. Spanish

Neg-body neg-ever returned to Cuba

i. Nobody ever returned to Cuba. [NC]

ii. Nobody (never) returned to Cuba. [DN]

Besides, in Spanish, other than the cases of NC which involve negation, ambiguity also arises in predicates that generally can license NPIs. For example, when pre-verbal neg-words occur embedded in the predicates like *doubt*.

102). Dudo que *nadie* lo sepa. Spanish

Doubt.ISG that neg-body it know.Subj.

i. I doubt that nobody knows it.

ii. I doubt that anybody knows it.

The ambiguity of (102) is because of two meanings of *nadie*. *Nadie* yields an negative reading in subject position in (102i) and an NPI reading in (102ii). The NPI reading of *nadie* in (102ii) also shows that NPIs are not always banned in pre-verbal subject positions if there is a licenser in the higher clause. But, as in (103), if *nadie* occurs post-verbally, it does not always give rise to ambiguous reading, it only yields the NC reading.

103). Dudo que lo sepa *nadie*

Doubt.ISG that it knows.3SG neg-body.

I doubt that anybody knows it.

Herburger argues that, cross-linguistically, it is accepted that pre-verbal positions are not suitable positions for NPIs but for neg-words (cf Lahiri, 1998, 2020, also section 3.5). Herburger argues that once neg-words are used in pre-verbal positions with a sentential negative marker, there is a possibility that they can be interpreted in both directions; as NPIs, and as semantically negative.

Going one step further, neg-words begin appearing as semantically negative in the contexts where NPIs are licensed, e.g., post-verbal positions (with narrow scope). At this step, the ambiguity is still tolerable because such constructions are pragmatically very rare.

Once, post-verbal neg-words begin taking scope over the event quantifier and induce sentential negation, a considerable amount of ambiguity arises. As the ambiguity increases, learnability decreases. For example, in (104) below, the sentence can have three meanings.

104). *No* vino *nadie*.[93]

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[93] Cited in Herburger (2001).

Neg came neg-body.

Nobody came.

[*nadie* being semantically negative and taking scope over the negative marker]

i. Nobody is such that he didn't come. [DN]

[negative marker taking wide scope over the neg-word]

ii. It is not the case that nobody came. [DN]

[*nadie* as a negative quantifier taking scope over the event quantifier]

iii. It is not the case that anybody came. [NC]

Herburger argues that when post-verbal neg-words are used quite frequently and pragmatically accepted, it is expected that post-verbal neg-words would start taking scope over the event quantifier, and the ambiguity would vanish. In such cases, neg-words are interpreted only as semantically negative, e.g., English negative quantifiers in *I ate nothing*.

Herburger's analysis received criticism for its inability to explain many aspects of NC. First, the assumption that post-verbal neg-words cannot take scope above the event quantifiers is criticised, since English/Dutch negative quantifiers are licit in post-verbal positions and also induce sentential negation, e.g., *I ate nothing*. Furthermore, other quantifiers i.e., *todo* in Spanish in post-verbal positions can take scope above the event quantifier, as shown in (105). Herburger does not explain this discrepancy between negative and positive quantifiers clearly.

105). La policia ha detenido a *todo* sospechoso.[94] Spanish

The police has arrested prep every suspect

The police arrested every suspect.

Second, Herburger argues that NC in Spanish seems puzzling because of the homophonous nature of neg-words and NPIs. Once the ambiguity caused by homophonous nature of neg-words and NPI is taken into account, NC remains just a matter of NPI licensing in Spanish. Herburger does not provide the details of the analysis to account for the ambiguity caused by the homophonous nature of neg-words and NPIs.

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[94] Cited in Penka (2007).

Third, Herburger does not explicitly address the cases where pre-verbal neg-words co-occur with a sentential negative marker and induce double negation, e.g., in Italian. She simply argues that neg-words are also negative, so they, in pre-verbal positions, induce their negation, and along with the sentential negation, double negation arises. At the same time, Herburger also does not provide an analysis for Strict NC languages where pre-verbal neg-words are always used with the negative marker and they never yield DN readings. Also, in Strict NC languages, it is hard to detect if pre-verbal neg-words are negative quantifiers and post-verbal ones are NPIs or the other way round is also possible.

Fourthly, instead of providing technical details of ambiguity analysis, Herburger relies on the diachronic developments described in Jespersen's cycle and exemplifies English which historically has been an NC language but now in its most modern and standard form is no more an NC but a DN language. Furthermore, throughout the paper, Herburger uses Spanish, a Non-strict NC language as an example but in the analysis part, she uses English which is a DN language in its standard variety, and NC in several sub-standard varieties. NC varieties of English are so divergent that they can hardly be divided into Strict or Non-strict varieties of NC (Blanchette, 2015; Green, 2011, 2012, Anderwald, 2002; Tubau, 2016; many others).

Concluding, Herburger argues that neg-words can be ambiguous provided they occur in positions where both, negative and NPI readings are possible. All the data presented above for all the three categories of neg-words (negative, NPIs, ambiguous) have nothing to do with the most frequent patterns of NC but belongs to the ambiguous aspect of NC so only the ambiguity approach can very easily tackle it. Herburgur's proposed analysis gives an impression to an extent that NC itself is more ambiguous than the neg-words.3.7 Neg-words as non-negative indefinites.

3.7 Neg-words as non-negative indefinites

In previous subsections, various approaches to NC have been discussed. It was shown that the approaches discussed do not seem to successfully provide a unified analysis for all combinations of neg-words and NC or absence thereof. Each approach faces some problems for its specific framework or proposal for particular reasons.

In the following section, the author will discuss a different kind of approach that argues for the non-negative status of neg-words. It also argues that if neg-words are non-negative that does not mean that they have to be the same or similar to NPIs. Such an approach is put forth in its most detailed and fine-grained form by Zeijlstra (2004, 2008a, b, and forthcoming) who takes neg-words as semantically non-negative and NC as a syntactic agreement in which the relation between neg-words and sentential negation is spelled out syntactically. Based on the diachronic developments, described in Jespersen's cycle, this theory also presents a typological distribution of languages into groups like DN and NC languages.

The author will discuss the significant points of Zeijlstra (2004, et seq.) at length in this section as it is the theory that successfully accounts for many aspects of negation and NC that other theories are not fully able to. The author will also, at the end of this section, review all the questions that other theories have not been able to answer properly, and that Zeijlstra's theory does. It also has implications for language variation and acquisition. Moreover, the author will also use this theory as a backdrop to investigate the acquisition of sentential negation and negative concord in early child language for languages related to three dimensions: DN, NC, and an NC cum DN language, in chapters 8-11. The next section and subsequent chapters will further elaborate on this.

3.7.1 Neg-words as non-negative indefinites

Zeijlstra (2004) argues that neg-words are non-quantificational and semantically non-negative indefinites, i.e., they do not denote existential quantifiers but introduce free variables that need to be bound by existential closure introduced by some sentential operator, e.g., a quantifier, an adverb, or a modal operator. Furthermore, neg-words also carry a [uNEG] feature that needs to be checked by an element carrying [iNEG]. In this way, neg-words are subject to two licensing conditions such that their introduced free variable needs to be bound by an existential closure and their [uNEG] feature needs to be checked by an element carrying [iNEG].

Zeijlstra proposes an analysis of NC in terms of the syntactic agreement. The central idea of his analysis is that elements that are only morphosyntactically marked for negation are not semantically negative by themselves but they reflect an agreement relation with the semantic negation introduced by a negative (c)overt element with [iNEG], in the same clause. Following Chomsky's Minimalism (1995), he argues that agreement relation is spelled out in terms of a feature checking mechanism. Agree is clause bound; the elements carrying [i/uNEG] must be in the same clause. NC is thus an instance of syntactic agreement, between elements carrying [i/uNEG] features in the same clause. As syntactic agreement is clause bound, an immediate prediction that follows from this is that NC is also clause bound. The role of negation as a clausal operator fulfils both the licensing requirements of neg-words in the way that it binds the free variable introduced by neg-words, and also checks their [uNEG] feature.

He assigns the following meaning to neg-words as shown in (106a) and to the negative operator (106b) (2004, in press).

106). a. $[[\text{n-Q}]] = \lambda P.[\exists Q(x) \ \& \ P(x)]$ where $Q \in \{$**Person'**, **Thing'**, **Place'**...$\}$

b. $[[Op]] = \neg\exists$

3.7.2 Negative concord as a syntactic agreement

Zeijlstra argues that similar to the languages that exhibit subject-verb agreement through reflecting the semantic properties of a subject onto the verb, as shown in (107), NC languages also exhibit agreement of negation by reflecting it onto two or more element.

107). a. Du kommst.[95] German

You come.2SG

You come.

b. [TP $\text{Du}_{[\text{i2SG}]}$ $\text{kommst}_{[\text{u2SG}}$]

In (107a), it is shown that the information about the 2nd person singular subject is presented twice: first, by the semantically meaningful pronoun *du,* and second, by the semantically vacuous affix *-st* on the verbal stem *komm*. The semantic operator conveying the semantics of *du* reflects that the subject is a second person singular pronoun, while the verb ending *-st* only indicates that the features of the subject are reflected on the verb too. Zeijlstra takes this doubling effect of semantics to be a trigger for the presence of formal features. He hypothesises the doubling phenomenon of formal features as given in (108), (Zeijlstra, 2014).

108). a. If and only if there are doubling effects with respect to a semantic operator OP_F in the language input, all features of F are formal feature [i/uF].

b. If there are no doubling effects with respect to a semantic operator OP_F in the language input, all features of F are semantic features ([F]).

[95] Cited in Zeijlstra (2014).

Following standard minimalism, Zeijlstra argues that the syntactic agreement is a relation between the elements, carrying the [i/uF]. In the case of example (107), the subject *du* contains the interpretable formal feature [iF] and the *-st* an uninterpretable formal feature [uF].
He extends this agreement phenomenon to negation as well and in the line of (108b) argues that if there are no doubling effects with respect to the negative operator, and every morphosyntactically marked negative element corresponds to a negative operator, the language exhibits semantic negation. Semantic negation is interpreted directly in the syntactic component. DN languages such as Dutch and German are such examples. I will discuss Dutch in detail again in section (3.7.3).

On the other hand, when morphosyntactically marked negative elements do not correspond one to one to the negative operator, or there are doubling effects with respect to negation, the languages exhibit the presence of formal negative features. NC languages are exactly such cases. As it has already been shown in the previous sections that in NC languages, not all of the negative elements correspond to the negative operator. Zeijlstra formulates his NC hypothesis as shown in (109), cited in Zeijlstra (in press).

109). NC is an Agree relation between a single feature [iNEG] and one or more features [uNEG].

Zeijlstra argues that in NC languages, neg words are the elements that are only marked for negation but they themselves do not carry the semantic negation. Being semantically non-negative, neg words carry the feature [uNEG].
In the next section I will show how Zeijlstra's proposal can be applied to a variety of languages, before that I will discuss Zeijlstra's learning algorithm.

3.7.3 Acquisition of formal features

Zeijlstra argues that languages vary with respect to using negative elements for expressing sentential negation and exhibiting NC. Moreover, there is even variability detected within NC and DN languages as it was discussed in sections 3.1 and 3.2. He argues that it cannot be the case that the properties that a particular set or a subset of the set of languages exhibit should be a part of universal grammar, but it must be a part of the first language acquisition process.

To provide a learning mechanism of formal feature in various respects, for example, a) how the child language learner would acquire that her language either contains formal features or not, if no, why? b) if yes, which element carries [iF] and which one is responsible for [uF], c) how the alleged configurational needs between [iF] and [uF] will be met, d) how the connection between [iF] and the lexical semantic feature [F] will be determined, Zeijlstra provides a learning algorithm that will be discussed in detail below.

Zeijlstra presents his learning algorithm for formal features in general and shows how can it count for negation and NC. I will briefly summarise the general algorithm and then specifically focus on that of negation and NC.

3.7.3.1 Learning algorithm

As predicted by (108), it is assumed that the language acquirers will only be able to detect the formal features in their language if there is overt evidence for it, in the linguistic input, they receive. If the doubling evidence is absent, the formal features are also absent.

As for the acquisition perspective, it is argued that the null hypothesis would be that formal features are not present and morphological expressions directly reflect the semantics. So, the first assumption is that every element that seems to induce some semantic environment should be taken as a carrier of the semantics of that particular environment. If this one-to-one relationship between an element and its semantics is missing, only then the semantically redundant element must be assigned a formal feature [uF]. The element carrying [uF] will only mark the presence of the semantic content [F] but will not carry itself. Zeijlstra generalises it as shown in (110), (Zeijlstra, 2014, 14).

110). If some morphosyntactic element α manifests the presence of some semantic context F, but cannot be assumed to be the carrier of F itself, then assign a formal feature [uF] to α.

The presence of [uF] is subject to two requirements: a) a requirement that it appears in a semantic environment F, and b) a formal requirement that if a [uF] is present, there must be an element which not only possess the semantics of F but also a property [iF], reflecting that a [uF] can only survive if an [iF] is present. Zeijlstra states it as given in (111), again from (Zeijlstra, 2014).

111). Assign [iF] to all morphosyntactic elements that introduce the semantic context that is manifested by [uF]. If no overt morphosyntactic element is responsible, assume some covert element to be present that carries the semantics of F and that, therefore, should be assigned [iF].

Zeijlstra argues that while interpretable formal features [iF] are still part of semantic features [F], and not separable from them, only the presence of [uF] will make the cue for the presence and acquisition of formal features. [iF]s are different from [F]s just because that they are able to check [uF]s. He also argues that only if the sentence grammaticality is not ensured by the overt element, the presence of an abstract element containing the [iF] must be assumed. In Zeijlstra's framework of formal features, [uF] is learnable, and given that it can only survive in the context where there is an [iF] present, so the [iF] is also learnable.

3.7.4 Application of Zeijlstra's theory

Acquiring formal features of negation and NC.

In this subsection, it will be shown how Zeijlstra's learning algorithm can be applied for a variety of perspectives of negation, i.e., sentential negation, double negation, NC, and its varieties. I will start from DN languages, discussing Dutch.

3.7.4.1 DN language: Dutch

In Dutch, every morphosyntactically negative element give rise to a semantic negation. As it was shown in section 3.1 that negative elements in Dutch are the negative XP marker, *niet*, and negative quantifiers, *niemand, nichts,* etc.

112). a. John loopt *niet.*[96] Dutch
John walks neg.
John does not walk.
b ¬ walk' (j)

113). a. *Niemand* komt.[97]

[96] Cited in Zeijlstra (2022).

[97] Cited in Zeijlstra (2004).

Neg-body comes.

Nobody comes.

b. ¬∃x.[person'(x) & come'(x)]

In both examples, the negative element is responsible for sentential negation. Two negative elements appear together in (114), both induce their semantic negative force and the sentence renders a double negation reading.

114). Jan heeft *niet niemand* gebeld.[98]

Jan has neg neg-body called

Jan didn't call nobody

Negative quantifiers undergo quantifier raising to a higher negation and yield sentential negation, as shown below in (115).

115). a. John doet *niets*.[99]

John does neg-thing.

John does nothing.

b. ¬∃x.[thing'(x) & do'(J, x)]

So, there are no elements in the sentences that are only marked for negation and do not yield own semantic negation. So, as per (108), no [uNEG] feature can be assigned to any element. If there are no [uNEG] features, there must not be [iNEG] too, along the lines in (110-111).
Hence, there is no need to formalise negation in Dutch and the child also cannot acquire that there are formal features of negation in her language, because there is no overt input in the form of doubling for it, in her language. See chapter 10 for the results and statistical analyses of Dutch.

3.7.4.2 Non-strict NC language: Italian

Zeijlstra argues that different types of NC are in fact a difference in formal features that negative elements carry. Zeijlstra argues that in Non-strict NC language, the negative marker is the

[98] Cited in Zeijlstra (2004).

[99] Cited in Zeijlstra (2004).

carrier of the formal feature [iNEG], while the neg-words contain [uNEG]. As it was shown in previous sections, in Italian, both, the negative marker and neg-words seem to render the sentence negative separately, and together yield NC.

The well discussed examples of Italian for *non* and *nessuno* are shown again in (116-117) with their negative reading shown in (116b) and (117b), respectively.

116). a. Gianni *non* telefonato.
Gianni neg calls
Gianni doesn't call.
b. ¬call'(g, x)

117). a. *Nessuno* ha telefonato.
Neg-body has called.
Nobody called.
b. ¬x.[person'(x) & call'(x)]

The example for NC is shown below in (118a), carrying a combination of *non* and *nessuno*, and its NC interpretation in (118b). *Non* in (116) and *nessuno* in (117) induce semantic negation independently but this conclusion is troublesome for (118) as it contains both of them but with only one semantic negation. *Non* and *nessuno* together induce one single semantic negation, indicating clearly that negation is formalised in Italian. In (118b), the c-commanding [iNEG] on *non* checks the [uNEG] on neg-word, and the sentence yields an NC reading, as in (118c).

118). a. Gianni *non* telefona a *nessuno*.
Gianni neg calls to neg-body
Gianni doesn't call anybody.
b. $[_{\text{NegP}}$ *non*$_{[\text{iNEG}]}$ telefona $[_{\text{vP}}$ a *nessuno*$_{[\cancel{\text{uNEG}}]}]]$
c. ¬call'(g, x)

In the sentence like the one in (119a), where a pre-verbal and a post-verbal neg-word together yield an NC reading, even in the absence of any overt negative element carrying an [iNEG]. Zeijlstra argues that an abstract negative operator $Op_{\neg}$,carrying the feature [iNEG] preceding the pre-verbal neg-word is assumed to be present, as shown in (119b). As stated per (108-111), no negative element can be taken as a carrier of the semantic feature of negation in (119a), so no overt element can be assigned [iNEG] and an abstract negative operator is assumed to be a carrier of [iNEG].

119). a. Ieri *nessuno* ha telefonato a *nessuno*.
yesterday neg-body has called to neg-body
Yesterday nobody called anybody.
b. [Ieri $Op\neg_{[\text{iNEG}]}$ $nessuno_{[\cancel{\text{uNEG}}]}$ ha telefonato a $nessuno_{[\cancel{\text{uNEG}}]}$]

Two important points need to be made clear here, i) the inclusion of the abstract negative operator, and ii) the presence of multiple [uNEG] features. For i), Zeijlstra argues that the inclusion of the abstract negative operator with an [iNEG] feature is quite natural, and similar covert operators have been proposed in the linguistic literature. He argues that just similar to the subject-verb agreement in an Italian example in (120), cited in (Zeijlstra, 2014: 5), where the verb contains the uninterpretable person feature *-o* for the subject while the overt subject itself is not present. Following Rizzi (1986), Zeijlstra argues that while the presence of the covert subject is marked through the presence of [uF] on the verb, the subject itself with [iF] may be abstract. Thus the presence of [uF] suggests that the agree relation will be established between the overt [uF] and abstract [iF].

120). a. Canto.
Sing.1SG
I sing.
b. [*pro*[iφ: 1SG] canto[uφ: 1SG]]

Similar treatment applies to negation as well. If a neg-word with a [uNEG] feature is already present and marks the presence of an operator with [iNEG], the negative operator needs not be present overtly. So, if, in a well formed sentence with visible [uNEG], no overt element with [iNEG] is present, an abstract negative operator with [iNEG] will be assumed. If an overt negative marker *non/NON* is added, it yields double negation or marginal results, as shown below in (121).[100]

[100] The NON in capital letters indicates stress marking.

121). a. *Ieri *nessuno non/NON* ha telefonato a *nessuno*.

Yesterday neg-body neg has called to neg-body

Yesterday nobody has neg called anybody.

b. [Ieri $Op\neg_{[iNEG]}$ $nessuno_{[\cancel{uNEG}]}$ $non/NON_{[iNEG]}$ ha telefonato a $nessuno_{[\cancel{uNEG}]}$]

For the presence of multiple [uNEG] features, following Ura (1996) and Hiraiwa (2001), Zeijlstra adopts Multiple Agree[101] arguing that one single c-commanding [iNEG] feature can check multiple [uNEG] features, similar to (121).

For the acquisition of formal features in L1 Italian, the child will receive abundant input like (118-119), containing the doubling effects of negation, but with only a single semantic negation. The child must acquire that negation in Italian is a formal category and she must assign formal feature [i/uNEG] to negation. For the acquisition of formal features in Italian, the assumption that the child will assign [iNEG] to *non* and [uNEG] to neg-words seems surprising at first sight, but the examples like (118-119) make a large part of the abundant input carrying the doubling effects with respect to negation. The presence of such input shows the child that the sentence with two (multiple) negative elements does not yield a double negation but only one single semantic negation. It also indicates that neg-words must contain [uNEG], marking only the presence of negation and carrying no semantic negation themselves. The child, here, must assume an abstract negative operator which carries [iNEG] and checks the [uNEG] feature on neg-words. See chapter 9 for the results and statistical analyses for Italian.

3.7.4.3 Strict NC language: Czech

Zeijlstra argues that similar to Non-strict NC languages, neg-words in Strict NC languages also carry [uNEG] because both types of NC languages allow multiple neg-words in an NC construction. Seemingly, the difference between both types of NC is the presence of the negative marker with pre-verbal neg-words since it cannot appear in Non-strict NC but must obligatorily appear in Strict NC. Zeijlstra argues that this difference matters indeed. In Strict NC languages, for example, in Czech, the negative marker being obligatorily present outscopes pre-verbal neg-words. It cannot be assigned [iNEG], but it carries [uNEG]. In this way, all the overtly present negative

[101] See Zeijlstra (2008, 2014) for details.

elements carry a [uNEG] feature and NC relation is established only with an abstract negative operator OP¬ carrying a [iNEG] feature.[102]
An example is shown below in (122), cited in Zeijlstra (2004).

122). a. Dnes *nikdo ne*-volá *nikomu*. Czech

*T*oday neg-body neg calls neg-body

Today nobody calls anybody.

b. [Dnes *Op*$\neg_{[\text{iNEG}]}$ *nikdo*$_{[\cancel{\text{uNEG}}]}$ *ne*$_{[\cancel{\text{uNEG}}]}$ -vola *nikomu*$_{[\cancel{\text{uNEG}}]}$]

The Czech acquiring child receives abundant input containing the doubling effects and must realise that negation is formalised in Czech. At first, the child may assume that the negative marker *ne* carries [iNEG], but the input where it appears with both, pre-verbal and post-verbal neg-words must make her assume that these negative elements only mark the presence of negation operator but do not carry the semantics of negation by themselves. All the overt negative elements will be assigned [uNEG] and only the abstract negative operator will be assigned [iNEG].

So, for the question that also came across while discussing the previous approaches that if the negative marker is semantically non-negative in Strict NC languages, why can't it be dropped, being considered unnecessary in the sentence structure?, Zeijlstra argues that in these languages, the negative marker is purely an agreement marker and can't be dropped out suddenly, just similar to the subject-verb agreement in Italian, shown again in (123) below. The agreement marker *-o* on the verb is not dropped even when the subject is overtly realised.

123). a. Canto.

Sing.1SG

I sing.

b. Io canto/*cant.

I sing.1SG/sing

I sing.

In the same way, the negative marker can also not be dropped due to functional reasons in the Strict NC language, despite its being semantically non-negative.

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[102] Zeijlstra argues that in Strict NC languages, the negative marker lacks the semantic content. Here I will not explicitly discuss the reasons Zeijlstra states for this argument. For a detailed view see Zeijlstra (2004, in press).

3.7.4.4 Standard English

Standard English (SE) is a very interesting and unique language in terms of expressing negation. SE is considered as a DN language because every negative element seems to carry its own semantic negation, and every two negative elements yield double negation reading, as it was shown in sections 3.1 and others, illustrated again in (124), cited in Zeijlstra (2004).

124). a. Mary did*n't* see *nobody*. English

b. *Nobod*y did*n't* see Mary.

c. *Nobody* saw *nothing*.

Zeijlstra argues that the examples containing the negative marker Neg° *n't* in (124a-b) can also be easily interpreted as NC because in non-standard NC varieties of English the negative marker *n't* participates in NC. The NC varieties of English will be discussed in the next chapter. Additionally, this observation is also in line with actual NC languages which all have a Neg° that participates in NC. Unlike other DN languages, e.g., German or Dutch, where the negative marker is an XP, the negative marker in English is a head, Neg°. This Neg° can project the functional projection NegP, and attaching to auxiliaries, possibly moves to a higher projection. In Zeijlstra's framework, similar to Strict NC languages, the Neg° *n't* is taken as semantically vacuous and carries a [uNEG] feature, which is checked by an abstract negative operator Op¬. Whenever it appears in a sentence by itself, the negation is induced by the abstract negative operator.

125). a. Marry did*n't* leave.

b. [Mary *Op*¬$_{\text{[iNEG]}}$ did*n't*$_{\text{[}\cancel{\text{uNEG}}\text{]}}$ leave]

As for the XP negative marker *not*, Zeijlstra argues that it carries the feature [iNEG] because it posits itself in Spec-NegP whose head is an abstract Neg° with a feature [uNEG]. The [iNEG] feature of *not* checks the [uNEG] on the abstract Neg°, and a single semantic negation is yielded, (126b).

The question now is: if *not* does not participate in NC, then how can it be assigned a feature [iNEG] since French *pas* also does not participate in NC. Zeijlstra argues for this that firstly, the

Neg° always carries [uNEG], irrespective of its being overtly marked or abstract. To check this [uNEG], the presence of an [iNEG] is a must. The [iNEG] of *not* in Spec-NegP will check this [uNEG] feature on Neg°, as shown in (126b).

126). a. Mary did *not* leave.[103]

b. [Mary did *not* [iNEG] [Neg° [~~uNEG~~] leave]].

If it is assumed that *not* contains only the semantic negation [NEG] and consequently cannot check the [uNEG], then during the process of parsing, an abstract negative operator with the feature [iNEG] will still be added whenever there is a sign spot for a [uNEG], the Neg°. And, a sentence already carrying *not* in Spec NegP will yield a double negation reading, as shown in (127).

127). [Mary did *not*[NEG] *Op*¬[iNEG] [Neg° [~~uNEG~~] leave]].

*Mary did *not not* leave.

As the negative quantifiers like *nobody* and *nothing* do not participate in NC in SE, they lack the evidence of carrying any formal features of negation and must be taken semantically negative instead.

So, given the system of negation in SE and (108), the child acquiring SE will initially hypothesise that every element induces its own semantic negation, this assumption will be correctly working for *not* and negative indefinites. But for *n't*, children must realise that it carries [uNEG] and no semantic negation, it only marks for negation.

In Zeijlstra's framework, SE is taken as an invisible NC language because it does exhibit some elements namely the negative head *n't*, and lacks some other, i.e., neg-words that are typically used in yielding NC. It is shown that some negative elements carry formal features and some don't. As a result, in English, the number of semantic negations is equal to the number of negative elements present in a sentence and this is what makes SE an invisible NC.

I will further discuss predictions that this theory makes for the acquisition of sentential negation and NC in chapter 6, in detail.

Note that, it is not only the case that neg-words always carry [uNEG] features as it was shown for all the languages discussed above. In Zeijlstra's framework, neg-words can also carry [iNEG], for example in Afrikaans. In Afrikaans, neg-words are carriers of [iNEG], and the negative

[103] Cites in Zeijlstra (2022). See also Espinal (2000)

marker carries [uNEG]. For details about Afrikaans, see Biberauer & Zeijlstra (2012a), Biberauer & Zeijlstra (2011), and Zeijlstra (2022). See chapter 8 for the results and statistical analyses for SE.

3.7.4.5 Partial NC: French

Zeijlstra argues that NC is not only restricted to the Strict and Non-Strict paradigms, but it can also be tested in *Obligatory and Optional*, and *Partial, and Invisible* NC paradigms. He discusses a number of languages under all these three paradigms. Other than the Strict vs Non-strict that also has been discussed throughout this chapter, Zeijlstra captures the details of obligatory vs optional NC. He shows that NC in Czech and Greek are obligatory, while West Flemish and Catalan (some varieties) are examples of optional NC where the negative marker can be dropped.

French is an example of a partial NC language. In French, both negative markers, a pre-verbal *ne* and a post-verbal *pas* can yield a single semantic negation, (128a). But as for co-occurrence of them with the neg-words, only *ne* co-occurs with neg-words as in (128b-c), *pas* does not, if it occurs, it only yields a DN reading, as shown in (128d).

128). a. Marie (*ne*) mange *pas*.[104] French
Marie neg eats neg
Marie doesn't eat.
b. *Personne* (*ne*) mange.
Neg-body neg eats
Nobody eats.
c. Jean (*ne*) mange *rien*.
Jean neg eats neg-thing
Jean doesn't eat anything.
d. *Personne* (*ne*) mange *pas* (*rien*).
Neg-body neg eats neg neg-thing
Nobody doesn't eat (anything).

So for the negative properties of negative elements of French, Zeijlstra does not take *ne* to be a participant in NC because it cannot negate the sentence alone by itself as in (129), but rather he

[104] Cited in Zeijlstra (2022).

takes it as an NPI since *ne* is licensed in almost all the environments that are standardly used to license NPIs, (section 3.5).

129). *Marie *ne* mange.
Marie ne eats.
*Marie does not eat.

Neg-words in French are able to induce semantic negation by themselves, but in a combination of another neg-word, still, yield only one semantic negation, so they are assumed to carry [uNEG] which is checked by an abstract negative operator with [iNEG].

130). a. *Personne ne* mange.
Neg-body *ne* eats.
Nobody eats.

b. *Op*$_{\neg[\text{iNEG}]}$ *Personne*$_{[\cancel{\text{uNEG}}]}$ (*ne*) mange.

c. Jean *ne* mange *rien*.
Jean ne eats neg-thing.
Jean does not eat anything.

d. *Op*$_{\neg[\text{iNEG}]}$ Jean (*ne*) mange *rien*$_{[\cancel{\text{uNEG}}]}$

Pas is taken to be semantically negative but with no formal features because it does not participate in NC. In a sentence, to check the [uNEG] feature on neg-words, an abstract negative operator is assumed to be present, as shown in (131). *Pas* and *Op*¬ both yield their semantic negation and a double negation reading is yielded.

131). a. *Personne* (*ne*) mange *pas* (*rien*).[105]
Neg-body neg eats neg neg-thing
Nobody doesn't eat (anything)

b. Op$_{\neg[\text{iNEG}]}$ *Personne*$_{[\text{uNEG}]}$ (*ne*) mange *pas* rien$_{[\cancel{\text{uNEG}}]}$

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[105] Cited in Zeijlstra (2022).

So in French, both the negative markers, *pas* and *ne,* do not participate in NC, and this is what makes French a partial NC language.

For invisible NC, Zeijlstra also discusses English, Hindi/Urdu, and Punjabi, which all possess a negative marker that is a head but lack the neg-words that are taken as typical participants of NC. For details, see Zeijlstra (2022).

3.7.5 Neg-words in fragmentary answers and DE contexts.

In this subsection, the analysis proposed in this theory for the interpretation of neg-words in fragment answers and DE contexts will be discussed, beginning with neg-words in fragment answers.

Neg-words in fragment answers

As it has been already discussed in previous sections that neg-words in fragment answers seem to induce negation on their own. It was also shown in section 3.5 where it was argued that neg-words in fragment answers cannot contain negation if the question itself does not contain negation. Negation cannot be taken as elided in the answers in a positive question, it can be elided only in a negative question (Merchant, 2011).

In the syntactic agreement approach, it is assumed that neg-words carry a [uNEG] feature. So if a neg-word appears by itself in an answer, it is required that there must be an element with an [iENG] present to check the [uNEG] feature on the neg-word. The examples already discussed for Italian and Greek are shown again in (132) and (133), respectively. The analysis for both the examples under the syntactic agreement approach is given in (132c) and (133c), respectively.

132). a. Q: Chi hai visto ? Italian

To who saw.2SG

Who have you seen?

b. A: *Nessuno* *Alcuno.

To neg-person. *anybody

Nobody. *Anybody

c. [*Op*$_{\neg\text{[iNEG]}}$ *nessuno*$_{[\cancel{\text{uNEG}}]}$ ho viste]

133). a. Q: Ti idhes? Greek

What saw.2SG?

What did you see?

b. A: *TIPOTA/*tipota*

Neg-thing

Nothing/*anything.

c. [*Op*¬[iNEG] [*TIPOTA*[~~uNEG~~] [~~*dhen*~~[~~uNEG~~] ~~ida~~]]]

Neg-thing neg saw.1SG

Nothing

In (132c), the [uNEG] feature is checked and deleted by the [iNEG] on *Op*¬, and semantic negation is not elided but induced by the *Op*¬. As Greek is a Strict NC language, in (133c), where neg-words obligatorily appear with the negative marker *dhen*, both carry [uNEG]. *Op*¬ checks these [uNEG] and also induces semantic negation. So, no negation is elided in the Greek example too, and the condition introduced by Merchant (2010) is not violated. Zeijlstra argue that NPIs cannot trigger the presence of *Op*¬, that is why they cannot appear in fragment answers.

Neg-words in DE contexts

As it was shown in section 3.5 that neg-words in DE or non-veridical contexts e.g., comparatives, verbs like *doubt*, adverbs like *before*, etc., do not seem to induce negation but they are interpreted as similar to plain NPIs.

The theory under discussion proposes that the carriers of formal features need not be always semantically negative. DE and non-veridical contexts are among the cases which carry the formal feature [iNEG] but they are not semantically negative. Being the carriers of [iNEG], these elements check the [uNEG] feature of neg-words and ensure their grammatical occurrence in the sentence. The example for Spanish already shown in section 3.6 for the preposition *before* and the verb *doubt* will be shown again in (134-135), with their syntactic agreement interpretation. A similar interpretation also applies to comparatives.

134). a. *Antec* de hacer *nada*, debes lavarle las manos. Spanish

Before of do neg-thing, must.2SG wash.CL the hands

Before doing anything, you should wash your hands.

b. *Antec*[iNEG] de hacer *nada* [~~uNEG~~], debes lavarle las manos.

Before doing anything, you should wash your hands.

135). a. *Dudo* que vayan a encontar *nada* doubt.

1SG that will.3PL.Subj find neg-thing

I doubt they will find anything.

b. *Dudo*[iNEG] que vayan a encontar *nada*[~~uNEG~~].

I doubt they will find anything.

In Table 3.2, the inventory of negative elements and their formal features of the languages discussed in this section is presented.[106]

Negative property	**DN**	**NC Non-strict**	**NC Strict**	**DN/ Invisible NC**
	Dutch	Italian	Czech	English
	Overt negative marker			
Semantically negative	✓	✓		(not) ✓
Semantically non-negative			✓	(n't) ✓
Formal feature		[iNEG]	[uNEG]	(not) [iNEG] (n't) [uNEG]
	Abstract negative operator Op¬			
Semantically negative		✓	✓	✓
Formal feature		[iNEG]	[iNEG]	[iNEG]
	Neg-words			
Semantically negative	✓			✓
Semantically non-negative		✓	✓	
Formal feature		[uNEG]	[uNEG]	

Table 3.2: The inventory of negative elements and their formal features of sample languages

[106] The table provides a summary of morpho-syntactic negative elements proposed by Zeijlstra (2004, 2008, 2014). Empty box shows the absence, while the tick ✓ shows the presence of the property mentioned in the left most column for each language.

Table 3.2. presents the summary of negative elements showing that in the DN language, the Dutch, both, the negative marker and neg-words are semantically negative and no formal features are present. While both the negative marker, *non* and *OP*¬ in Non-strict Italian, are semantically negative as well as formally interpretable. Neg-words in both, the Strict and Non-strict NC languages are semantically non-negative as well as formally uninterpretable. The negative marker *n't* in English is semantically non-negative plus formally uninterpretable, while *not* and the *Op*¬ are semantically negative plus formally interpretable. English lacks neg-words.

Summarising, Zeijlstra argues that NC is a syntactic agreement. Building on the flexible formal feature hypothesis (FFFH), he argues that formal and semantic features are independent of each other (FFFH will be discussed in the next chapter). A particular formal feature does not need to be semantic as well as interpretable. Formal features may not contain semantic material always, as it was shown for DE and non-anti-additive environments. In Non-strict NC languages, the negative marker is the carrier of semantic as well as formal features of negation, while the neg-words are carriers of [uNEG]. In the absence of the negative marker with the pre-verbal or multiple neg-words, an abstract negative operator is introduced to induce sentential negation and to check the uninterpretable feature of neg-words. In the case of Strict NC, all the overt elements carry [uNEG], and an abstract negative operator works the same as it does in Non-strict NC language. Zeijlstra also tests more dimensions of NC. He argues that NC is a derived system in a set of natural languages that exhibits inter-language variation, so it cannot be the case that formal features make a part of UG but they are acquired by the language learners based on the linguistic input they are exposed to.

3.8 Review and conclusion

Briefly reviewing all the approaches discussed so far in this chapter, I will conclude this detailed chapter.

In all the approaches that are discussed in the several subsections of this chapter, there remained a few aspects that were partly addressed or left unaddressed. The first aspect was that of a two-fold analysis for neg-words. In the NQ approach, neg-words were analysed semantically negative just like the negative quantifiers in DN languages. Only in NC languages, to account for their negation, extra/non-grammatical operations like presumptive quantification and negative absorption were stipulated. The NQ approach is also not fully able to account for the partial presence of the negative marker in Non-strict and the obligatory presence of the negative marker in

Strict NC languages, especially when it is stipulated that neg-words are semantically negative themselves, and as universal quantifiers, they can undergo quantifier raising to induce sentential negation. In non-negative contexts like DE or non-veridical contexts, the semantic negation of neg-words was assumed to be lost as a result of merely a Spec-head agreement.

The NPI approach takes all the instances of expressions of negation as NPIs, and negation is induced by the abstract negative operator. The NPI status of the negative marker is distinguished from plain NPIs in that only neg-words can license the negative marker but not plain NPIs.
As it was shown in detail in section 3.5 that neg-words are very different from plain NPIs in terms of licensing conditions, licensers, lexical semantics, and exhibiting language specific properties. It was also shown that negation cannot be elided for neg-words in fragment answers.

The ambiguity approaches focus on all the three aspects of neg-words, namely, semantically negative, semantically non-negative (NPIs like), and ambiguous. Furthermore, ambiguity increases or decreases depending on the lexical semantics of neg-words, and the environments they are used in. So it is difficult to unify the analysis proposed by this approach. It is also not likely that ambiguity is a part of the grammatical system of any language and that it can be acquired or learned with no effort. In ambiguity approaches, not only neg-words but the negative marker may also be taken as ambiguous.

Lastly, for the approach NC as a syntactic agreement, based on the doubling effects, formal features of negation are detected. If the doubling effects are not present, the NC is also not present. So, this approach clearly distinguishes between DN and NC languages. Furthermore, the Strict and Non-strict NC are analysed independently to each other. The difference between the Strict and Non-strict NC is the difference between the features that the negative marker carries in both forms of NC. It is formally uninterpretable in the former but formally interpretable in the latter.

Formal features are also separated from lexical semantic features. It naturally follows from this that the lexical items that seem to license neg-words in non-negative contexts are not semantically negative but formally negative, i.e., carry interpretable formal features that can cause the grammatical occurrences of neg-words. The neg-words in fragment answers are also analysed the same way as in non-fragment instances, depending on the Strict or Non-strict aspect of NC.

The abstract negative operator is proposed only when no overt negative element can be interpreted as a negative operator and can check the uninterpretable features. The system proposed in this approach can successfully attest to the various dimensions of NC, other than typically been discussed Strict vs Non-strict. The theory also provides elegant cues for language acquisition, variation, and development.

NC as a syntactic agreement seems the most fine-grained theory that can capture the naturally occurring patterns of different systems of negation in different groups of languages. I will use the predictions this theory makes to investigate the acquisition of sentential negation and negative concord by young children in a number of languages. See chapter 7 for the prediction made by this theory.

In the next chapter, I will briefly summarise the systems of expressions of negation in sample languages, namely, Dutch, Italian, Standard English, and NC varieties of English: British NC and African American NC.

Chapter 4

System of negation in sample languages

This section will briefly summarise the system of negation in sample languages including Dutch, Italian, Standard English, and NC varieties of English. As negation in all these languages has also been already introduced or discussed to an extent in the previous sections, this section will provide an overview summary of all the observations that have been formed for negation particularly for these languages.

4.1 Negation in Dutch

While most of the research on negation has been carried out in English on English and other Romance languages, little research has been conducted to investigate the behaviour of negation in Dutch or Italian. In this subsection, the system of negation in Dutch will be summarised briefly.

It was shown in the previous chapters that Dutch expresses sentential negation using exclusively the negative marker *niet,* illustrated again in the examples below, cited in Zeijlstra (2004).

1). a. Jan loopt *niet*.
Jan walks neg.
Jan does not walk.

b. … dat Jan *niet* loopt.
That jan neg walks.
That Jan does not walk.

Niet occupies the fixed position in the sentence structure but depending on the sentence, verb, and object type, it may appear sentence internally or externally, as it is visible from the examples above in (1). The examples also indicate that mainly the position of *niet* is related to the finite verb which may take various positions in a sentence. Dutch is a V2 language where the verb moves to the position second irrespective of the constituent present in the sentence initial position. In the examples above, the *niet* follows the finite verb in (1a), and precedes the verb in the subordinate clause, in (1b). Unlike other V2 languages e.g., Swedish, Dutch does not allow topicalisation of the negative marker, as shown in (2).

2). *Niet* gaat Jan naar huis.[107]
Neg goes Jan to home
John does not go home.

Similar to English *not, niet* can also be used with nominals, as shown below in (3).

3). a. *Niet* Jan.
Neg Jan
Not jan.
b. *Niet* dit.
Neg this
Not this.

As it was discussed in chapter 2 that there is a debate in research over the presence of the negative projection NegP and the syntactic status of the negative markers. It was also discussed there that the negative markers that are syntactic heads can head their own functional projection NegP. Pollock (1989) suggested that NegP is present between TP and VP, but Ouhalla (1990) suggested that it is universally present above TP and above VP. Ouhalla also argued that NegP is present above TP in Romance and below TP in Germanic languages. Zanuttini (1991, and later) offers more flexible positions and argues that universally NegP is present in four different positions.

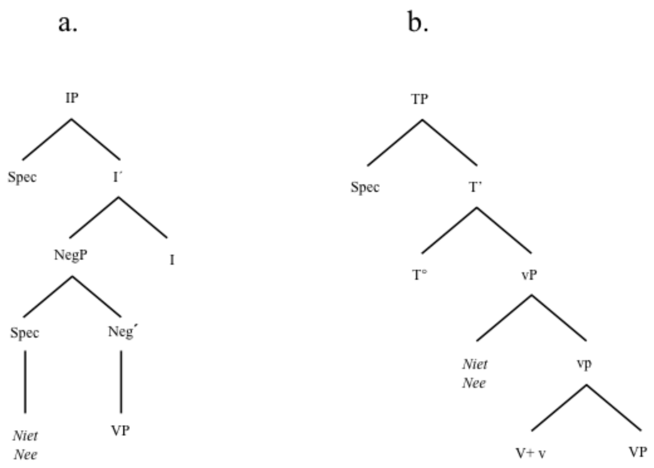
A later proposal (Zeijlstra, 2013 and later) argues that the position of NegP is flexible and not universally fixed. According to Zeijlstra, the minimal requirement for a negative marker is to scope over the vP to yield sentential negation, and this is what motivates the cross-linguistic variation in expressing negation. It is also argued that the negative markers that are Neg° can project a functional projection NegP and the ones that are XP, cannot.

It was also shown that based on several tests and diagnostics that the negative marker in V2 languages i.e., German or Dutch is an XP and thus cannot project its own functional projection. Meisel (1997), and Wojtecka et al. (2011) following Zanuttini (1991) argue that NegP is present in languages that have even an XP negative marker, which locates in Spec NegP and they assume an empty Neg°, as shown in (4a). It is, after Zeijlstra (2013, and later) assumed here that *niet* is an XP

[107] Cited in Zeijlstra (2007).

negative marker located in an adjunct position, above vP and no NegP is present in Dutch, assuming a structure like the one shown in (4b) below.

4).



Other than sentential negation, constituent negation is also expressed by the negative marker *niet* placing it before the constituent to be negated, as shown in (5). The sentence means it rained but not long ago.

5). Het regende *niet* lang geleden.
It has rain neg long ago.
It rained not long ago.

Besides *niet*, negation is also expressed by the negative particle *geen*, which is also used as an indefinite article and as a determiner, e.g., as in (6), meaning *no*.

6). a. Ik heb *geen* boek in mijn tas.
I have neg book in my bag.
I have no book in my bag.

b. Hij heeft *geen* zin in.[108]

He has neg lust in

He doesn't feel like anything at all.

As it has been already discussed in previous chapters that in Dutch, indefinite pronouns like *niemand*, *niets* are taken as semantically negative universal quantifiers that are able to induce sentential negation, shown in (7).

7). a. *Niemand* hoeft zijn huis te verkopen.[109]

Neg-body needs his house to sell

Nobody needs to sell their house.

b. Jan ziet *niets.*[110]

Jan sees neg-thing.

Jan sees nothing.

Negation is also expressed by the negative adverbs like *nooit (never), geen (no)*, and *nirgens (nowhere), etc.*

8). a. Hij heeft *nergens* zin in.[111]

He has neg-where lust in

He doesn't feel like anything.

b. Hij gaat *nooit* naar school.

He goes neg-ever to school

He never goes to school.

Dutch also exhibits yes/no questions and uses *nee* as a yes/no negator.

9). a. Q: Oh heb je dan al *geen* zon meer?[112]

---

[108] Cited in Zeijlstra (2004).

[109] Cited in De Swart (2010).

[110] Cited in Zejlstra (2004).

[111] Cited in Zeijlstra (2004).

[112] Examples are cited in Hoek (2013).

oh have you then already neg sun anymore

Oh is there already no more sun?

A: *Nee*

No.

b. Lag je te maffen meissie?

Lay you to sleep girl

Were you sleeping?

A: *Nee* …

No…

Modern Standard Dutch is a non-NC language[113] as shown again in (10), but some varieties e.g., Middle Dutch, West Flemish or colloquial Dutch are NC varieties of Dutch, cited in Zeijlstra (2007).

10). Dat Jan met *niets niet* tevreden was. Standard Dutch

That John with neg-thing neg content was

That John was not pleased with nothing.

11). a. *Niemand* en had mi *niet* gesien. Middle Dutch

Neg-person neg has me neg seen

Nobody has seen me.

b. Da Valère me *niets* ketent *en*-was. West Flemish

That Valere with neg-thing content en-was

That Valere was not pleased with anything.

c. Je geeft me *nooit geen* aandacht. Colloquial Dutch

You give me neg-ever neg attention

You don't give me any attention.

Dutch also exhibits NPIs which are licensed including negation, in almost all the environments that were extensively discussed in section 3.5 for the licensing of NPIs. A couple of examples are shown below. Negation, and numeric quantifiers can license NPIs, as shown in (12) and (13).

[113] Only the modern standard Dutch (a DN language) will be taken as a sample language for this dissertation.

12). *Hoogstens zes* agenten hebben *ook maar iets* bemerkt.[114]
At most six cops have anything (at all) noticed
At most six cops noticed anything (at all).

Dutch NPIs consist also of verb like *hoeven* (need) and idiomatic expressions like *poor de poes* which may mean *soft*. Both the expressions give NPI reading under negation.

13). a. Jan *hoeft niet* te koken.[115]
John need neg to cook
Jan does not have to cook.

b. Zij is *niet voor de poes*.
She is not for the cat
Lit: She is tough.

Summarising, the system of expressing negation in Dutch contains a negative marker *niet*, a yes/no negative marker *nee*, negative quantifiers, negative adverbs, and prepositions. All of these and other typically NPI licensing contexts can license NPIs. Dutch exhibits one to one mapping of form and meaning for negation for standard variety but some of its varieties also exhibit NC.

In chapter 5, the research that has been reported so far for the L1 acquisition of negation by young children will be discussed. Chapter 10 will present the results for the empirical child data analysed for the acquisition of negation.

4.2 Negation in Italian

In the previous chapters, it has already been discussed that in Italian sentential negation can be expressed using various negative markers i.e., negative marker, neg-words, or by a combination of both. It was also discussed there that the sentential negative marker *non* is a pre-verbal negative marker that always precedes the finite verb.

14). Gianni *non* ha telefonato.
Gianni neg has called

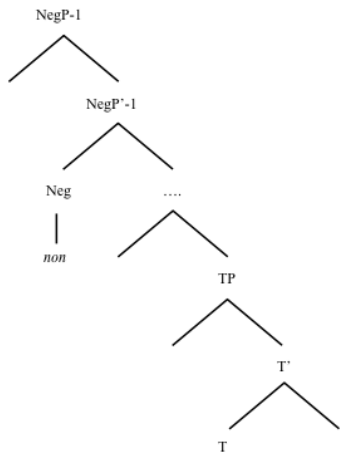
[114] Cited in Zwarts (1996)

[115] Cited in Zeijlstra (2022).

Gianni didn't call.

In section 2.3.1 it was shown that *Non* is a Neg°, that can project its own functional projection NegP located above TP, which Zanuttini (1991, 1997) labels as NegP1, shown in (15).

15).



Other than *non* Italian has a negative marker *no* used to express negation in yes/no questions as shown in (16).

16). Q: Avete vinto?[116]
Did you win?
A: No.
No.

Content words like *refiuto* and *impercettibile* and the preposition *senza* are also used to express negation.

17). a. *Rifiuto* di parlare.[117]
I refuse to talk.

---

[116] Cited in (Altuna et al, 2017).

[117] Examples a and b are cited in (Altuna et al. 2017).

b. Un *im*percettibile odore inondava la stanza.

An imperceptible smell invaded the room.

c. Me ne sono andato *senza* the Gianni dicesse poi molto.[118]

I left without Gianni saying all that much.

Italian NPIs are licensed in almost all the environments that have been discussed in section 3.5. Few examples are shown below. Conditional *se* (18a), question (18b), preposition *senza* (18c), predicate *dubito* (18d), and negation (18e).

18). a. *Se* Gianni mangera *mai* dei broccoli, scoprirà quanto sono buoni.[119]

If Gianni ever eats broccoli he'll find out how good it is.

b. Hai visto *alcunche*?

Have you seen anything?

c. Me ne sono andato *senza* the Gianni dicesse *niente*.

I left without Gianni saying anything.

d. *Dubito* the se ne sappia granche.

I doubt that much is known about it.

e. *Non* the abbia visto *nessuno*.

It's not that I saw anyone.

As it has been discussed extensively that Italian is an NC language where two or more than two negative elements yield a single semantic negation.

19). a. Gianni *non* ha telefonato *nessuno*.

Gianni neg-has telefoned neg-body.

Gianni has not called anybody.

b. *Nessuno* ha telefonato *nessuno*.

Neg-body has telephoned neg-body.

Nobody has called anybody.

---

[118] Cited in Aquaviva (1997).

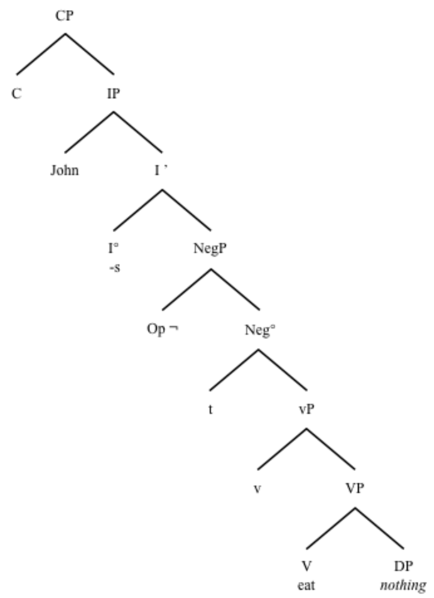
[119] All the examples in (18) are cited in Aquaviva (1997).

In the next chapter, the acquisition of negation in Italian will be discussed. Chapter 9 will present the results for the child data analysed in this dissertation for the investigation of the acquisition of negation and negative concord in Italian.

4.3 Negation in Standard English

Standard English (SE) is known as a DN language since every negative element in a clause yields its own semantic negation, as it has been shown in the previous chapter. SE is also a unique language such that it has a negative head that projects its own functional projection NegP, unlike other typical DN languages. It also has two negative markers; *not* which is taken as an adverbial negative marker and possibly carries the specifier position of NegP. The functional projection NegP is projected by a negative head *n't*. *N't* is a contracted form of *not* which attaches to auxiliaries i.e., be (have and copula form), modal auxiliaries, and do support, and may move to a higher projection. The syntactic structure of negation in English is given in (20).

20).



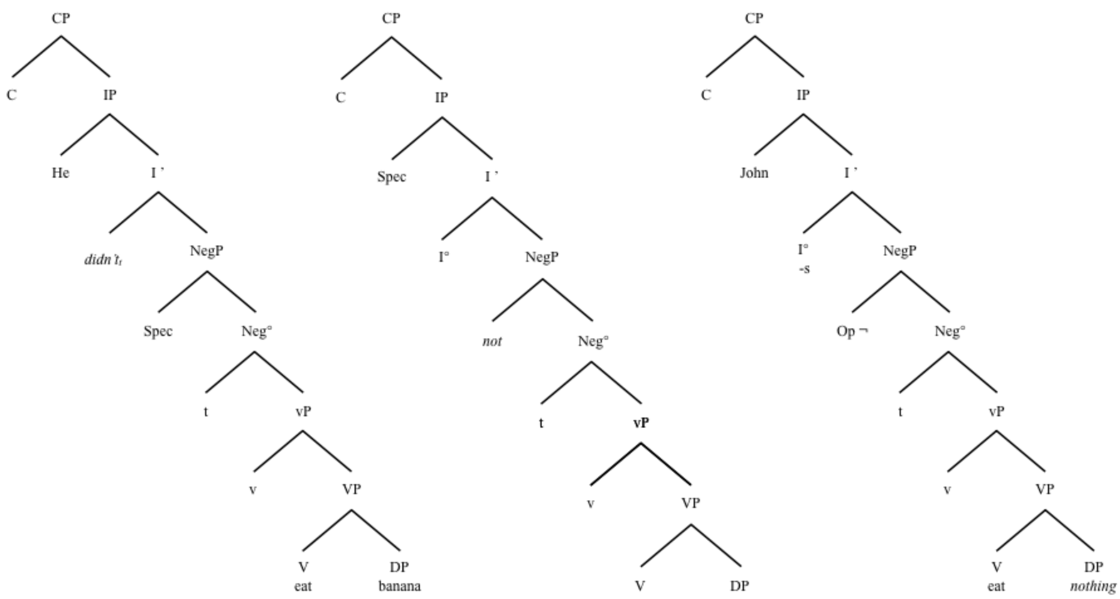
The syntactic structure of the example given in (21a-c) is given in (21d-f) respectively. NegP in English is assumed as posited below TP/IP and above VP.

21). a. John did*n't* eat banana.

b. John did *not* eat banana.

c. John eats *nothing*.

d. e. f.



SE also exhibits negation using the yes/no negative marker *no*. For example, in (22).

22). a. Q: Do you like Semantics?
A: No.
(I don't like semantics).

b. Q: Have you watched Lala Land?
A: No
(I haven't watched Lala Land).

Negation is also expressed using the negative quantifiers like *no*, *nobody*, *nothing* etc.

23). a. There is *no* one here.

b. *Nobody* has arrived yet.

c. I like to eat *nothing*.

In SE a combination of two negative elements always yields DN reading, as was shown in the previous chapter. It was also shown in section 3.5. that English has plain NPIs like *any*-term, which are licensed in almost all the environments discussed there.

It was also shown in the previous chapter that SE is an invisible NC language because according to Zeijlstra (2004,) diachronically SE is in a transition stage from its DN stage to a full NC stage supported by evidence like, a) it has a pre-verbal Neg° *n't*, similar to all the NC languages attested in Zeijlstra (2004), b) plain NPIs in SE when used under negation give rise to single semantic negation, similar to neg-words when used under negation in NC languages, c) NC is quite frequent in non-standard varieties of SE where *n't* participates in NC when used with negative quantifiers like *nobody*, *nothing*, etc.

As was shown in section 3.7 that SE does not exhibit NC overtly, but non-standard varieties of English do exhibit NC. Chapter 8 will present the results for the acquisition of negation in child SE.

Below, non-standard varieties of English which are NC, will be discussed very briefly.

4.4 Negation in Negative Concord English

In this section, the NC varieties of English (henceforth NC-E) for North American and British English will be summarised. Given that the negative elements (*not*, *n't*, negative quantifiers) used to express sentential negation in SE and NC-E are the same so it is expected that the syntax of negation would be similar in both varieties of English. Given that both the varieties of English express single semantic negation, no matter using a single negative marker or multiple negative markers, so it is also expected that there is only one syntactic and semantic negation in NegP.

Smith (2001) argues that NC is a widespread phenomenon in English. American NC-E includes Appalachian English, African American English ((AAE, also named as Black English, African American Vernacular English), Alabama English, and New York English, to name a few (Green, 2002; Labov, 1966/2006; Labov, 1972; Howe, 2005, 1997).

British NC-E includes dialects from almost all the regions of Great Britain, i.e., Ireland (Belfast English), Southwest (Bristol English), Northern (Scotland England), Wales, to name a few (Anderwald, 2002).

It is reported in the literature that NC-E exhibits extensive variation based on the dialect, region, or variety itself that it is hard to define the clear differences in terms of Strict vs Non-strict.

NC-E varieties of American and British English exhibit properties of both Strict and Non-strict NC and even more which do not belong to any of these two groups of NC (Labov et al. 1968; Labov, 1972; Ladusaw, 1992; Anderwald, 2002; Smith, 2001; Blanchette, 2015; Blanchette & Lukyanenko, 2019; Blanchette, et al. 2018; Tubau, 2008, 2014, 2016; Tottie, 2002, 2009; Szoke, 2010; among others).

Blanchette (2015, 2017) and Robinson (2021) reports detailed micro syntactic variation in varieties of American NC-E. Blanchette argues that some NC-E varieties display only the subject NC or the Object NC. Subject NC contains a pre-verbal neg-word and a negative maker while the object NC is said to be the case where a post-verbal neg-word co-occurs with a negative marker. NC-E varieties differ in displaying these patterns; exhibit either one or both.

I will discuss NC-E with respect to only Strict, Non-strict, and a couple of unique properties of NC-E. Examples for strict NC are shown in (24-26).

Strict NC-E

In Strict NC-E, neg-words always co-occur with the negative marker. (24) shows examples for pre-verbal neg-words, and (25) for post-verbal neg-words.

24). a. *Nobody* can't get in this.[120]
b. *No* game do*n't* last all night.
c. *Nobody* do*n't* bother with them, do they?
d. *No one* did*n't* recognise her.

25). a. Bruce do*n't* want *no* teacher telling him *nothing* about *no* books.[121]
b. Ai*n't* got no more pages.
c. They did*n't* see *nothing*.
d. He has*n't* done *nothing*.

Like all other Strict NC languages, NC-E also exhibits constructions using neg-words in both positions; pre/post-verbal.

[120] Examples (a) and (b) are for AAE, cited in Green (2002). Examples (c) and (d) are for British NC-E, cited in Anderwald (2002).

[121] Example (a) and (b) are for AAE, cited in Green (2002). Examples (c) and (d) are for British NC-E, cited in Henry (2016).

26). a *Nobody* did*n't* eat *nothing* in breakfast.[122]

b. And till today I can work enough arithmetic that *nobody* ca*n't* cheat me out of *nothing*.

Non-Strict NC-E

In Non-strict NC-E, a post-verbal neg-word co occur with a negative negative marker (27a-b). Two neg-words also co-occur, as in (27c-d).

27). a. He did*n't* have *no* more in here.[123]

b. They do*n't* have no training wheels.

c. *Nobody*'d *no* idea.

d. … and *nobody* used to say *nothing* to him.

Only a pre-verbal neg-word can also yield the sentential negation in Non-strict NC-E.

28). a. *Nobody's* as fly as me.[124]

b. *Nobody* fights fair.

NC-E speakers also used NPIs under negation. as shown in (29a), and (182b) for British NC-E.

29). a. No. I do*n't* want anybody to die in my family.[125]

b. I have*n't* ever thought anything about it.

c. *None* of them could*n't* do anything.[126]

NC-E also exhibits the use of neg-words in fragment answers.

30). a. Q: Who called you yesterday?[127]

---

[122] Cited in Blanchette (2017).

[123] Examplesa (a) and (b) are for AAE, cited in Green (2002). Examples (c) and (d) are cited in Tubau (2008).

[124] Examples are cited in Tubau (2008), the example in (a) is also cited in Labov (1972).

[125] Examples (a) and (b) are cited in Labov (1972) for American NC-E.

[126] Cited in Tubau (2008). Also see Tubau (2013).

[127] Cited in Tubau (2016).

A: Nobody.

b. Q: Who attended the party?

A: Nobody.

4.4.1 Unique properties of Negative Concord English

In this subsection, the unique properties of NC-E will be summarised briefly. These properties are unique to NC-E since they have not been reported for other NC language.

1. *Expressing negation using only post-verbal neg-words*

NC-E exhibits some very interesting and unique patterns that are present neither in Strict or Non-strict NC. For example, no Strict or Non-strict language exhibits negation using only post-verbal neg-words, but NC-E does, as shown in (31) below.[128] For a detailed discussion of this unique aspect of NC-E, see Blanchette (2017) and Tubau (2008) among others.

31). a. I paid *no* money, for I did*n't* have it.

b. He took *nobody* on the trip.

c. But he had *no* music.

d. We had *no* horse or *nothing*.

2. *Negative auxiliary inversion (NAI)*

NC-E also NAI in which a negative auxiliary appears before the pre-verbal subject neg-word, similar to a yes/no question but with declarative NC reading, as shown in (32), (Foreman, 1999; Green, 2002; Zanuttini & Bernstein, 2014; Martin and Wolfram, 1998/2021; Howe, 1997).

32). a. Did*n't nobody* live in there then.[129]

b. Did*n't nobody* get hurt or *nothing*.[130]

c. Ai*n't nobody* in my family Negro![131]

---

[128] Examples (185a-b) are cited in (Blanchette (2017), and example (185c) is from Labov (1972).

[129] Cited in Blanchette (20XX).

[130] Cited in Tortora (2010), also in (Wolfram and Christian, 1976).

[131] Cited in Labov (1972).

d. Do*n't nothing* come to a sleeper but a dream.[132]

Such NAI construction also appears without NC reading in NC-E varieties, as shown in (33). Smith (2001) shows a detailed picture and analysis of such construction for NC-E. Non-negative auxiliaries cannot be inverted, as shown in (33c), but when a non-negative auxiliary is used, a non-negative form of indefinite is used, as shown in (33d).

33). a. Didn't everybody live in there then.

b. Freeze! Don't another person move!

c. *Do nobody want to go to the movies.

d. Do anybody want to go to the movies?

3. *Ain't in NC-E*

Many non-standard varieties of English also use the auxiliary *ain't* to express negation, for the present tense *be* and *have + not*, as shown in (34a-c) below, but in AAE it is also used for past tense *do* + *not*, as shown in (34d) (Fisher 2018). *Ain't* is used for all person and number, forming no person distinctions (Anderwald, 2002/2003). For a comprehensive overview of the origin, use and functions of *ain't* see (Labov. et al. 1968; Wolfram, 1969, Weldon 1994; Anderwald, 2005, 2005; Henry, 1998, 2002, 2005, 2016; among others).

34). a. I *ain't* tired. (I'm not tired).

b. We *ain't* gonna finish. (We aren't going to finish).

c. What do you expect, you *ain't* been round here, have you? (You *haven't* been around here).

d. I *ain't* believe you that day, man. (I *did not* believe you that day, man).

4. *Intra-speaker mixing of Neg-words and NPIs*

Speakers of NC-E also show the production of constructions where they use both, neg-words and NPIs in the same sentence, as shown in (35) below.

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132 Example is cited in Green (2002).

35). a. *Neither* of my brothers would*n't* do *anything*.[133]

b. We *never* did go to school with *any* coloured people or *nothing* at Eulaton.[134]

c. Way back yonder did*n't anybody* have *nothing* then.

Chapter 11 will present the results for the child NC English for the acquisition of negation and negative concord.

4.5 Conclusion

Summarising, in this chapter, the system and patterns of negation in sample languages were summarised briefly. Dutch is a DN language that expresses sentential negation using a negative marker that is an adverb, and negative quantifiers. SE also exhibits the same patterns in addition to using also the negative head *n't*. Italian uses the negative head marker *non* to induce sentential negative marker. Being an NC language, Italian also uses multiple negative elements to express sentential negation. NC-E is another unique variety that expresses a number of properties of both; DN and NC languages. Various theories explaining the status of negative markers, neg-words, functional projection NegP, and their position in the syntactic structure were discussed in the previous chapter.

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[133] Cited in Tubau (2008).

[134] Examples (b) and (c) are cited in Feigin (1979).

Chapter 5

The acquisition of sentential negation and negative concord

Pinker (1994) states 'language acquisition is the jewel in the crown of the cognition. It is what everyone wants to explain'.

Studying and explaining the acquisition of language by young children has been given prime focus by the cognitive, psychological, neurological, and linguistic research. It has widely been investigated what makes young children to master their language quite earlier when many other behaviours and skills are learnt quite late. It is also argued that adults do not teach every possible word (possibly 50,000 - 250,000 words) or phrase of a language to their children, children learn most of them in their early years, before going to the formal education system (Aitchison, 2003; Lust, 2006).

The most simple and earliest studies of language acquisition used the note taking technique to describe what children talk. Parent researchers (de Villiers and de Villiers, 1974; Maratsos and Kuczaj, 1975; Stern & Stern, 1907; Jordens, 1998, 2002; Wode, 1976, among many others) used this note-taking technique to study the acquisition of language by their own children. These studies provide detailed information about what children said in what contexts. Later, tape recorders and parents' reports were used for this purpose. In the times of most advanced technology, the intermodal preferential looking paradigm, eye tracking system, the use of neurophysiological measures, and imaging techniques have been used to collect data for child speech. For most of the data available for a number of languages, the Child Language Data Exchange System (CHILDES) (MacWhinney, 2000, et seq.) provides access to the scripts and phon data of typically developing monolingual, bilingual, and children with some visual, brain, and language impairment.

After stating the bigger questions in the language acquisition research, this chapter reviews the major theories proposed over the past several decades to explain the data and the information provided by language acquisition studies.

The first half of the chapter will contain the major theories and approaches adopted to study the problem of language acquisition. The second half of the chapter will provide the discussion for the acquisition of negation and negative concord in child language.

5.1 The bigger questions

Two points play a role in shaping the bigger questions in the filed of language acquisition. First, positive evidence does not explicitly contain the information which is considered necessary to acquire the final state of language. Second, negative evidence is also not available which may guide the child during the process of acquisition. Despite the truthfulness of both of the points, still, children can master their language very early.

Both the points contribute in forming several questions that acquisition research tries to find answers for.

One question is: What does a child bring to the task of language acquisition? Or what is the initial state? (Bavin, 2010). The brief discussion in this chapter will illustrate that although there prevail several points of disagreement among the proponents of different theories, they all agree on the fact that the child comes to the table of language acquisition prepared to acquire. The difference in their respective arguments lies in what they think the child to be prepared with, whether it is the case that the child is equipped with the general understanding of what a language is or there are some specific mechanisms that will guide the child to learn a language.

The question of whether the linguistic conception is innate, or the general cognitive abilities are enough for a child to learn a language, has not been agreed upon yet. One group of theories suggest the view that the same general cognitive abilities guide the child to learn a language. The other group argues for a separate and independent cognitive system that leads to the acquisition of the language.

Another question is whether there are biases or constraints that can influence the acquisition process of a language for a child? if yes, from where and when do they originate and are they universal? Among a variety of arguments, it is also argued that biases generate as a result of a child's exposure to a language, Smith (2000). It has also been an important aspect to investigate whether children passing through various developmental trajectories show similar patterns while acquiring one or more languages together or at different times? Or do children tend to be similar or differ in their acquisition preferences cross-linguistically? Besides, a final question has been how the study of divergent language development helps understanding natural language acquisition? Most of the parts of these questions are still partially answered, unanswered, or under conflict.

5.2 Theories of language acquisition

To date, several behaviourists and rationalist/nativist/generativist theories and approaches have been put forth to explain child language acquisition. Both kinds of theories oppose each other in, a) the absolute origin or source of language, b) the initial state, and c) methods or mechanisms of acquisition. A rationalist theoretical approach proposes some innate knowledge while the behaviourist approach proposes that learning based on the input is the actual knowledge of any language, and the state of mind is a *tabula rasa,* a blank slate. Also Tavakoli (2013).

5.2.1 Behaviourist theories

Following the psychological accounts, Behaviourism begins with Watson (1913), which presents several assumptions about behaviour. Mainly that behaviour is observable and learned from the environment, its learning is similar in humans and animals, it is a result of stimulus-response pair, and its analysis should be based on science, etc. Language learning is considered on a par with other behaviours that can be learned through imitation, associative learning, and reinforcement. The interaction between the stimulus and response is built upon naturally given that the source for both is provided.

Skinner (1938, 1948, 1971, et seq.) introduces the modern form of behaviourism and argues for the presence of some innate behaviours and the role of genetic components in its shape. Skinner's learning theory of behaviourism is based on stimulus, conditioned response, and reinforcement. He argues that stimulus is provided to the child by adults in the form of language input. Children respond to it accordingly, i.e., they listen to adults naming something and learn the word and its meaning. This is called stimulus-response conditioning. At the same time, Skinner also accepted that not all the language or behaviours can be learned in response to some stimulus or children learn many behaviours without any stimulus provided to them directly, simply from the environment. Positive reinforcement encourages correct learning while negative reinforcement discourages incorrect learning. See also Zale, et al., 1968; Lieven, 2010.

Several constructive, functional, usage-based, and socio-pragmatic approaches followed behaviourism to explain language acquisition.

A constructivist proposal for language learning assumes that a child does not have an inborn knowledge of the grammar of any language, but of course, the child is born with a human specific ability to learn a language (Skinner, 1938). This proposal assumes that the child is not born with the grammatical categories such as nouns and verbs, etc., but all the knowledge of a language that a child acquires is based on the generalisations that a child draws by hearing the speech around her. Most of the constructivist proposals are input-based, assuming that input as a whole is the basic driving force behind a child's acquisition of her language.

Functional or usage-based approaches propose that a child's acquisition of her language is driven by the desire to use language, i.e., to express needs and emotions (Tomasello, 2000a, b). The function of communication instigates a child to use language. They argue that language expressions revolve around two aphorisms, a) meaning is use, and b) structure emerges from use. Empiricist socio-pragmatic approaches propose that children's learning ability is deeply connected with their ability to make socio-pragmatic inferences about the focus and communicative need of children, for example, looking at an object and talking about it.

Bates and MacWhinney (1989), MacWhinney (2000), Elman et al. (1996), Slobin (1973, 1985), and Austin, et al. (2014) advocate emergentist approaches to language acquisition and describe emergentism as a way to 'linking a growing understanding of the brain with new theories of cognition'. They argue that words or language expressions are generated and regenerated to serve communicative functions. Language rules, principles, or constraints do not exist by themselves in the language but are basically the physical features of the language. The computation of language is controlled by the functioning of input, and a process of emergence. Elman et al. (1996, 124) do accept the innateness of language but not in the way as Chomsky does.

Unlike earlier behaviourist empiricist approaches, later behaviourist approaches accept and propose the presence of an innate capacity (Slobin, 1985), the ability of networking (Elman et al., 1996), and an appeal to connectionism between language and mind (Prince & Smolensky, 1991; Smolensky, 2000). It is argued that language is learned not in any language specific cognition but by the general cognitive domain which is responsible for all the other aspects of child development.

So for the role of the child, it is argued that the first responsibility of the child is to recognise the intentions and goals of adult speakers which they express in their language use (linguistic input) and to learn those expressions culturally through paying attention. The second important responsibility of a child is to find patterns in the input and to use those patterns to produce more speech beyond the input she receives. So, paying attention and finding patterns are regarded as two important cognitions that a child requires to learn a language.

Tomasello (2003) argues that there exists no poverty of the stimulus if the linguistic competence is assumed as a store of grammatical constructions and the child is assumed to possess the required learning skills (such as categorisation, analogy, making distributions, and schemes). He argues that all the linguistic constructions (questions, passives, transitives, imperatives, etc.) that a child learns in her early years are abundantly available in the input that a child receives right from birth. And, the acquisition of all such linguistic constructions is facilitated by cue availability (frequency of the input), cue reliability (consistency of the available input), and cue cost (complexity of the input) (Lieven & Tomasello, 2008). Observing closely all these three input variables, predictions about the age and stages of acquisition can be drawn (Bates & MacWhinney, 1989; Dittmar et al., 2008). The whole learning process is conducted in the general cognitive domain, assuming that the human beings show the possession of the same general cognitive abilities as other living species when it comes to learning a language.

To summarise, it is discussed above that under behaviourism, imitation and reinforcement were considered as two basic models to acquire a language. But a closer look at the language produced by children in their early years exhibits that imitation is clearly insufficient to acquire a language. Some children produce the same words or sentences that they hear from their environment but most of the children are not just imitators (Bloom et al., 1974). Also, all the initial child language is not just imitation. Children are selective, they do not imitate everything they hear. They imitate only the parts of sentences and produce their own unique expressions.

As for reinforcement, positive reinforcement may encourage the child to speak more or keep the correct language expressions but provision of negative reinforcement is rarely reported in the literature. Parents very rarely provide negative reinforcement to their child specifically for acquiring the language. Is is also not clear how the reinforcement will guide the child to generalise the abstract language rules.

5.2.2 Nativist theoretical approaches

Proponents of nativist approaches argue that it is not possible to explain language and its infinite productivity, intricacy, and order by just picking the words and behaviours from the adult speech or environment and copying them. Nativists also argue that it is not possible to learn the complex or abstract concepts just by itself or from out of nothing (cf. Watson, 1913; Skinner, 1938, 1948, 1971; Bates and MacWhinney, 1989; Elman et al., 1996; Tomasello, 2003, among others).

Poverty of the stimulus

The poverty of the stimulus has been discussed and present in one or the other form in the major works of Chomsky (1957, 1961) and his contemporaries. In his earlier works, Chomsky argues that input is a large and contains the particular information in a comprehensive way but later, Chomsky (1967) argues about the restricted and deficient input a child receives to build an infinite set of utterances in her language.

Baker (1979), Smith and Wilson (1979), Chomsky (1980), Baker and McCarthy, (1981) and Hornstein and Lightfoot (1981) extensively talked about what has been entitled either *the poverty of the stimulus* (Chomsky 1980), *the logical problem of language acquisition* (Baker and McCarthy, 1981), or *the deficiency of the data* (Hornstein and Lightfoot, 1981), *Plato's problem* (Chomsky 1986), *deductive gap/projection problem* (Baker, 1981/1982), *the learnability problem* (Wexler and Caulicover, 1980; Pinker 1984), etc. Also see Pulum, et al., 2002; Dubinsky and Grady, 2000).

The main claim of generativists with respect to the poverty of the stimulus has been, a) the data is deficient, b) it is noisy or degenerate; the data contains fragments, ungrammaticalities, incomplete sentences, and slips of the tongue, c) the data is finite, d) the data faces the absence of the inter-relations of synonyms (eventual competence), e) the data does not contain the information about the ambiguity and ungrammaticality that is recognised by all speakers of a language.

Roepper (2009) argues that the central point of acquisition research revolves around understanding how young children attempt to acquire fully grammatical language. He argues that the major problem does not lie in explaining that how young children acquire only the grammatical strings of their language, but the problem is to explain how children analysed that information which in turn enabled them to learn only that grammatical strings and not the incorrect or 'ungrammatical' expressions of their language. And, this is considered as the exact domain where the input provides very little (smaller chunks of repetition of linguistic expressions, limited corrective feedback) to no information to the child. Investigating this aspect of the acquisition process can help in figuring out to what extent children are innately equipped to learn a certain type of analysis of linguistic units.

Crain and Nakayama (1987) and Crain and Pietroski (2001) gave the concept a new gist arguing against the idea that the child deduces the information from the input data but argued that data derive children through linguistic space, the space that UG provides. Since then, the focus of such empirical generative research has been that a) either a child exhibits the knowledge of a language that is assumed as unlearnable from the mere induction of the input, b) inability of the input to inform learners about a certain linguistic feature, c) if the linguistic feature in question was not found in the child speech, its absence or failure was assumed (Rice et al., 1999). In the most recent forms, the poverty of the stimulus has taken the form of a claim that the input provided to a child does not contain the most critical aspects of the child's eventual linguistic competence, and this makes the hallmark of the current learnability problem.

Lashley (1951, 1960) was one of the earliest scholars who noticed that behaviourist studies are consistently ignoring the orderly or logical arrangements in the units of sequenced patterns. He argued that behaviourism describes the conditions of input and immediate switching in the (nervous) mechanism without taking into consideration 'what is already going on within the system'. He adds that input is not just a static set of expressions but itself is an active, and organised system. In any learning organism, the learned behaviour is the one that emerges from an interaction between the organised system and any designated stimulus of the input. He further argues that in a language, syllables, words, phrases, and sentences all are based on some serial and order. They are not organised as an associated chain. Whenever there is an order, the units are organised in a logical serial, so what determines the order and how is it learned is a question of utmost importance.

Lashley's groundbreaking work on such observations led contemporary researchers to take the rationalist or cognitive paradigm to study language and its acquisition by a child. Lashley himself too struggled to find the proper answers for his own question he raised in his works.

Chomsky (1986) was one of them who from the earliest of his career criticised behaviourists or behaviourist empiricists and argued that stimulus, response, or any type of reinforcement does not have any strong link to language and behaviour learning. Chomsky (1959, 576-578) argues that ignoring the contribution of children in language acquisition presents only a 'superficial account of language acquisition', and 'our capacity to generate language crucially determines our capacity to perceive language. It appears that we recognize a new item as a sentence not because it matches some familiar item in any simple way, but because it is generated by the grammar that each individual has somehow and in some form internalised. And, we understand a new sentence, in part, because we are somehow capable of determining the process by which this sentence is derived in this grammar'.

As pointed out by Lashley, Chomsky, based on his theoretical and empirical studies, proposes a generative grammar, an element of the brain/mind that is responsible for providing syntactic information to generate language. For him, the ultimate source of generating the language is not the input but the brain. The mechanism of acquisition of language depends upon the mental ability to generate language i.e., receiving input and deducing new information. And the initial state is biologically programmed prior to experience in a way that it generates new language and constrains its forms.

Chomsky's language faculty (1986, et seq.) involves an innate hypothesis and language acquisition device, according to which brain/mind is involved in identifying and extracting through mental computations. The idea of the language acquisition device led the subsequent researchers to assume that there is some innate grammar printed inside the child's brain for every specific language and provided with the respective input, the innate grammar will develop that language. After that Chomsky modified his theory of language faculty and introduced Universal Grammar (UG).

Chomsky (1995) argues that UG makes a part of the human genetic endowment and of the mind and brain. It is already there in human mind as an initial state. More specifically, UG is not defined as a grammar of some particular language but a set of principles available universally, ahead of the experience.

Chomsky distinguished language acquisition from general learning to recognising language acquisition as a computational cognitive process. Chomsky (1995) discriminates I-Language from E-Language: I-Language is the internal computational system of the human mind but E-Language is the one that we use to communicate with the outer world. E-Language is the output of I-Language. I-language or the computational system of the brain generates an infinite set of expressions of E-Language. Chomsky consistently explains I-Language in his subsequent works.

Figure 5.1 adapted from Chomsky (1995, 219) shows the components of UG. It explains that I-Language/UG interacts with auditory and conceptual interfaces and generates E-language/ communicated speech. To perform this complex function several branches of linguistics help the child.

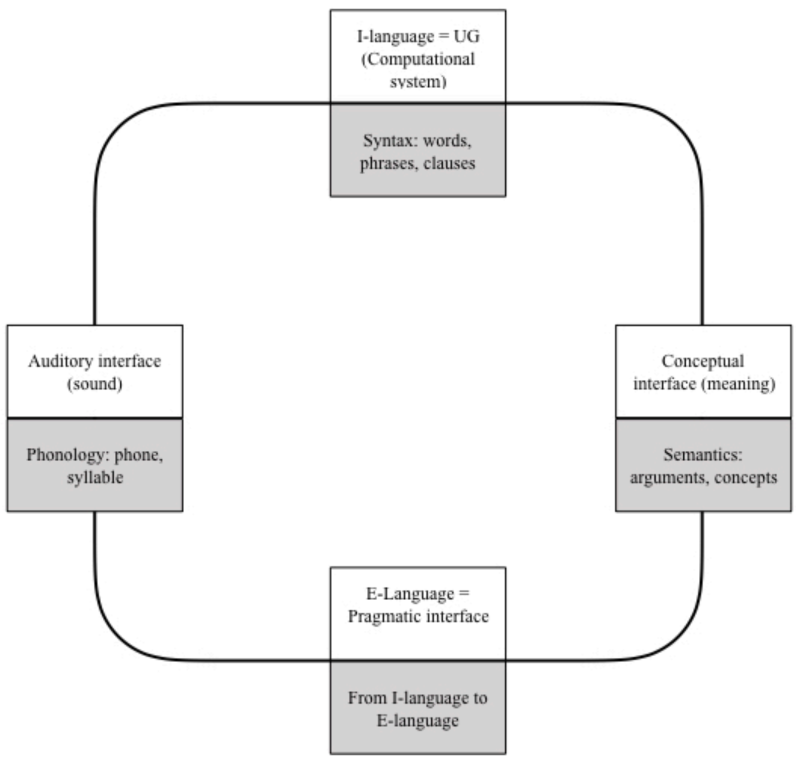

Figure 5.1: The components of UG.

The improvement in linguistic scientific research over the years has modified, improved, and developed the contents of the language faculty. Chomsky (1986) and later Hauser, Chomsky, and Hauser et al. (2002) see linguistic computation as distinct from other cognitive abilities (cf. Pinker & Jackendoff, 2005).

Several questions have been raised about the nature of UG and its interaction with the input. For example, what are the preconditions of UG and does it reflect the child's input? Does the mind have any knowledge printed prior to experience? Does UG develop over time? How are the child and input related? How are UG principles applied and how parameters are set? If children are not born with any specific language imprints, how will they set language specific constraints and parameters? If children use the input to learn a language, they must do the processing of primary linguistic data, and if errors occur, they are informed that the processing they made is incompatible with their hypothesis, then how do they re-switch the parameter? etc.

One of the influential theories proposed to argue for the nature of UG is the theory of maturation (of UG) (Felix, 1988; Wexler and Manzini, 1987; Radford, 1990; Borer and Wexler, 1992, Crain and Pietroski, 2002; among others) which recognises the developmental changes in the child's knowledge of grammar and language.

Within the theory of maturation, two hypotheses are proposed. Wexler and Manzini (1987), Felix (1988), and Borer and Wexler (1992) proposed the Maturation of UG and argue that UG is a genetic program guiding the growth of grammar that determines the developmental steps in the acquisition of grammar. Initially, UG constrains the early system of language. The principles and properties of UG will be available to the child but may not be operational, initially. They will become operational and *mature* in a specific order with the passage of time as the language *grows* in the brain. The stage determination can also be explained based on the maturation process. Under this claim, certain properties of grammar are argued to grow or mature over time. Wexler and Manzini (1987), Felix (1988), and Borer and Wexler (1992), Wexler (1998, 2000), among others, argue that if young children are sometimes not able to produce grammatical speech, performance factors are the major cause to play a role in it, is not a plausible explanation. Since, performance systems do not include grammar but only strategies. The maturation hypothesis can explain the varying properties of child speech which grows rapidly, and contains many overlaps. The role of the input would be different at different times i.e., during maturation, relevant positive input establishes the modifications in the analysis of grammatical representations.

The hypothesis faced several problems and criticism such as if the whole of UG is not readily available to the child, there is a possibility that some wild grammar could be generated. And any wild sentence or grammar generated by the child could be argued as a result of the latency of UG.

An alternative hypothesis proposes (Radford, 1992, among others) that UG is readily available to the child but the functional categories are subject to maturation and not used by the child in the early stages. Children's early speech consists of only the lexical categories of their language.

Summarising, the table 5.1 provides the summary of the major claims that behaviourist and nativist theories make, as discussed above.

Behaviourism	**Nativism**
i. Language is learned from the experience, input and environment.	i. Language is learned through the mental computational system
ii. Imitation, sensory motor experience, and use facilitate the process of acquisition.	ii. Complex, abstract, and sequenced patterns cannot be acquired through copying and use.
iii. Infants' mind is *tabla rasa*.	iii. Infants are born with genetic endowment which contains UG.
iv. New structures for the languages are deduced from the experience.	iv. New structures for the language are acquired through recursive and transformational rules.
v. Domain general cognition facilitates language acquisition.	v. Language specific cognition derives language acquisition, i.e., the language faculty.
vi. Language acquisition is input based. Input is sufficient and there is no poverty of the stimulus.	vi. Language acquisition is creative and goes beyond the input. Input is impoverished, it degenerates and lacks eventual linguistic information.
vii. The role of the child is to identify and recognise the rule from the input and make new language structures.	vii. Child is the active participant of the language acquisition process. Her brain computes and generates new structure for the language.

Table 5.1: Summary of Behaviourism and Nativism.

5.3 The acquisition of sentential negation

In this section, the acquisition of negation in L1 will be discussed in detail. Negation is central to human cognition and it is one of the very basic components of human languages, and has been studied for centuries by researchers, scholars, and scientists. The study of the acquisition of negation has also been an important topic due to the dichotomous and multifaceted nature of negation: on the one hand, negation is a quite dynamic and complex phenomenon that varies a lot cross-linguistically, and on the other hand, children acquire it without facing any big problems. Negation is argued to be cognitively (Piaget, 1977) and linguistically (Horn, 2001) complex, which exerts an extra cognitive load for the child (Bloom, 1970, 1991; Horn, 2001). The study of the acquisition of negation has been of central focus in understanding the relationship between mental and linguistic development. For this sake, contemporary researchers from almost every school of linguistic, cognitive, and language development theory have been extensively studying the acquisition of negation in child language.

5.3.1 History of the acquisition of negation

Pea (1988:178) argues that a negative word is “one of the most consistently used words throughout the single word utterance period”.

Acquisition of negation has been a prominent topic in acquisition research in the 1960s -70s. Numerous researchers (Kalima and Bellugi, 1966; Bellugi, 1967; McNeil, 1968; Bloom ,1970; Brown, 1973; Wode, 1977; Park, 1979; Bhatia, 1978/1983; Shapiro and Kapit, 1978; Sano, et al. 1994; Kavk, 2019; among others) studied the acquisition of negation in young children acquiring English, Japanese, Hindi/Urdu, German, Swedish, etc., and provided syntactic and semantic explanations. Most of these primitive studies relied on age as a predictor of the onset of a negative word and the development of the language overall. Since Brown (1973), studies also began measuring the Mean Length of Utterance (MLU) of the child to measure the overall developmental stages of the language and to see whether the acquisition of negative words corresponds to the acquisition of language in general.

In the 1980-90s, with the rapid emergence of cross-linguistic research trends, the acquisition studies expanded to other languages like Arabic, Dutch, Chinese, French, and Korean (T. Lee, 1982; Choi, 1988; Drodz, 1995, 2002; Dimroth, 1995; Jordens, 1987/1999; Horn, 2010; Yosoufi et al., 2016; Wallage, 2005; Maps, 1999; Fitzgibbons, 2014; among many others). Most of the acquisition studies from the 1960s to the late 1980s focused on the context of the sentences in order to analyse the syntactic or semantic category of a negative word uttered by the child.

Most of the acquisition studies in the last two decades (Gilkerson et al., 2003, Schulz, 2010; Thornton and Tesan, 2013, 2016; Jasbi, 2020, among others) focused on the production, context, and functions of the negative speech of young children. Studies also attempted to comprehend the syntactic and semantic status of the negative words at a particular stage of the linguistic development of young children. Unlike the previous studies, existing studies also tend to provide statistical analyses to identify inter-relations of different syntactic and semantic categories of negative expressions used by the children in their speech.

With the advent of new and advanced technology in psycho-cognitive linguistics and data science, some of the older famous claims have been questioned or denied, and the new claims, speculations, and questions have been raised using a wide variety of methodological techniques. Researchers claim that peculiar cognitive (Ely et al., 2001) or linguistic prerequisites (Zeijlstra, et seq.) are required to be in place before the child becomes able to acquire a specific linguistic form of negation. Within the field of child language acquisition, many scholars based their theoretical claims for acquisition on the investigations of the acquisition of negation.

An expression of negation has also been reported as one of the first and most frequently used words that a child learns in earlier stages of language acquisition (Pea, 1988). Stern and Stern (1907) report that children acquire the negative polar particle *no* earlier than its counterpart *yes.* Even in the multi-word stage when children begin acquiring new words and combining various grammatical and syntactic structures, negation remains an active part of their speech (Dimroth, 2010).

It is also a fact that the early child negation does not represent the whole system of negation of the adult language. The acquisition of negation takes gradual and consistent developmental pathways. Depending on the language specifications, children gradually add new words for negation in their lexicon and learn how to express negation. So far, the acquisition of negation in early child language has been studied in many linguistic aspects; syntactic, semantic, pragmatic/ discourse, phonological, etc. In this chapter, the focus of the discussion will be mainly on the acquisition of negation with respect to the syntactic accounts.

5.3.2 Klima and Bellugi (1966) Bellugi (1967)

Kalima (1964), Klima and Bellugi (1966), and Bellugi (1967) in their seminal work on negation and child's early grammar present a detailed study of the acquisition of negation in child language. Bellugi (1967) describes the acquisition and development of negation in the longitudinal data of three English speaking children (known as Brown corpus, 1973). Bellugi (1967) presents three stages (three periods) in the acquisition of negation based on the stages of linguistic derivation proposed in Klima (1964). Bellugi (1967) summarises these stages in the form of rules. Bellugi's rule for the first stage (period A) of negation, according to which, in the deep structure of the sentence, negation is placed external to the sentence, is shown in (1) below.[135] The first stage is also named as the one-word stage or the holophrastic stage (aging 12-18 months) of overall language development. The word meaning '*no*' has been argued to be among the most frequent word used by young children during the one-word stage of language development (Piaget, 1977; Pinker, 1994; Crain and Nakayama, 1987; Grady, 2005; Cameron-Faulkner et al., 2007).

1). a. [{Neg: *no*, *not*} + nucleus] = S
    b. [{nucleus + Neg: *no*}] = S
    c. *Not* daddy.
    d. Go *no*.

In (1a), Neg refers to the negative markers *no* and *not*, nucleus represents the information like a noun or verb, while S represents the full sentence. Bellugi argues that (1a) represents the utterances of children's negative speech which contain the negative marker *no* or *not* at the beginning of the nucleus, as exemplified in (1c). The rule in (1b) describes that the negative marker *no* can be placed at the end of the noun or a verb, as shown in (1d). Bellugi names this position of negation as sentence peripheral or sentence external negation. Sentence external position illustrates the speech in which the negative marker is the first or the last word of the sentence or it infers from the meaning of the sentence that the words coming before the negative marker are not part of the negative meaning of the sentence. A few examples from Bellugi (1967) are shown in (2).[136] The examples also mark the earliest multi-word speech in child language (aging 20-24 months).

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[135] All the rules shown in (1), (4), and (6) for period A, B, and C are cited in Kalima (1964) and also Bellugi (1967, 214).

[136] The examples shown in (2-7) are cited in Bellugi (1967), they also make a part of the data investigated and presented in this dissertation.

2). a. *No* eating that one.

b. *No* I see truck.

c. *Not* have coffee.

d. Wear mittens *no*.

e. Stick *no.*

Harris and Wexler (1996) argue that during the first stage *no* and *not* are used interchangeably. Bellugi (1967) also argues that young children often omit subjects in their early speech and when subjects tend to occur, they are positioned right to the negative marker, as shown below in (3).

3). a. *No* Mummy giving baby Sarah Milk.

b. *No* the sun shining.

c. *Not* Fraser read it.

Bellugi's (1967) proposed rule for stage two (period B) is shown in (4) below. The negative elements are positioned adjacent to the verb.

4). a. $S \rightarrow$ Nominal + Aux_{neg} + {Predicate: main verb}

b. Aux_{neg} = { Neg = [*no*, *not*], V_{neg} = [*can't*, *don't*]}

The rule in (4a) states that the sentence S consists of a subject, negative markers *no* and *not*, or negative auxiliaries *can't* and *don't*, and the main verb. In stage two, additional information e.g., objects, adjectives, pronouns, articles, etc., also begin to appear in the sentence. Children show the frequent use of various verbs in their negative speech. Their speech in this period is also known as the telegraphic speech since it contains only lexical words and they often omit the functional categories (Bellugi, 1967; Brown, 1973; Tomasello, 2003; Grady, 2005; Felix, 1988). Some examples are shown below in (5).

5). a. Cormer *not* there faster.

b. He *not* going empt hall.

c. Fraser *no* boot.

c. Hi *don't* play curtain.

d. I *can't* find it.

Bellugi argues that initially children exhibit the use of negative auxiliaries *can't* and *don't* at the end of stage two. The author also argues that these auxiliaries are used as unanalysed wholes or formulaic expressions since at this stage children do not show the use of *can* or *do* in simple positive or interrogative speech but only in negative speech. The limited use of auxiliaries forms the evidence that children have not acquired *can't* and *don't* as negative auxiliaries which are combinations of the auxiliary word and the negative marker i.e., *do* + *n't* or *can* + *n't* but as whole words. Such formulaic expressions are also found in wh-questions.[137] Later, Choi (1988) reports that children also acquire *won't* as an unanalysed whole word. Bellugi (1967) analyses the initial *don't* and *can't* as learned lexical forms of the verbs and not as a part of the full auxiliary or tense system. For example, the simple lexical form [*know*] and the negative lexical form [*don't know*], [*reach*] and [*can't reach*], [*he going*], and the tensed form [*he's going*] are all treated as the learned forms.

Bellugi's stage three (period C) represents the adult-like structure of negation in child language and the third stage of syntactic derivation. Bellugi (1967) presents the system of negation at stage three as a rule given in (6).

6). a. $S \rightarrow$ Nominal + Aux_{Neg} + {Predicate: verb}

b. Aux = {T, V_{aux} = [auxiliary verbs], Neg = [*not, n't*]}

In the third stage, the sentence consists of a subject, negative auxiliaries, and an object. *Aux* represents the target auxiliary system which may consist of Tense, auxiliary verb, and the negative marker.

Bellugi argues that at stage three, children show acquisition of various verbs, auxiliaries, and modals with negation as shown below in (7a-d). Marking of tense through auxiliaries becomes the most frequent pattern of tensed structures. Still, at this stage, children were also found using *not* with or without auxiliaries and modals as shown in (7f). At this stage, children do not exhibit such patterns of expressing negation using the negative marker *no*.

7). a. Briefcase *doesn't* work.

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[137] Examples of formulaic expressions in wh-questions are like the one in (i), cited in Kalima and Bellugi (1966).

(i) a. Where go?

b. What doing?

b. I *can't* find it.

c. This *isn't* clay.

d. You *won't*.

e. *Don't* kick my box.

f. I *not* crying.

The free variation of the use of *no/not* disappears in child speech at this stage. Children are argued to be able to distinguish between *no* and *not,* i.e., the negative particle *no* is used only in anaphoric functions but *not* is used in the context of sentential negation. This is also taken as evidence that children are becoming more like adults in their use of negative words. Children also produce imperative speech at this stage using the adult model of negative auxiliary. According to Bellugi (1967), at this stage children exhibit the use of auxiliaries like *can, do,* and *did* in simple declarative speech so it provides evidence that now children have begun analysing negative auxiliaries as a combination of an auxiliary and a negative marker. Children keep on using the existing forms of negation in an adult-like manner while adding the other forms of negation, e.g., prepositions and negative quantifiers, etc.

Bellugi (1967) based her study of negation and child language development on Roger Brown's (1972) stages of language development, which he maintained on the basis of the MLU of the children they studied. Brown's first stage of language development starts when children's MLU rises above 1.0 and ends at 2.0. The second stage starts from 2.0 and ends at 2.50, and so on (cf. Crystal, 1973). Bellugi's investigation of children's negative speech begins when two of the three children were of mean age of 28-29 months. The other child was19 months old. The MLU of two older children was 1.96 and 1.80 respectively. The third and younger child had an MLU of 1.74. Bellugi's defined periods or stages may not match with stages that are maintained on the basis of age.

Stages are also maintained on the basis of the advent of respective negative elements. In this way, the first stage is marked when the first negative element appears in the production of children's earliest speech. The production and acquisition of the next one indicate the onset of the next stage, etc. In this way, at each stage the functions performed by the respective negative elements are also noticed (Wode, 1977, cf. Park, 1979). While Wode (1977) presented mostly anecdotal data of one child of only one language, he presents a general theory of negation that could be able to account for the cross-linguistic acquisition data. He only presents a couple of examples for each stage.[138] Wode's identification of stages based on the limited amount of data received various criticism and questions (Park, 1979; Stromwold and Zimmerman, 1999, among others). Park (1977) presented an analysis of early child German and argued that children acquiring German produced the polar particle *nein* in sentential/non-anaphoric negation earlier than that of anaphoric negation.

5.3.3 Acquisition of the negative polar particle and the sentential negative marker

To date, many studies have reported that children acquire the negative polar particle earlier than the sentential negative marker. See, for English, (Bellugi, 1966, 1967; Bloom, 1970; Cameron-Faulkner et al., 2010; Thornton and Tesan, 2013; Sandu, 1994; Feimann, et al. 2017; Ahmad, 2002; a.o.), for German (Wode, 1977; Park, 1977; Stromwold and Zimmermann, 1999; Felix, 1987; Schelletter, 2001), for Arabic, (Omar, 1973; Bunain, 2002; Youssef, 2015; Omari 2017), for Japanese (McNeil and McNeil, 1968; Ito, 1981) for French (Meisel, 1997; Choi, 1988; Weissenborn et al., 1989), for Swedish (Lange and Larsson, 1973), for Tamil (Vaidyanathan, 1991), for Italian (Volterra and Antinucci, 1979; Benazzo and Morgenstern, 2014), for Korean (Choi, 1987), for Mandarin (Lee, 1981), for Hindi/Urdu (Bhatia, 1995), for Dutch (Jordens, 2002), for Turkish (Kavak, 2018), for Cantonese (Tam, Wai-yee, 1998), and Finnish (Bowerman, 1973; Atkinson, 1975).

The patterns of the acquisition of negation are found similar among the first and second language learners. Examples for the acquisition of negation in children's early language are shown below, for a few languages.

8). a. *Nein* essen.[139] (2;0)[140] German
Neg eat
No eat.

b. *Nein* Auto kaput.[141] (2:2)
Neg car broken.

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[138] He presented only 13 example sentences for stage II and III: 6 for stage II and 7 for stage III. He also did not explain how the stage switching was supposed to happen.

[139] Cited in Stromwold and Zimmerman (1999).

[140] Child age is mentioned as year, month and day, as mentioned in the source.

[141] Cited in Park (1981), also in Clahsen et al. (1983/2016).

The car is not broken.

c. Ich kann das *nich*.[142] (2:4)

I can that neg.

I cannot.

d. Kan *nicht* durch. (2:5)

Can neg (fit) through

(The toy) cannot (fit) through.

9). a. Inta imsi *la*?[143] (2:2) Arabic

You go-Mus-SG neg

You must not go.

b. *Mis* tu-xrug. (2:8)

Neg she-leave.PRES

She didn't leave.

c. Dudi *ma*-akal-s. (2:9)

Dudi neg eat neg

Dudi didn't eat.

10). a. *Nee* tafel.[144] (1:7) Dutch

No table.

b. *Nee* doen uit. (1:8)

No do out.

c. Cynthia ook *nie*? (1:10)

Cynthia also not.

Cynthia also not?

d. Allemaal *niet* zitten. (1:11)

Everybody not sit.

Everybody doesn't sit.

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[142] The early child speech version of *nicht*.

[143] Cited in Youssef (2015). Many dialects of Arabic are reported for displaying similar patterns of acquisition of negation (references therein).

[144] Dutch examples are cited in Jordens (2002).

11). a. *Inte* gul.[145] (20-25 months) Swedish

Not yellow.

b. *Inte* mamma hjalpa Embla.[146]

*N*ot mommy help Embla.

Mama does not help Embla.

There is disagreement on why children acquire the negative polar particle earlier than the negative marker. It is argued that since the negative polar particle is phonologically less complex as compared to the negative marker, i.e., *nicht* or *not* which contain more consonants (cluster) than the polar particles *no* or *nein* (Stromwold and Zimmarmann, 1999), so it is easier for children to acquire the polar particle earlier that the negative markers. Deprez and Pierce (1993) mentioned a phonological acquisition of negation which indicates that *nicht* contains palatal fricative that is one of the last sounds that a child acquires and that is why the polar particle is acquired earlier to it. The evidence of phonological complexity is still argued to be incomplete.

It is also argued that the reason for children's early acquisition of the polar particle may be the more syntactic complexity of the negative marker and less of that for the polar particle. As conservative learners, children choose the polar particle prior to the negative marker due to the fact that it does not require them to build any complex syntactic structure. Children can simply use the polar particle at the sentence initial position, and it can also function as an isolated element. While the acquisition of negative marker does require them to build a complex syntactic structure i.e., to place the negative marker in the correct sentence medial position and to connect it to the part of the sentence it precedes.

According to Choi (1987), in the earlier periods of development, a child's language development lags behind the cognitive development that is why children acquire easier forms (polar particle) of negation earlier to other somewhat difficult forms (negative marker). At later stages, when the cognitive and language developments interact with each other, they enable the children to acquire the other negative markers too.

Stromwold and Zimmermann (1999) argue that in their analysis of the child and adult speech, parents' negative speech contained a higher frequency for the negative marker *nicht* than the polar particle *nein*. And, still, children acquired the polar particle earlier to the negative marker, so

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[145] Cited in Clahsen (1988).

[146] Cited in Platzack (1990/1992), Clahsen (1988), age is mentioned in months.

the input frequency accounts cannot describe this earlier acquisition of the polar particle in any better way. A proof of indication that parents unconsciously use any particular negative marker more frequently to facilitate the acquisition task, was not found.

Park (1977) argues that children learning Swiss German acquired the negative marker earlier than the polar particle. He also argues that children acquired sentential/non-anaphoric use of the polar particle prior to its anaphoric one.

5.3.4 Sentence external negation

There is one thing common in the data presented in (2a-b and 3a-b for English) (8a-b for German), (9a-b for Arabic), and (10a-b for Dutch) that the polar particle is placed in the sentence external or peripheral position. The data in (3c for English), (10c for Dutch), and (11a for Swedish) show that the sentential negative marker is also placed at sentence external position. The English examples shown in (3) and repeated below as (12) has also been under discussion ever since the advent of Bellugi's (1967) detailed study of negation.

12). a. *No* Mummy giving baby Sarah Milk.
b. *No* the sun shining.
c. *Not* Fraser read it.

As for the utterances which contain sentence external negation, Bellugi (1967) argues that these sentences exhibit the Deep Structure of sentential negation as well as the child's inability to apply transformational rules for the movement of negation.[147] L. Bloom (1970) argue that such negative utterances do not necessarily reflect the sentence external negation but they are the instances of anaphoric negation.[148],[149] Some of the negative sentences look like sentence external negatives

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[147] The transformational rule of the movement of negation to a lower position does not hold valid in the modern syntactic theory.

[148] In anaphoric negation the negative marker does not negate the sentence but it negates the previous utterance uttered by another speaker, E.g., in (i)
(i) speaker A: You will have to sleep early tonight.
speaker B: No, I want to wake up till late and finish my work.
In (i), *no* in speaker B's speech is not negating the sentences of which it is a part of, rather it is negating the previous sentence uttered by the speaker A.

[149] An important point to notice is that not all sentence external negative speech can be interpreted as sentential/non-anaphoric instances of negation. Sentence external negative sentences are analysed as anaphoric or non-anaphoric/sentential negation based on the context. Most of the speech that Bellugi (1967) discussed and presented, she analysed it based on the context, and she categorised such speech accordingly. Later, the same speech was also replicated and analysed by Deprez and Pierce (1993).
Louis Bloom also found patterns of sentence external negative speech in the children's speech she studied, and she formed her argument based on the context of the speech of her subject children. Although the structure of the sentence external negative sentences were almost the same in Bellugi and Bloom's studies. Both the authors made their claims based on the contexts, and that are mostly correct per se.

because the subject is missing from these sentence. Hyams (2011) extensively discusses the absence of subjects in the child speech. McNeil and McNeil (1968), and Clahsen (1988) also reported sentence external negation for Japanese, and de Villiers and de Villiers (1979) for English children they studied.

Deprez & Pierce (1993) refute the presence of sentence external negation and argue that negation in early child speech is located in sentence internal position and its position is in line with the adult speech. Following Pollock (1989), they also argue that negation makes a part of the IP. It is generated between the IP and the VP: below IP and above VP. The examples of child speech shown in (12) do not reflect that children are unable to position negation below IP but they reflect that the subject is not raised from a VP-internal position to Spec-IP. Deprez and Pierce (1993) argue that children's early negative speech can be used as a diagnostic to support the VP-internal subject hypothesis (Koopman and Sportiche, 198). Children produce negation initial speech since they allow the subject to remain VP-internal.

Deprez and Pierce's analysis has been questioned by many subsequent researchers, mainly by Stromwold and Zimmerman (1999). Stromswold and Zimmermann (1999) reanalyse Deprez and Pierce's data for German and strongly reject the VP-internal subject hypothesis with respect to negation in children's speech. They rather argue that many sentences containing the polar particle (*nein*) that were analysed as sentential negation by Deprez and Pierce were actually instances of anaphoric negation, and that once children have acquired the negative marker (*nicht*), they use it similar to the adult model and it is always placed sentence medial.

Gilkerson, et al. (2003) argue that the children they studied in an experimental analysis, analysed external negation as sentential negation and not as anaphoric negation. They claim that young typically developing as well as older linguistically impaired subject children exhibit a longer stage of sentence external negation where the negative polar particle was used to express sentential negation. They argue that it confirms their findings that children's external negation is an instance of sentential negation. Drozd (1995) calls external negation as sentential metalinguistic exclamatory negation.

As is clear from the data provided above so far, most of the sentences of external negation are with the polar particle. If children also use the polar particle to express sentential negation, the question arises why children commit more errors with the position of it (they do not place it in the middle of the sentence but place it at the external position), than they do with the negative marker (which is almost always sentence-medial).

First, if the external negation with the polar particle is the sentential negation, then it may be regarded as a performance error because neither children's grammar allows such negative sentence nor adults produce them. It may also be the case that such errors are not errors of the placement of the polar particle but due to that of some other element of the sentence.

Second, one factor may be related to the surface structure of the polar particle in the input speech. In the input, children hear anaphoric polar particle placed at the sentence initial position and that is why they also produce it a lot as an anaphoric negator. But this cannot explain why children use the polar particle in the sentence-middle position as a sentential negator also (although only for a limited frequency and also not in all languages). If they have analysed it as a sentential negative marker then the use of the polar particle in sentence middle position should be in a higher frequency, at least in the early stages.

Third, children hear the negative speech in the input containing the negative marker equally to as they do for the polar particle but they do not commit the same type and amount of errors while placing the negative marker, as they commit with the polar particle. No study so far has reported the errors of interchangeable use of the polar particle and the negative marker by children. Children are observed to be clearly distinguishing between both of them.

In addition to the early child English, German, Arabic, and Swedish, external negation utterances with sentential negative marker were also found in French (Deprez and Pierce, 1993), Spanish, and Catalan (Bel, 1996), among other languages. Examples for French and Catalan are shown below in (13 & 14) cited in Deprez and Pierce (1993) and Bel (1966), respectively.

13).	a.	*Pas* la pope dormir.[150]	(1:9:3)	French
		not the doll sleep.		
	b.	*Pas* attraper papollon.	(1:9:3)	
		not catch butterfly.		
14).	a.	Menja *no*.	(1:11:15)	Catalan
		Eat not.		
		(S/he) doesn't eat.		
	b.	*No* Menja.[151]	(1:11:15)	
		not eats.		

[150] Cited in Deprez and Pierce (1993)
Child age is mentioned as year, month and day.

[151] The sentence structure *No menja* and not the *Menja no* is grammatical in adult Catalan.

(S/he) doesn't eat.

There is only one sentence for German, cited in Park (1979) and also in Deprez and Pierce (1993).

15). *Nicht* da Mama. (25-26 months)
not here Mommy
Mommy is not here.

To summarise, more studies report the presence of the polar particle at the sentence external position and very few report the same for the negative marker. There is disagreement that either the polar particle is used for only anaphoric negation or also for the sentential negation. To date, literature lacks the agreement on reasons why children acquire the polar particle earlier to the negative marker, and also why children do not commit the same errors which they do with the polar particle.

5.4 Relation to the CDS input

As was shown in the previous sections, children take quite a unique way to acquire negation. Perhaps, a brief look at the input addressed to the children can provide a picture of the system of negation provided to children. The frequency with which a certain negative form is provided, the age at which it is, and the particular expressions that are not provided in the input can all help in revealing the quality and quantity of the linguistic input of the negative speech. It can also help in figuring out the problems children face to acquire the adult-like system of negation of their target language.

The child's acquisition of any aspect of language grammar has been more or less related to the linguistic input she receives in her environment, in a vast majority of the child language acquisition research. The studies that compared child speech to the parents' input often have reported that the input regarding each linguistic item or type was very low in frequency and it has also been degenerating. But the child has mastered it all so well and abruptly.

In addition, it is also worth noting that some of the aspects of language grammar can be represented using various forms while not explicitly telling the child that all the forms can be used to express the same meaning. For example, in English, in adult input, the same negative meaning can be expressed using the variety of negative expressions, as shown in (16) below.

16). a. She is *not* a singer.

b. She's *not* a singer.

c. She *isn't* a singer.

The child's task is to acquire not only these expressions but also the underlying system of language which generates these different types of structures to express the same meaning. Currently, there is a disagreement that how far the input facilitates language acquisition and either the modification in the input might also support an early acquisition of language or not. Newport, et al. (1977) argue that the specific types of constructions i.e., language general properties (e.g., noun phrases, verb phrases in simple declarative sentences, yes/no questions) and language specific properties (e.g., auxiliaries, inflections on nouns, or verbs, etc.) in the input positively correlate with the development of those types in child language. They also argue that variations (if parents speak longer, short, complex, or simple sentences) in the input affected the growth of language specific properties in only a limited way but variations didn't show any effect on the language general properties. But Furrow, et al. (1979) argue that they found an effect of parents' input on the child's language development.

Negation in adult speech has been investigated rather less. It has been overwhelmingly reported or suggested that certain expressions, as shown in (17) that children produce are not attested in negative adult speech.

17). a. *No* go.

b. *Not* run.

c. He do*n't*.

Bellugi (1967) argues that parents' speech explicitly contained the auxiliary form of negation (*isn't, don't, doesn't*, etc.) while children used *no, not,* and only later acquired negative auxiliaries. Bellugi reports a clear mismatch between the parents and children's speech for the selection of negative forms to express the negative meaning. Grammatical corrections are rarely reported in input samples. The discussions during the data collection sessions between the child and the adults have been about the activity that they are performing together and not about the linguistic or metalinguistic aspects of their language.

Maratsos and Kuczaj (1976) study the use of *not* and *n't* in child and parents' speech. Their son Abe followed his parents in producing *don't* and *can't* over *do not* and *cannot* but for the auxiliary *isn't*, he produced *is not* form. Pea (1979) also reports a relation between input data and the child's negative speech.

Bellugi (1967)'s studied child data that de Villiers and de Villiers (1975) reanalyse and find that mothers of the two children often used the polar particle *no* at the beginning of the negative sentence such as *no, I don't think you should do that,* and the same pattern was also frequently found in the children's speech. De Villiers and de Villiers (1979) also report the same patterns for their son whose negative speech they studied. Later, in another study, de Villiers and de Villiers (1985) argue that the patterns children show in the acquisition of negation are similar to those used by their parents. Stromwold and Zimmerman (1999) report no effect of frequency input on the children's acquisition of *nein* and *nicht* in the speech they investigated.

5.5 (No) poverty of the stimulus/input

Most of the studies of the poverty of the stimulus in syntax come from the study of case filters, subject-auxiliary inversion, and anaphors. Few studies have investigated the poverty of the stimulus in the category of negation.

According to Hornstein and Lightfoot, the main claim of generativists with respect to the poverty of the stimulus has been a) the data is deficient, b) it is noisy or degenerate; the data contains fragments, ungrammaticalities, incomplete sentences, and slips of the tongue, c) the data is finite and discontinuous (input contains gaps), d) the data faces the absence of the inter-relations of synonyms (eventual competence), and e) the data does not contain the information about the ambiguity and ungrammaticality that is recognised by all speakers of a language.
For example, from the negative sentences below in (18), only one of them (18a) is grammatical and acceptable in adult English. The input example in (18a) is degenerating in the sense that it does not inform the child that the other three constructions are not allowed in the language if they are not produced in the adult language.

18). a. She does *not* like coffee.
b. *She *not* likes coffee.
c. *She *not* like coffee.
d. *She *not* does like coffee.

Bellugi (1967) argues that in the parents' speech the negative auxiliaries e.g., *don't, can't, won't*, and *haven't* were quite extensively used but the *n't* was occasionally used with the *is* form of *be*. The most frequent form of *is* was (19a) and not the (19b). Bellugi (1967) and later Thornton and Tesan (2013) and Thornton (2007) also argued that children acquired the negative auxiliaries for 3rd person singular subjects later than some other ones.

19). a. He's *not* coming.

b. He *isn't* coming.

5.6 Typical errors in children's negative speech

The most commonly reported error in child speech is the omission of elements that are obligatorily present in adult speech, either it is a complete constituent of the sentence or a particular grammatical morpheme that adds to or necessarily shapes the meaning of the sentence. A gradual but not rapid acquisition of functional elements like determiner, tense, auxiliaries, etc., has been reported in the acquisition research. In English, German, and Hebrew young children have been reported to leave out the functional morphemes during the telegraphic speech period. The deep structure of child speech contains the obligatory but only concrete elements of a sentence e.g., a subject, an object, or a verb (Brown 1973).

Bloom (1970) argues that due to cognitive processing limitations, children often omit some of the structures of their speech. For example, in the child speech below, cited in Bloom (1970), the child utters the verb *like* when she talks about her father but cannot utter it when she talks about herself, and negation is also added.

20). a. Daddy like coffee.

b. Lois *no* coffee.

Bloom argues that the child knows the verb but in (20b) she cannot produce it due to the extra producibility effort she did for the word *no.* Syntactically, the sentence became complex and she couldn't perform well in production. Greenfield and Smith (1976) disagree with Bloom that child possesses the deep structure of the sentence but they argue instead that the child could not fully display it due to cognitive limitations.

Bellugi, (1967), and many others argue that the system of negative auxiliaries in children was confined to *can't* and *don't* whereas the adult input contained a complete system of negative auxiliaries. Children also produce errors which are surprisingly rare in adult speech. For example, in

(21) cited in Deprez and Pierce (1993). Children are placing the subject of the sentence to the right of the negative marker while it always appears to the left in the input they receive.

21). a. *No* the sun shining. = The sun is not shining.

b. *Not* Fraser read it. = Fraser mustn't read it.

Children also show a substantial amount of evidence of missing subjects in the negative speech. If the subject is missing from the sentence it is not easy to figure out that if it is omitted from the left or the right of the negative marker, Stromwold and Zimmerman (1999), e.g., in (22a) for English and (22b) for Swedish.

22). a. No go.

b. *Inte* gul.

Not yellow.

The examples like the one in (22) are not very informative to determine the position of the subject with respect to the negative element or marker (Bloom, 1970).

De Villiers and de Villiers (1979) also reanalyse the negative speech by the children that Bellugi (1967) studied and argue that few of the examples containing subjects mentioned by Bellugi (1967) as sentential negation were anaphoric negation. De Villiers and de Villiers (1979) also investigate their son and found similar patterns in his negative speech.

The most discussed kind of errors of negative speech is the one that involves different positions of the negative marker with respect to the verb or auxiliary. For example, as shown in (23) below, a child places the negative marker before the verb. What is crucial to the example (23a) is the child is not using the adult-like form of negation, *not* or *n't*, and secondly, the verbal inflection to mark the tense is also missing. In example (23b), the tense auxiliary is missing with which *not* should be attached to form an adult-like expression. Borer and Wexler, (1992) and Wexler (1996) argue that children often omit the tense considering it as an option. It was based on such speech that Wexler (1996) presented his famous hypothesis of optional infinities (see also Croker, et al, 2000). Wexler states that young children use the finite and infinite forms of verbs simultaneously, in their early speech. They optionally use the infinite form of verb in the contexts which require the obligatory use of the finite form of the verb.

23). a. He *no* bite you.

b. Mary *not* play baseball.

If the tense is an option in the early child speech then the negative sentences like the ones shown in (24) should not exist in early child speech.

24). a. Mary *not* plays baseball.

b. Mary *not* is playing football.

In fact, the errors like the one in (24) are reported very rarely (except Schütze, 2010) in the literature. Wexler (1998) reports a total of three sentences of a child whose speech he investigated. From these three, he discarded one and analyses two of them as being equal to zero occurrences. If children consider using the finite form of the verb an option, then the examples like the ones in (25) should also not exist in child speech.

25). a. Mary does *not* play baseball.

b. Mary *doesn't* play football.

c. Mary do *not* play base ball.

d. Mary *don't* play football.

For (25a) and (25b), both are the tensed and adult-like forms and children should produce them optionally since both the sentences require the projection of tense in the child's negative speech. Such sentences should occur regularly only after children have acquired the tense. Examples (25c) and (25d) are also unexpected because, if there is no tense projected in the sentence structure, there is no need to insert the auxiliary *do*. Another structure that Wexler argues should not be produced by children during the optional use of the tense is the one given in (26).

26). She goes *not*.

Wexler argues that the structure like (26) is not available in adult English because neither the verb nor the -*s* can move across *not*. When children have acquired the agreement then they should not place the verbal inflection -*s* with subjects other than 3rd person singular. Wexler argues that if sentence forms as shown in (24-26) exist in the child language it will also be suggestive that children possess the knowledge of tense and they can generate tensed sentences.[152]

Verhagen (2009), Jordens (1987, 2002), and Wijnen and Verrip (1998) investigate the finiteness and its relation with negation in Dutch. Haegeman (1995) argues that the production of adult-like negation and finiteness developed hand in hand in children's speech. Children show the correct use of tense in sentences when they have developed an adult-like expression of negation. Besides, negation and tense were correctly placed in children's speech for more than 75% of the total negative speech. Un-tensed, root, or non-infinite clauses made only 5% of the total negative speech. See also Unsworth, et al. (2008).

Children also exhibited the excelled correction in using the auxiliaries with respect to the main verb and finiteness. Children performed very well in expressing negation using the negative auxiliaries, placing the negative marker after the first auxiliary. According to Stromwold & Zimmermann (1999), the sentences where children could not place the negative marker after the first auxiliary, were not ungrammatical but contained narrow scope negation. Children exhibited the early acquisition of tense and the elements that are co-related to the tense, e.g, negation.

5.6.1 Non-agreeing *don't*

Another form of error that is consistently reported by many researchers is the non-agreeing use of negative auxiliaries with 3rd person singular subjects, shown below in (27).

27). a. Robin *don't* play with pens.[153]
b. Helen *don't* like it.
c. Do she *don't* need that one?

Numerous accounts have proposed various analyses for the initial non-agreeing *don't*. Bellugi (1967) and Kalima and Bellugi (1966) argue that *don't* is analysed similarly to *not* as it emerges earlier than some other negative auxiliaries. But, this initial *don't* is still different from *not* since it does not appear with progressive forms of the verb unlike *not*. It is an instance of memorised forms.

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[152] Actually Wexler's argumentation revolves around the optionality analysis that the child language has some additional options available when it comes to language generation; option of omitting tense or option of generating additional sentence forms. In adult language the *-s* can move to the verb, as verb does not move to T/I. If child has both options, movement from I to V and V to I, only then the forms like the 'she goes *not*' can be generated. Furthermore *not* will also block such movements across it so children should not produce such forms. But in any case if such forms exist it will count as finite and tense form.

[153] Example (a) is also reported by several researchers other than Bellugi (1967) (1966), also cited in Schütze (2010). All the examples in (32) are also part of the data investigated in this dissertation. See also Blount (1975) for a view of child language.

Batet et al. (1995) analyses it as a formulaic expression. Hyams (2011) argues that the initials *don't* or *can't* are better analysed similarly to *no* and *not* and not as negative auxiliaries. Maratsos and Kuczaj also reported the same for initial *don't* and other negative auxiliaries.

Stromwold (2005) considers children's initial *don't, didn't,* and *doesn't* as negative auxiliaries and fully productive in early child language. Guasti (1993) and Guasti and Rizzi (2002) argue that children's use of *don't* with 3rd person singular is identical to adults' *doesn't* and children's syntactic knowledge of tense and agreement are fully functional. Initially, children have not fully set the agreement parameter (to mark agreement overtly) although it is present in the syntax. Due to the unfinished learning of parameters, children cannot perform in an adult-like manner i.e., they are unable to use *doesn't.* Children mark and omit features simultaneously. Wexler (1998, and later) considers *don't* as a result of the optional use of tense forms of verbs. Schütze (2010) argues that children's early grammar contains underspecified features for tense or agreement and that sometimes it fails in marking the agreement overtly in children's negative speech and consequently they produce *don't* with -3s person singular subjects. See also Powers, et al. (2000).

5.6.2 Perception of *n't* as equivalent to *not*

There is not much debate on how young children analyse the negative marker *not* and its contracted form *n't*. There exist only few studies which address this point. Maratsos and Kuczaj (1976) aimed to investigate how far children (3-4 years old) syntactically relate and differentiate the two forms i.e., *not* and *n't* used with auxiliaries like aux+*not* and aux+*n't*. They argue that both *not* and *n't* share morphological resemblance (*not/n't*), semantic similarity (express negation), and positioning overlap (placed after or attached with the first auxiliary), so children ought to analyse both the negative markers in a similar way. Additionally, *not* has an additive pattern that it still remains closer to the predicate when it comes to e.g., questions, like in (28a-b), but *n't* gets farther from the predicate in questions, like (28c-d).

28). a. Has he *not* seen that?
b. Will he *not* come?
c. *Hasn't* he seen that?
d. *Won't* he come?

It is also found in the data that in the initial stages, children produce sentences using *not* and omitting auxiliaries, as shown above, and also below in (29).

29). a. He *not* coming.

b. He *not* in there.

In such examples, the position of *not* cannot be easily analysed as adjacent to the auxiliary because no auxiliary is present. It may be said to be a posited pre-verbal/predicate. But such examples are not reported so far for *n't,* where it appears without auxiliaries, as in (30) below.

30). a. He *n't* coming.

b. He *n't* in there.

Through an imitation task in which *not* and *n't* were placed with two or three auxiliaries, Maratsos and Kuczaj (1976) hypothesise that due to the language system, children are given somewhat independence to generate two different syntactic statuses for *not* and *n't*. They hypothesised that if children produced both *not* and *n't* with the first auxiliary in the sentences, they have analysed both forms similar to adult forms. But if the positions of *not* and *n't* differ in child speech, it may provide evidence that children analyse both forms differently.

Although they could not find strong and consistent evidence across children which can account for a generalised rule for children's analysis for *not* and *n't*. But children of course exhibited a tendency that illustrates that they were placing *not* in various positions, after the first (31a), second (32b), or third auxiliary (33b), very often. [154]

31). a. Model: Have *not* the boys been falling off the cliff?

b. Imitation: The boys been *not* falling off the cliff?

32). a. Model: The big turtle have *not* been swimming in the pond.

b. Imitation: The big turtle has been *not* swimming in the pond.

33). a. Model: The fireman should have *not* been sleeping on the floor.

b. Imitation: The fireman should have been *not* sleeping on the floor.

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[154] From (36-38), the (a) examples are for model sentences presented to children and (b) examples are children's imitation. All the examples are cited in Maratsos and Kuzcaj (1976). See also Grigoroglou, et al., 2019; Childs 2017a,b; Childs, et al., 2015..

Children placed *n't* adjoined to the first auxiliary in their imitated sentence almost always, an example is shown in (34b), cited in Maratsos and Kuczaj (1976). Variety of model sentences were provided for *n't* used with auxiliaries.

34). a. Model: The fire could *haven't* been very hot.
b. Imitation: The fire *couldn't* have been very hot.

Some children were quite adult-like: they placed *not* after the first auxiliary and also imitated *n't* adjoined to the first auxiliary. While three of the children always produced *not* closer to verb/ predicate but produced *n't* with the first auxiliary consistently, clearly marking two different positions for *not* and *n't*.

Maratsos and Kuczaj suggested that children can differentiate aux+*not* from aux+*n't*. They produce *not* as an early negator for constituents like NP, progressive VP and adjectives, but use *n't* for the full sentence. Other than Maratsos and Kuczaj (1976), no studies investigated this aspect of child negation but mostly re-reported the findings suggested by Bellugi (1967).

5.7 The acquisition of NC in SE and NC English

Standard English

Several psycholinguistic corpus and experimental studies have investigated the acquisition, preference, and interpretation of NC by children acquiring SE even when NC is not readily available in the linguistic input that children receive (Henry, 2016; Bellugi, 1967; White, 2004; Thornton & Tesan, 2013; Thornton et al., 2016; Green, 2002, 2011; Blanchette, 2013, 2015, 2017, Zanuttini, et al., 2018; Rudanko, 2007; Poplack, 2006; Matos, 1999; Martinez, 2013; Kortmann and Schneider, 2011; Kallel, 2017; Jack, 1978; de-Dios-Flores, 2019; among many others). Both the studies, comprehension and production, have reported the production of NC for early child SE, although it is natural to acquire it in NC varieties of English.

Beginning from the corpus studies: Bellugi (1967) reports that children acquiring SE produced NC. She argues that *'a thick layer of negation spread over negative sentences'* (1967, 137). The thick layer refers to the presence of neg-words e.g., *nobody*, and *nothing* in the sentence with the negative marker. She argues that for children it seems like they assume that 'apply negatives wherever possible in the single proposition', similar to Labov's (1972) 'proliferation of negation'. Some of the examples of NC speech cited in Bellugi (1967) are shown in (35) below.

35). a. *Nothing* ca*n't* reach it, see?[155]

b. I do*n't* got *no* paper today.

c. *No* one's *not* going to do what I'm doing.

d. I was*n't no* baby.

Bellugi (1967) does not provide any detailed technical mechanism to account for the NC of children acquiring SE.

Miller (2012) reanalyses the data of one of the children that Bellugi (1967) studies and provides sociolinguistic factors due to which young children acquiring SE produced NC. Miller found out that the child studied is acquiring SE but she produces the NC for 65% of the time as compared to her parents in whose speech NC was found for less than 9% of the time. The reason Miller provides for child's production of NC in a higher rate is that the child's mother was a speaker on NC variety of English. Being conscious of the camera and recording, she consciously reduced the use of NC in formal settings but in informal and daily routines, the family produced NC normally in their speech. Since young children are not as conscious of social factors or stigmas so they tend to speak the way they are used to. Miller also argues that figuring out the properties of negative indefinites in their grammar may not be an easy task for young children since they incorrectly use negative indefinites along with the negative marker. Additionally, children also prefer NC over DN. Miller's findings clearly suggest a mismatch between child and adult speech as far as the negative concord is concerned.

Thornton and Tesan (2013) and Thornton et al. (2016) also reanalyse the Brown corpus as well as the Belfast corpus which is an NC variety of British English. Thornton and Tesan (2013) argue that children acquiring both varieties of English produced NC. Despite the dialectal differences, children of both dialects of English produced NC at almost the same age, i.e., soon after 3 years of age. They argue that the different properties of the input do not seem to affect the acquisition patterns of young children i.e., children of both varieties produced NC, at the similar age, and with similar stages. They also argue that it is quite likely that NC makes a part of children's early grammar until it is being dissipated by prescriptive grammars in the early school years.

Thornton and Tesan's this speculation opens up new questions that whether school's grammar teaching also can lead the grammar acquisition given that by the age children begin school

[155] The sentences exemplified also make a part of the data presented in this thesis.

they have already acquired the major part of the grammar of their language naturally. Blanchette (2017) argues that adults English speakers also interpret and preferred NC readings over DN readings when they were presented with sentences containing multiple negative elements. Blanchette argues that NC also makes a part of the grammar of adult English speakers in spite of the fact that NC is not used in normal speech.

The experimental studies (Coles-White, 2004; Green, 2002, 2011, and others) also report the production of NC in children acquiring SE. When comparing the findings to those of NC English, Coles-White argues that she found no significant difference between the SE group and NC English group with respect to their production and comprehension of NC and DN. Children of both groups quite easily interpreted NC while facing considerable difficulty for interpreting sentences containing DN. Coles-White also argues that more correct responses of children for NC is suggestive of the assumption that NC is easier for children to comprehend and interpret than DN. She further argues that under binary choice situations i.e., NC or DN, NC can be considered as a default value given that redundant information (more than one negative element) is easier to interpret and also that children are not sure about the true interpretation of DN. Authors argue that it may also be the case that children have not mastered the full negation system of their language yet.

The experimental study of Thornton et al. (2016) further contributes to the understanding that children acquiring SE can produce and interpret NC. The study is based on the truth value judgement tasks about the potentially ambiguous sentences between NC and DN on the one hand, and only DN sentences on the other hand. The study reveals that young children acquiring DN Australian English performed better in assigning NC readings for the ambiguous sentences than they did for DN readings. Children were different from the adults who assigned DN readings more often to the ambiguous sentences. Children and adults performed equally well in judging the clearly DN sentences. Thornton et al. (2016) argue that their findings reveal that children possess NC in their grammars while at the same time adults prefer DN (cf. Blanchette, 2017).

Negative Concord varieties English

For NC English, initially, many studies focused only on the historical perspectives, exploring the emergence and variation present in NC. Only later, studies began to explain the NC in child speech using the linguistic and acquisition theories (Coles-White, 1998, 2004; Green 2002, et seq., Veenendaal, et al., 2014; Stewart, 2014; Sailor, 2017; Palacios, 2017; a.o.).

Henry (1998, 2016, 2017) report that children acquiring British NC English (Belfast and Bristol varieties) are able to master NC soon after the third year of their life. And it is quite productive until the age of four years. Children produced a variety of negative sentences; the single sentential negation with negative marker, single semantic negation with negative quantifiers, and also NC.

Green (2002, et seq.) in her experimental study argues that children acquiring African American English (AAE) produce NC in spontaneous speech, as in (36). Same children also used single negation in elicitation tasks which shows that NC is not a norm but optional in child speech, as shown in (37), cited in Green (2011).

36). a. Because he *don't* want *no* training wheels on his bike. (5:1)

b. They *don't* have *no* training wheels. (5:1)

37). a. *Don't* have training wheels on it. (4:11)

b. This one don't have training wheels. (5:2)

Green argues that the productive use of NC by young children shows that they learn NC assuming it just as a trait of the NC English. Over the developmental stages, children change the structural patterns of NC, this may be due to the effect of input frequency for a certain kind of expression.

Green (2011) argues that a particular feature of NC English, the negative auxiliary inversion develops later than other NC forms, in young children's speech. Stokes (1976) presents one example for the negative auxiliary inversion as shown below in (38a), also cited in Green (2011). Children can produce NC with neg-word at the subject position, as in (38b), cited in Green (2011).

38). a. *Don't nobody* know him.

b. *Nobody can't* get in this.

Stokes (1976) argues that the production of NC is observed cross-linguistically, and children master NC quite efficiently. Stokes further argues that children acquiring SE and NC English exhibit several similarities in the production of NC. The differences their speech exhibits are more evident in the later stages of development.

Stokes compares her findings for children acquiring NC English with that of Bellugi's for children acquiring SE and argues that it cannot be said conclusively how far children of SE and NC English are similar in their acquisition of negation but there is of course some overlap observed. It means that children of both varieties of English showed the production of NC. Children acquiring

SE reduce the use of NC as it is not prevalent in the input but NC English children continue to use it with higher frequency as it is frequently present in the adult input.

Coles-White (2004) also studied the acquisition of NC in children of AAE and SE. While comparing both of the groups, she argues that no difference was found in the interpretation of NC and DN sentences in both groups of children. She asked children sentences like the one shown below in (39).

39). a. The man *didn't* feed the baby with *no* spoon [NC]

b. The man *didn't* feed the baby with *no* hair. [DN]

Children aging 3 years interpreted the sentences correctly for 77 -87% of the time for NC (45a). She argues that sentences with DN like the one in (39b) are harder to interpret for both of the groups, and the correction rate was around 54%, which is less than the score of correction of NC sentences. Children of both varieties of English correctly and very easily interpreted the sentences which explicitly demanded NC interpretation.

The reanalysis of the Belfast corpus by Thornton and Tesan (2013) report the production of NC in children acquiring NC English. The time of emergence of NC in NC English has not reported in any of the studies quoted in this subsection. All the studies generally report the production of NC in young children acquiring NC varieties of English.

To summarise, it is evident that children of both varieties of English produce NC. Various sociolinguistic, pragmatic, and semantic explanations have been put forth to account for it. Given that SE is not an NC variety of English, children produce it, and still, it is unclear that either it is dissipated from their grammar later on, or they contain it in their grammar and they simply do not produce it due to other reasons. On the other hand, children acquiring NC English, produce NC, and later reduce its production or use since in some NC English (i.e., AAE), NC is only optional. So certain questions still remain open, a) how do children of SE variety produce an extra negative element when it is not present in their input? b) How do children of both varieties process the extra negative elements that they produced in their speech? c) What syntactic information do they assign to the extra negative elements.

5.8 The acquisition of negation in Dutch

In this section, the acquisition of negation and negative concord in Dutch will be summarised briefly.

The study of the acquisition of negation in Dutch is not as elaborate as it is for English. To date, most of the studies for the acquisition of negation in Dutch investigate only a few children (mainly 2-5) to present the patterns children exhibit while acquiring negation in their language.[156] It is also important to note that following Bellugi and others mentioned in the above sections, most of the research studies investigating acquisition of negation in Dutch just report the confirmation if a particular pattern which was observed in existing studies e.g., for English are also found in Dutch or not. There are hardly any studies found which could present a detailed view of negation in Dutch child language.[157]

Jordens (1987, 2002) argues that children begin acquiring negation using the polar particle *nee*, as was shown in the previous sections. Following Bellugi's identified patterns, Jordens further argues that along with the anaphoric use of the polar particle *nee*, young children also use it as a clausal negator. Jordens refers to the initial uses of the polar particle as 'holistic *nee*'. Children are also reported to use the polar particle for anaphoric negation, they also place negation in sentence external position, (Jordens, 1999, 2002; Van Kampen, et al., 2006; Van Kampen, 2010). Some examples are shown in (40).[158]

40). a. *Nee* tafel.[159] (1:7)
No table.

b. Da *nee*. (1:8)
There no.
There is no.

c. *Nee* Cynthia afpakke. (1:9)
No Cynthia snatch away.
Cynthia does not snatch away.

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[156] It is important to note that no other studies on acquisition of negation in child Dutch were found than mentioned in this particular section. It is also made clear that the researcher could only benefit from the research studies that are reported using English language. There must be studies investigating acquisition of negation in child Dutch reported in Dutch language but due to the limited knowledge of Dutch, research could not benefit from them. See Rankin (2012).

[157] The studies refer to the research studies conducted in English. Due to the inability to comprehend Dutch, the author could not benefit from the studies conducted in Dutch, if any.

[158] Jordens presents data of his own two children.

[159] All the examples in this subsection are cited in Jordens (2002). See also Breitbarth (2013).

d. Mijnie *nee* daden. Bove. (1:9)

Mijnie no that way. Upstairs.

Mijnie has not gone that way. (She has gone) upstairs.

The initial use of *nee* is marked as anaphoric, mostly used to answer yes/no questions. Children also show limited use of *nee* to express clausal negation, and it is argued to be the effect of adults' speech which contains anaphoric use of *nee*. Jordens (2002) argues that initial *nee* is used most of the time with NPs, VPs, or adverbials. Children begin placing *nee* in sentence medial position and its use in sentence external position gradually tends to disappear.

At this stage, children also exhibit the use of negative modal auxiliaries such as *kanniet* (cannot), *magniet* (may not), *hoefniet* (has to not), which are argued to occur in the same contexts as *nee* does, Jordens assumes them all as modal operators. At this stage, children show only limited use of modals in simple declarative speech, although in the same sentence external position as *nee* is used. Some examples are shown below, cited in Jordens (2002).

41). a. Mama *magnie*. (1:7)

Mama allowed not.

Mama didn't allow.

b. *Kannie* bal pakke. (1:9)

Cannot ball get.

Cannot get the ball.

c. *Nee*, daar *nie*. (1:9)

No, there not.

No, not there.

Jordens argue that during this stage, the negative marker *niet* is very rarely used by young children, an example is shown in (41c) (the child form *nie* is used for *niet*).

Children also place *niet* at sentence initial or final position, examples are shown in (42).

42). a. *Niet* Cynthia bed slape.[160]

Not Cynthia bed sleep.

[160] Cited in Jordens (2002)

Cynthia does not sleep on bed.

b. *Niet* juie (luier).[161]

Neg diaper.

Not diaper.

c. Boekje *niet*.

Book neg.

(I want that) book not.

The examples in (42b-c) show that grammatical information like articles and verbal morphology is sometimes omitted by young children.

In the later stage, children use the negative marker *niet,* positive, negative, and modal auxiliaries quite frequently, and this stage is referred to as 'conceptual ordering' by Jordens. Examples are shown in (43).

43). a. Allemaal *niet* zitten. (1:11)

Everybody not sit.

Everybody doesn't sit.

b. Deze mag ook *niet*? (1:12)

This one may also not.

This may also not.

c. *Kanniet* Poes in. (1:11)

Cannot kitty in.

Kitty cannot be in.

d. Mama *kanniet* kusje. (1:11)

Mama cannot kiss.

Mama cannot kiss.

Jordens, based on the speech of children he studied, reports only a few instances of infinitives in negative speech, arguing that optional use of finites and infinitives (Wexler, 1998) does not hold true for Dutch child speech.

[161] Examples (50b & 50c) are cited in VanKampen (2006).

Van Kampen and Evers (2006) argue that between the age of 2-3years, Dutch acquiring children produce NC. They exhibit the use of *niet* + modal auxiliaries and the negative marker *niet* together in a sentence. Some examples are shown below in (44), cited in Van Kampen and Evers (2006).

44). a. *Kwilnie(t)* badje *niet*.
wanna-neg bath neg
I don't wanna take a bath.
b. *Kannie(t)* zien helemaal *niet*.
cannot see at all neg
I cannot see all.

The authors argue that NC is not a property of the adult Dutch language but it appears in the child's early speech for a short period of time. They also show that the Dutch child produced the NC sentences like the one exemplified in (45a), while the mother of the child expressed the same sentence as in (45b), cited therein.

45). a. *Niemand* speelt *niet* met mama.
neg-body plays neg with mama.
Nobody not plays with mama.
b. *Niemand* speelt met mama.
neg-body plays with mama.
Nobody plays with mama.

Authors argue that the production of NC in child Dutch is related to the verb second phenomenon. The child receives abundant input containing the modal auxiliaries and the verb at the second position. An example is shown in (46).

46). a. Laura pakt popje$_t$ *niet* t_v.
Laura takes the doll not
Laura doesn't take the doll.
b. Wil Laura popje$_t$ *niet* t_v?

Wants Laura doll not?

Doesn't Laura want the doll?

Such input makes the child assume that *niet* is attached to the verb and also must be used once again at the sentence-final position when the verb is moved to the V2 position. Consequently, this assumption generates the production of two negative elements in one sentence.

According to Van Kampen and Evers, the double production of the negative marker is related to the finiteness and tense. As soon, the child develops tense and acquires the finiteness in her grammar, and begins using tensed and finite forms of the verbs in the sentence middle positions, she reduces the production of the double and sentence-final *niet*. At this stage, she also realises negative modal auxiliaries as tensed variants of the finiteness and negation. Van Kampen also showed that during the age of 2-3 years, development of finiteness and tense grows and NC vanishes.

Since there is not any other study reported for the acquisition of NC in child Dutch and Van Kampen and Evers report data (diary notes) of two children, so it is not clear how far their reported findings can be generalised. Besides, authors provide only one graph for the acquisition of finiteness, with no technical details and the reasons that lead the child to the production of NC. Authors claim that Dutch speaking children reach the final stage of analysing Dutch as a DN language passing through some intermediate stage i.e., a stage where Dutch children analyse Dutch as an NC language and produce NC. This intermediate stage lasts for about a year. The evidence provided is considered inconclusive.

It has been widely argued in the literature about negation in double negation language that sentences with more than one negative elements are hard to process equally for children and adults so they are hardly produced. Despite the best efforts, author could not find any empirical study that could enlighten on the phenomenon of double negation in adults or child language, and questions remain open like is there any other reason for not using more than one negative element, and how far this absence of double negation sentences could effect children's language, if at all, etc. See chapter 3 for a detailed view of the theories of negation discussed in this dissertation.
See chapter 10 for the empirical findings presented in this dissertation for the acquisition of negation in child Dutch.

5.9 The acquisition of negation in Italian

This section is dedicated to the exploration of the literature that sheds light on the acquisition of sentential negation by young Italian speaking children, using the negative polar particle *no*, the negative marker *non,* and neg-words (*nessuno, niente*, etc.). The acquisition of negation in Italian child language has been studied only by very few researchers.[162] Among the few, the most quoted study for the acquisition of negation is that of Volterra and Antinucci (1976/1979), which provides the pragmatic analysis of the initial productions of negative words in Italian. The study analyses the corpus data of Italian and English speaking children and presents some similarities about negation patterns between the both. Although the study does not provide any details of syntactic development of a child's negation, it does indicate the syntactic shifts that a child takes during the acquisition process of different negative markers. The acquisition process and syntactic shifts adopted by young Italian children are similar to the one discussed in the sections above for SE and Dutch, I will be summarising the major findings and examples of the Italian data only.

Volterra and Antinucci argue that initially children produced negation using the semi-negative Italian word *pu* meaning *all gone* in English and the Italian polar particle *no*. The examples for both of the expressions are given below in (47).

47). a. *No*.[163] (1:4:3) [Forbidding his mother to switch on the flashlight]
No.
b. Mama *Pu*. (1:5:20) [Pretending to shoot his mother]
Mama all gone.
c. *No* c'e pu. (1:4:3)
No there is more.
There is no more (candy).

At this stage, children place the polar particle *no* and *pu* at the sentence external position as it is normal in Italian. Children also used the polar particle with other elements expressing syntactic information, i.e., subject as shown in (48).

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[162] The intention here is to say that the author could not find the enough amount of research conducted on acquisition of Italian in child language in English languages. It is surely possible that the research on the acquisition of negation in child language has been done in Italian but due to the inability of the researcher to comprehend Italian, the due benefit of that research could not have been availed. See also Gulamini and Moscati, 2009; Bernini, 2000; Cuccio, 2011, for child language in Italian.

[163] The examples from (47-51) are cited in Volttera and Antinucci (1976).

48). a. A palla *no*.[164] (1:10)

A ball no.

The ball, I don't find.

b. *No* sona. (1.11)

No ring.

Doesn't ring.

The examples in (48) also show that children are using the polar particle *no* to express sentential negation.

Around the age of 24 months, children started using the negative marker *non*, as shown below in (49). Children show the transition at the syntactic level such that they replaced (but not completely) the use of *pu/no* + V with the *non* + V.

49). a. *Non* si sta per terra. (2:0:7)

Neg sit on the ground.

Do not sit on the ground.

b. Hai itto *non* n'e a panta? (2:0:15)

Is there neg bell.

Look, there is no bell.

Children use the polar particle *no* to answer yes/no questions, as shown below in (50).

50). a. Mother: Glieli dai agli uccellini questi giocattoli?

Do you give these toys to the little birds?

Child: *No*. (1:4:27)

b. Mother: Claudia l'uccellino dov'e.?

Where is the little bird?

Child: Mama, ci ci. Mama, *no* ie ci ci. (1:4:11)

Mommy, bird. Mommy there is no bird.

---

[164] The examples are of child speech. Many often, in Volttera and Antinucci (1976) the speech is written as it is spoken by the child, and the glosses are not provided. Sometimes, if some of the sounds are not produced by the child while pronouncing a noun a verb, they are also skipped from the written speech exemplified in the study. That is why some of the (parts of) sentences do not make clear sense when tried to translate them into the adult speech.

Children also use the semi-negator *pu* to answer the question. An example is shown in (51).

51). Q: Mother: Dove la pupa?
Where is the doll?
A: Child: *Pu*. (1:8:3)
All gone.
[There is no doll]

The authors argue that although by the age of 18 months, children have already started producing the polar particle and the negative marker, and show the knowledge of sentence polarity. Still, children's expression of negation does not reflect the full adult-like system of negation. Children, with the passage of time, add new functions and forms in their grammar to express negation.

Since Volterra and Antinucci studied the pragmatic details of child's acquisition of negation, but it is shown from the data discussed above that children produced the polar particle *no* in anaphoric (50) and also in non-anaphoric functions (51), but the anaphoric use of the negative marker *non* was not observed in the data.

Recent studies (Morgenstein et al., 2018) elaborate on the classic study of Volterra and Antinucci (1976), with more focus on the pragmatics and multi-modality of negation. These studies also do not reflect on the syntactic or semantic details of the child's early negation.
There are not many studies that present the acquisition of negation using two or multiple negative markers, NC, in Italian.

It was discussed in the previous sections that children produce and prefer NC over DN in SE. Among the most recent studies, in an experimental study, Tagliani (2019) argues that Italian speaking young children aging 3-5 years prefer NC reading over DN and produce NC. The same children found DN hard to interpret. Children are able to understand DN until the age of seven years. Moscati (2020) attempts to investigate whether this is only a language specific property of SE or it has something to do with the cognitive abilities of children or it is a learning phenomenon that children prefer NC over DN. Moscati (2020) hypothesised that NC is initially a part of the early grammar of children and they overgeneralise it. Moscati reported that similar to English peers, Italian children also preferred NC readings over DN for the negative fragment answers in contexts that can generate both readings. Tagliani and Moscati both argue that cross-linguistically, children prefer NC over DN. Both of the studies provide a very limited set of data so it is not clear to what extent their claim that children cross-linguistically prefer NC over DN, can be valid or generalisable.

5.10 Review and conclusion

In the above several sections, the detailed discussion and overview of the literature for the acquisition of negation makes clear that there is a mismatch reported between the child and adults' speech. Children begin from acquiring the negative polar particle and later they add the sentential negative marker, and other negative expressions in their grammar. Adult speech, on the other hand, contains the consistent use of the sentential negative marker. What makes children take their own unique path to acquire the very basic phenomenon of the polarity of the sentence in their speech, has been a constant puzzle for researchers of language acquisition and linguists to solve. To do this, several accounts and proposals have been put forth.

Behaviourist, input-based, and usage-based models argue that children learn what they hear most of the time. The linguistic input is considered as the role model of the speech that children need and attempt to acquire. But the mismatch observed between the early child and adult speech does not support the claims forwarded by empiricists and behaviourists. It is surprising, that given that the input contains the extensive amount of examples for both forms of negation, but children acquire one earlier than the other. If children learn first what they hear most, then they must also learn both forms of negation simultaneously, the negative marker and the negative polar particle. Since, the input containing the negative marker has also been found in a similar proportion to the negative polar particle, or at least in an abundance. Furthermore, the position of the negative marker has also been an intriguing question for behaviourists to explain. Adults use the negative marker in its proper place but children of course use several positions until they place it correctly.

Under generative linguistics also, various theories, approaches, and models attempted to explain the mismatches found between child and adult speech. First, the theory of maturation proposes that either UG matures over time or the functional categories that children do not express in their early speech are subject to maturation overtime. The proponents of the generative framework argue that the missing functional categories will be acquired by children when they come across the triggering input, but they do not explain the nature of the triggering input. As for the acquisition of negation is concerned, adults use the negative polar particle and the sentential negative marker with similar proportions, but children begin with using the negative polar particle anaphorically and non-anaphorically. Although the input is readily available to the child for the acquisition of the sentential negative marker, is it the case that the input does not serve as the 'triggering data' initially? Is it the case that children do not or cannot pick it and process it as the required 'triggering data'? Are they deficient in some abilities? At what point the input for the sentential negative marker will prove itself as 'triggering data' that the child will pick it up and acquire. Generativists have been struggling to provide satisfactory explanations to these and many other questions.

The assumption that children's omission of certain functional categories is a reflection of the adult speech which also lacks the functional categories for a considerable part of their speech is not true. Adults' speech directed to children is always correct, clear, and contains fuller and grammatical sentences. The negative marker e.g., negative auxiliaries in English can only be used as a part of the small clause in negative tags, like (*you like potatoes, don't you*?), or in the speech like (*it isn't a dinosaur, it isn't, honey.*). But such speech is prevalent quite less in child directed speech. If this kind of speech is quite prevalent in adult directed speech, it still cannot be stated as a reason for children's simple speech, since, children are argued to be sensitive to the child directed speech and not (or almost not) to adult directed speech. Children find child directed speech more comprehendible, easier, and clearer than adult directed speech. Furthermore, it is shown that if children aging 2-3 years old use small clauses like '*not him', 'no me', or 'he don't'*, it is often not the case that they produced these short sentences when it was required in the context to answer using such phrases. Rather, they used such small clauses when the context required them to answer in fuller and more comprehensible words. On the other hand, if children have acquired such clauses based on the extensive input, it will lead to the assumption that they have overgeneralised some forms that they have learned. And, they use them even when they must use some other expressions, giving the impression that children have learned some wrong expressions. How will they un-learn them, it is not clear under such an approach.

The theories presented so far are not fully able to account for the varying behaviour of the child's early language acquisition. Theories also cannot fully explain inter language and inter child variations. Currently, it is argued (Yang, 2019; Wexler, 2020, among others) that a language acquisition theory must have both of the components: a model of the language structure and a model for language acquisition. The theory must have the ability to account for the fine grained individual and dialectal differences.

Chapter 6

Consequences and prediction of Zeijlstra's theory for language acquisition

Zeijlstra's (2004, et esq.) theory of NC was discussed in detail in chapter 3 (section 3.7). The main points of Zeijlstra's theory are summarised in (1):

1).

a. Feature (un)interpretability is an independent and formal phenomenon, [iF] features are not semantic themselves, but that elements that carry them may (not always) carry the semantics of [F] as well.

b. The [uF]s require to stand in an Agree (c-commanding) relation with [iF] which has the ability to check [uF]'s configurational needs.

c. NC is an instance of syntactic agreement between the negative formal features [i/ uNEG].

d. If there are no doubling effects with respect to the negative semantic operator in the input, the language exhibits semantic negation and is a DN language.

e. If there are doubling effects with respect to the negative semantic operator in the input, the language exhibits formal negation and is an NC language.

Keeping in view these main points, the learning algorithm (section 3.7.3), and the application of Zeijlstra's theory (section 3.7.4), it is assumed that Zeijlstra's theory particularly predicts certain stages for the acquisition of negation and NC.
The hallmark prediction for the acquisition process of negation and NC is shown in (2).

2). Children acquiring any language begin from semantic negation. Children assume that every morpho syntactic element that is being used in a negative sentence is semantically negative. If and only if there are doubling effects with respect to negation present in the language input that children receive for their local language, will they infer that their language exhibits the presence of formal features of negation.

Several sub-predictions can be drawn from (2), for a variety of languages, i.e., Dutch, Italian, Standard English and negative concord English, as shown below.

6.1 Predictions for a DN language: Dutch

The inventory of negative elements in Dutch is shown in chapter 3 (section 3.7). it is summarised as in (3) below.

3).

Negative element	Formal feature
Niet (adverb)	Semantically negative (¬)
Negative indefinites	¬∃

In Dutch, negation is expressed using only one negative marker per clause. Syntactically, the negative marker is adverbial which serves as the negative operator. In Dutch, the negative marker is interpreted as semantically negative. In addition, there are no doubling effects for negation in the input, children will correctly assume that every negative element is semantically negative itself and there is a 1:1 correspondence between the negative element and the meaning.

Children are expected to learn the adult stage of negation early and with no problem. Since the input explicitly containing the two semantic negations are rarely produced by even adult speakers of Dutch (or any language), it is expected that young children will hardly be able to produce or comprehend double negation sentences in the earlier stages of their acquisition (Zeijlstra, 2004; Penka, 2007/2010, Tagliani, 2019; Moscati, 2020, a.o.)

6.2 Predictions for an NC language: Italian

The properties of Italian negative markers are shown in (4).
4).

Negative element	Formal feature
Non	[iNEG] + ¬
Op¬	[iNEG] + ¬
Negative indefinites	[uNEG] + semantically non-negative

It follows from (2), that children acquiring Italian will also initially hypothesise that every negative form is semantically negative. When children receive linguistic input that explicitly contains doubling effects of negation, this will violate their assumption that every negative form in Italian is also semantically negative. This violation of their initial assumption will lead children to re-set their assumption from negative forms being semantically negative to negative forms being formally negative. Children will learn that negation is formal and not semantic in their language. Since Italian contains abundant input for doubling effects of negation, children will easily, early, and rapidly transit from semantic negation stage to formal negation stage, i.e., children will acquire NC earlier than their peers acquiring e.g., Standard English.

The prediction in (2) looks straightforward and easily applicable for a DN language like Dutch or an NC language like Italian and the acquisition process seems smooth and rapid. When it comes to languages which are partial or invisible NC, e.g., Standard English (SE) the prediction in (2) does not predict a clear process. Rather, it follows from (2) that the acquisition process will take several stages until it reaches the final stage. First, the predictions for SE and NC English will be presented and then it will be discussed how Zeijlstra's hall mark prediction suggests for a several stages acquisition of negation for standard English.

6.3 Predictions for Standard English

In the section 3.7. 4, it was shown that Zeijlstra argues that SE exhibits formal features of negation. The inventory of negative formal features was given as shown in (5).

5).

Negative element	Formal feature
N't	[uNEG]
Not	[iNEG] + ¬
Op¬	[iNEG] + ¬
Negative indefinites	¬∃

The FFFH and the learning algorithm predict that children acquiring SE will initially hypothesise that negation is semantic in their language and there is a 1:1 relation between every negative form and meaning. The first part of this prediction is partly true while the second part holds fully true for SE. An abundant amount of input containing negative markers like *no, not, n't,* used as a single sentential negative marker, is available to children. Similar to DN languages, children acquiring SE will begin acquiring negation using the adverbial negative marker *not* or *no*. Children will use *no, not* as the sentential negative marker where adults will use the negative auxiliary form of negation. The predicted examples for child speech at this stage could be sentences containing the negative marker *not* or the negative quantifier *no* instead of *n't*.

Given that SE adult input does not contain overt evidence for doubling effects of negation or NC which can guide children to assume that negation is formal in their language, the acquisition of the negative marker Neg° *n't* with a [uNEG] is predicted to be a bit later than the adverbial forms of negation.

After that when children have acquired *n't* and it forms the evidence that formal features of negation are projected in their grammar, their grammar is potentially able to license NC. Children must potentially be able to produce NC.

Since, the adult input for SE violates children's assumption that SE is an NC language, they will have to re-set their assumption from SE as an NC language to SE as a DN language. Based on the input, children will learn that NC is not allowed in their language, consequently they will reduce its production and will again analyse SE as a DN language.

A bit more about child SE:

Zeijlstra's proposed acquisition algorithm predicts for a complex path for child SE. It triggers several zig zag patterns for children to show up on until they reach their final stage of the acquisition of negation.

The prediction that children acquiring SE will initially hypothesise that their language exhibits only semantic negation makes SE similar to the other DN languages, e.g., Dutch. In DN languages, an adverbial negative marker does not block the movement of tense or agreement morpheme between the T and V. It means children acquiring SE can produce sentences where the tense morpheme is shown up on the main verb, e.g., *It not works.*[165] In spite of the fact that *not i*s

[165] Cited in Thornton and Tesan (2013).

taken as an adverbial negative marker in the adult SE, such forms are not produced even in adult speech. It will be interesting to see that if children produce such sentences, if they do, how and when will they de-learn them again.

Furthermore, if Bellugi's (1967) (and many others) claim that children's initial acquisition of negative auxiliaries like *don't* and *can't* are also instances of adverbial negation and must be treated as whole forms, similar to *not,* is true, then it is possible that children also produce negative sentences like *This don't works,* where tense inflection is shown on the main verb. Such forms will show that children are treating *don't* and *can't* similar to the adverbial negative marker *not*. Again, these forms are not allowed in the adult grammar. At this stage, to see if children treat adverbial and head negative markers alike, it would also be interesting to see if children produce sentences like *He can't coming,* along with the forms like *He (is) not coming.*

If children begin from semantic negation and assume a 1:1 relation between every negative form and meaning then it is also predicted that they can produce double negation sentences like *He does not call nobody,* with the intended meaning that *he called somebody*. But generally, it is argued that sentences with double negation are very rare in the adult input and young children might not be able to produce or process them in earlier stages (see Tagliani, 2019; Moscati, 2020, among many other). Instead, children should produce negative polarity items (NPIs) in their negative speech. NPIs are taken as counterparts of negative concord items. Children acquiring SE should not produce NC in the semantic negation stage.

A very critical point in predicting the acquisition of sentential negation (at least for SE) is determining the evidence that children have acquired *n't* or the formal features of negation. Several pieces of evidence are presented in this regard. Zeijlstra argues that when children have started showing the productive use of negative auxiliaries in their speech, and when they show the use of a variety of negative auxiliaries in a variety of structures, it forms the evidence that they have acquired *n't*. One important structure in the productive use of negative auxiliaries is their use in the interrogatives and negative tag questions which require the movement of the complex negative auxiliary from T/I to C. This movement of the negative auxiliary from T/I to C is suggestive of the evidence that the negative auxiliary is a head (as only head moves to head position and also a head does not block the movement of other heads, (see chapter 2) and not an adverb or a vP adjunct. At this stage when children have acquired *n't*, they must produce adult like negative sentences e.g., *It doesn't work*.

6.4 Predictions for Negative Concord English

It was discussed in the previous chapters that some varieties of English do exhibit NC. Zeijlstra's theory and algorithm predict that similar to NC languages, children acquiring NC English will also initially hypothesise that negation is semantic in their language. Unlike their SE peers, they will be receiving abundant input for NC and doubling effects of negation which will make them assume that negation is formalised in their language, and their grammar can license NC. Which is also the correct option for their language. Based on the first hand input for NC, it is expected that children acquiring NC English will be able to acquire NC earlier than their SE peers.

6.5 Summary

Summarising, it would also be interesting to see if children acquiring NC English also take a several-stages-path to acquire adult like negation in their language and whether they also show the early acquisition of one negative marker over the other. Do children show similar acquisition patterns at similar ages or do they differ from each other and also from their SE peers, and do children acquiring (varieties of) English differ from their peers of other languages, i.e., Dutch and Italian. Once children have acquired the adult like forms of negation, it would also be interesting to see that at what age will they remove the non-adult like structures from their negative speech?

Chapter 7

Methodologies

In this chapter, data collection, extractions, cleaning, and processing for Standard English, Negative Concord English, Italian, and Dutch will be shown.

7.1 Sample population

The child sample selected for this study is purely random and furnishes the aim to present a broader view of children's acquisition of negation, i.e., various negative markers, various ways of expression of negation, right from the time when children begin to speak until the age they are considered mature in their language use.

The selected sample represents the subset of the child population representing typically developing children of both genders, children cared at home by a family member or a caregiver, cared for at the day care, being children of parents having variety of education, i.e., school, professional, university degree, etc., of various socio-economic backgrounds.

Table 7.1 presents the summary of children for all the sample languages.[166]

X.	Sample language	Total number of participants
1	Standard English	1175
2	Italian	19
3	Dutch	58
4	Negative concord English	171
Total	**4**	**1423**

Table 7.1 Summary of children for all the sample languages.

7.2 Data collection

The corpus data for Standard English, Dutch, and Italian are retrieved from the CHILDES.[167] See appendix_B for the list of the corpus used for each language, and appendix-C for

[166] See Appendices I, J, K, and L for monthly and age-group wise details about children for all the sample languages.

[167] https://childes.talkbank.org/

details about number of chat files searched for each of the languages. Access to the data for African American English was granted upon the special request of the author.[168]

7.3 Data extraction

All the data are extracted using the Python programming language version 3.8.8. See appendix-E of SessionInfo for a detailed list of Python standard, attached and imported libraries. The negative sentences for each language are extracted for children as well as Child Directed Speech (CDS). To keep all the negative sentences separate, they are extracted as per negative element, for example, the polar particle (*nee, no, no*) the negative marker (*n't/not, non, niet*), negative quantifiers, and NC, for children, and to build a brief comparison to, also for CDS.

From the Python package PyLangAcq version 0.15.0, using the function *pylangacq.read_chat*, a reader was instantiated to read a particular chat file. To read the whole directory, the classmethod Reader was accessed via the function *pylangacq.Reader.from_dir* and saved as an object. A list of negative elements was created, and using a for loop, every negative sentence of the child participant was collected using the object reader. The information about the child's name, corpus name, role, and age was accessed using the *method.headers* of the object reader and joined with the sentences. The list of sentences was then converted into a data frame using the function *pd.DataFrame* from the package Pandas version 1.2.4. This data-frame was then converted into a CSV file using the function *to_csv* from the same package and saved for cleaning and further processing.

7.4 Data cleaning

In order to achieve a clear and detailed picture of children's negative sentences, their sentences for each element were read through, cleaned, and processed thoroughly by hand or using cross tabulation and subsetting from RStudio whenever required See appendix-F (SessionInfo) for a detailed view of R packages used:

Negative p*olar particle:* For example, sentences for *no/nee* are separated into two tables, i) sentences where *negative polar particle* is used only as a single word i.e., most probably as an answer to a yes/no question like *no, nee nee, oh nee*. etc., ii) the other table contains sentences for *no/nee* followed by some predicate.

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[168] See chapter 11.

Negative marker: The sentences for the negative marker i.e., *not/non/niet* are also gone through sentence by sentence to separate all the adult-like and grammatical sentences from the ungrammatical ones. Thus, the sentences for the negative marker were also categorised into, i) adult-like/grammatical and ii) non-adult-like/ungrammatical sentences. A sentence was considered grammatical/adult-like if it is acceptable in adult language and contains all the structural information in a fully grammatical manner. A sentence was considered ungrammatical/non-adult-like if it is not acceptable in the adult language for containing any ungrammatical information about any part of the sentence, e.g., negative marker, mismatched verb forms with respect to the subject, missing auxiliaries, etc.

NQs: The negative sentences containing the negative quantifiers were also gone through sentence by sentence to separate i) grammatical/adult-like sentences from ii) the non-adult-like/ ungrammatical ones for Standard English and Dutch.

NC: The negative sentences for NC for Italian and Standard English were also gone through thoroughly. All the unclear sentences for each language were discarded.

Sentences with missing details i.e., name, age, or corpus were also discarded form children and CDS sentences. Child and CDS sentences of children aged 12 months were also discarded due to lack of clarity. Sentences of children older than 84 months were also discarded as one of the aims of this dissertation is to present a detailed view of younger children only. Sentences of non-typically developing children were also discarded. Generally, the age ranges between 13-84 months, for the specific details about each language see the respective results chapters.

After cleaning and tabulating the data, a column named TAG was added to the table describing the negative element and its status, e.g., *nee-polar, niet-adultlike*, etc. See figure 7.1. from the RStudio showing the sentence table with all details.

num	sentence	speaker_childage	corpus_role_name	TAG
582	nee , da .	19	TD_Target_Child_Tijn	nee_polar
580	nee .	19	TD_Target_Child_Tijn	Nee_nee
581	nee .	19	TD_Target_Child_Tijn	Nee_nee
6195	nee .	19	Groningen_Target_Child_Tomas	Nee_nee
150	nee , uit .	20	TD_Target_Child_Gea	nee_polar
53	nee .	20	TD_Target_Child_Corine	Nee_nee
54	nee .	20	TD_Target_Child_Corine	Nee_nee

Figure 7.1: A sample sentence table for the child sentences for the negative polar particle *nee* for Dutch

Figure 7.1 shows that the first column *sentence* indicates the sentence, the second column named *speaker_childage* provides information about children's age in months, and the next column *corpus_role_name* indicates three things: the name of the corpus, the role of the target child for whose data is recorded, the name of the target child. The column *TAG* summaries the data table in a word briefly, e.g., the sentencing table contains the sentences for the negative polar particle *nee*.

7.5 Data processing

The cleaned and tagged data tables were loaded in R for further analyses. See appendix-F (SessionInfo) for all R packages used for data processing and statistical analyses. The data tables were all united forming one big table for children and one for CDS. All the sentences were then counted per month per child. The CDS sentences were also counted the same way.

For CDS sentences, if there were more than one CDS speaker for a particular child in a single month i.e., mother, investigator, father etc., their sentences were collected and made one corresponding CDS row for the particular child per month. After that, all the CDS speakers whose corresponding children's sentences were not available and children whose CDS sentences were not available were discarded from the final tables.[169]

This way, both tables, children's and CDS were containing the equal number of rows. All the children's rows were fully aligned with their respective CDS rows so when fitting the model each

[169] Children mentioned in table.1 remain after removing the non typically developing children and children with missing details, i.e., age, name, corpus, CDS sentences, etc.

child's data should be evaluated for her respective CDS speaker's data. Both, the children's and CDS tables were joined side by side using the R package qpcr. Data were processed separately for each language.

For an easy visualisation and presentation of the data and to conduct post hoc multiple comparisons, a column for age-group was added to the table. The final shape of the table looked like the one shown in figure 7.2.

	name	age_month	TAGnee_cds	TAGniet_cds	TAGnqs_cds	age_group
1	Groningen_Investigator_mot_Caroline_Target_Child_T...	19	46	81	20	19–24
2	TD_Investigator_Folkert_inv_mot_Target_Child_Tijn	19	24	26	7	19–24
3	TD_C_Investigator_Folkert_inv_mot_Target_Child_Cori...	20	9	17	1	19–24
4	TD_Father_FAT_mot_Target_Child_Gea	20	31	22	18	19–24
5	Groningen_D_Investigator_Paulien_mot_Target_Child_...	21	8	14	2	19–24
6	Groningen_Investigator_Caroline_mot_Target_Child_T...	21	93	116	19	19–24
7	Groningen_A_Investigator_Gerard_mot_Target_Child_...	22	24	37	15	19–24

Figure 7.2 showing the CDS part of the negative sentences calculated per month.

The column age-group shows the group of children as per age.

7.6 Descriptive statistics

Among many functions of descriptive statistics (counts, frequency, mean, confidence intervals, etc), one is to explore and present the key concepts of the variables under investigation in detail and mostly present them in the form of simpler summaries or charts. The second important function of descriptive statistics is to reflect the relationship of variables, along with indicating their distribution. Computing descriptive statistics is one of the vital steps completed before conducting the inferential statistics. In every chapter of the results, the descriptive statistics are computed prior to inferential statistics that serve the purpose just stated.

In descriptive statistics, while summarising and presenting the data, the measure of central tendency is used. The measure of central tendency is also called averaging. Averaging provides a number that tends to identify the most typical or common or the central value of data, at a certain condition (Manikandan, 2011). Mean, median, and modes are the mostly used three ways to compute the average of the data. Furthermore, the mean is considered one of the accurate and precise measures of average since it accounts for all the observations under investigation, for a larger set of data (Fisher, 1925, 1935, 1992; Neyman, 1995, 1933, a.o.). In modern statistics, it is often suggested to check for more than one measure of average or central tendency to get a better view of the data.

For the data under investigation here, the mean is used as the measure of the average use of any negative element. Most often, the median was also checked which was found in the same range as the mean. In order to get the typical value for the use of any negative element per age-group, averaging was performed using the arithmetic mean. The mean values are computed by dividing the total number of sentences containing any negative element by the number of child speakers who spoke, in each age-group. The obtained mean value represents the typical number that children of that particular age-group on average will use a negative element in a certain manner.

Bootstrap confidence intervals are one of the measures of precision and accuracy of the estimate they are computed for (DiCiccio. and Efron, 1996; Sedgwick, 2014). Bootstrap confidence intervals of any estimate, i.e., the mean in this case, are computed by taking 1000 resamples of the original sample and computing their means which gives a range in which the original observed mean would fall.

7.7 Methodology for statistical modelling

In order to estimate the effect of predictors[170], a Generalised Linear Mixed Model (GLMM; Baayen, 2008) with a negative binomial error structure and the log link function (McCullagh and Nelder, 1989) was used.[171]

For the data sets for which there were repeated observations and to control the chance of type 1 error rate up to the level of 0.05, random intercepts and slopes for fixed effect predictors were included in the model (Schielzeth and Forstmeier, 2009; Barr et al., 2013). See the respective results chapters for language or model specific details, if any.

Prior to fitting the model, the response variable was inspected to see if it is roughly symmetrically distributed which was the case and no outliers were identified. To test the overall effect of the fixed effects predictors and to avoid cryptic multiple testing (Forstmeier and Schielzeth, 2011) a full null model comparison was conducted where the null model did not contain the fixed effects predictors but was otherwise the same.

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[170] Following the convention, throughout this dissertation, the term *predictor(s)* is used for independent variable(s), and *response* for dependent variable(s).

[171] Until mentioned otherwise, all the predictor and response variables are modelled as count variables.

The main effect of individual fixed effects was also tested by comparing the full model with a reduced model while lacking one of them at a time using the *drop1* function. These tests and the full null model comparison were conducted using the Likelihood Ratio Test (LRT) (Dobson, 2008).

The model stability was estimated by dropping one sample individual at a time and fitting the model on the rest of the sample individuals, the estimates drawn from these sub-models were compared to the original model fitted including all the sample individuals. The model was revealed of a good fit.

To check for the collinearity among the predictors, the Variance Inflation Factor (VIF) was determined which stands always closer to 1, using the function *vif* of the package Car, version 3.0-12. The response was never over dispersed and had the dispersion parameter near to 1.[172] Best Linear Unbiased Predictors (BLUPS) were normally distributed (see Baayen, 2008 and Harrison et al., 2018).

The models were fitted in R (version 3.6.3; R Core Team 2020)[173], using the function *glmer.nb* of the package lme4 (version 1.1-28.1; Bates et al., 2015; Bates, et al. 2018). The confidence intervals were achieved using the *confint* function of lme4.

7.8 Post hoc multiple age-group comparisons

Post hoc multiple age-group comparisons are conducted to identify where the statistically significant differences among the sample groups lie in exhibiting the estimated average use of any particular negative element (Onwuegbuzie and Leech, 2004; Forstmeier and Schielzeth, 2011, a.o.). The child data analysed in this dissertation expands to a wide range of ages. In case of the significant results for age as a continuous predictor in a GLMM model, the post hoc multiple age-group comparisons are conducted. For this purpose a GLMM model is fit using age-group as one of the predictors. For a predictor with more than one levels, the first level (e.g., age-group) is treated as the reference level (e.g., reference age-group) and the GLMM model output shows the difference in the estimate between the reference and all the levels. To see if other levels of age-groups also exhibit statistically significant difference from each other, post hoc multiple comparisons are conducted, using the function *glht* from the package multcomp.

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[172] The dispersion parameter is computed using the function that Dr. Roger Mundry wrote and gave use during the course of Regression Analyses at Destsched Primatenzentrum Leibni-Institut für Primatenforschung, Goettingen, in March 2022, with his permission.

[173] See the Appendix-F (SessionInfo) for R for all the details about the packages and their versions.

7.9 Studying sub groups

In the case of large data sets of larger sample size, studying subgroups leads to identifying certain within-populations trends for the subject matter under investigation and helps test hypotheses in more detail. Studying subgroups becomes particularly significant when a subgroup exhibits certain characteristics that are particularly different from the overall or a major part of the population, (Xuming, 2020; Fletcher, 2007; Farrokhyar, et al. 2022, Dijkman, et al., 2009; a.o.). For example, for the identification of Negative Concord among children acquiring Standard English, the sample is sub-grouped into 4 groups with respect to the presence or the absence of NC in children's and their CDS data, see chapter 8, section 8.3.3. The techniques of studying subgroups have been widely used in the life sciences research.

Chapters 8, 9, 10, and 11 provide the empirical findings, results, and statistical analyses of Standard English, Italian, Dutch, and Negative Concord English, respectively.

Chapter 8

Results

Standard English

This chapter will present the empirical and inferential results for the acquisition of sentential negation and Negative Concord (NC) for children acquiring Standard English (SE) as their first language.

8.1 Standard English (SE)

This chapter presents the analyses of the use of various negative elements of 1175 children acquiring Standard English varieties of North America and Great Britain.[174] See appendix_J (A) for a monthly view of number of children.

The aims and focus of this chapter would be to present a detailed view of children's acquisition of negation overall focusing in particular on the use of negative elements like *no, not, n't,* Negative Quantifiers (NQs), and NC, making the extensive use of descriptive statistics e.g., counts, table summaries, averaging, percentages, proportions, etc. The focus would also be on highlighting peculiar features of children's use of various negative elements. In addition, descriptive statistics would also serve the purpose of showing the distribution of the data and the relationship of variables under investigation. After that, statistical modelling and inferences would be provided that will serve as the base for making conclusions and drawing inferences.[175]

The procedure of the upcoming sections would be as follows:

In this section, total negative sentences for children and CDS will be presented. Section 8.2 presents the negative sentences per negative element. Section 8.2.1 presents the detailed view of children's use of the negative element *no*, section 8.2.2 will show that of *not* and section 8.2.3 presents the use of *n't* in a detailed and comprehensive way. In all the sections, for all the negative elements, comparison will be presented between children's and CDS negative sentences whenever required and possible. Sections 8.2 to subsection 8.2.5 will present the descriptive and empirical analyses while the statistical modelling and analyses will be presented from section 8.3 - 8.4.

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[174] The data presented in this chapter is mixed, for instance, 428 children represent the longitudinal data and 747 children represent cross sectional data, spanning until the age from 13 month to 84 month, 7 years.

[175] Inferential statistics are conducted using a complex procedure of computations and followed by a certain set of assumptions. They are used to make inferences and draw conclusions, and to generalise an inference beyond the data under investigation. See Bortz, J. (1999), Quinn, and Keough, M. J. (2002), and the references mentioned in chapter 7.

We start by presenting the total number of negative sentences for children and child directed speech (CDS) in British Standard English and North American Standard English. A total of 228523 for British Standard English and 208070 for North American standard English were selected for the analysis. Table 8.1 presents the details of the total British and North American Standard English child and CDS negative sentences investigated in this chapter.[176]

SE variety	Child	CDS	Total
British	85897	142626	228523
North American	83959	124111	208070
Grand Total	169856	266737	436593

Table 8.1: Summary of the total number of negative sentences for British and North American SE.

Since the negative elements used in both of the varieties of Standard English are the same and used in the same functions, from now onwards, the sentences are presented collectively, and both the varieties of English will be represented using only the term Standard English (SE). For an easy visual presentation of the negative sentences and later to compute post hoc multiple age-group comparisons, the age is divided into age-groups consisting of 6 months each, appendix_J(B) presents number of children in each age-group.

It was shown in chapter 7 that a sentence was considered negative if it contained any of the negative markers or the NQs from the ones shown below in (1), (see chapter 7 for details).

1). *not, isn't, can't, don't, aren't, doesn't, needn't, won't, hasn't , haven't, cannot, shouldn't, wouldn't, couldn't, hadn't, wasn't, weren't, no, nobody, nothing, never, no one, none, neither, nor*

Figure 8.1(A) presents a total of 169856 negative sentence for children and 8.1(B) presents the total of 266737 of negative sentences for child directed speech (CDS) across age-groups, respectively.[177]

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[176] These negative sentences remain after removing sentences for non-typically developing children, for children of age-group 0-12 months, children with unclear or missing details (name, age, and developing group, etc), and very unclear sentences for both sentence groups. See chapter 7 for a detailed methodology.

[177] Each age-group consists of 6 months. E.g., age-group 13-24 contains the sentences for children aged 13 months to 24 months. The age-months for 8.1(B) represents the age of the children and sentences for CDS.

The Y-axis, as well as the length of bars represent the total counts and the x-axis represents the age-groups.

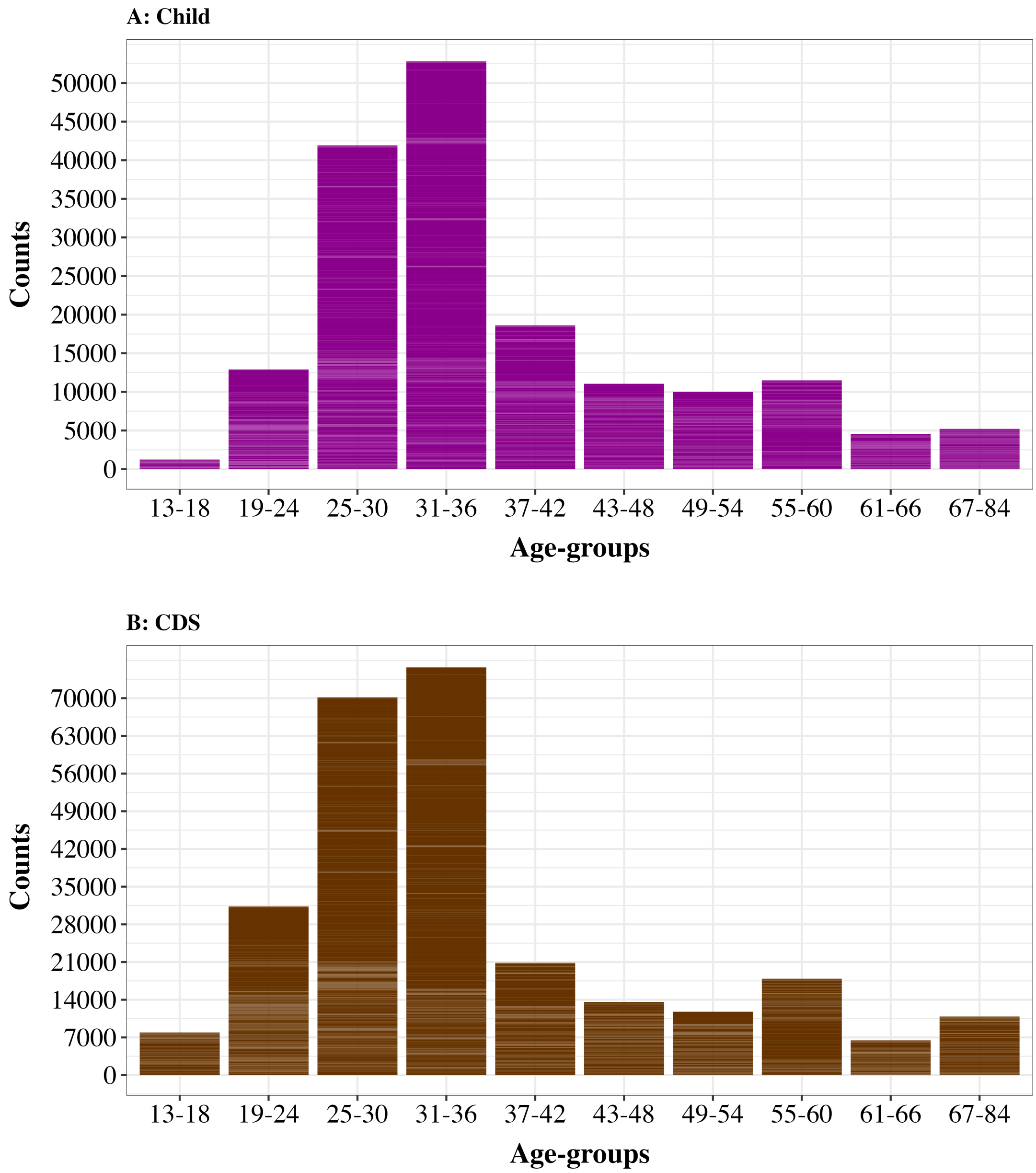

Figure 8.1: Total number of negative sentences for children and CDS per age-group.

Figure 8.1(A) shows that the first age-group 13-18 contains only 1249 sentences, age-group 19-24 contains more than 12 thousand sentences. There is a big increase in the total number of sentences for the next two age-groups. Most (a total of 52831) of the total negative sentences make a part of the age-group 31-36. Similarly, figure 8.1(B) presents the total number of negative sentences for CDS per age-group. Overall figure 8.1(B) presents that each age-group contains a higher number of negative sentences for CDS as compared to the child sentences. Apart from that, there is also a similarity between both the parts of figure 8.1 that the age-groups which contain most of the sentences for children in figure 8.1(A) also contain more sentences for CDS in figure 8.2(B) i.e., age groups (25-30, 31-36) as compared to some other groups i.e., age-groups 13-18, 61-66, etc.

8.2 Negative elements

As it was shown in chapter 7 that in order to achieve a detailed view of the acquisition or use of various negative expressions, children's negative sentences are separated as per the negative markers and NQs.

Figure 8.2 presents the total number of negative sentences for *no, not,* and *n't* for children. NQs are presented later in section 8.2.4.

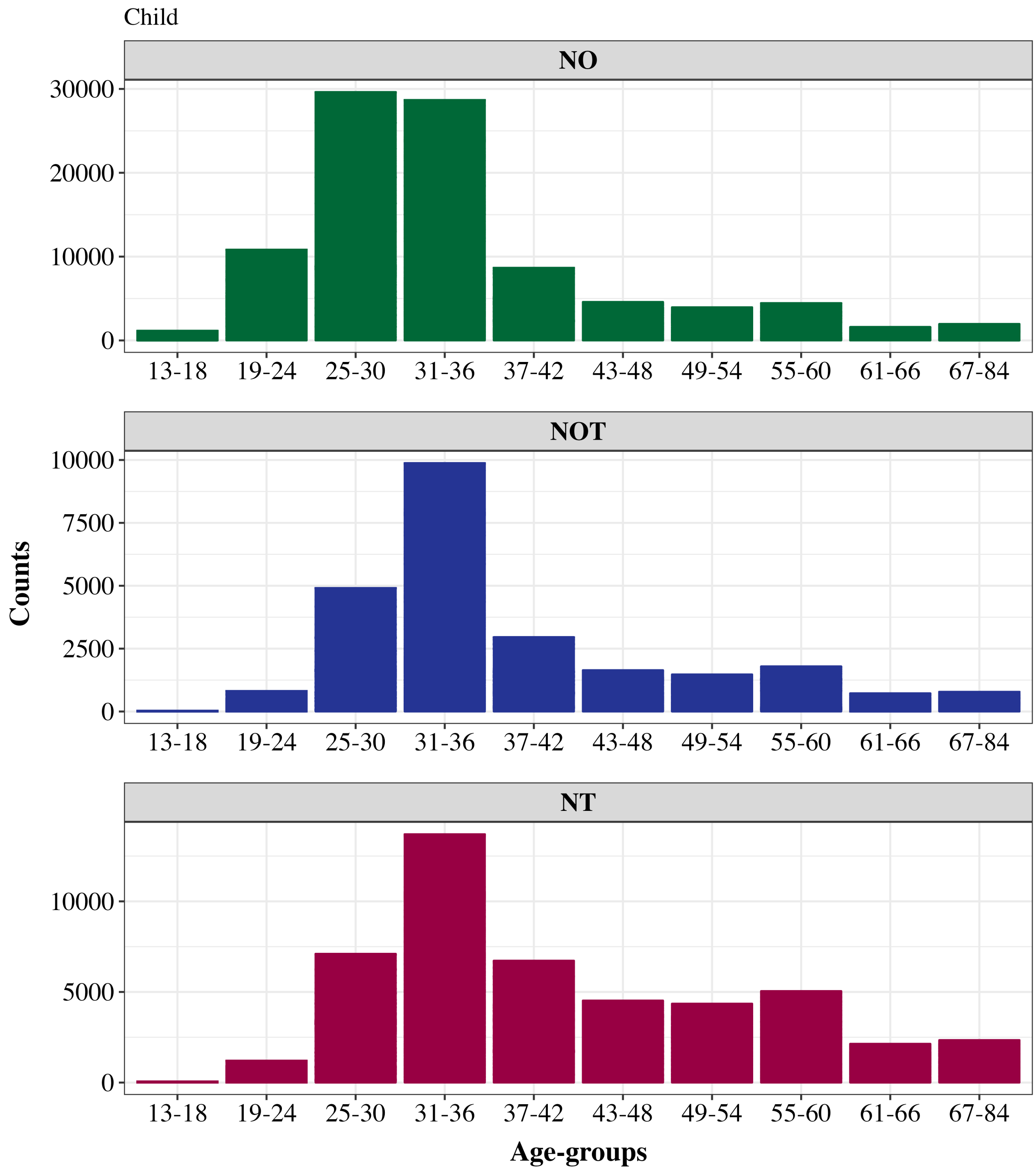

Figure 8.2 Children's negative sentences for *no, not,* and *n't* in each age-group.

Figure 8.2 presents the total number of negative sentences (95510, 24997, 47209) for *no*, *not,* and *n't,* respectively, divided into age-groups. Figure 8.2 shows that the age-group 13-18 contains more sentences for *no* as compared to *not* and *n't*. The situation is the same for the next age-group. From the age-group 25-36 to onward, every age-group contains more sentences for *n't* as compared to *not*. The age-group 31-36 contains most of the sentences for *not* and *n't*, while the age-group 25-30 does the same for *no*.

In order to present a comparison of children's negative sentences with that of CDS, negative sentences for the CDS were also separated in the same way, as shown in figure 8.3.

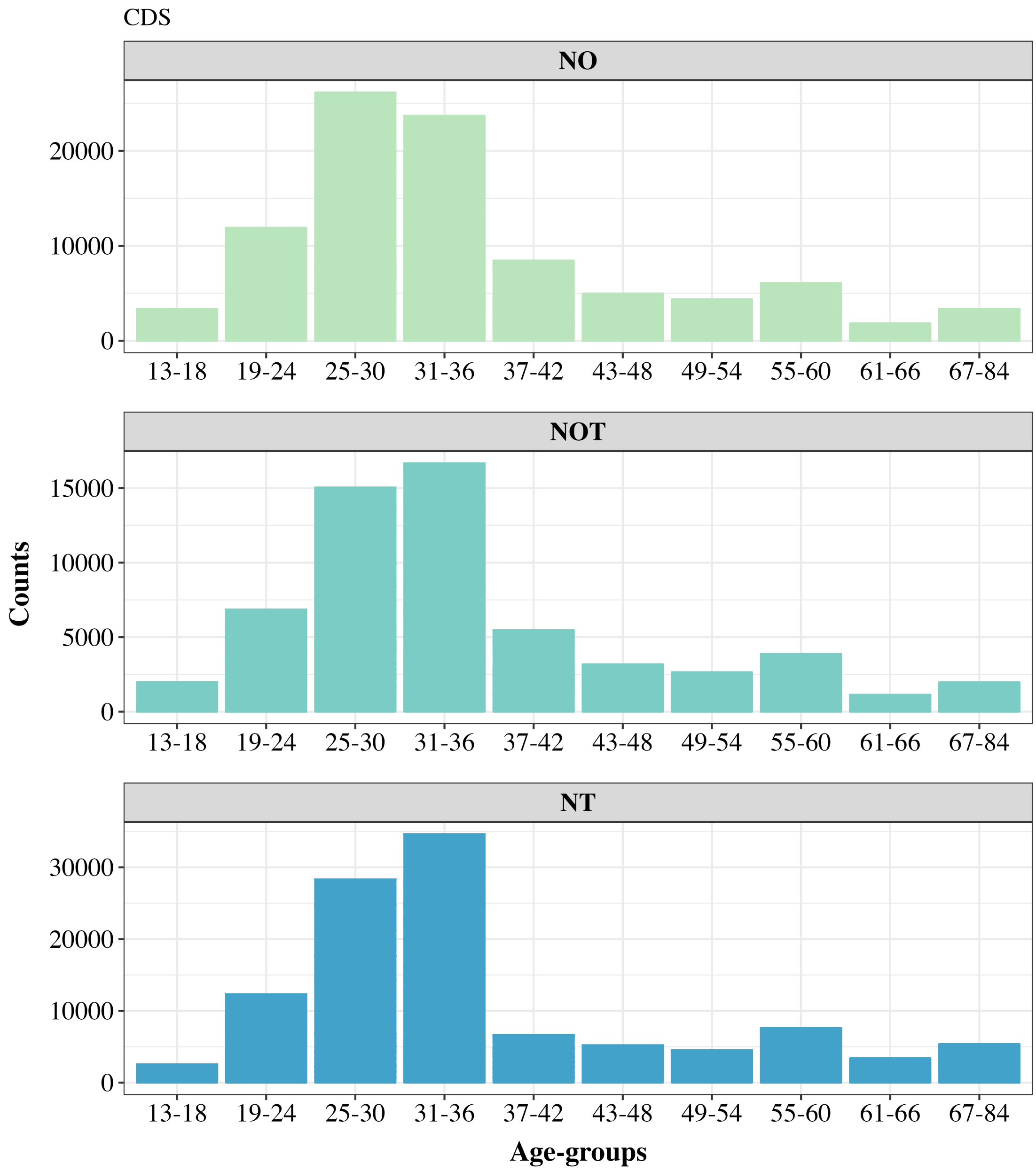

Figure 8.3: Negative sentences for *no, not,* and *n't* for the CDS in each age-group.

Figure 8.3 presents the total number of negative sentences (94087, 58824, 110436) for *no, not,* and *n't*, respectively, divided into age-groups. Similar to figure 8.2, the age-group 13-18 for CDS contains most of the sentences for *no* (3332), 2550 for *n't* and then 1985 for *not*. Also, for all of the age-groups, the total number of sentences for *n't* remains the highest, followed by *no* and lastly *not*. Furthermore, the number of sentences for CDS remains higher than that of child across the age-groups.

To present a detailed view of the acquisition of several negative expressions by young children, the negative sentences to be investigated are separated into grammatical/adult-like and non-adult-like/ungrammatical negative sentences for various negative elements. The grammatical/ adult-like sentences include the sentences which are structurally fully grammatical as well as sentences which are acceptable in spoken SE. The short sentences like *no juice, not for me, not yet, me neither*, etc., are also considered as adult-like because they are very frequently found in the CDS negative sentences also.

In the following sections, the acquisition patterns, point of age of the acquisition, use, and trajectory of various negative elements will be presented across age-groups for children's sentences, and a comparison will be presented to CDS sentences whenever applicable.

8.2.1 The negative element *No*

In the child language acquisition literature, the negative expression *no* is given much attention due to its dual role, the role as a polar particle and also as a negative quantifier. Several studies (Kalima, 1964; Klima and Bellugi, 1966; Bellugi ,1967; Piaget 1952; Pinker 1979; Crain 1987; Grady, 2005/2011; Cameron-Faulkner et al. 2007, Wode, 1970, cf. Park 1979, Stromwold and Zimmerman 1999, among many others) claim that children acquired the polar or anaphoric uses of *no* prior to its quantificational use. Furthermore, among all the negative elements, *no* is most frequently used as a sentential negator in the child's early vocabulary (see chapter 5 for details).

In this section, a detailed view of the children's acquisition of *no* will be presented, finding the answers to the open questions discussed in chapter 5. The later sections will show a detailed view of all the other negative elements.

Children's adult-like negative utterances contain the sentences where they use *no* as a quantifier and *no* as a polar particle. Sentences in (2) present the use of *no* as a quantifier and (3) as a polar particle/anaphoric expression.[178]

2). a. There's *no* smoothy. (Providence_Target_Child_Naima: 27)[179]

b. He got *no* arm now. (Nicholas_Target_Child_Taite: 29)

c. There is *no* moon. (Valian_Target_Child_Non: 21)

[178] All the child and CDS data presented as examples in this chapter make the part of the data analysed for SE, in this chapter. The same also holds for chapter 9, 10, and 11.

[179] *Providence* indicates the corpus name, *Target_Child* identifies the target child, *Naima* indicates the child's name, and *number after* the colon indicates the child's age given in months.

d. Have *no* more dog. (Suppes_Target_Child_Nina: 25)

No used as a polar particle or in anaphoric uses contain sentences used as shown in (3a), used with a combination of exclamative *oh* or *ah*, followed by the declarative as in (3b), or a negative sentence as in (3c). *No* is also used repititively such as *no no* followed by a negative (3d) or a positive sentence or only *no* used repetitively, as in (3e).

3). a. I say *no*. (Nelson_Target_Child_Emily: 21)
b. Oh *no* the cars. (Manchester_Target_Child_Carl: 24)
c. Oh *no* you *don't*. (Braunwald_Target_Child_Laura: 32)
d. *No no* I do*n't* want to do. (Providence_Target_Child_Lily: 25)
e. *No no no no*. (Nicholas_Target_Child_Lana: 13)

Moreover, there are also sentences containing the use of *no* in structures which are not considered grammatically correct in written or spoken SE. Such sentences are labelled as children's non-adult-like sentences for *no*. Children's non-adult-like negative sentences for *no* include the sentences where they use *no* as a sentential negator. Such examples include the sentences like the ones shown in (4) below. The sentence in (4a-b) shows *no* with a subject and an object. The sentence structure in such examples seem like [(*subject)* + *no* + *object*].[180] Such sentences lack the use of any verb or auxiliary.

4). a. Man *no* spoon. (Brown_Target_Child_Eve: 18)
b. I *no* napkin. (Braunwald_Target_Child_Laura: 23)

Sentences illustrating sentence peripheral or sentence external negation (Bellugi, 1967; Thornton & Tesan; 2013, a.o.) contain sentences like the ones shown in (5). Initially, Bellugi (1967) claimed that children pass through a stage where they use *no* external to the sentence.

5). a. Mommy mommy *no no*. (Providence_Target_Child_Ethan: 16)
b. Kick *no*. (Braunwald_Target_Child_Laura: 18)
c. Doll sit *no*. (Manchester_Target_Child_Aran: 23)

[180] The parenthesis () around the *subject* indicates optionality.

Sentences for sentence peripheral or external negation lack some other essential elements like a verb, an article or a determiner, etc.

A number of other studies (see chapter 5 for details) reported the same. Most of these studies reported the findings based on a handful of children. The investigation of the negative sentences presented in this chapter revealed that *no* in sentence external position was found only for 94 children at least once.[181] A vast majority of children did not produce *no* in any sentence peripheral or external position. Consequently, not enough evidence was found to determine the use of *no* in sentence external position as a stage of the acquisition of *no*.

Table 8.2 provides a summary of *no* used as *sentence external* of young children of the first 4 age-groups.[182]

Age-group	Total number of children	Number and percentage of children produced no_external	Number and percentage of children didn't produce no_external	Sentences with no_external
13-18	47	9 (19%)	38 (80%)	15
19-24	169	23 (13%)	146 (86%)	31
25-30	260	25 (9%)	235 (90%)	137
31-36	191	21 (10%)	170 (89%)	67

Table 8.2: Children's use of *no* in sentence external or peripheral position for unto age month 36th.

The use of *no* in the middle of the sentence with a verb as in (6a-b) or without a verb as in (6c-d) was also observed. The sentence structure in such sentences looks like [(NP) (VP) *no*].[183]

6). a. I *no know*. (Bates_Target_Child_Kathy: 28)

b. I *no* want it. (Lara_Target_Child_Lara: 25)

c. I *no* shoes. (Manchester_Target_Child_Joel: 25)

[181] Among the 94 children, some of them are found in multiple age-groups as they were recorded longitudinally.

[182] The percentages are shown rounded.

[183] The brackets indicates optionality: the sentence may have a representation like.

[NP *no*]
[VP *no*]
[NP VP *no*]

d. I *no* napkin. (Braunwald_Target_Child_Laura: 26)

Another unique pattern was the use of *no* with an article as shown in (7), and in interrogatives as in (8).

7). A *no* ice-cream. (Braunwald_Target_Child_Laura: 23)

8). Why *no* people's at home? (Gelman_Target_Child_Non: 34)

The sentences exemplified in (4-8) are labeled as children's non-adult-like negative sentences for *no.* Negative sentences for *no* in CDS contain plenty of sentences for *no* used as a polar particle and as a negative quantifier. There was no ungrammatical sentence found in negative sentences for *no* in CDS.

Figure 8.4 shows the average (i.e., mean) use of *no* in children's and CDS sentences, along with bootstrap confidence intervals. The mean is computed by summing all the negative sentences in an age-group and dividing them with the number of speakers of that particular age-group. The average i.e., mean indicates the most typical value that could be observed for the use of a particular negative element in an age-group. The confidence interval of an estimate tends to measure the precision and accuracy of the estimate they are computed for. See chapter 7 for details about the importance and use of mean and bootstrapping confidence intervals.

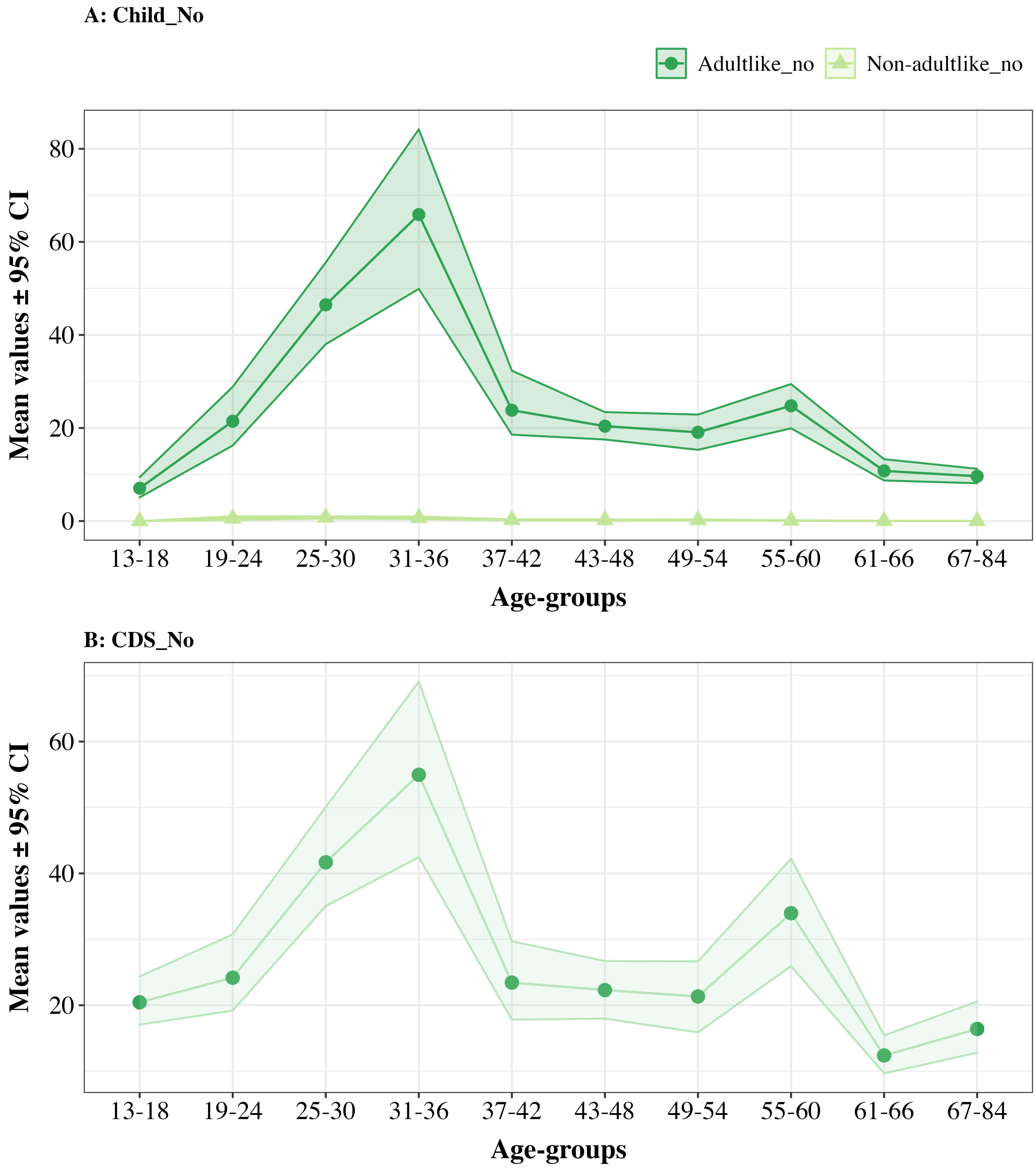

Figure 8.4: Mean values for children and CDS negative sentences for *no* in each age-group.[184]

In figure 8.4, the adult-like and non-adult-like negative sentences for *no* for child and sentences for *no* for CDS are presented. Figure 8.4(A) presents the average use i.e., mean values for the use of *no* in an adult-like and non-adult-like manner for children. The shaded area across the mean points and lines represents the 95% confidence interval. It is evident from the figure that the mean values for the use of *no* in an adult-like manner has been higher than the use of *no* in the non-

[184] Throughout the chapter, the average use of negative elements are indicated in the mean values. The shaded area around the mean point indicates the 95% confidence interval.

adult-like manner across all the age-groups. Age-group 31-36 shows the highest mean values for child as well as CDS sentences. The figure shows that the average use of *no* in children and CDS sentences is much higher for the middle age-groups. The average use also exhibit an increasing trend for the initial five age-groups. After the age-group 37-42, there is a variation observed but the mean value remain lower.

Bellugi (1966, 1967), Thornton and Tesan (2013, 2008) and others argue that children acquire the use of *no* as an anaphoric element prior to its use as a quantificational NQ (see chapter 5 for a detailed view of the literature). Since the child sentences and number of children presented here is higher than the ones shown in Bellugi and any other study, it is found useful to see if children used *no* as an anaphoric element before using it as a negative element. For this purpose, sentences for children's use of *no* as an anaphoric expression were separated from their sentences which contain *no* as a negative or quantificational element. Figure 8.5 presents the mean use of *no* as an anaphoric and as a negative element.

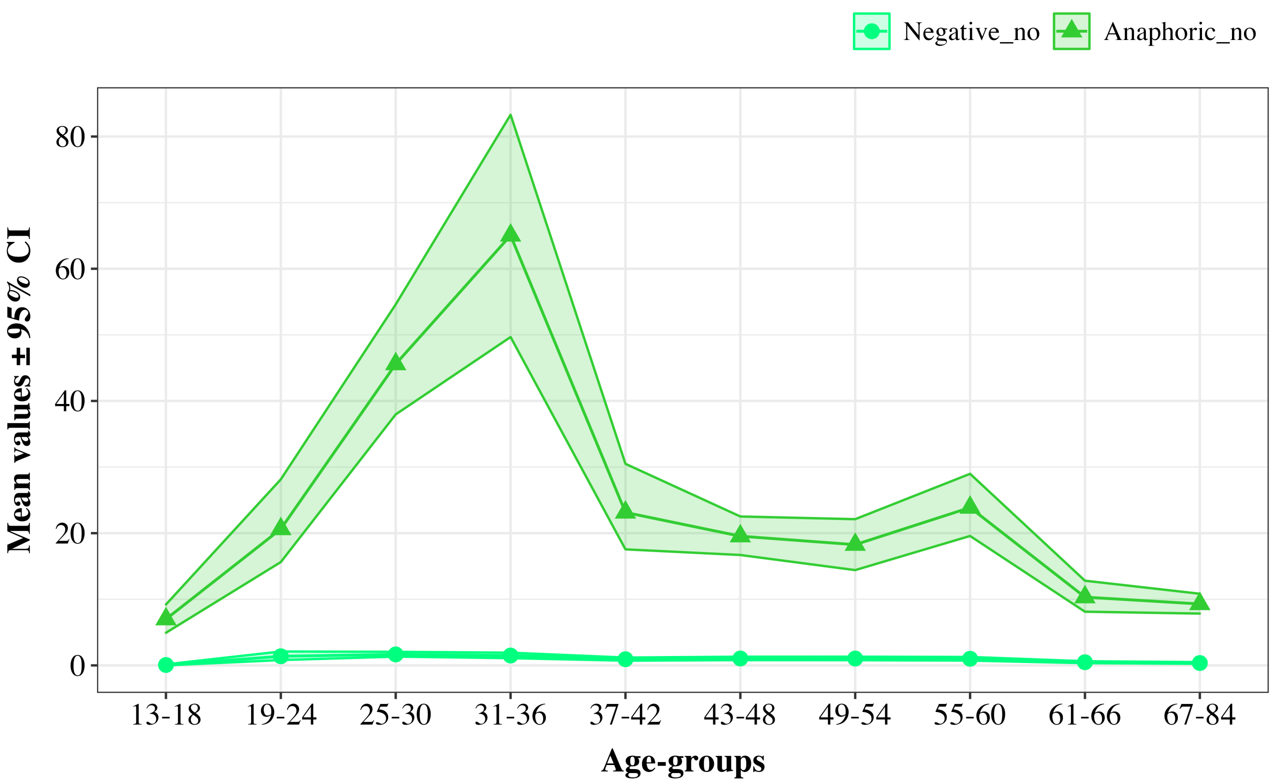

Figure 8.5: Children's average use of *no* as a negative and as an anaphoric/polar expression.

Example sentences for Negative_no are the ones where children used *no* as a negative quantifier, shown in (2), and those of Anaphoric_no are given in (3). The examples shown in (4-8) also show the use of *no* as a negative element, although in a non-adult-like manner. Figure 8.5 shows that the use of *no* as an anaphoric/polar expression exhibits higher mean values than its use as a negative quantifier.

There could be several reason for this higher mean values for anaphoric *no*. To figure them out, the sentences of children for Anaphoric *no* were gone through thoroughly. First, it could be an indication that higher mean values for children's adult-like use of *no* in figure (8.4A) might be due to more use of *no* as an anaphoric expression which was indeed the case. There were 92032 sentences containing the anaphoric use of *no* while only 3478 sentences were found where *no* was used as a NQ or as a sentential negative element.

Second, it could also be the case that the higher mean values for Anaphoric_no in 8.5 might be due to some children who were using *no* as an anaphoric expression more than others children. It turned out that this was also the case. In the age-groups 13-18, 19-24, 25-30, and 31-36, anaphoric_no was found abundantly for few of the children as compared to some others. For example, children named *MPI_Fraser* used *no* as a polar particle 7267 times, *MPI_Eleanor* use it for 4777 times, and for *Thomas_Thomas* 16361 uses of anaphoric *no were found* where *no* was used repetitively. e.g., [*no*], [*no no*], [*no no no*].

Third, it could also be due to some children who were recorded longitudinally and had sentences for anaphoric *no* more frequently than others. Looking deep down in the sentences, it turned out that it was also indeed the case. Children with longitudinal data were found having *no* as an anaphoric element far more than others, as it is just stated above.

To further confirm the acquisition of *no* as an anaphoric element before its use as a negative element, the frequency of the use of *no* was scaled. Scaling could counter the over-use of *no* as an anaphoric expression by some children, and reduces the effect of the higher use of anaphoric *no* by some of the children.[185] It turned out that even for scaled frequencies, higher mean values were found for Anaphoric_no than for the Negative_no across all the age-groups. Furthermore, the higher

[185] Centring/scaling can be done using the standard scaling function *scale()* in R (R Core Team, 2022). The purpose of scaling is to fit the values of the input data set into a specific range. This way the extreme values become closer to each other. The problem with the standard centring is that it assign the values in minus for some of the values of the input data set. This was a bit problematic for the data set under investigation such that an utterance is uttered or not. It can be uttered (can be assigned the value 1) or not (can be assigned the value of 0). It cannot be in minus. Furthermore scaling does not represent the original form of the data set (Quinn and Keough, 2002). So the manual centring was found more appropriate option for the data presented here. Assigning 1 to all the values above 0 (from 1-n, where n can be any number of utterances uttered), and 0 to all the utterances of the value of 0. This way the children who produced e.g., 16000 utterance for Anaphoric_no and children who produced only 1 utterance for Anaphoric_no were given the same value, i.e., 1. It is generally assumed that manual scaling also may not represent the true patterns found in the data set (Field, 2005; Mundry, 2014).

shaded area around the anaphoric_no in figure 8.5 for the first 4 age-groups indicates a higher level of variance than the other age-groups and also than that of Negative_no.[186]

Furthermore, it was also found that with the exception of a few, almost all of the children aged 13-24 months used *no* as an anaphoric element prior to its use as a negative quantificational element.

Keeping aside the discussion of *no* as an anaphoric/polar expression, it is also essential to report that the mean use of *no* used as a negative element correctly and in an adult-like manner remain higher than its use as a negative element in a non-adult-like manner, across all the age-groups.[187]

8.2.2 The negative marker *not*

In this subsection, a detailed view of children's use of *not* will be presented.

In Standard English, the negative marker *not* is used as a separate negative word accompanied by the auxiliaries which are shown in (9), and also used as a contracted form which is attached with auxiliaries and makes a combined word i.e., negative auxiliaries. N*ot* and *n't* share several syntactic, morphological, and semantic properties but are still treated differently. It is argued that children adopt different paths to master the acquisition of *not* and *n't* and exhibit various patterns for the acquisition of *not* which they do not show for *n't* (Maratsos and Kuczaj,1976; Bellugi, 1967; Deprez and Pierce,1993; De Villers and De Villiers, 1979, 1985, and many others). (See chapter 5 for details).

To get a detailed view of children's acquisition of *not*, their negative sentences for *not* were also separated into adult-like and non-adult-like negative sentences. Children's adult-like negative sentences for *not* include the sentences as exemplified below. The relevant auxiliaries are shown in (9), and their usage with *not* is shown in (10).

9). [*is, am, are, do, does, was, were, has ,have, had, can, could, need, will, would, should*]

10).	a.	Peanuts do *not* come.	(Braunwald_Target_Child_Laura: 22)
	b.	You are *not* going with me mama.	(Nicholas_Target_Child_Jane: 26)
	c.	This is *not* a bunny.	(Valian_Target_Child_Non: 22)

[186] It suggests that there are less children who produced more anaphoric *no* and more children who produced less or no uses of anaphoric *no*.

[187] The mean values for adult-like use of negative no remain always remain closer to 1 but that of non-adult-like use of no remain closer to 0 for most of the age-groups except 0.7 for 25-30.

d. He does *not* love me. (MPI-EVA-Manchester_Target_Child_Fraser: 29)

The negative marker *not* was also found in sentences where the tense agreement marker (-s, -re) was shown on the subject, as shown in (11).

11). a. Oh you're *not*. (Wells_Target_Child_Stella: 21)
b. It's *not*. (Howe_Target_Child_Barry: 19)

Not is also used as the nominal negator, as in (12).

12). a. Oh *not* these. (ParentChild_Target_Child_BEY: 18)
b. But *not* bike ride. (Braunwald_Target_Child_Laura: 18)

The child sentences also contained *not* in expressions that were not exclusively nominal or verbal. The examples are shown in (13c).

13). a. Maybe *not*. (Nelson_Target_Child_Emily: 19)
b. *No not* yet. (Nicholas_Target_Child_Joel: 26)
c. Why *not*? (Forrester_Target_Child_Ella: 24)

The sentences exemplified in (9-13) were taken to be grammatically correct or adult-like use of *not*.

It wasn't the case that children produced only the grammatical sentences with *not*, sentences with non-adult-like use of *not* were also found. These contain sentences like the ones exemplified below.

Sentences like the ones in (14) lack an auxiliary. This was the most frequently found pattern of non-adult-like sentences for *not*.

14). a. I *not* go. (MacWhinney_Target_Child_Mark: 21)
b. Oh I *not* find a man. (Manchester_Target_Child_Aran: 24)
c. I *not* wan. (Demetres_Target_Child_Jimmy: 28)
d. I *not* hungry. (Cornell_Target_Child_Brendon: 19)
e. He *not* coming. (Braunwald_Target_Child_Laura: 25)

f. I *not* falling down. (Wells_Target_Child_Olivia: 27)

Sentences shown in (15) exhibit the usage of *not* with *have*. In such sentences *have* gives a reading of the main verb rather than an auxiliary. Such sentences were counted as lacking an auxiliary and as *not* preceding the verb.

15). a. You *not* have one. (Brown-2_Adam_Adam: 35)

b. Mummie *not* have tea. (Wells_Target_Child_Sheila: 42)

Other than using *not* with the bare verb, 7 instances of *not* with the inflected main verb were also found, two examples are shown in (16).

16). a. It *not* works. (Providence_Target_Child_Lily: 26)

b. Purdie *not* wants a carry. (Thomas_Target_Child_Thomas: 37)

Not placed in front of the auxiliaries is shown in (17). There were10 sentences of this kind.

17). a. It *not* was daddy. (MPI-EVA-Manchester_Target_Child_Fraser: 29)

b. Ashley *not* can play this? (VanHouten_Target_Child_Erica: 40)

Other than that, some sentences were found for *not* used with a wrong form of auxiliary with respect to the subject, for example, as in (18).

18). a. I is *not* like that. (MPI-EVA-Manchester_Target_Child_Eleanor: 36)

b. Jack do *not* have eggs. (Braunwald_Target_Child_Laura: 23)

The child sentences exemplified in (14-18) are entitled as non-adult-like negative sentences for *not.*

As for the CDS, there were abundant negative sentences for *not* used with all auxiliaries, and in interrogative form like *why not.* Also, there wasn't any ungrammatical sentence found in CDS with *not*.

Figure 8.6 presents the mean values for CDS and children's adult-like and non-adult-like sentences for *not*.

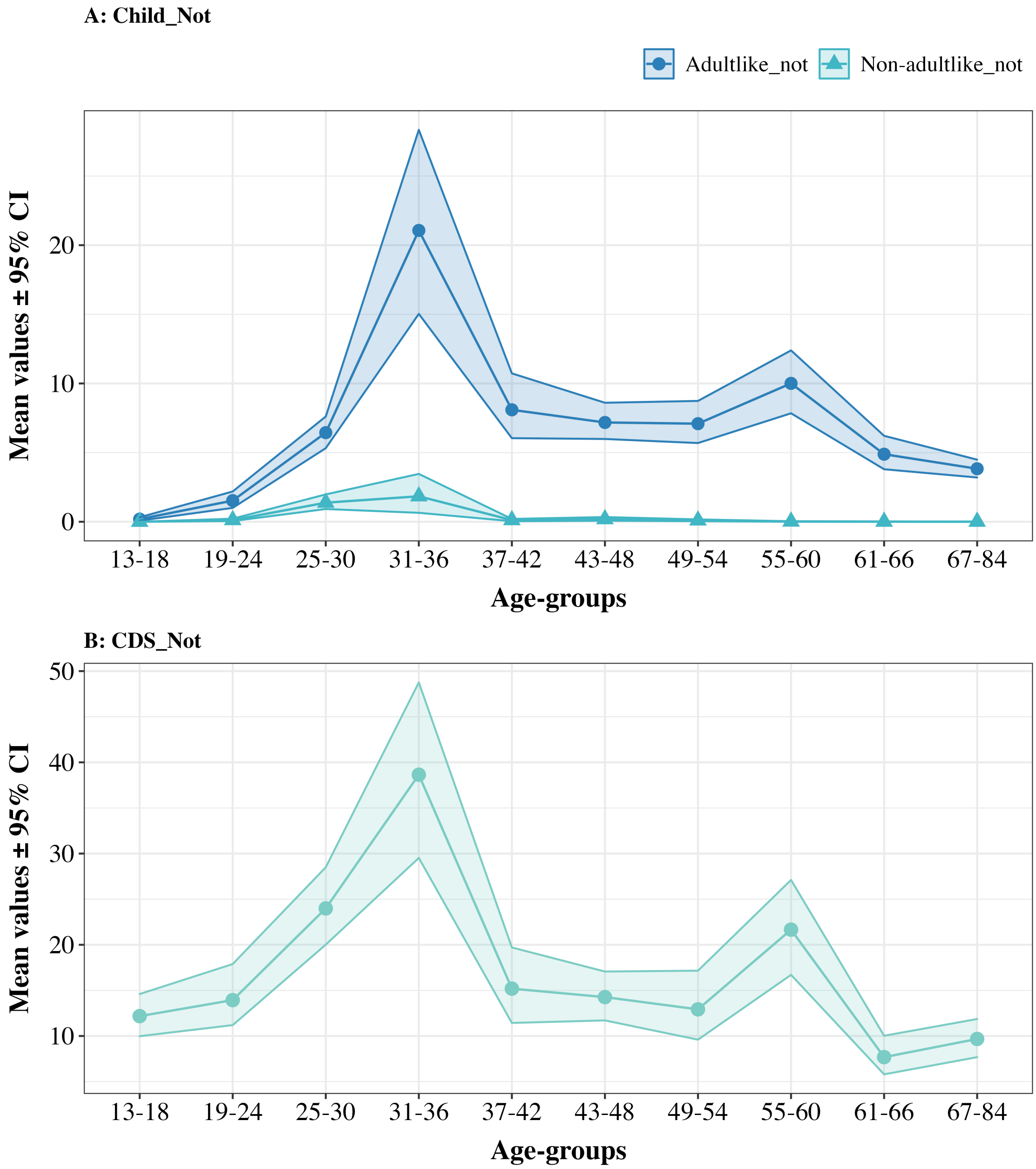

Figure 8.6: Mean values for CDS and children's adult-like and non-adult-like sentences for *not* across age-groups.

Figure 8.6 shows an evident difference between the mean values of the use of *not* for child and CDS sentences for the first three age-groups, for instance, the mean values for the use of *not* in CDS are higher than those of children. Even when *not* is more frequent in CDS in these age-groups, the mean values for the use of *not* in children's sentences are lower. The trend of the mean values in Figure 8.6(A) and 8.6(B) is similar.

Furthermore, comparing children's adult-like and non-adult-like negative sentences for *not*, it is also evident that children's adult-like use is more frequent than their non-adult-like one, across the age-groups.

The slightly higher mean values for non-adult-like use of *not* for the age-groups 25-30 (1.38) and 31-36 (1.84) than all the other may imply that when children begin acquiring *not* (from the age of 25 months), they face difficulties to acquire the negative marker *not*. To confirm if this really is the case that children were struggling to acquire *not* in an adult-like manner, all the children present in the year 25-36 were observed closely. It was found that the higher mean values for the non-adult-like *not,* especially in the age-group 31-36 are mainly due to some children, but most specifically due to one child (Thomas_Thomas), who was struggling hard to acquire *not.* He alone produced more than 600 sentences for the ungrammatical use of *not* (most of them were lacking the use of an auxiliary), nearly 500 were produced during the age 31-36 months.[188] A closer look at the Thomas' non-adult-like sentences revealed that their frequency dropped considerably from the age of 37 months.
Other children showed quite similar trend such that they were very frequent in producing grammatical and adult-like sentences for *not*.

The more shaded area around the age-group 31-36 also indicates the higher variability among children in using *not* in a non-adult-like manner.[189]

Table 8.3 provides a summary of children's adult-like and non-adult-like sentences and percentages for *not* in each age-group.

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[188] Other than this child, a child in Manchester corpus (e.g., Fraser, 316 sentences of non-adult-like *not*) were also more frequent in using *not* in a non-adult-like manner in this age-group.

[189] Conceptually, it is like this that there are less children who produced more ungrammatical uses of *not* and there are more children who produced less or no ungrammatical uses of *not*.

	Not	Adult-like-not		Non-adult-like-not	
Age-group	**Total sentences per age-group**	**Sentences per age-group**	**%**	**Sentences per age-group**	**%**
13-18	31	31	100	0	0
19-24	812	752	92.61	60	7.38
25-30	4906	4040	82.34	866	17.65
31-36	9873	9079	91.95	794	8.04
37-42	2957	2914	98.54	43	1.45
43-48	1643	1601	97.44	42	2.55
49-54	1474	1454	98.64	20	1.35
55-60	1794	1791	99.83	3	0.16
61-66	724	723	99.86	1	0.13
67-84	783	782	99.87	1	0.12
Grand total	24997	23167	92.67	1830	7.32

Table 8.3: Children's total number of negative sentences for the negative marker *not* and its division in adult-like and non-adult-like along with percentages per age-group.

Table 8.3 shows that throughout the age-groups, children's use of *not* in an adult-like and grammatical manner remain far higher than their non-adult-like and ungrammatical use of *not*.

8.2.3 The negative marker *n't*

The negative marker *n't* is used combined with auxiliaries, forming negative auxiliaries (see chapters 3 and 6 for details). For the last two decades, there has been a debate in the literature about the unique syntactic and semantic properties of *n't* (see chapter 2) due to which it is distinguished from its counterpart *not* in English and also from negative markers in other languages (see chapter 3). Also, due to these properties, *n't* is argued to be used in structures that are theoretically possible in Standard English but usually not produced e.g., negative concord (Zeijlstra 2004, et seq.). It is also assumed that young children acquire *n't* in quite distant ways (see chapter 5 for details). For example, there has also been a debate about the time point at which *n't* is realised as a Neg° in the child's grammar. It is also argued that negative auxiliaries are acquired ahead of the use of auxiliaries in declarative constructions. Furthermore, the acquisition of *n't* is associated with the acquisition of a particular auxiliary or some negative auxiliaries are acquired prior to some others

(Thornton and Tesan, 2013, Thornton, et al. 2016, Maratsos and Kuczaj,1976; Bellugi, 1967; Deprez and Pierce,1993; De Villers and De Villiers, 1979, 1985; de Villiers and Roeppers, 2011; Thornton and colleagues 2007, and many others).

In this section, a detailed view of the usage or acquisition of *n't* in child speech will be presented along with a brief view of its use in CDS.

Negative auxiliaries are used abundantly in an adult-like manner in children's sentences. The negative declarative sentences are exemplified in (19). The use of *n't* in syntactically advanced structure e.g., negative tag questions is shown in (20) while examples for wh-interrogatives are given in (21).

19).	a.	And it was*n't*.	(Nelson_Target_Child_Emily: 21)
	b.	Because it does*n't* have any air in it.	(Brown_Target_Child_Eve: 25)
	c.	So you do*n't* waste it.	(Wells_Target_Child_Penny: 23)
	d.	It is*n't* too big.	(Providence_Target_Child_Naima: 25)
	e.	It wo*n't* fit.	(Sachs_Target_Child_Naomi: 25)
	f.	No I ca*n't*.	(Nicholas_Target_Child_Jed: 26)

20).	a.	That's my lolly, is*n't* it?	(Braunwald_Target_Child_Laura: 28)
	b.	Papa writes with pen, does*n't* he?	(Haggerty_Target_Child_Helen: 31)

21).	a.	Why do*n't* you come in here?	(Clark_Target_Child_Shem: 31)
	b.	Why do*n't* you do it?.	(Lara_Target_Child_Lara: 31)

Children's sentences shown in (19-21) are called adult-like uses of *n't*.

Other than those, some non-adult-like expressions were also found for *n't*. The sentences in (22) show a few examples of the use of non-agreeing negative auxiliary with respect to the subject of the sentence, there were a of total 363 such sentences.[190]

[190] A total of 484 sentences were found containing the non-agreeing negative auxiliary with regard to the subject, from which more than 300 were sentences with 3SG subject and non-3SG negative auxiliary as shown in (i-ii) and 9 sentences were sentences with 1SG or 2SG/P subjects with non-1/2SGP negative auxiliaries, as shown in (iii-iv) below.

i. Laura do*n't* wiggle (Braunwald_Target_Child_Laura: 22)
ii. Dinosaur do*n't* go on this. (Weist_Target_Child_Jillian: 27)
iii. You is*n't* going to work. (Cruttenden_Target_Child_Jane: 33)
iv. No we was*n't*. (Thomas_Target_Child_Thomas: 42)

22). a. Oh he do*n't* want anything. (Demetras_Target_Child_Jimmy: 31)

b. No we was*n't*. (Thomas_Target_Child_Thomas: 42)

c. But you has*n't* got anything. (Cruttenden_Target_Child_Jane: 35)

There were also only few sentences found where negative auxiliary was used with the inflected main verb, as in (23), while a bunch of sentences were found where negative auxiliaries and tense agreement morpheme shown on the subject, were found, as exemplified in (24).

23). a. No it does*n't* goes there. (MPI-Manchester_Target_Child_Fraser: 31)

b. This do*n't* works. (Kuczaj_Target_Child_Abe: 31)

24). a. It'*s doesn't* work. (Brown_Target_Child_Adam: 40)

Quite interestingly, in some of the sentences, positive and negative auxiliaries were used together, as shown in (25).

25). a. *Has* he *has*n*'t* got any dinner. (Lara_Target_Child_Lara:32)

b. *Is* this *isn't* hard. (MPI-Manchester_Target_Child_Fraser:36)

Children's sentences exemplified in (22-25) were taken as non-adult-like uses for *n't*.

An abundant amount of negative sentences for *n't* were found in CDS. There were just 3 sentences found exhibiting the use of mismatched negative auxiliary with regard to the subject of the sentence. E.g., as in (26).

26). Because you was*n't* eating it. (HSLLD_HV1_MT_Grandfather: 43)

Given the abundant amount of the grammatical negative sentences for CDS, these 3 sentences are considered as performance errors and not taken in for any further analysis.

Figure 8.7 presents the means values for the use of *n't* in CDS and that of adult-like and non-adult-like sentences for children.

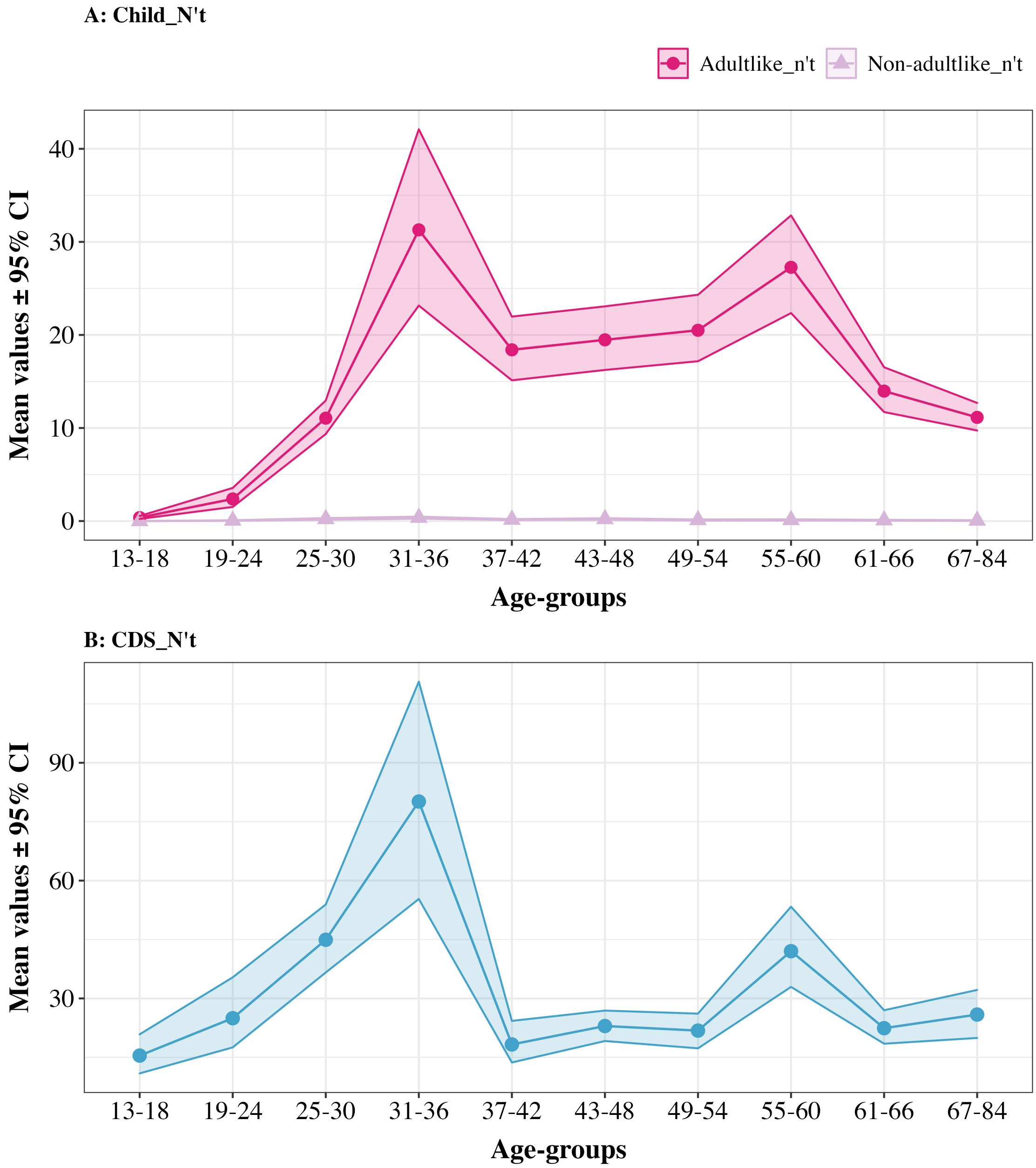

Figure 8.7: Means values for *n't* in CDS and that of adult-like and non-adult-like sentences for children, across age-groups.

Figure 8.7 shows that the means values for the use of *n't* in CDS are higher for all of the age-groups than those of children. The age-groups 31-36 exhibits the highest mean use of *n't* for children and also for CDS.

In 8.7(A), looking at children's mean values for adult-like and non-adult-like uses of *n't*, it is evident that the mean values for non-adult-like uses of *n't* remain always closer to 0 except the age-group 25-30 (mean value 0.215) and 31-36 where it is 0.35. In order to have a detailed view of children's non-adult-like uses of *n't*, the sentences were closely looked upon for the children who were most frequent in this non-adult-like production of *n't*. It was revealed that the non-adult-like sentences of the age-group 25-30 and 31-36 were containing the mismatched negative auxiliaries with respect to the 3SG subject, as shown in (22).[191] [192]

Table 8.4 presents the summary of the use of *n't* in children's sentences.

		Adult-like-n't		**Non-adult-like-n't**	
Age-group	**Total sentences per age-group**	**Sentences per age-group**	**%**	**Sentences per age-group**	**%**
13-18	61	61	100	0	
19-24	1203	1170	97.25	26	2.16
25-30	7105	6933	97.57	136	1.91
31-36	13704	13488	98.42	155	1.13
37-42	6726	6625	98.49	54	0.80
43-48	4525	4343	95.97	48	1.06
49-54	4354	4203	96.53	22	0.50
55-60	5048	4881	96.69	20	0.39
61-66	2139	2067	96.63	12	0.56
67-84	2344	2273	96.97	11	0.46
Grand total	47209	46044	97.53	484	1.02

Table 8.4: Summary of children's use of *n't* in adult-like and non-adult-like manner across age-groups along with percentages

[191] The child Suppes_Nina produced a total of 60 non-adult-like patterns of *n't,* among them 56 were in the age-group 25-30 and all of them were mismatched negative auxiliaries with respect to the subject. Surprisingly such patterns were significantly dropped (only 2 were found) after the age of 30 months. Suppes_Nina's total non-adult-like patterns of *no* and *not* were 2 and 17, respectively. The child MPI-EVA-Manchester_Fraser_Fraser produced a total of (3724) grammatical/adult-like uses of *n't* and only (28) non-adult-like ones, among these most were for mismatched negative auxiliaries in the age-group 31-36. So a slightly higher mean value for the age-group 31-36 could be due to this child.

[192] Surprisingly, the child Thomas_Thomas who produced one of the highest numbers of non-adult-like structures of *not* was not found using *n't* in non-adult-like ways much. There were only 8 sentences found for non-adult-like and 3218 adult-like sentences containing *n't* in his negative sentences for *n't*. See the previous section for details about Thomas's sentences for *not*.

Table 8.4 presents the total and percentages of sentences of *n't*. It is evident that for all the age-groups, the percentages for grammatically correct negative sentences are higher than those of non-adult-like ones for children.

To get a detailed view of children's use of *no, not,* and *n't,* a monthly view of children's use of these negative elements for initial 42 months is presented below in figure 8.8, from the age of 13 months to 42 months.[193]

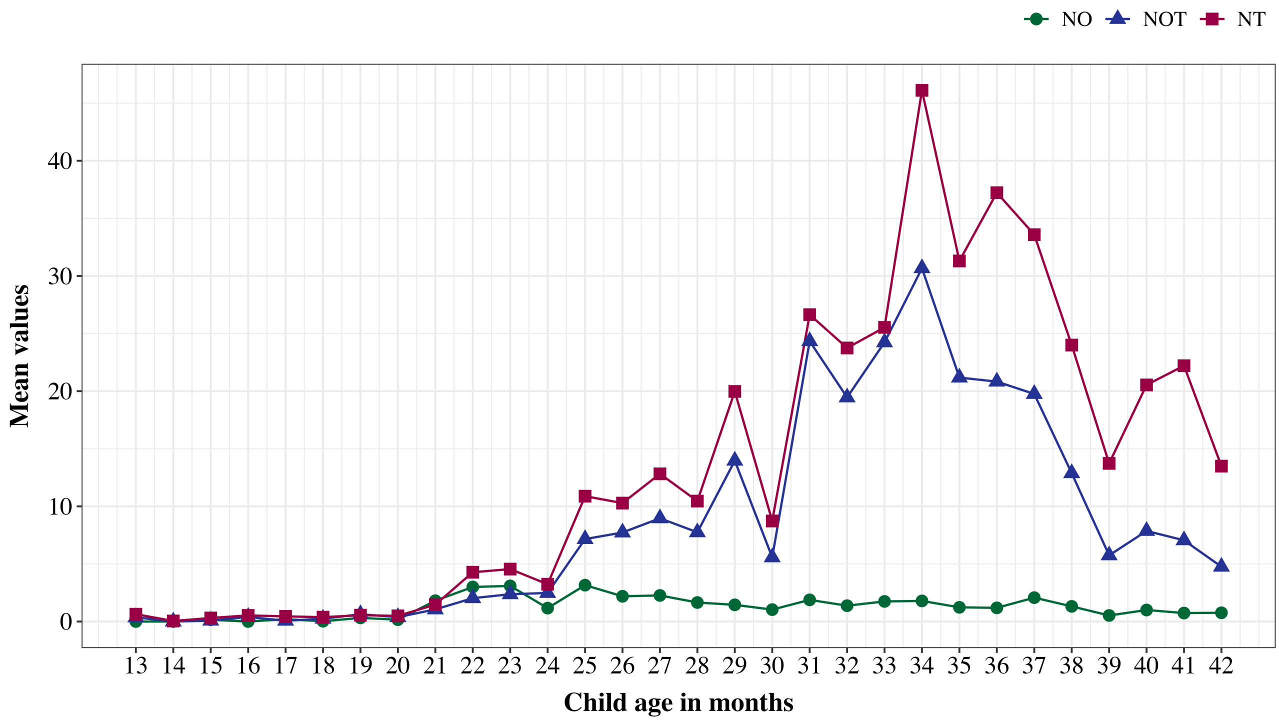

Figure 8.8: Children's use of *no, not,* and *n't* across the age of 3.5 years: from the months 13 to 42.

Figure 8.8 shows that the mean values for the use of *no, not,* and *n't* remain not very different for the months 13-21. From 21 to onward, there seems a visible variation and increase in the mean values for *n't* and *not.* Except for the 22nd and 23rd months, the mean values for the use of *not* always remains higher than *no*. Furthermore, there is more variation observed in the mean use of *not* and *n't* across the months as compared to *no*.

When compared every individual child's use of *no* (used only as a negative element), *not* and *n't*, it was found that as soon as children are 2 years old, a vast majority of the children are found using initially *n't* and then *not* very frequently, to express sentential negation.

[193] The use of *no* depicted in figure 8.8 does not contain its polar or anaphoric uses but only the negative one. (See section 8.2.1, and figure 8.4 and 8.5 for details).

8.2.4 Declarative auxiliaries

It was discussed in chapter 5 that it is well reported in the literature (see chapter 5) that young children acquire negative auxiliaries prior to the use of auxiliaries in the simple declarative sentences. And that the earliest negative auxiliaries should be analysed as whole words instead of a combination of an auxiliary and the negative marker (see also chapter 5). To see if this really is the case, the children's use of auxiliaries in the declarative sentences were searched. Following auxiliaries were searched, as shown in (27) below.

27). a. [*do, are, were, have*] == 1st, 2nd person singular and plural subject
b. [*is, was, has*] == 3rd person singular

It is important to report that the auxiliaries were searched which have clear distinction with regard to the subject of the sentences. For example, auxiliaries like, *could, would, will, shall, can, had* were used in the same form for all of the subjects, i.e., 1st, 2nd or 3rd person singular or plural. Only the auxiliaries shown in (27) take a distinguished form with regard to the subject of the sentence.

Thornton and Tesan (2006) and others (see chapter 5) also argue that children acquire the agreement marker *-s* late, and thats's why they acquire the auxiliaries *doesn't* and *does* later than *do* or *don't.*

To achieve a detailed overview of children's auxiliaries in the declarative sentences, 1st and 2nd person auxiliaries were separated from 3rd person auxiliaries. A total of 96967 sentences containing the 1st and 2nd person auxiliaries (1st-2nd_pos_aux) and 84120 sentences containing the 3rd person singular auxiliaries (3rd_pos_aux) were found in the declarative sentences.[194] The use of auxiliaries in declarative sentences is shown below in figure 8.9 only for up to 42 months.

Figure 8.9 shows the mean values of children's use of auxiliaries in declarative sentences.

[194] These sentences remain after removing all the unclear sentences, sentences with missing details (name, age, group, etc) and sentences of non-typically developing children. In addition, these sentences depict the use of auxiliaries like *is, do, can, has*, etc. in declarative sentences and not the use of auxiliary with *not* in sentences like *He is/are/can/do not come(ing).*

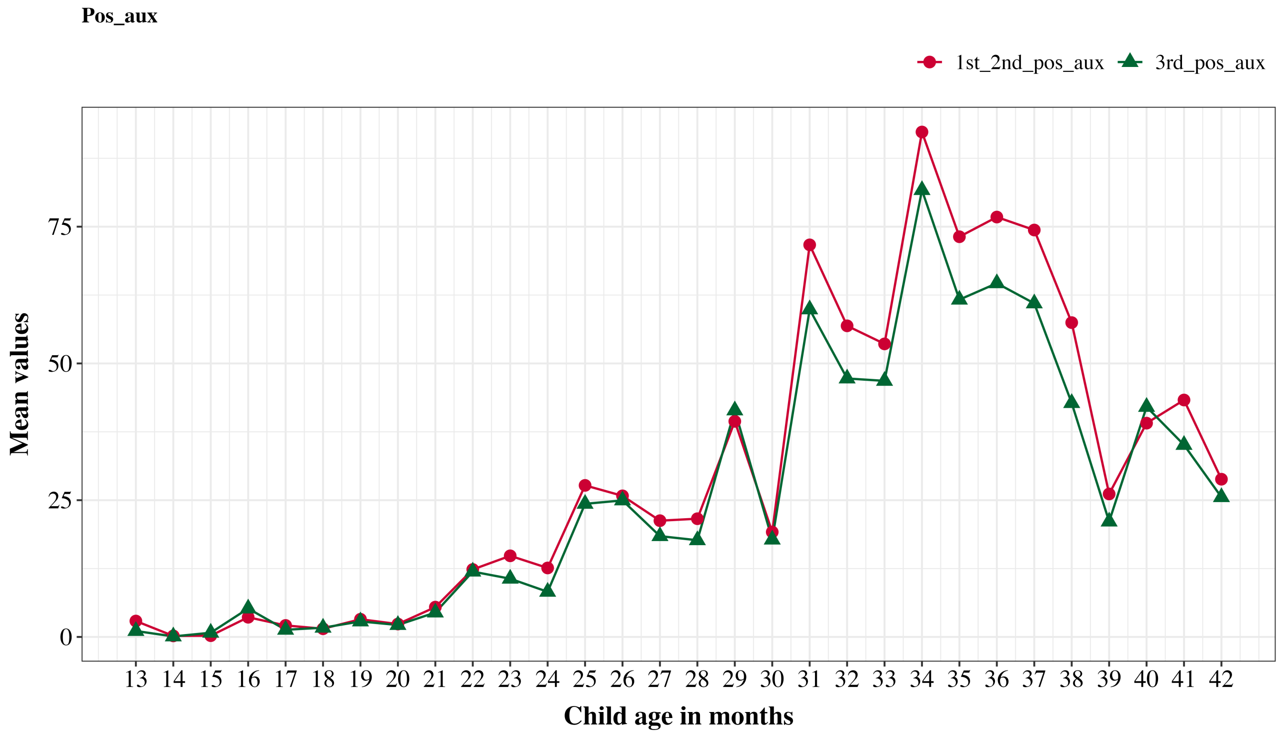

Figure 8.9: 1st, 2nd and 3rd person auxiliaries in declarative sentences for up to age month 42nd.

Figure 8.9 shows that 1st, 2nd, and 3rd person auxiliaries were used in a similar manner right from very early and the trend continues until the month 42nd. Furthermore, it is shown from the figure 8.9 that the use of auxiliaries in declaratives is higher than their use in negative sentences either making negative auxiliaries or used as a separate word with *not* (compared to figure 8.6 for *not* and and 8.7 and 8.8 for negative auxiliaries). For the age months 13-21st when the use of negative auxiliaries is much lower and the mean use remains between 0-1, the use of auxiliaries in declarative sentences, for a vast majority of the children, is much higher for these months.

Table 8.5 presents the summary of declarative sentences containing auxiliaries.

	Sentences containing auxiliaries	**1st, 2nd person, & Plural**	**3rd person singular**
Age-group	**Total sentences per age-group**	**Sentences per age-group**	**Sentences per age-group**
13-18	530	265	265
19-24	7679	4423	3256
25-30	28987	15009	13978
31-36	55932	30220	25712
37-42	26002	14095	11907
43-48	14311	7804	6507
49-54	14443	7734	6709
55-60	17459	9214	8245
61-66	7486	3836	3650
67-84	8258	4367	3891
Grand total	181087	96967	84120

Table 8.5: summary of the total and percentages of auxiliaries in declarative sentences of children.

Table 8.5 presents the total number of sentences containing auxiliaries in declarative sentences across all the age-groups. It is evident that for all the age-groups, the number of sentences is higher for auxiliaries in declarative sentences as compared to negative auxiliaries in negative sentences shown in table 8.4.

8.2.5 Comparison between negative and declarative auxiliaries

On closely observing the use of auxiliaries in declarative sentences, it was found that auxiliaries are found in majority of children's declarative sentences from a very early age, and their use increased over time. A variety of auxiliaries (*do, are* and *is,* at month 13 , *am* at month 18, *was* at month 15, *has, can, does,* and *have* at month 16[195] and *were* at month 18 are found in grammatically correct structures, within the period of 6 months, from 13-18th months.

During these 6 months, only the negative auxiliaries *don't* and *can't* were found in the negative sentences. Children who produced *don't* and *can't* were already producing *do* and *can* and a variety of auxiliaries in the declarative sentences. During these months, it was observed very frequently that children producing auxiliaries in declarative sentences in a particular month were not found producing negative auxiliaries in that same month.[196] It is observed rather less that younger children produced negative auxiliary (aux+*n't*) prior to the use of auxiliary in the declarative sentence. In the next 6 months (19-25) the other negative auxiliaries emerging were *won't* and *isn't* at age month 19, *aren't, doesn't* and *couldn't* at month 20, *hasn't, haven't, and wouldn't* at age month 24, and *shouldn't* at the age month 25.

8.2.6 Negative quantifiers (NQs)

Other than the negative markers *not* and *n't,* as shown above, sentential negation was also expressed using NQs. A total of 2140 sentences were found containing NQs for children and 3390 for CDS. The NQs searched for children's and CDS sentences are shown in (28) and their use in child sentences is given in (29). Since the use of *no* as a NQ has been presented above in section 8.2.1 so that is not included here again.

28). [*nobody, nothing, never, nowhere, none*]

29).	a.	Got *none*.	(Manchester_aran_Aran: 23)
	b.	I *never* know.	(Wells_Betty_Betty: 24)
	c.	Inside *nothing* there.	(Clark_Shem: 26)
	d.	And *nobody* can see him.	(Providence_Ethan_Ethan: 28)

[195] There was one sentences found for *can, does* each at the age 13 months, and both the sentences were produced by the same child named Nicholas_Target_Child_Shelly. 1 sentence for *are* and 2 sentences for does at the month 13th, and later from 16 onwards more frequently.

[196] For example, the child Nicholas_Target_Child_Shelly who produced *don't* grammatically in the first month was also found using *do*, both in grammatical manner. He also used *can, is,* and *does* in declarative speech but the negative auxiliaries *can't, isn't,* and *doesn't* weren't found in his sentences in that month. The same pattern was also found for several other children. The opposite was also observed for several other children.

Children's usage of NQs is found in a quite adult-like manner. Furthermore, no sentence was found showing the nonadult-like use of NQs.[197]

Figure 8.12 presents the mean values for the use of NQs for child and CDS sentences.

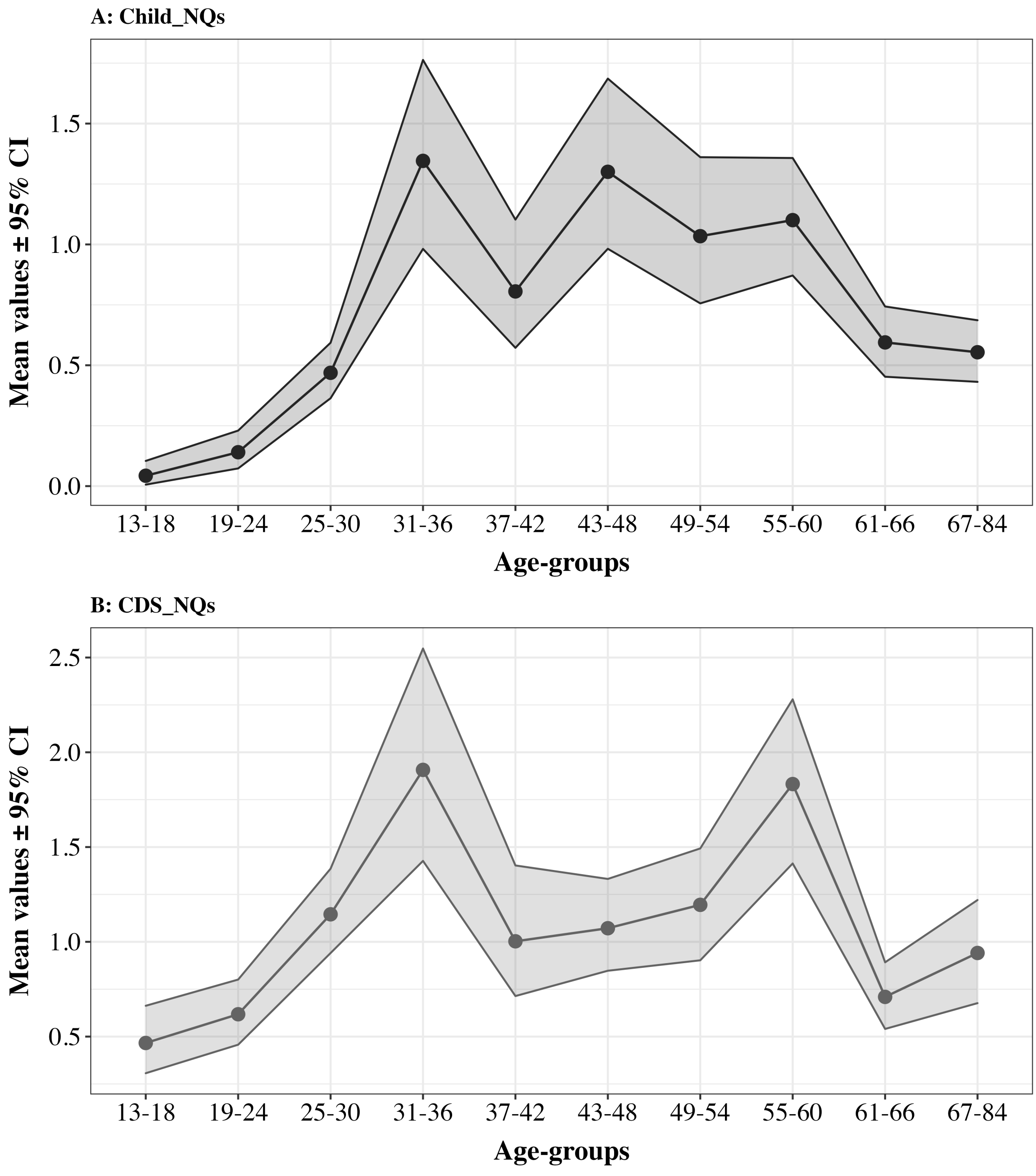

Figure 8.10: Means values for *NQs* for child and CDS sentences across age-groups.

Figure 8.10 presents the mean values for the use of NQs in child and CDS sentences. Figure 8.10 shows that the mean values for the use of NQs are slightly higher than children's use of NQs.

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[197] As it was shown in the section 8.2.1 that *no* is used in several roles. The use of *no* as a quantifier includes only the sentences exemplified in (2), two examples are also shown in (28e-f).

Among NQs, *no* used with *one* and *more* making *no one* and *no more* is used most of the time from the age of 19 months, *nothing* and *never* at month 21, *nobody* at month 25 and *nowhere* not until age month 38th. All the quantifiers were available in CDS right from month 13th.

Table 8.6 provides a summary of use of NQs in children's and CDS sentences.

	Children	**CDS**
Age-group	**Sentences containing NQs per age-group**	**Sentences containing NQs per age-group**
13-18	7	76
19-24	69	304
25-30	294	718
31-36	580	822
37-42	290	361
43-48	290	239
49-54	212	245
55-60	197	328
61-66	88	105
67-84	113	192
Grand total	2140	3390

Table 8.6: Summary of the use of NQs in children's and CDS sentences.

Table 8.6 shows that the sentences containing NQs in CDS have been higher than those of children in most of the age-group.

8.2.7 Negative concord (NC)

A total of 681 sentences containing two or multiple negative elements to express single sentential negation were found in the children's sentences. Almost all the types of NC (discussed in chapter 4) were found. Some examples are shown below in (30-32).

30). a. I *not* got *nothing*. (Wells_Target_Child_Jonathan: 23)

b. I *don't* read *no* more books. (Brown_Target_Child_Eve: 24)

31). I *not* got *nothing*? (Wells_Target_Child_Jonathan: 23)

32). a. So *nobody doesn't* get in. (EllisWeismer_Target_Child_65: 30)

b. I *don't* need *no* cars *neither*. (Manchester_Target_Child_Becky: 33)

Examples (30a-b) show the use of negative auxiliaries with the NQs in object position. Example (31) shows the use of *not* with NQs in the object position. Example (32a) shows the use of NQs in subject position and negative auxiliary together.[198] Example (32b) shows the use of a combination of a negative auxiliary and the negative adverb *neither*. The example (32b) exhibit the presence of Strict NC, while the examples (30 and 31) can typically be examples of both, Strict and Non-strict NC varieties. No sentence with negative auxiliary inversion was found.[199]

Two negative elements in a sentence were found quite frequently but there were not many instances of using more than two negative elements. Some of the examples are shown in (33) below.

33). a. I ca*n't* do *nothing* with *no* string. (Brown_Target_Child_Adam: 50)

b. I do*n't* need *no* cars *neither*. (HSLLD_Target_Child_TP: 63)

A total of 632 sentences for NC were found in CDS negative sentences. Some example sentences for NC in CDS are shown below in (34).

34). a. You're *not* gonna let him have *none*? (Warren_Mother_Target_Child:Scott: 19)

b. That *ain't no* baby one. (Post_Sibling_Target_Child_Tow: 17)

There was no example found in the data for the negative auxiliary inversion for CDS either. Figure 8.11 shows the mean values for the use of NC in children's and CDS sentences.

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198 There was no sentence found for NC containing a NQ at subject position and a negative auxiliary or a negative adverb, in the UK corpus. The example shown is from the North American variety of SE.

199 Negative auxiliary inversions are discussed briefly in chapter 4.

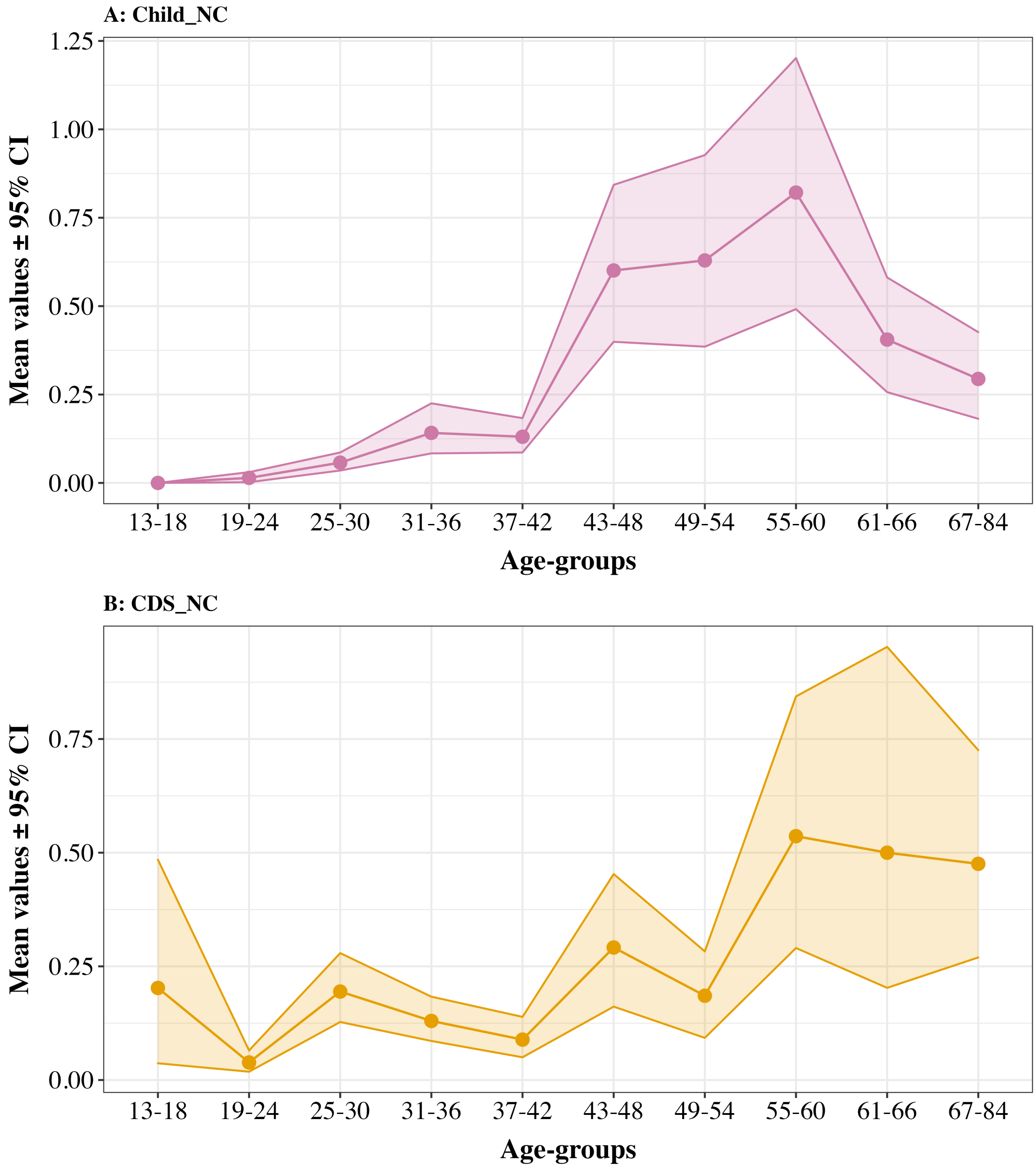

Figure 8.11: Mean values for the use of NC for child and CDS sentences.

Figure 8.11 presents the mean values for the use of NC for children's sentences and those of CDS. It is evident that mean values for child NC sentences are lower for initial 3 age-groups and then slightly increase for the next age-groups. Mean values for the age-group 55-60 are higher than all the other age-groups. The mean values for NC for CDS show a visible variation across the age-groups. Age-group 55-60 shows higher values in both the groups of NC, children's and CDS.

Table 8.7 presents a summary of the sentences of NC for children and CDS across age-groups.

	Children	CDS
Age-group	**Sentences containing NC**	**Sentences containing NC**
13-18	0	33
19-24	7	19
25-30	36	122
31-36	61	56
37-42	47	32
43-48	134	65
49-54	129	38
55-60	147	96
61-66	60	74
67-84	60	97
Grand total	681	632

Table 8.7: A summary of the sentences of NC for children and CDS across age-groups.

The table 8.7 shows the higher number of NC sentences in CDS as compared to children's across all the age-groups except two groups.

8.3 Statistical Analyses:

This section will present the results for the statistical models fit for *not, n't and NC,* respectively. The procedure of this section would be as follows: subsection 8.3.1 will present the statistical analysis for the negative marker *not*, subsection 8.3.2 presents the analyses for the negative marker *n't*. Subsection 8.3.3 presents detailed analyses for NC. This section will also provide the post hoc multiple age-group comparisons in order to estimate the variation in the estimated average use of negative markers *not* and *n't*.

Section 8.4 will present the discussions based on the empirical and statistical analyses while section 8.5 concludes.

8.3.1 The negative marker *not*

It was predicted in chapter 6 that given the input, children will acquire the negative marker *not* without any delay. The prediction, predictors and the response are outlined as follows:

Prediction: Provided with caregivers' input for not, children will acquire the negative marker rapidly and without any difficulty.

Predictors: Not_CDS, and age as a continuous predictor.

Response: children's use of not.

In order to estimate the effect of age as a continuous and Not_CDS (*not* in CDS input) as fixed effects predictors on children's use of *not,* a Generalised Linear Mixed Model (GLMM; Baayen 2008) with a negative binomial error structure and the log link function (McCullagh and Nelder, 1989) was used.[200] A total of 48% of the children have repeated observations and to control the chance of type 1 error rate up to the level of 0.05, random intercepts and slopes for both of the predictors, age and not_CDS, taking children (i.e., name) as a grouping factor, are also included in the model (Schielzeth and Forstmeier, 2009; Barr et al., 2013). See chapter 7 where subsection 7.5 describes a detailed methodology used for model selection. The sample analysed for modelling *not* comprised a total of 24997 observations for the use of *not* of 715 children.

Table 8.8 presents the results (estimates together with SE, lower and upper confidence interval (CI) bands, significant tests, p values, dispersion parameter, and VIF) for the model fit for the children's use of *not* as a response and *not* by CDS/input (not_CDS) and age as predictors.[201] [202] [203]

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[200] The term *predictor(s)* will be used for the independent variables and the term *response* will be used for dependent variable.

[201] All the results of the model_not indicated are in the log link space, i.e., the estimate for age can be derived using the inverse of log of the estimate shown, for example;
age = exp(0.022) = 1.022, Not_CDS = exp(0.035) = 1.035.

[202] See chapter 7 for a detailed procedure to achieve the coefficients mentioned in the table.

[203] P-values are derived from the significance testing.

Model_not: Not_child modelled as a function of Age and Not_cds.							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**x^2**	**df**	**p**
Intercept	-0.267	0.116	-0.495	-0.039			
Age	0.022	0.002	0.018	0.027	87.36	1	< 0.0001
Not_CDS	0.035	0.002	0.030	0.040	152.31	1	< 0.0001
Full-null					241.12	2	< 0.0001
Disp.P	0.73						
VIF	Maximum VIF: 1.00						

Table 8.8: Results for the GLMM modelling *not* of children, age, and *not* in CDS.[204]

Table 8.8 shows the results for the model estimating the effect of age and the input for *not* in CDS. The full model was clearly significant as compared to the null model (likelihood ratio test: x^2 (2) = 241.12, $p < 0.0001$). Both of the predictors show a significant effect on the response, i.e., on children's use of *not*. Overall the mixed effects model described 89% variance in the response from which 71% can be attributed to the fixed effects predictors. The model results support the prediction that given the required input, children will acquire the negative marker *not* timely and with no difficulty.

8.3.2 The negative marker *n't*

Prediction: Provided with the CDS input for n't, children will acquire the negative marker n't earlier and without any difficulty.

Predictors: N't_CDS, and age as a continuous predictor.

Response: Children's use of n't.

In order to estimate the effect of predictors, i.e., age and *n't* in CDS input (n't_CDS), a Generalised Linear Mixed Model (GLMM; Baayen 2008) with a negative binomial error structure and the log link function (McCullagh and Nelder, 1989) was used. Since 43% of the children have repeated observations across the age-months, random intercepts and slopes for both of the

[204] Not_CDS indicates the CDS input for *not.* Not_child indicates the response variable *not* in children's sentences.

predictors, age and n't_CDS, taking children (i.e., name) as the grouping factor, are included in the model (Schielzeth and Forstmeier, 2009; Barr et al., 2013). See chapter 7 subsection 7.5 for a detailed methodology. The sample analysed for the model_n't comprised a total of 47207 observations for the use of *n't* of 896 children.

Table 8.9 presents the results (estimates together with SE, confidence intervals, significance tests, p values, dispersion parameter, and VIF).

Model_n't: N't_child modelled as a function of Age and N't_cds.							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**x²**	**df**	**p**
Intercept	0.369	0.821	0.207	0.529			
Age	0.0315	0.001	0.027	0.035	268.51	1	< 0.0001
N't_CDS	0.0097	0.0009	0.007	0.011	83.93	1	< 0.0001
Full-null					367.29	2	< 0.0001
Disp.P	0.84						
VIF	Maximum VIF: 1.00						

Table 8.9: Results for the GLMM modelling *n't* of children, age, and *n't* in CDS.[205]

Table 8.9 presents the model_n't estimating the effect of CDS input for *n't* and age on children's use of *n't*. The full null model comparison was clearly significant (likelihood ratio test: x^2 (2) = 367.29, $p < 0.0001$). Both of the predictors have a significant effect on the response, i.e., children's use of *n't*. Overall, the mixed effects model described 72% variance in the response from which 47% can be attributed to the fixed effects predictors. The model results exhibit the support for the prediction that CDS input for *n't* will positively effect the use of *n't* by children and provided with the adult input, children will acquire the negative marker *n't*.

As for the acquisition of the negative markers *not* and *n't*, results for both of the models confirm one of the central predictions that caregivers' provided language input for *not* and *n't* will positively affect children's acquisition of the negative marker *not* and *n't,* respectively. The model results also signify the positive role of age, i.e., as children grow in age they get mature in their

[205] N't_CDS indicates the *n't* in CDS input.

acquisition of both of the negative markers. Children tend to show the use of both of the negative markers in a more mature and adult-like manner as they grow. The positive role of age was expected and predicted since the use of both of the negative markers was becoming more adult-like/ grammatical with an increase in the age of children, as shown in this chapter in earlier sections.

8.3.3 Negative concord (NC)

It has been discussed in the previous chapters that adult SE does not allow NC so it was predicted in chapter 6 that no NC would be found in CDS negative sentences. It was also predicted that NC must be found for children since their NC is theoretically predicted.

It has been shown above that NC was found in CDS negative sentences. There can be several reasons for this, i) some of the CDS speakers were speakers of NC variety of English but living in the parts where SE was spoken, ii) CDS speakers have spent some time with speakers of NC variety of English or have speakers of NC variety in their acquaintances and consequently adopted NC, iii) CDS speakers could have picked up NC through electronic or print media, (see also Henry 2016; Bellugi 1967; White 2004; Green 2002, 2011; Blanchette 2015, 2017, among many others), and iv) the production of NC was a result of the slip of the tongue, etc. See also chapter 5.

The positive role of the CDS input has also been well shown in the acquisition of *not* and *n't* in the above section, and in the previous literature (see chapter 5 and references therein). Based on such empirical and inferential evidence it is naturally predicted that children being cared for by adult speakers who spoke NC to them could pick up NC and acquire it naturally.

Keeping all the scenarios in view and in order to achieve a detailed and real view of NC on children under investigation, all the children and their respective CDS speakers were read through thoroughly and divided into 4 different subgroups, so the post hoc analyses and multiple group comparisons could be conducted (see chapter 7 also). The different groups of children with regard to the use of NC are as follows:

1) Children who did not produce NC and did not have NC input in their respective CDS, (these children will be named group-1).
2) Children who did not produce NC but have NC input in their respective CDS sentences (group-2).

3) Children who produced NC themselves but did not have NC in their respective CDS input (group-3).
4) Children who produced NC and also have NC input in their respective CDS sentences (group-4).

The motivation behind this division of children into several groups is to get a detailed view of children's NC. The grouping was purely random and done purely on the bases of the presence or absence of NC in children's sentences aligned with their respective CDS speakers.

Division and studying sub-groups in the study have been widely supported in all the major fields of research in order to extract useful information from the sample population. Currently the field of research of all fields is observing a major shift from just being philosophical and theoretical to empirical and inferential. Claims are largely based on the information extracted from the data of group or of a subgroup. During this shift, studying subgroups have also achieved significant importance. Subgroup studies have been helping in grasping the subject matter thoroughly and producing models that better explain the research questions and help determine the validity of hypotheses.

Table 8.10 presents the summary of the number of children in each group.[206]

Group	Number of children	Percentage %	Child NC	CDS NC
Group-1	684	73.39	X	X
Group-2	87	9.33	X	✓
Group-3	83	8.90	✓	X
Group-4	78	8.36	✓	✓
Total children	**932**			

Table 8.10: Summary of number and percentage of children in each group with respect to NC in child and CDS.

[206] The symbol (X) indicates the absence and (✓) indicates the presence of the NC.

It was discussed in chapter 6 that Zeijlstra's theory of negative concord hypothesises that doubling effects or NC input are required to acquire the formal features of negation that are projected through the Neg° negative marker *n't*. According to Zeijlstra's proposal, the relation between NC and *n't* is two fold. The NC input is required to acquire the Neg° *n't,* and the Neg° marker *n't* is what triggers the acquisition of NC. It was discussed in detail in chapters 3 and 6 that SE behaves as a half/hidden NC language such that it possesses the Neg° *n't* which can trigger the acquisition of NC but it does not exhibit NC in the adult speech to trigger the timely acquisition of *n't*. This way, the adult input in SE provides young children half of the ingredients to master the acquisition of negation in their local language i.e., the adult input containing the use of *n't* as the only sentential negative element but not the NC input.

Keeping in view Zeijlstra's proposal, children in group-1 and group-3 are among those who received confusing or incomplete input i.e., no NC/doubling effects but input containing *n't* as the only negative element. Children in group-2 and group-4 are those who received both forms of input.

Children in group-3 and group-4 are the two groups which truly represent the data to test Zeijlstra's proposed learning algorithm that is why we will start by presenting the statistical analyses for subgroup group-3 and group-4 first.

The procedure for the upcoming subsections is as follows: subsection 8.3.3.1 will present the statistical model modelling the effect of CDS input for *n't* on the acquisition of NC by children of group-3. Section 8.3.3.2 will first present the statistical modelling for *not* and *n't* separately, taking age-group as one of the predictors. Subsection 8.3.4 will present the analyses for group-4.

8.3.3.1 Group-3: NC

NC:

Group-3 is the group of children who received no NC input but themselves produced NC. This group truly represents the children as per Zeijlstra's proposal that the presence of Neg° in SE will lead to the presence of NC in young children's language. In order to model if the CDS input containing the Neg° *n't* will lead to the probability of observing NC in the child's language, the GLMM regression binomial model with the logit link function was fit, taking NC_child as the response and n't_CDS as a predictor. Since 67.46% (56 out of 83) children have repeated observations, random intercepts and slopes for the predictor were added to the model taking children (i.e., name) as the grouping factor.

Model results showed that the full model was clearly significant as compared to the null model (likelihood ratio test: x^2 (1) = 6.90, $p < 0.001$) showing that predictor n't_CDS has a statistically significant positive effect on NC by children. The model results confirmed one of the central predictions regarding the acquisition of NC namely that the presence of Neg° *n't* in the adult input will positively affect the probability of observing the presence of NC in children's language. The model's results support Zeijlstra's predicted 1:1 correlation between the presence of a Neg° negative marker in the CDS language input and NC in children's language.

8.3.3.2 Group-3: *not* and *n't*

In order to build the comparisons between the acquisition of *not* and *n't* for children of various age-groups of group-3, post hoc multiple age-group comparisons would be conducted. For this purpose, separate models were fit using not_CDS and n't_CDS as predictors, respectively, in addition to the age-group as a predictor. It has been mentioned in the beginning of the chapter that age-groups consist of 6 months each, and there are total 10 age-groups.

Not:

The GLMM model taking not_CDS (*not* by CDS) and age-group as predictors and children's *not* as a response was used to see the effect of age-group and *not* by CDS on children's use of *not*. Random intercepts and slopes were added for the fixed effect predictor not_CDS only.[207] The model's results showed that the predictor not_CDS has a statistically significant effect (likelihood ratio test: x^2 (1) = 32.17, $p < 0.0001$) on children's use of *not*. Age-group was also highly significant (likelihood ratio test: x^2 (9) = 126.73, $p < 0.0001$). On the significance level of 0.05, all the age-groups were significantly different from the reference age-group, 13-18, in representing the estimated average use of *not*.

Post hoc multiple age-group comparisons:

To see if other age-groups also differ from each other, post hoc multiple age-group comparisons were performed using the *glht* function of the multcomp package. See chapter 7 and references therein for more about post hoc multiple age-group comparisons.

[207] In all the models fit with age-group as a predictor, no intercepts and slopes were added for age-group in the model. But the random intercepts and slopes were only added for other predictors.

The motivation behind the post hoc comparisons for *not* and *n't* is to see if a particular age-group pair that exhibits a statistically significant difference in the mean use of *not* also shows the statistically significant difference in the mean use of *n't*. If this is the case, it would suggest that they are treating both negative markers similarly. If the pair does not show any significant difference in the mean use of both *not* and *n't*, that would also suggest that the two age-groups exhibit a similar estimated average use of both the negative markers. If they exhibit the difference in the estimated average use of only one of the negative markers and not the other, it would imply that the pair differs only in one negative marker and not the other and they treat both of them differently.

It is important to note that in chapter 6 it was predicted that children acquiring SE will acquire *not* earlier than *n't* since the required adult input for *not* is readily available to them. But the required input, i.e., NC, for the acquisition of Neg° *n't* is not readily available to children so they will acquire *n't* later than *not*. This difference, if any, in the acquisition can only be traced through post hoc multiple comparison for various age-groups, since the empirically data for *not* and *n't* showed that children were using both of the negative markers at the similar time, as shown in section 8.2 and 8.3.

The results for the post hoc comparisons showed that in the average use of *not*, the age-group 19-24 was significantly different from all the other age-groups. No other age-group comparison was found statistically significant.

N't:

The results for the GLMM model showed that the predictor n't_CDS (*n't* in CDS) has a statistically highly significant effect (LRT: x^2 (1) = 28.91, $p < 0.0001$) on children's use of *n't*. Age-group was also statistically highly significant (LRT: x^2 (9) = 191.89, $p < 0.0001$). All the age-groups were significantly different from the reference age-group, 13-18, with respect to the predicted and estimated average use of *n't*.

Post hoc multiple age-group comparisons:

The post hoc comparisons showed that the age-group 19-24 was also statistically significantly different from all the other age-groups in observing the estimated average use of *n't*. No other age-group was found statistically and significantly different.

Table 8.11 presents the post hoc multiple comparisons (estimates, Standard Error (SE), Lower and upper Confidence Interval (CI) bands, and p value) between age-groups in the estimated average use of *not* and *n't* for group-3.[208] [209]

Post hoc multiple age-group comparisons group-3											
Age-group	**Estimate**		**SE**		**Lower CI**		**Upper CI**		**P value**	
	not	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***
19-24 - 13-18	1.039	1.684	0.490	0.439	-0.487	0.315	2.566	3.053	> 0.05	0.004
25-30 - 19-24	1.240	1.386	0.179	0.157	0.682	0.897	1.797	1.876	< 0.01	< 0.001
31-36 - 25-30	0.354	0.186	0.125	0.117	-0.038	-0.178	0.746	0.551	> 0.05	> 0.05
37-42 - 31-36	-0.182	-0.034	0.146	0.131	-0.639	-0.446	0.274	0.376	> 0.05	> 0.05
43-48 - 37-42	0.237	0.056	0.185	0.163	-0.339	-0.453	0.814	0.566	> 0.05	> 0.05
49-54 - 43-48	-0.087	0.135	0.198	0.135	-0.705	-0.409	0.530	0.680	> 0.05	> 0.05
55-60 - 49-54	0.114	0.013	0.217	0.181	-0.563	-0.553	0.791	0.580	> 0.05	> 0.05
61-66 - 55-60	0.343	0.015	0.280	0.235	-0.531	-0.579	1.217	0.886	> 0.05	> 0.05
67-84 - 61-66	-0.153	-0.026	0.286	0.023	-1.047	-1.014	0.740	0.478	> 0.05	> 0.05

Table 8.11: Post hoc multiple age-group comparisons between the children of different age-groups for the estimated use of *not* and *n't*.

Table 8.11 shows that for group-3, the children who didn't receive any NC input and were producing NC themselves were observed behaving similarly in the average estimated use of *not* and *n't*. From the age-group 25-30 to onwards there was not any statistically significant difference found in the estimated average use of *not* and *n't*, across age-groups, as shown in the table 8.12. The estimate of the difference between the first pair of age-groups (25-30 - 19-24) for *n't* is larger and is statistically more significant than that of *not*. It is shown in table 8.12 that the estimate of the mean difference from the age-group pair (25-30 - 31-36) to onward is lower for *n't* than that of *not.* It suggests that once children have established the use of *n't*, they are more similar in its use than they are in the use of *not*.

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[208] The estimate shows that the magnitude of the difference between the means for the age-groups. The first row shows that the mean for the age-group 19-24 is higher than the mean of age-group 13-18, so on. A -ve sign with the estimate indicates the lower mean value for the group on the left side of (-) as compared to the age-group on it's right side.

[209] One particular age-group is compared to all the other age-groups. The table presents the age-group comparisons only in a linear order i.e., 13-18 — 19-24, 25-30 — 31-36, etc. For all the other comparisons see the appendix_O.

Although the results for the post hoc multiple age-group comparisons overtly do not show that the estimated average use of *not* and *n't* would differ between children of various age-groups, but the magnitude of estimates and p-values do indicate that there is some variation observed between the both. The results for the post hoc multiple age-group comparisons suggest that *not* and *n't* are acquired simultaneously.

Upon observing all the children of the group-3 it was revealed that all the children in group-3 who produced NC were already producing *n't* frequently. The results for group-3 supports the prediction that when children have acquired *n't*, their grammar is potentially able to license NC. The acquisition of *n't* does not differ between age-groups after the age-group 25-30, so it is argued that on average children acquire the negative marker n't between the age 25-30 months, and in the same duration, their grammar also becomes able to license NC.

The next subsection presents the analyses of the subgroup group-4.

8.3.4 Group-4: NC, *not*, and *n't*

NC:

As it was mentioned above that children in group-4 received NC input from their caregivers. Since children in this age-group received complete input, *n't* used as a single negative element as well as NC, it is predicted that the input for Neg° *n't* will have a positive effect on children's acquisition of NC. In order to estimate the effect of NC_CDS (NC in CDS), n't_CDS (*n't* in CDS), and age on children's acquisition of NC, a GLMM with negative binomial error distribution and log link function was used. The full-null model comparison was clearly significant (LRT: x^2 (1) = 33.25, $p < 0.0001$). N't_CDS has a highly significant positive effect (LRT: x^2 (1) = 10.49, $p < 0.001$) on children's NC. NC_CDS also showed a highly significant positive effect on children's NC (LRT: x^2 (1) = 22.78, $p < 0.0001$). The age also turned out to be statistically highly significant (LRT: x^2 (1) = 37.06, $p < 0.0001$).

The model fully results support the prediction that the presence of Neg° *n't* in the adults' language input will have an affect on the presence of formal features of negation in children's grammar, i.e., NC. Furthermore, the model results also support one of the central predictions that the presence of doubling effects in the input will lead to the presence of the same in the children's negation also.

Upon observing closely, it was revealed that all the children group-4 were also using *n't* quite frequently, similar to their peers in group-3. There was no child found in either of the both groups who used NC earlier than *n't* or didn't produce *n't* at all and produced NC.

In order to conduct post hoc multiple age-group comparisons the statistical models are fit using age-group as one of the predictors.

N't:

Children in group-4 received the essential input containing NC/doubling effects as well as input containing only *n't* for the early acquisition of *n't.* It is predicted that children in this age-group will acquire *n't* earlier or will acquire *n't* and *not* simultaneously. In order to model the effect of the presence of NC/ doubling effects/NC, *n't* in CDS, and age-group on children's acquisition of *n't*, a GLMM model with a negative binomial error distribution and the log link function was used.

The model results show that the NC/doubling effects in CDS have a statistical significant effect (LRT: x^2 (1) = 5.40, p, 0.02) on children's *n't* only while controlling the absorption effect of other two predictors (n't_CDS and age-group). The significant effect of n't_CDS (LRT: x^2 (1) = 42.56, $p < 0.0001$), and age-group (LRT: x^2 (9) = 293.56, $p < 0.0001$) was also shown on children's use of *n't*. The model results support the prediction that the presence of NC/doubling effects in the adult input will have a positive effect on the acquisition of Neg° *n't*.

The post hoc comparisons:

The post hoc multiple age-group comparisons show that the reference age-group 13-18 was significantly different from all the other age-groups, age-groups 19-24 and 25-30 were also significantly different from all the other age-group in observing the estimated average use of *n't*.

Not:

CDS input for *not* with (LRT: x^2 (1) = 54.78, $p < 0.0001$) and age-group (x^2 (9) = 197.60, $p < 0.0001$) showed a statistically significant effect on children's use of *not*. In the post hoc multiple comparisons between age-groups, all the age-groups were significantly different from the reference age-groups, while the age-groups 14-24 and 25-30 were also significantly different from all the other age-groups.

Table 8.12 summarises the post hoc multiple comparisons between age-groups for group-4.

Post hoc multiple age-group comparisons group-4										
Age-group	**Estimate**		**SE**		**Lower CI**		**Upper CI**		**P value**	
	not	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***
19-24 - 13-18	2.135	1.024	0.509	0.313	0.554	0.042	3.717	2.006	< 0.001	0.03
25-30 - 19-24	0.954	1.071	0.160	0.161	0.457	0.564	1.452	1.577	< 0.001	< 0.01
31-36 - 25-30	0.506	0.721	0.111	0.118	0.159	0.352	0.852	1.091	< 0.001	< 0.01
37-42 - 31-36	0.027	0.319	0.112	0.117	-0.322	-0.48	0.377	0.687	> 0.05	> 0.05
43-48 - 37-42	0.073	0.057	0.125	0.126	-0.316	-0.337	0.463	0.453	> 0.05	> 0.05
49-54 - 43-48	0.056	0.129	0.127	0.131	-0.350	-0.281	0.462	0.539	> 0.05	> 0.05
55-60 - 49-54	-0.006	0.006	0.135	0.136	-0.428	-0.421	0.415	0.433	> 0.05	> 0.05
61-66 - 55-60	0.024	-0.144	0.173	0.164	-0.515	-0.659	0.563	0.369	> 0.05	> 0.05
67-84 - 61-66	-0.647	-0.421	0.186	0.176	-1.226	-0.976	-0.068	0.128	0.01	> 0.05

Table 8.12 summarises the post hoc multiple comparisons between age-groups for group-4.

For children in group-4 who received NC input, it was predicted that they must be getting mature in the acquisition of *n't* earlier, or the average use of *not* and *n't* should not be any different for children of younger age-groups. This is exactly what is reflected in the post hoc multiple age-group comparisons shown in table 8.12. From the age-group 31-36, no age-group is significantly different from the following age-group in showing the predicted average use of *not* and *n't*. The model results and post hoc multiple comparisons support one of the central predictions that provided the essential NC input, children will acquire *n't* earlier or *n't* and *not* simultaneously.

Summarising, for the subgroup group-3 who received half of the input, there was not a significant difference found between the estimated average use of *not* and *n't*. For the subgroup group-4, as predicted, there was also no statistically significant difference between the average use of *not* and *n't* found across age-groups.

For children of the both of these subgroups, it is confirmed that when children produced NC they were already using *n't* thus supporting the prediction that after acquiring the Neg° *n't*, their grammar is potentially able to license NC.

It was mentioned above that with respect to the use of NC, there were two additional groups, i) those who didn't receive NC input and didn't produce NC themselves, named group-1 and those who received NC input but didn't produce NC by themselves, called group-2. The predictions and analyses for these two groups are shown in the upcoming two subsections.

8.3.5 Group-1: *not* and *n't*

Children in this age-group did not produce any NC and also did not receive any NC input. In order to see the effect of the input for the negative marker *not* and the Neg° *n't,* the use of children's *not* and *n't* were modelled as functions of *not* and *n't* in CDS, respectively, in addition to the age-group as the second predictor. In both of the models, random slopes were added for not_CDS and n't_CDS, respectively.

Not:

The model results of GLMMs for *not* show that the effect of not_CDS (likelihood ratio test: x^2 (1) = 135.03, $p < 0.0001$) and age-group (likelihood ratio test: x^2 (9) = 270.11, $p < 0.0001$) were found showing statistically highly significant effect on children's *not*.

N't:

And, in the other model, n't_CDS (likelihood ratio test: x^2 (1) = 50.86, $p < 0.0001$) and age-group (LRT: x^2 (9) = 523.57, $p < 0.0001$) also have a statistically highly significant positive effect on children's *n't*. In both of the models, the reference age-group, 13-18, was significantly different from all the other age-groups. Table 8.13 presents the results of the post hoc comparisons.

Post hoc multiple age-group comparisons group-1										
Age-group	**Estimate**		**SE**		**Lower CI**		**Upper CI**		**P value**	
	not	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***
19-24 - 13-18	1.680	1.076	0.441	0.277	0.304	0.209	3.057	1.943	0.004	0.003
25-30 - 19-24	1.278	1.249	0.155	0.115	0.792	0.887	1.765	1.611	< 0.001	< 0.001
31-36 - 25-30	0.449	0.545	0.117	0.094	0.822	0.250	0.816	0.840	0.004	< 0.001
37-42 - 31-36	0.528	0.130	0.126	0.103	-0.342	-0.193	0.447	0.455	> 0.05	> 0.05
43-48 - 37-42	0.296	0.331	0.157	0.130	-0.195	-0.077	0.789	0.740	> 0.05	> 0.05
49-54 - 43-48	-0.145	-0.080	0.175	0.144	-0.692	-0.532	0.402	0.372	> 0.05	> 0.05
55-60 - 49-54	0.058	0.165	0.199	0.160	-0.536	-0.336	0.681	0.668	> 0.05	> 0.05
61-66 - 55-60	0.004	-0.138	0.206	0.165	-0.6339	-0.657	0.648	0.380	> 0.05	> 0.05
67-84 - 61-66	-0.196	-0.211	0.184	0.147	-0.771	-0.673	0.378	0.250	> 0.05	> 0.05

Table 8.13: Post hoc multiple comparisons for the estimated average use of *not* and *n't* between the children of different age-groups.

For the post hoc multiple comparisons for *not* and *n't,* it is further revealed that the age-groups 19-24 and 25-30 were also significantly different from all the other age-groups for observing the predicted average use of *not* and *n't*. The children in group-1, who didn't receive any NC input and also didn't produce any NC themselves were found similar with respect to the estimated average use of *not* and *n't*.

For both the groups (group-3 and group-1) who didn't receive any NC/doubling effects input, it is shown that the pair of age-groups (25-30 - 31-36) does not exhibit a statistically significant difference in the predicted average use of *n't* in group-3 but there is a significant difference observed for group-1. The only difference between the two groups is the NC, i.e., group-3 produced NC but group-1 didn't. It could imply that NC does have an effect such that the overt realisation of NC/doubling effects could also cause the difference for the estimated average use of *n't* between the children of the same age-groups. Only the more targeted study on the said subject matter would enlighten more.

The next subsection will present the analyses for the subgroup group-2.

8.3.6 Group-2: *not* and *n't*

Children in the group-2 received NC input but did not produce any NC themselves.

Not:

In order to estimate the effects of not_CDS and age-group on children's acquisition of *not*, a GLMM model was used. Like always, the model results showed that the input not_CDS showed a statistically highly significant effect (likelihood ratio test: x^2 (1) = 26.28, p < 0.0001) on children's use of *not*. Age-group also showed a statistically highly significant (LRT: x^2 (9) = 102.66, p < 0.0001) on children's use of *not*. Furthermore, in addition to all the age-groups being significantly different from the reference age-group, 13-18, the age-group 19-24 was also significantly different from other age-groups.

N't:

Since children in this group received NC input which is essential for the early acquisition of *n't*. A GLMM log link model using n't_CDS, NC_CDS, and age-group as predictors and n't_child as the response was used. Random intercepts and slopes were added for n't_CDS and NC_CDS. The input n't_CDS with (likelihood ratio test: x^2 (1) = 30.97, $p < 0.0001$) and age-group (LRT: x^2 (1) = 250.32, $p < 0.0001$) were statistically and positively significant. The predictor NC_CDS with (likelihood ratio test: x^2 (1) = 1.11, $p = 0.02$) also showed only slight but significant effect on children's use of *n't*.

In the post hoc multiple age-group comparisons, all the age-groups were significantly different from the reference age-group in observing the estimated average use of *n't*. Furthermore, age-group 19-24 and 25-30 were also significantly different from other age-groups.

Table 8.14 shows the results of post hoc multiple age-group comparisons between the age-groups.

Post hoc multiple age-group comparisons group-2										
Age-group	**Estimate**		**SE**		**Lower CI**		**Upper CI**		**P value**	
	not	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***	***not***	***n't***
19-24 - 13-18	0.901	1.908	0.414	0.003	-0.390	1.899	2.194	1.918	> 0.05	< 0.001
25-30 - 19-24	1.031	1.268	0.211	0.004	0.373	1.254	1.689	1.282	< 0.001	< 0.001
31-36 - 25-30	0.626	0.947	0.168	0.004	0.101	0.933	1.150	0.961	0.006	< 0.001
37-42 - 31-36	-0.067	0.074	0.238	0.0045	-0.811	0.060	0.677	0.088	> 0.05	< 0.001
43-48 - 37-42	-0.398	0.207	0.370	0..005	-1.553	0.193	0.756	0.221	> 0.05	> 0.05
49-54 - 43-48	-0.071	-0.134	0.453	0.307	-1.486	-1.057	1.342	0.788	> 0.05	> 0.05
55-60 - 49-54	0.675	0.138	0.444	0.367	-0.708	-0.963	2.059	1.239	> 0.05	> 0.05
61-66 - 55-60	0.088	0.485	0.438	0.390	-1.277	-0.684	1.454	1.655	> 0.05	> 0.05
67-84 - 61-66	0.258	-0.341	0.493	0.436	-1.279	-1.649	1.796	0.967	> 0.05	> 0.05

Table 8.14 shows the results of post hoc comparisons between the age-groups.

The post hoc multiple age-group comparisons for the group-2 do not support the prediction that children who receive complete input will acquire *not* and *n't* simultaneously. As the post hoc multiple age-group comparisons show that children do not differ from each other from the age-month 31st to onward in the estimated average use of *not*, but they still differ in the estimated average use of *n't.* It suggests that children have established the acquisition of *not* but they still haven't done that for the negative marker *n't.*

Summarising, for children in group-2 and their peers who also received NC input and produced NC by themselves (group-4), it is shown that when the estimate of difference for the average use of *n't* for the pair (37-42 - 31-36) is not statistically significant for group-4, it is still statistically significant for group-2. The point of difference between both the groups, (group-4 and group-2) is the overt realisation of NC. The age-group pair in group-4 was receiving NC input and also producing NC themselves and thus was not exhibiting any significant difference in the estimated average use of *n't* but those in group-2 who are also receiving NC input but not producing NC themselves do exhibit. As it is said above that NC does show an effect on children's acquisition of *n't*.

8.4 Discussion

It was discussed in chapter 6 that Zeijlstra's proposed FFFH and the learning algorithm predict for SE that initially children will assume that negation is semantic in their local language and there is a 1:1 relation between every negative form and negative meaning. The first part of the proposal holds only partly true for SE but the second one holds fully true. An immense amount of input containing only one negative marker either *not* or *n't* is available to children and it is shown in table 8.8 that CDS input for *not* has a strong positive effect on children's acquisition of *not* and table 8.9 shows that the CDS input for *n't* has a strong positive effect on children's acquisition of *n't,* along with age. Results for both of the models also reflect the importance of CDS input on children's acquisition of both negative markers. See also Furrow et al. (1979); de Villiers & de Villiers, (1975) for reporting the positive role of CDS input and for the limited role of input see Stromwold & Zimmerman, (1999).

It was shown in table 8.8 that age has a highly significant positive effect on children's acquisition of *not*. Furthermore, the post hoc comparisons for *not* in table 8.11 to table 8.14 also show that children were not found significantly different in observing the estimated average use of *not* after the age of 30 months. They were showing not much difference in the average use of *not* just at the age of 2.5 years, see also section (8.5.1).

It was predicted in chapter 6 that since SE does not exhibit the overt evidence for the doubling effects of negation i.e., NC, which can guide children to assume that negation in their local language is formal so the acquisition of the negative marker *n't* will be a bit delayed than the acquisition of the adverbial negative marker *not*. This prediction is partly confirmed such that the magnitude of the difference between the estimated average use of *not* and *n't* in the younger age-group pairs varied but explicitly the age-group pairs were not statistically significantly different in exhibiting the estimated average use of *not* and *n't,* as shown for the group-3 and group-1. Both of the groups did not receive any overt input for the formal features of negation.

The null hypothesis for Zeijlstra's proposed learning algorithm states that there are no formal features present in the linguistic input and all the features for negation are only semantic and the same will hold for child's language. Only the presence of doubling effects with respect to negation in the language input can lead to the presence of doubling effects of negation in the child's language also. This assumption can straightforwardly be applied to subgroup group-4. Since group-4 clearly exhibits the doubling effects with respect to the semantic negative operator in the CDS input, thus makes SE an NC language only for that group. It follows from this that the same should also be reflected in children's grammar. It is shown in section 8.3.4 for the subgroup group-4 that this prediction is confirmed such that the projection of formal features is also projected in children's grammar and thus suggests that children's SE is a NC language.

Zeijlstra further argues that if the doubling effects of negation are not present in the language input, and if the language exhibits negation using the Neg° negative marker, still it makes children potentially able to acquire and license NC, and that holds true only for the subgroup group-3. The children in subgroup group-3 produced NC but did not receive any NC input.

It was also predicted that the presence of doubling effects/NC will lead to the early and rapid acquisition of *n't.* The prediction is supported only for group-4 who received the overt CDS input projecting the formal features. Furthermore, the post hoc multiple age-group comparisons for the group-4 show that children of younger age-groups were exhibiting the similar average use of *not* and *n't*, reflecting the simultaneous acquisition of *not* and *n't*.

As discussed in chapters 3 and 6 that Zeijlstra (2004, et seq.) predicts the one to one correlation between the Neg° negative marker and NC. The analyses presented for the subgroups group-3 and group-4 also support Zeijlstra's predicted correlation that a language that will exhibit the use of the Neg° negative marker will also possess the NC. Children from group-4 were on an advantage that they received the CDS input for NC but children in group-3 had to rely on the CDS input for the Neg° *n't*.

8.4.1 Non adult-like *not* and *n't*

Not: It is also important to note that children's use of *not* in an adult-like manner always remains higher than that of their non-adult-like use of *not*. Out of a total of 715 children who used *not* at all, only 69 (9.65%) used *not* at least once in a non-adult-like manner. From a total of 1830 non adult-like sentences of *not*, 979 (53.49%) sentences are spoken by only two children and the rest 47% are spoken by all other 67 children. See subsection 8.2.2 (also footnote 11) to see details for these two children.

N't: It is shown in subsection 8.2.3 that for non-adult-like uses of *n't*, a total of 484 sentences were found. From a total of 896 children who used *n't* at all, only 132 (14.33%) produces at least one sentence containing non-adult-like use of *n't*.

Besides this, it is also important to note that the most frequent non-adult-like structure of *n't* was using *don't* with 3SG subject/pronoun. From a total of 896 children who produced *n't* at all, 189 (21%) used *don't* with 3rd person singular subject. It has been shown in section 8.2.3 that only 9 sentences are found containing the use of other incorrect negative auxiliaries with respect to the subject of the sentence.

It has been shown in sections 8.2.2 and 8.2.3 that children produced a variety of non-adult-like structures for *not* and *n't*, all in very low frequency. It could not be established that all or at least majority of children produced a particular kind of non-adult-like structure for any of the negative markers.

Furthermore, it is stressed that table 8.3 shows that the ratio of producing *not* in grammatically correct and adult-like manner remain above 95% per age-group except one, and that of *n't* remains closer to 97% throughout the age-groups. The ratio of producing grammatically incorrect or non-adult-like *not* and *n't* remain as lower as 3-4% which cannot be taken as sufficient enough to trigger concerns for the language development of typically developing children. For a more detailed view, see chapter 3, 9 and 12. Hence, based on all the evidence, it is argued that children's *not* and *n't* are adult-like and in a grammatical manner for up to 95% to 97%.

8.4.2 Adverbial to Neg° stage

It has been argued in chapters 3 and 6 that in DN languages the adverbial negative marker does not block the movement of tense morpheme from V to T. This can also hold true for SE if children use *not* with the main inflected verb, making the structures like the one in (35), also shown in (16a).

35). *It not works.*

The sentence like this will form the evidence that *not* is an adverbial negative marker and children are in the adverbial negation stage. It has been mentioned above that there were only 5 sentences of this kind and those are too sufficient to make any evidence to reflect that children are still in the adverbial negation stage. The evidence presented in the existing studies is mainly from Brown (3 children) or Kuczaj corpus (1 child), and the number of observations provided per level of the sample is too low to form any empirical or inferential claim that could generalise into a substantial amount of population. See section 8.2 and 8.3 also.[210]

Furthermore, it is implausible to think that based on every single new structure in the child's language, it can be claimed that children passed through a certain stage of their language development where they are potentially able to produce some kind of unique structures, and the same stage could also be observed or generalised on a bigger sample of child population.

Bellugi (1967) Kalima and Bellugi (1966) Schütze (2010) Wexler (1994, 1998) among others claim that children's initial uses of negative auxiliaries *don't* and *can't* reflect the use of these auxiliaries as the whole forms and not a combination of auxiliary and Neg° *n't*. Bellugi and others do not provide any evidence for their claim other than that children were using only these two negative auxiliaries in the early months of the acquisition of negation. It has been shown above that in data presented in this dissertation, majority of the negative auxiliaries are found in the initial few months. Subsection 8.1 presents 47209 sentences for negative auxiliaries, it has also been mentioned above that there was no sentence found in the form like *He can't coming, or they are don't using it*, etc., or in any structure that could reflect the use of *don't* and *can't* as adverbial negative markers, similar to *not.* The evidence does not inform that *don't* and *can't* or any other negative auxiliaries are analysed as just whole words and not as a complex of two words.

It has been shown in section 8.2.3 and table 8.4 that children very frequently used *n't* and also received abundant input for it being used as a single negative marker (figure 8.3). Figure 8.7 showed that children's average use of *n't* in an adult-like manner remained always much higher but their non-adult-like use remained between 0-1. It is also evident in subsections 8.2.2 and 8.2.3 that overall children's use of *n't* is much higher than *not*. It is shown that CDS input for NC has indeed the effect on children's acquisition of *n't,* also, it is shown in post hoc multiple age-group comparisons that the average difference between the age-groups with regard to the use of *not* and *n't*

[210] Only 3 observations from Kuczaj corpus.

hasn't been very significant in all the groups. All this evidence indicates that children were able to acquire *n't* much earlier, until the age 30 months, and also in a very productive and adult-like manner.

8.4.3 Interpretation of *n't* as a Neg° by children

It has been discussed in the above subsection that the existing literature reports that children's early use of negative auxiliaries are mere whole words and do not reflect that the negative marker *n't* is used as a Neg° negative marker. In this subsection, syntactic interpretations of some of children's uses of *n't* will be presented.

Along with the use of *n't* in negative declaratives, children's productive use of *n't* also includes its use in Wh and negative tag questions, since tag questions clearly show the movement of negative auxiliary from T/I to C head, suggesting that Neg° *n't* can move to T/I and attaches to tense or inflection and this combined head T°+Neg° move further on its way to C°. See chapters 2 and 3 for detailed discussion about syntax of *not* and *n't*. The negative auxiliaries *isn't, doesn't, wasn't, haven't, don't* were all found used in negative Wh and tag questions during the age months 19th - 24th. Some child examples are shown in (36) below, already shown in section 8.2.3. The syntactic movements are also shown along with.

36). a. That's my lolly, is*n't* it? (Braunwald_Target_Child_Laura: 28)

a'. That's my lolly [$_{CP}$ [$_{C°}$ *isn't*$_{i+j}$ [$_{TP}$ it [$_{T°}$ t_i t_j [$_{NegP}$ [$_{Neg°}$ t_j ... [$_{VP}$ ~~it~~]]]]]]]

b. So you do*n't* waste it. (Wells_Target_Child_Penny: 23)

b'. [$_{TP}$ you [*don't*$_i$[$_{NegP}$ t_i [$_{vP}$ waste it]]]]

c. Why does*n't* he need cereal? (Providence_Target_Child_Naima: 29)

c'. $_{CP}$ Why$_i$ [$_{C°}$ *doesn't*$_{j+k}$ [$_{TP}$ he [$_{T°}$ t_j t_k [$_{NegP}$ [$_{Neg°}$ t_k ... [$_{VP}$ need cereal t_i]]]]]]]

The examples and their syntactic representation provided show that children can perform complex and multi-step syntactic movements at the age of 2.5 years, i.e., 30 months. It makes the evidence that the projection of NegP is projected in child's grammar by then. See also Deprez and Pierce (1993), Abdulkarim (2000), and Roeper and Abdulkarim (1997) for similar findings.

Throughout this chapter, theoretical, empirical, and inferential evidence has been presented which is used to argue that children acquire *n't* from the the age of 18 months and master its productive use until the age month 24th. The next six months 25-30 children are found practicing, producing, and using *n't* more frequently and soon after the age-month 30 they sound more like as an adult in their use of negative auxiliaries, as it is already very evident from the examples shown for young children in subsection 8.2.3.

It is also argued that their transition from the adverbial negation stage (using *not* as a sentential negative marker) to the Neg° stage (using *n't* as a sentential negative marker) is quite rapid and barely traceable, as shown from 8.3.3.2 to 8.3.5.

It is argued that children have acquired *n't* productively until the age of 24 months, and the formal features are projected in their grammar through Neg° *n't*. Only then do they exhibit the overt realisation of it i.e., producing NC. Since children's transition from the adverbial negation stage to the Neg° stage is very rapid. The sentences children produced using more than one negative marker reflect the projection of formal features/NC and not of the Double negation/semantic negation stage (see Tagliani, 2019, Moscati, 2020, Tagliani et. al. 2022, among many other). No substantial amount of evidence was found to argue that the acquisition of the negative auxiliary *doesn't* and NC are co-related. (cf. Thornton & Tesan 2006; Londal and Thornton, 2017).

Furthermore, while strengthening the argument, it is stated that the inferential results in tables 8.8 and 8.9 and the results of post hoc multiple age-group comparisons support each other. Inferential results provide proof that CDS input for both of the negative markers has a strong effect on children's acquisition of the respective negative marker and that post hoc analyses should supplement it which they did.

8.4.4 Setting, re-setting of semantic/syntactic negation

It has been argued in the above sections that until the age of 24 months, children have acquired the versatile use of *n't*. Neg° *n't* is projected in their grammar which reflects the projection of formal features. It has been shown above that both of the groups of children (group-3, group-4) that produce NC were already using *n't.* All the children in two groups (group-1, group-2) that didn't produce NC were also using *n't* productively. From the total of 932 children, 771 (group-1 + group-2) (82.72%) children didn't produce NC while 161 (group-3 + group-4) (17.27%) produced NC.

Since both of the groups of children have been showing the projection of Neg° *n't* it is argued that children acquiring SE begin the acquisition of negation from the semantic negation stage and transit to the formal/syntactic negation very rapid, and their transit is barely traceable. After entering into the formal/syntactic negation stage the overt realisation of the formal negation, for example, production of NC, is exhibited optionally. The claim is strongly based on the theoretical, empirical and inferential evidence presented in the above sections, representing a wide sample of the child population (see Appendix-J for a detailed view of number of children per age month), ranging from 1 year until 7 years of age, and covering a detailed trajectory of their development. See chapter 7 for a detailed view of the characteristics and variability of sample children.

Zeijlstra (2004, et. seq.) claims that when the Neg° projection is added into the grammar of a child acquiring SE, its grammar is potentially able to license NC and this claim is only partially attested. In the real world no theoretical claim can ever be fully tested taking population like young children who are mainly very different, unique and in the process of rapid sensory, cognitive, psychological, psychomotor, and neurological development.

Furthermore, Zeijlstra (2004, et.seq.) argues that based on the input English children will cease the production of NC. It is predicted that when caregivers' input containing only *n't* will be available to guide children that their local language does not allow the use of more than one negative element they will eventually adopt it. Zeijlstra's argument is weighted as the strong effect of the input has already been shown above.

Similar to children who are acquiring both Dutch and Italian, a DN and an NC language as their L1s simultaneously, possess formal and semantic negations together, and don't mix them up (Arshad and Zeijlstra, in prep.), children acquiring SE also possess both of the grammars. The difference is children's semantic features of negation are based on the adverbial negative marker *not* and formal features of negation are based on the negative marker *n't*, a Neg°.

Since the data of NC producing children have not been available after the age of 84 months so it cannot be stated clearly that when and in how much duration NC would be dropped from children's grammar but definitely it has been decreased after the age month 60th.

Thornton and Tesan (2013) propose that NC will be eliminated from children's grammar in the school through the instructions for prescriptive grammar. Authors do not provide any mechanism under their proposed view to eliminate NC from children's grammar. The proposed explanation does neither seem attractive with a theoretical or practical point of view, nor do there exist any studies that could shed light on this.

8.5 Conclusion

The chapter presents a detailed investigation of the acquisition of negation and negative concord of children acquiring Standard English. It was observed in the data that some of the children were ahead in their language development than their age fellows, and some of the children were making more errors than their peers in a particular negative element but not in others. It is also important to note that children's expression of negation directly reflects the expression of negation in CDS sentences. The effect of caregivers' input for the negative marker *not* and *n't* is found strong and positive along with the positive role of age.

Additionally, for the acquisition of the negative marker *n't* by children acquiring SE, Zeijlstra (2004, et. seq.) argues that for the quick and timely acquisition of the negative marker Neg° *n't*, NC is required. Since adult SE is a double negation language that does not allow negative concord, the required input NC is not available to children but the input containing *n't* as the only negative element is readily available. Since children are receiving half of the input, this will lead to the late acquisition of *n't*. It was found as a result of multiple age-group comparisons that this prediction is not confirmed for all the subgroups since children who received NC input and children who did not receive any NC input were found similar in the estimated average use of *not* and *n't* across age-groups.

The evidence presented for two subgroups supports Zeijlstra's predicted correlation that when Neg° *n't* is projected in children's grammar they are potentially able to license NC. Zeijlstra's proposed correlation between the presence of Neg° negative marker and NC is also supported.

Chapter 9

Results

Italian

This chapter will present empirical and inferential results of the acquisition of sentential negation and negative concord for children acquiring Italian as their L1.

Similar to the previous chapter, the first half of this chapter will present the descriptive statistics i.e., counts, percentages, proportions, means, and confidence intervals, etc., to give a flavour of the data presented and investigates in this chapter. The descriptive statistics will serve the purpose of highlighting the key features of the data, distribution, and relationship of the variables, mainly focusing on children's data that consists of negative sentences.

The second half of the chapter will present inferential statistics and statistic modelling that will serve bases for drawing conclusions and inferences.

After removing unclear sentences[211], sentences of non-typically developing children, sentences with missing details[212], and removing sentences of children aged (0-12 months) and of children older than 84 months, a total of 3035 negative sentences for children and 6919 sentences for CDS[213] are taken in for analyses. The age range of children is 16-72 months.[214] For the sake of convenient visualisation of the data, and to conduct post hoc multiple comparisons later, age months are divided into age-groups, of an intervals of 6 months each[215], similar as in the chapter 8 for Standard English.

9.1 Negative elements

It was discussed in detail in chapters 2 and 3 that in Italian, sentential negation is expressed using the sentential negative marker *non* as shown in (1).

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[211] A total of 214 sentences for Italian children were not very clear. The sentences were containing any of the negative elements but as a whole they were not intelligible so they are not taken in for the analyses. Some examples are shown in (i).

i). a. *No* vale@wp. (Tonelli_Target_Child_Marco: 19)
b. *No* xxx *no non* ciange *(nes)suno* , quetto *no*. (Calambrone_Target_Child_Rosa: 31)
c. *Non* to. (Calambrone_Target_Child_Raffaello: 23)
d. Femmare a fi *nessuno* fa mamma a pallare +… (Calambrone_Target_Child_Martina: 27)

[212] Sentences with missing details like the name of the child, her age, or developing group, etc.

[213] There was no unclear sentence for CDS. Sentences with missing details and of adults of younger and older children were discarded the same way as children's.

[214] See appendix_K(A) for the details about children in each age-month, and appendix_K(B) for that of age-group.

[215] Only the first age-group (13-18) consists of only 3 months (16, 17, and 18). The last age-group (37-42) also contains 1 child of age 56 and 72 months each.

1). a. *Non* lo so.[216] (Antelmi_Mother_DON_Target_Child_Cam:26)

Neg I know.

I don't know.

b. Dopo *non* esce più. (Calambrone_Investigator_Luca_Target_Child_Diana: 26)

After neg go+3SG out anymore.

After she doesn't go out anymore.

In Italian, it is also possible in some cases to use the negative polar particle-like element *no* to express negation, as shown in (2). In the sentences below in (2), *no* is interpreted as a negative element, see chapter 3 for details. See Volterra and Antinucci (1976) and also chapter 5.

2). a. *No* perché *no*? (D_Odorico_Mother_MOT_Target_Child_Linda: 16)

Neg why neg.

No why not?

b. Va così storto, qui *no*.[217] (Tonelli_Mother_MOT_Target_Child_Marco: 19)

It goes like this twisted, here neg.

It goes so twisted, here not.

c. La pila *no*.[218] (Tonelli_Target_Child_Gregorio: 21)

The battery neg.

The battery not.

Besides this, principally neg-words in pre-verbal subject position and in negative interrogatives can also be used express sentential negation being the only negative element in the sentence, shown in

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[216] Glosses and the translation shown are provided by the native adult speakers of Italian.

[217] In Italian, to be more emphatic, or to make a contrast, *no* can be used instead of *non*, and put after the other word, e.g.,

i. Ci vai o *no*?
Are you going or not?

In a context like when a mother is asking the child to bring something from the kitchen, she says *Ci vai o no*? And if the child does not go, she angrily could say *sampre no*.

ii. Sempre *no*.
Always not.

iii. Penso di *no*.
I think not.

The examples in (i-iii) are provided by the Italian native speakers.

[218] The sentence is a child sentence, with the name and age mentioned in braces.

(3). In addition, neg-word used alone as an answer in a shared context or in fragment answers can also express negation, as shown in (3c).[219]

3). a. *Niente* ha deciso di metterlo là. (D_Odorico_Mother_Target_Child_Veronica: 20)
Neg-thing has decided the put it on there.
Nothing has decided to put it there.

b. Perché *niente*? (Calambrone_Mother_Target_Child_Martina: 19)
Why neg-thing.
Why nothing?

c. Come, *da nessuna parte*! (Antelmi_Mother_DON_Target_Child_Cam: 40)
Like, neg-where.
Like, nowhere.

To generate NC, a pre-verbal neg-word or *non* must accompany post-verbal neg-words, as in (4a). To induce stress, pre-verbal neg-words can also be used with *non,* shown in (4b).

4). a. *Non* c' è *nessuno* che ha tre occhi. (Tonelli_Mother_MOT_Target_Child_Marco: 19)
Neg there is neg-body that has three keys.
There is no one who has three keys.

b. *Niente NON* esiste *nient*' altro del biberon.
(D_Odorico_Mother_Target_Child_Federica: 19)
Neg-thing, neg exist neg-thing other the baby bottle.
Nothing nothing does exist other than the baby bottle.

All the sentences shown in (1-4) make a part of the CDS sentences analysed in this dissertation.

Hence, a sentence is considered negative if it contains any of the negative elements shown in (5), following the structures shown above in (1-4).

5). a. *Non* [the sentential negative marker]
Not

[219] In a context like:
Speaker A: Q: Where did you see the tiger?
Speaker B: A: Nowhere.
Such contexts are interpreted as cases of ellipsis. For details, see chapter 3.

b. *No* [in its negative uses]

No

c. *Neg-words* [in their respective negative uses]

Figure 9.1 presents the total number of 3035 negative sentences for children and that of 6919 for CDS for Italian, across age-groups.[220]

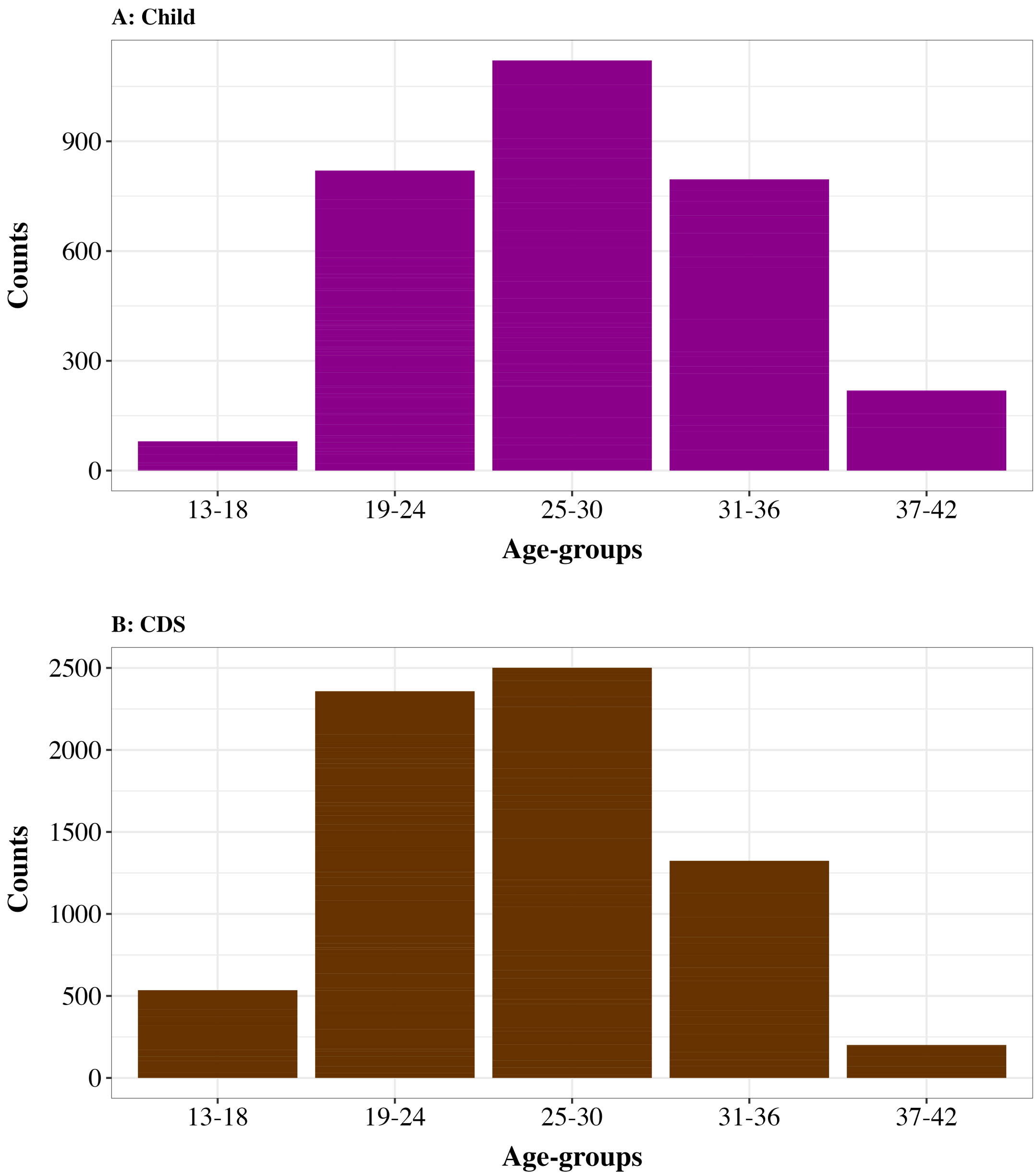

Figure 9.1: Total number of negative sentences for children and CDS per age-group.

[220] The Y-axis, as well as the length of bars represent the total counts and the x-axis represents the age-groups.

Figure 9.1(A) shows that the first age-group contains only 80 sentences, the smallest number of sentences of all the age-groups. The age-group 25-30 contains the highest number of sentences, 1121. Figure 9.1(B) shows the CDS negative sentences across all the age-groups. Age-group 25-30 contains the highest number of sentences (2501) for CDS too. Both the parts of the figure 9.1 show the similar trend with respect to the number of sentences in each age-group.

In order to present a detailed view of sentential negation, the negative sentences of children are separated into several categories as per the negative elements, i.e., sentences containing the negative polar particle *no*[221], sentences containing the sentential negative marker *non*, and negative sentences with the negative meanings of neg-words, and sentences containing NC.[222] Figure 9.2 shows the total sentences for *no, non* and neg-words. NC is further shown in subsection 9.5.

Figure 9.2 presents the total number of sentences for each category for child sentences.

[221] The total number of sentences for *no* contain its uses as a polar particle as well as its uses in negative meaning. The Uses of *no* as a polar particle are separated from its negative uses, and only the negative uses are taken as negative, as it will be shown below.

[222] For the NC sentences, the sentences which contain *non* and the neg-word(s) are counted in as a part of the total sentences for *non*, for child and CDS sentences.

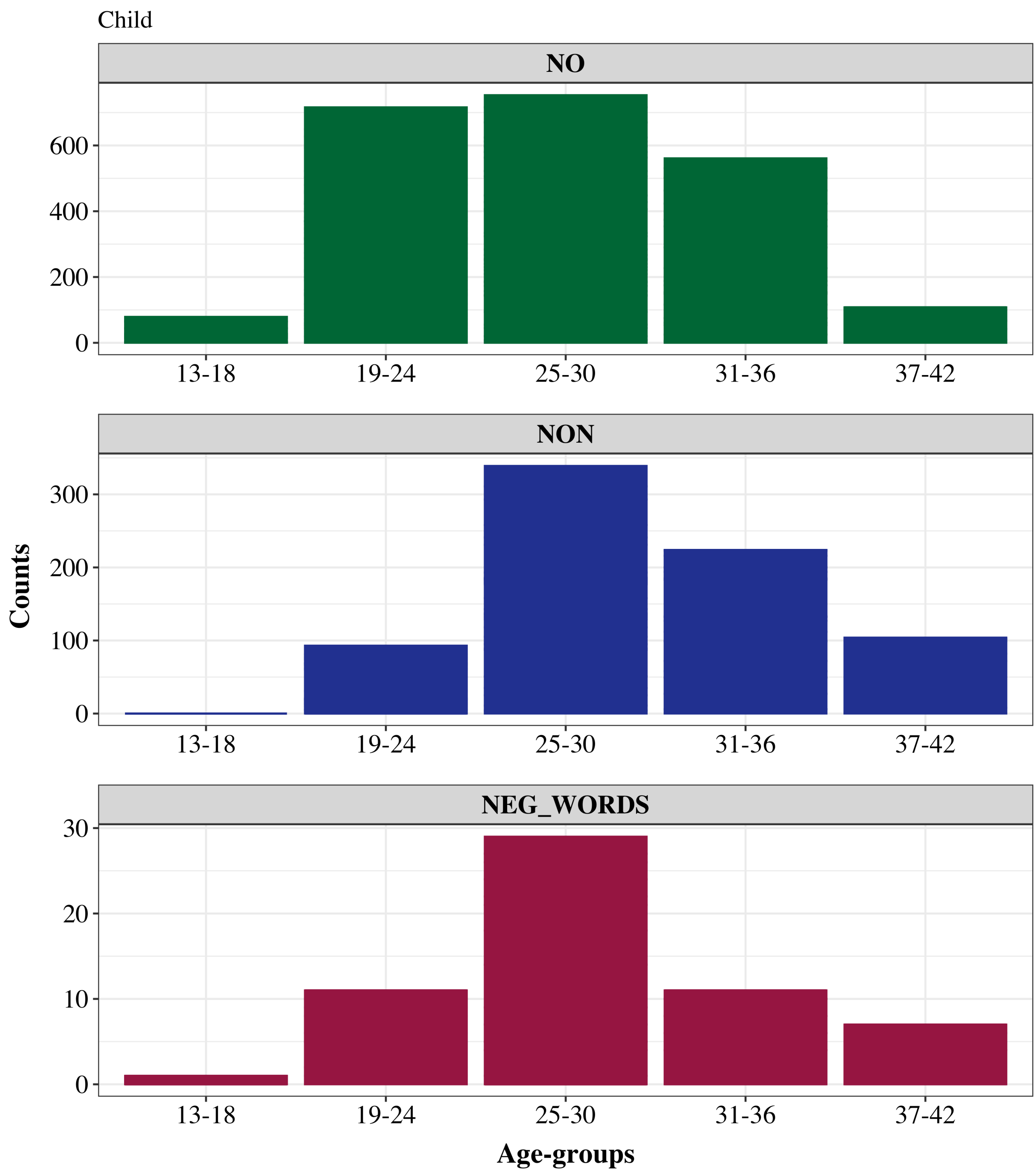

Figure 9.2: Total number of sentences for *no, non,* and neg-words across age-groups.

Figure 9.2 presents (2217, 760, 59) sentences for *no, non* and neg-words, respectively, divided into several age-groups. Figure 9.2 shows that there is a higher number of sentences for *no* as compared to *non* and neg-words in each age-group. Furthermore, each age-group has the lowest number of sentences containing neg-words as seemingly the only negative element. The age-group 25-30 contains the highest number of sentences for each element.

For a detailed overview of negative sentences for CDS, the sentences were categorised the same way as children's. Figure 9.3 presents the negative sentences for each element across age-groups for CDS.

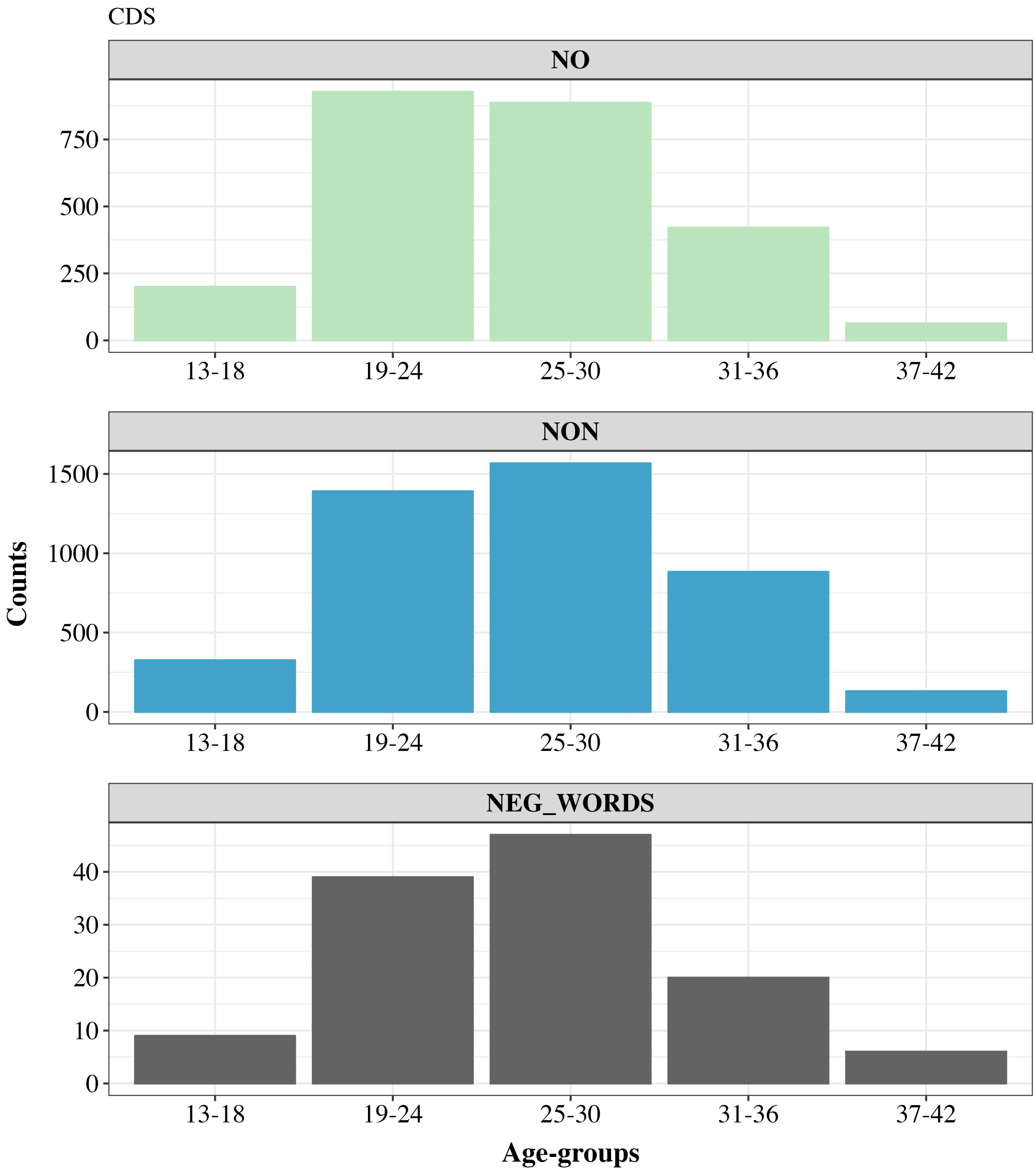

Figure 9.3: Total number of sentences for *no*, *non* and neg-words for CDS.

Figure 9.3 shows the total number of (2500, 4298, 121) sentences for *no, non,* and neg-words respectively, divided into several age-groups. *Non* contains the highest number of sentences among all. The age-group 25-30 contains highest sentences for *non* and neg-words. The sentences in age-group 37-42 contains lowest number of sentences for all the three element.

9.2 The negative polar particle *no*

It was discussed in chapters 5 and 9 that in child language acquisition research, the negative polar particle had been given much importance. It has also been argued that children acquire the polar particle ahead of sentential negative elements. It is also argued there that usually, the negative polar particle constitutes one of the first and most frequently used words in the early months of the child's language production. Languages vary with regard to the morphological, semantic, and syntactic properties of the negative polar particles. For instance, *no* in Standard English is used as a polar particle and *no* is also used with quantificational negative meaning. The sentence *no mummy* uttered by a 22 months old child acquiring Standard English could mean both ways i.e., *no* is used as a polar particle meaning [*no, mummy*]. Or it could also be interpreted as a negative quantificational element meaning [*mummy is not present*]. It is hard to determine the role of *no* in such sentences when sufficient information about the context of the sentences is not provided.

In a language like Italian, the polar particle *no* also has two roles, i.e., it is used as a polar particle, as well as also used as a negative element in some cases, as it was shown above in (2 & 5). In this subsection, a detailed view of the use of *no* in Italian child and CDS sentences will be presented.

Children's sentences where *no* is used as a polar particle are separated from the ones where *no* is used as a negative element. Sentences containing *no* as a polar particle include sentences like the ones exemplified in (6) below.

6). a. *No*. (D_Odorico_Target_Child_Linda: 16)[223]

b. Eh *no* , *no*. (Tonelli_Target_Child_Marco: 19)

c. *No* che *non* mi mangia. (Tonelli_Target_Child_Elisa: 23)
Neg that neg me eats.
No, it doesn't eat me.

d. *No* e´mia. (Calambrone_Target_Child_Raffaello: 25)
Neg and mine.

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[223] The longer name indicates the name of the corpus and the child and the numbers indicate the age in months. For example, in (D_Odorico_Target_Child_Linda: 16) *D_Odorico* indicates the corpus and *Target_Child* identifies the role of the child, *Linda* indicates the name while 16 indicates the age of the child given in months.

No, and mine.

The sentences (6a-b) show the use of *no* used as a single word, used repetitively, and combined with the conversation marker *eh*. Sentences (6c-d) show the use of *no* followed by a negative and a positive sentence. Similar patterns were described for English child sentences in chapter 8.

The negative uses of *no* include sentences like the ones shown in (2) above and shown below in (7).

7). a. La pila *no*. (Tonelli_Target_Child_Gregorio: 21)
The battery neg.
The battery not.
b. Perche` *no*? (Antelmi_Target_Child_Cam: 33)
Why neg?
Why not?

Children's sentences for *no* shown in (6-7) are taken as adult-like uses of *no* as such sentences are also found in CDS, as shown and described in subsection 9.1.
Some sentences seem to contain the ungrammatical or non-adult-like use of *no*. Some examples are given in (8).

8). a. Io *no* vedo. (Tonelli_Target_Child_Marco: 19)
I neg see.
I don't see.
Adult form: *Non* vedo. [224]
Neg see.1SG.
I don't see.
b. *No* vojo [: voglio]. (Tonelli_Target_Child_Gregorio: 21)
Neg want.1SG.
I don't want (it/to).
Adult form: *Non* voglio.
Neg want.1SG.

[224] The adult forms shown are provided by the native adult speakers of Italian.

I don't want (it/to).

c. *No* vedere. (Tonelli_Target_Child_Marco: 23)

Neg to see.

Not to see.

Adult form: *Non* vedere.

Neg see.INF.

Not to see.

The examples in (8) show that the sentences contain *no* as a negative element while the adult forms provided show that the negative marker *non* should be used to express negation. The use of *no* in such sentences is inconsistent with the adult grammar and hence taken as non-adult-like use of *no* by children.

The use of *no* in CDS sentences also contained sentences containing the anaphoric or polar use of *no* shown in (9a) and the sentences containing the negative use of *no*, as shown in (9b).

9). a. *No* ma faglieli vedere te. (Calambrone_Relative_Target_Child_Diana: 20)

Neg but make-them show yourself.

No but show them yourself.

b. *No* perché *no*? (D_Odorico_Mother_MOT_Target_Child_Linda: 16)

No why neg.

No why not?

Figure 9.4 presents the adult-like (polar particle and negative use) and non-adult-like use of *no* in child sentences. Figure 9.4 also presents the average use (arithmetic mean is used to identify the average use of any particular negative element. Arithmetic mean value tends to identify the typical value for the use of a certain negative element in a certain group of children. See chapter 7, section 7.6 for details about it and detailed methodology) of *no* in anaphoric and negative use in CDS sentences across age-groups. The shaded areas across the mean points identify the 95% confidence intervals. Confidence intervals indicate the precision and accuracy of the estimate they are computed for. See also chapter 7 of methodology for details.

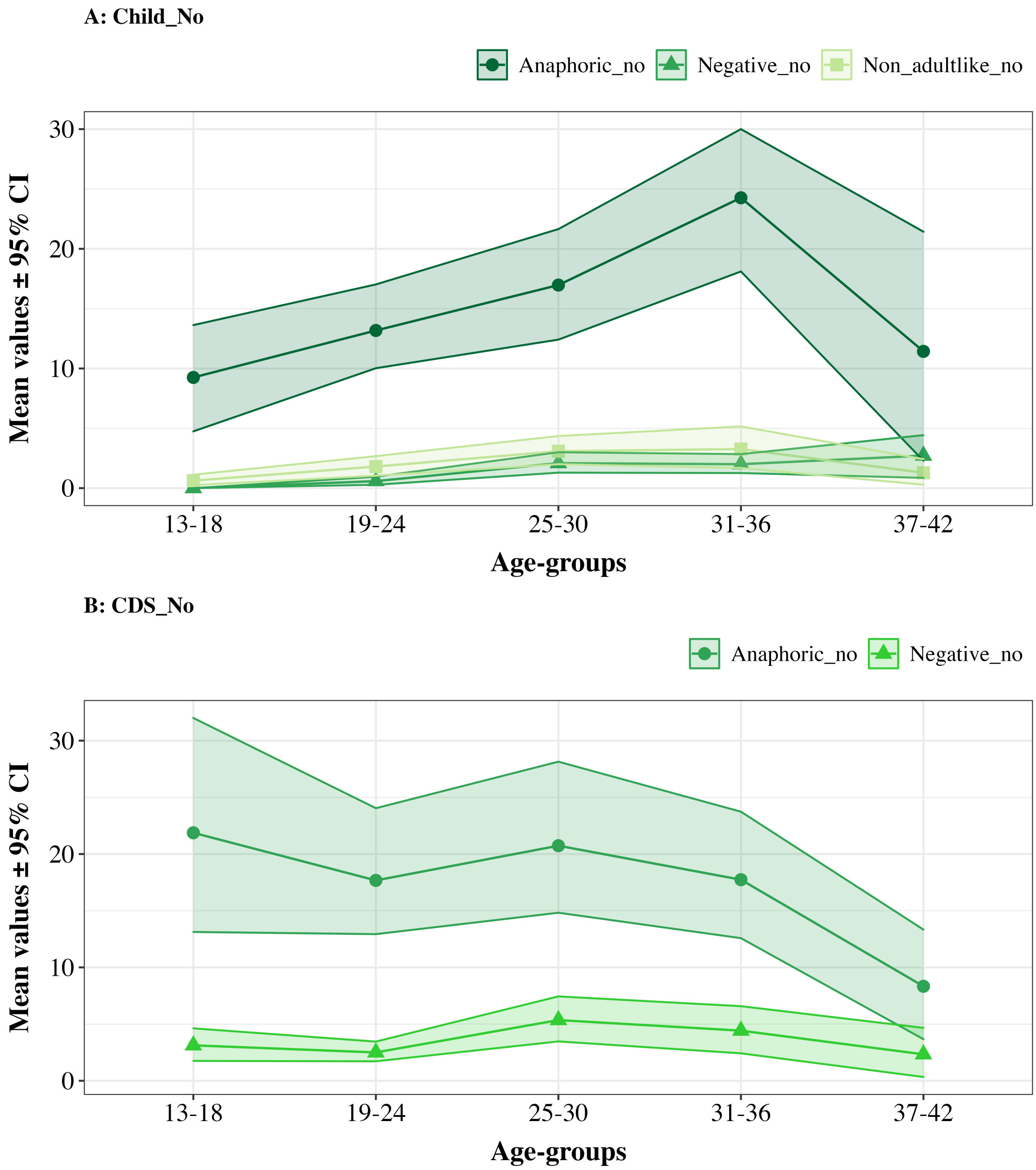

Figure 9.4: Mean values of the use of *no* in children's and CDS sentences, across age-groups.

Figure 9.4(A) shows that the mean values indicating the average use of Anaphoric/polar *no* are much higher as compared to the other two uses[225]. Age-group 31-36 has the highest mean value for the use of *no* as an anaphoric or polar particle. The mean value for the use of *no* as a negative element remains 0 for the first age-group, 0.58 for the second, and 2 or a little more for the next age-groups. The mean value for the non-adult-like uses of *no* is 0.62 for the first age-group, 1.80,

[225] This rise in the mean values for the use of anaphoric or polar particle could very well be influenced by some of the children, for example, for the child Calambrone_Target_Child_Rosa the use *no* as a polar particle (345 sentences for *no* used as a single or repetitively + 70 sentences for used with a positive or a negative sentence) and only 49 sentences for *no* used as a negative element were found. The similar case is observed for the child Tonelli_Target_Child_Marco (335 + 48) sentences for *no* as an anaphoric or polar particle and only 11 instances for *no* as a negative element were found.

and 1.28 for the second and the last age-group, respectively. The mean values for the use of *no* for age-groups 25-30 and 31-36 are a bit above 3.

Figure 9.4(B) shows that the mean values of the use of *no* as an anaphoric element are higher for the first 4 age-groups as compared to the last one which has the lowest. The mean value for the use of *no* as a negative element is closer to 5 for the first and more than 5 for the third age-group. The use of *no* as an anaphoric element exhibits higher mean values for the CDS negative sentences than those of children.

Upon observing children's sentences of *no* as a polar/anaphoric element closely, it was found that 1396 sentences containing *no* used as a single word or repetitively[226] and only 417 sentences for *no* used as an anaphoric element followed by a positive or a negative sentence were found. *No* used as a negative polar particle is found ahead of its use as a negative element for a vast majority of the children, similar to English (see chapter 8).[227] Similar findings have already been shown in Volterra and Antinucci (1976).

Table 9.1 and 9.2 present the summary of *no* in children's and CDS sentences, respectively.

Age-group		**Adult-like-no**				**Non-adult-like no**	
Age-group	**Total sentences per age-group**	**Sentences with Anaphoric no**	**%**	**Sentences with negative use of no**	**%**	**Sentences with negative use of no**	**%**
13-18	79	74	93.67	0	00.00	5	6.32
19-24	716	606	84.63	27	3.77	83	11.59
25-30	753	577	76.62	71	9.42	105	13.94
31-36	561	461	82.17	38	6.77	62	11.05
37-42	108	80	74.07	19	17.59	9	8.33
Grand total	2217	1798	81.10	155	6.00	264	11.86

Table 9.1: Summary of the sentences containing *no* in children's sentences across age-groups.

[226] The use of *no* as a single word or repetitively by Italian children, and also, the use of *no* as a polar particle prior to its use as a negative element is very much aligned with that of their Standard English peers. See chapter 8 for details.

[227] Regarding the debate of children's placing the negative element *no* in sentence external position, it cannot be said anything that either children did place the negative *no* in sentences peripheral or external position since to place the negative *no* in the sentence external position in Italian is quite normal.

Table 9.1 shows that the total number of sentences across age-groups is higher for the anaphoric use of *no*, followed by the non-adult-like use of *no,* and adult-like negative use of *no*, for children's sentences.

Table 9.2 shows the summary of sentences of CDS containing *no*.

Age-group	Total sentences per age-group	Sentences with Anaphoric no	Sentences with negative use of no
13-18	200	175	25
19-24	928	813	115
25-30	887	705	182
31-36	421	337	84
37-42	64	50	14
Grand total	2532	2112	420

Table 9.2: Summary of the sentences containing *no* in CDS sentences across age-groups.

Table 9.2 shows that the total number of sentences across age-groups is higher for the anaphoric use of *no* as compared to the sentences with the negative use of *no,* quite similar to children's sentences, shown in table 9.1.

From now on, the main focus of this chapter will remain on *non,* neg-words, and NC, in the subsequent subsections.

9.3 The negative marker *non*

Italian is a Non-strict NC language. Since one of the aims of this dissertation is to investigate the acquisition of NC by young children acquiring Italian so the negative sentences of children were separated into three types of sentences, a) sentences containing *non* as the only negative marker, b) sentences where neg-words are the only negative element, and c) sentences in which *non* is accompanied by neg-words (NC). See section 9.1 and chapter 3 for more details about NC in Italian.

In this section, a detailed view of the negative sentences containing only the negative marker *non* is presented. Section 9.4 will presents the sentences containing only the neg-words and section 9.5 will present a detailed view of NC.

Children used *non* remarkably in a grammatical and adult-like manner. Children's negative sentences containing *non* as the only negative marker include the sentences like the ones exemplified in (10) below.

10). a. *Non* fanno. (Roma_Target_Child_Francesco: 20)
Neg do+3PL. [228]
They don't make.

b. *Non* c' è. (Tonelli_Target_Child_Marco: 20)
Neg is there.
There isn't/It is not here.

c. *Non* lo so. (Tonelli_Target_Child_Gregorio: 22)
Neg it know+1SG.
I don't know it.

d. *No* che *non* mi mangia. (Tonelli_Target_Child_Elisa: 23)
No, neg me eat+3SG.
No, he/she/it does not eat me.

The negative sentences for *non* also include the negative questions and imperatives, as shown in (11-12).

11). a. *Non* ci (s)tá? (Calambrone_Target_Child_Viola: 25)
Neg there/here be?
Isn't she/it/he here?

b. Perché *non* si prende? (Calambrone_Target_Child_Guglielmo: 28)
Why neg 1st/2nd/3rd person Sub + bring/take+3SG object.
Why can't I bring it?

12). *Non* gonfiare! (Tonelli_Target_Child_Marco: 25)

[228] 3PL indicates for 3rd person plural.

Neg blow up.

Don't blow up!

Children's sentences exemplified in (9-12) are considered as fully grammatical/adult-like use of *non*.

The negative marker *non* was also found used in some structures which are not acceptable in spoken and written adult Italian. Such sentences include 52 sentences. Some of the examples are given below in (13-15).

13). a. Cavallo *non* vedo. (D_Odorico_Target_Child_Lorenzo: 20)

Horse neg see+1SG.

I don't see the horse.

Adult form: *Non* vedo il cavallo.[229]

Neg see+1SG the horse.

I don't see the horse.

b. Te *non* vole. (Calambrone_Target_Child_Raffaello: 24)

(Dative object) you neg want+3SG.

He/she/it doesn't want you.

Adult form: *Non* ti vuole.

Neg you want+3SG.

He/she/it doesn't want you.

The sentences shown in (13a-b) indicate that *non* is not correctly placed in the sentence. The verb and object are also not placed correctly. The sentence in (14) contains an unclear word at the position of an adjective or a noun subject. If the sentence still includes it, its position is not correct.

14). xxx questo *non* è. (Tonelli_Target_Child_Elisa: 25)

(xxx, the unclear word maybe an adjective or a noun subject) this neg is.

This is not a.

Adult form: Questo *non* è (un libro).

This neg is (a book).

This is not a book.

---

[229] All the adult forms are provided by the Italian native adult speakers.

The sentence shown in (15) shows that it contains the mismatched verb with regard to the subject of the sentence.

15). *Non* ce n' è le caprette! (Tonelli_Target_Child_Marco: 29)
Neg there is the goats.
There is no goats.
Adult form: *Non* ce ne sono di caprette!/*Non* ci sono le caprette.
Neg there are the goats.
There are no goats.

Children's sentences like the ones exemplified in (13-15) are considered non-adult-like sentences for *non*.
The negative sentences for *non* for CDS include sentences similar to the children's sentences shown above. There was no ungrammatical sentence for *non* found in CDS sentences.
Figure 9.5 shows the average use of *non* in children's as well as CDS sentences, across age-groups.

Figure 9.5 shows the mean values for the use of *non* in children's as well as CDS sentences, across age-groups. The age-group 13-18 has the minimum (0.00) and the age-group 37-42 has the maximum mean value (11.42). Meanwhile, mean values for children's non-adult-like use of *non* remain far less than those of adult-like ones. But there is a slight and gradual increase observed across age-groups, with the highest mean value of 2.14 for the age-group 37-42.
The higher mean value for non-adult-like *non* for the age-group 31-36 could be due to the child Calambrone_Target_Child_Rosa who produced most of the non-adult-like *non* in this age-group (a total of 12 from a total of 15 in this age-group). The child Antelmi_Target_Child_Cam produced most of the non-adult-like *non* in the age-group 37-42 (9 out of a total of 15 in this age-group).[230]

[230] The child Antelmi_Target_Child_Cam was quite productive in his overall production of *non*. He produced a total of 105 sentences for *non* in adult-like manner and only a total of 12 for non-adult-like ones.

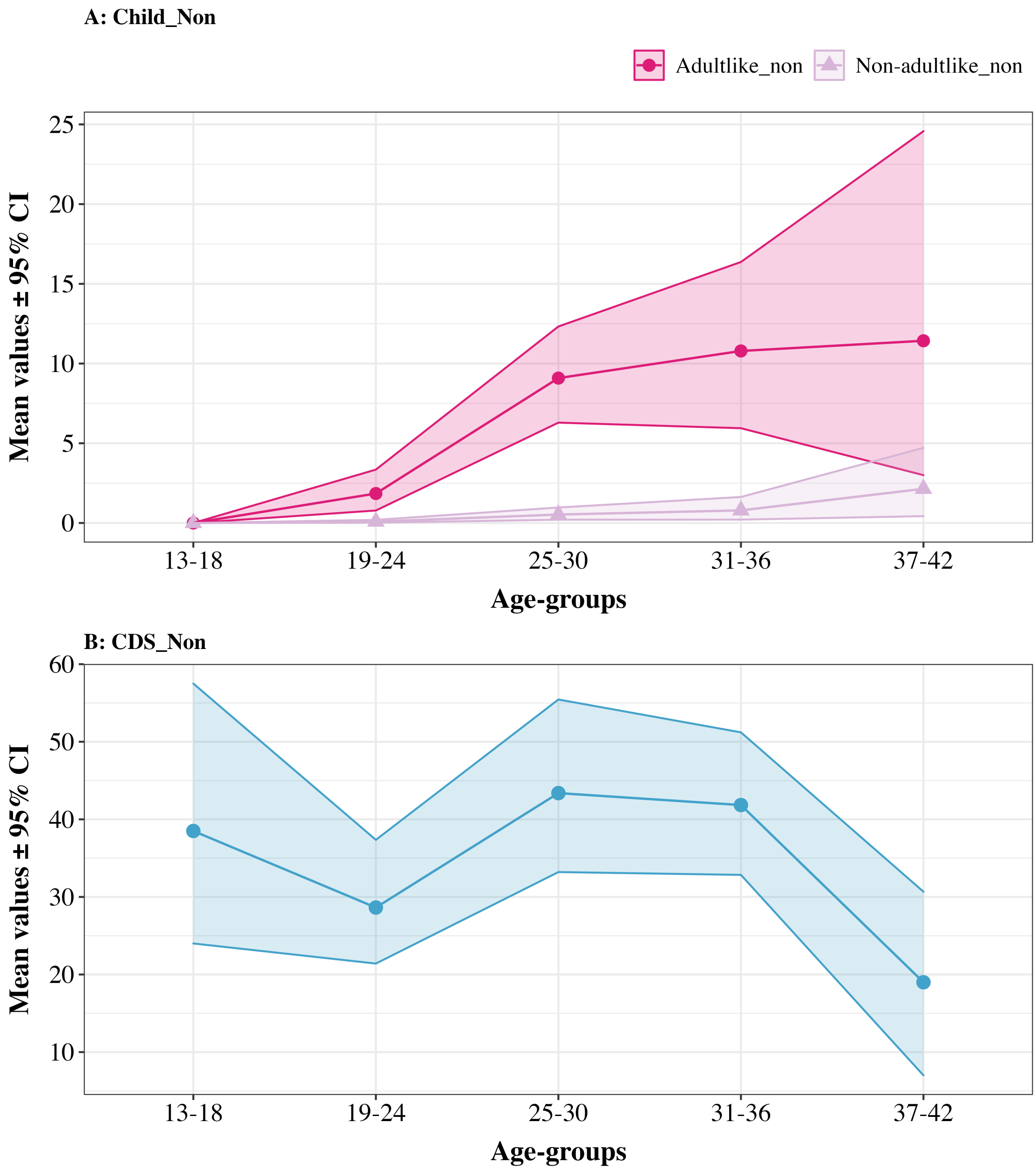

Figure 9.5: Mean values of use of *non* in child and CDS sentence across age-groups.

Figure 9.5(B) shows that the mean value for CDS sentences for the age-group 25-30 is the highest. It is evident that the mean values for the use of *non* remain quite higher than that of children across the age-groups.

Upon observing the available child sentences for *non* closely, it is revealed that *non* first appeared in children's sentences in an adult-like manner at the age of 20 months. The use of *non* in non-adult-like structures was also found at the age of 20 months but not by the same child. Volterra and Antinucci (1976) report the use of *non* around the age of 24 months.

Table 9.3 presents the summary of children's use of *non* in their negative sentences.

Age-group	**Total sentences per age-group**	**Adult-like *Non***		**Non-adult-like *Non***		**CDS**
Age-group	**Total sentences**	**Total Sentences**	**%**	**Total Sentences**	**%**	**Total Sentences**
13-18	0	0	0.00	0	0.00	308
19-24	89	85	95.50	4	4.49	1317
25-30	327	309	94.49	18	5.50	1475
31-36	220	205	93.18	15	6.81	795
37-42	94	79	84.21	15	15.78	114
Grand total	730	678	92.88	52	7.11	4071

Table 9.3: Summary of children's adult-like and non-adult-like sentences for *non* across age-groups.[231]

Table 9.3 shows that the percentage of the use of adult-like *non* remains quite higher than those of non-adult-like ones. Figure 9.6 presents a detailed view of the use of children's *non* across all the months of the age.

In order to see the development of *non* in children's data more closely, the monthly view of the use of *non* is presented below in figure 9.6.

[231] The age-group 13-18 does not contain either adult-like or non-adult-like sentences for *non* for children. There were 3 sentences found at the age of 16 months and 2 at the age of 18 months but these all 5 sentences were not very comprehendible so they are taken as unclear sentences for *non* and not analysed as a part of either adult-like or non-adult-like uses for *non* in child sentences. Such sentences include the examples like the ones given in (i) below.

i). a. pù [*] [=? *non* c' è più]. (Roma_Target_Child_Francesco: 16)

b. ta [=? sta , *non* c' è] pu. (Roma_Target_Child_Francesco: 18)

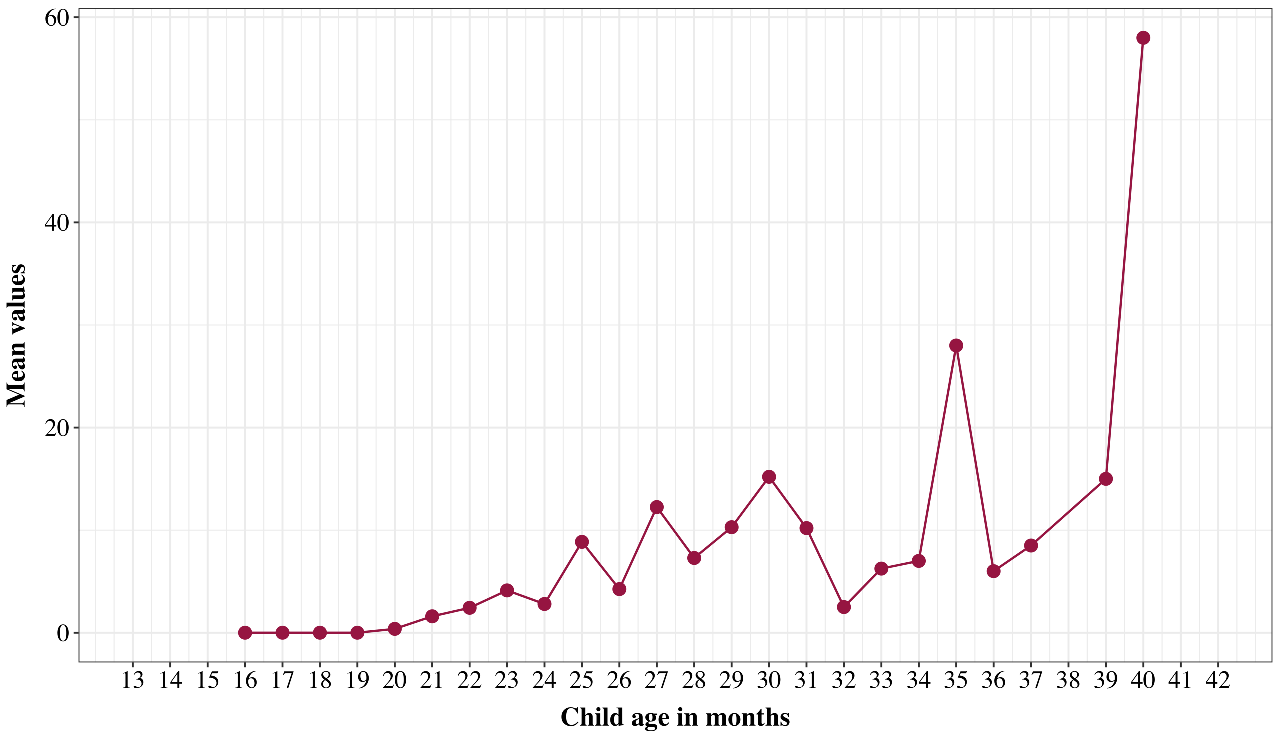

Figure 9.6: Average use of children's *non* across age-months.

Figure 9.6 presents a detailed and monthly view of the use of children's *non* across the age.[232] The figure shows that from the month of 20th, the mean value gradually increased for the next four months. From the month of 24 onward, there is a variation observed in the mean values across all the months.

9.4 Neg-words

In Italian, neg-words in certain positions in certain situations can also be used to express sentential negation, being the only negative element in the sentence.
The following subsection will present a detailed view of the use of neg-words found in children's and CDS sentences. For this purpose, the following neg-words have been investigated:

[232] It has already been mentioned that the child sentences for Italian start from the age of 16 months.

16). *Mai, nulla, niente, nessuno, nessun, nessuna.*[233]

Never, nothing, nothing, nobody/no-one, nobody/no-one, nobody/no-one

In 59 sentences, neg-words are found used in an adult-like manner in child sentences, some examples are shown in (17). Most of these sentences are short ones like shown in the examples below, and reveal the typical use of neg-words in fragment answers. See chapter 3 for detailed syntax and use of fragment answers.

17). a. *Mai*. (Tonelli_Target_Child_Marco: 17)

Neg-ever.

Never.

b. *Niente*. (Calambrone_Target_Child_Martina: 19)

Neg-thing.

Nothing.

c. *Nulla*. (Tonelli_Target_Child_Gregorio: 21)

Neg-thing.

Nothing.

d. E poi *niente*. (Tonelli_Target_Child_Elisa: 25)

And then neg-thing.

And then nothing.

Only 7 sentences were found for non-adult-like uses of neg-words, two examples are shown in (18).

18). a. E *niente*. (D_Odorico_Target_Child_Federica: 19)

Is neg-thing.

Adult form: *Non* e′ *niente*.

Neg is neg-thing.

It's nothing.

b. C'e *nessuno*. (Calambrone_Target_Child_Martina: 27)

[233] Neg-word *nessun* carries its endings as per the subject of the sentence, meaning in all forms remain neg-body/one, e.g.,

- *Nessuno* (Masculine singular)
- *Nessuna* (Feminine singular)
- *Nessun* (more of euphonic)

So they are searched as a separate word for each.

There is neg-body.

There is nobody.

Adult form: *Non* c'e *nessuno*.

Neg there is neg-body.

There is nobody.

The non-adult-like use of neg-words indicate that neg-words are used in post-verbal positions as the only negative elements. The sentences clearly lack the use of another neg-word or *non* in the pre-verbal position. Adult forms show the use of *non* with post-verbal neg-word, to induce sentential negation.

Figure 9.7 shows the average use of neg-words being the only negative element in the child as well as CDS sentences. The non-adult-like use of neg-words is not shown in the figure.

There were 121 sentences found for neg-words being the only negative element in the sentence in CDS sentences. There was only one sentence found which could not indicate the clear meaning of the neg-word in the sentence. The sentence was discarded and not included in the further analyses.

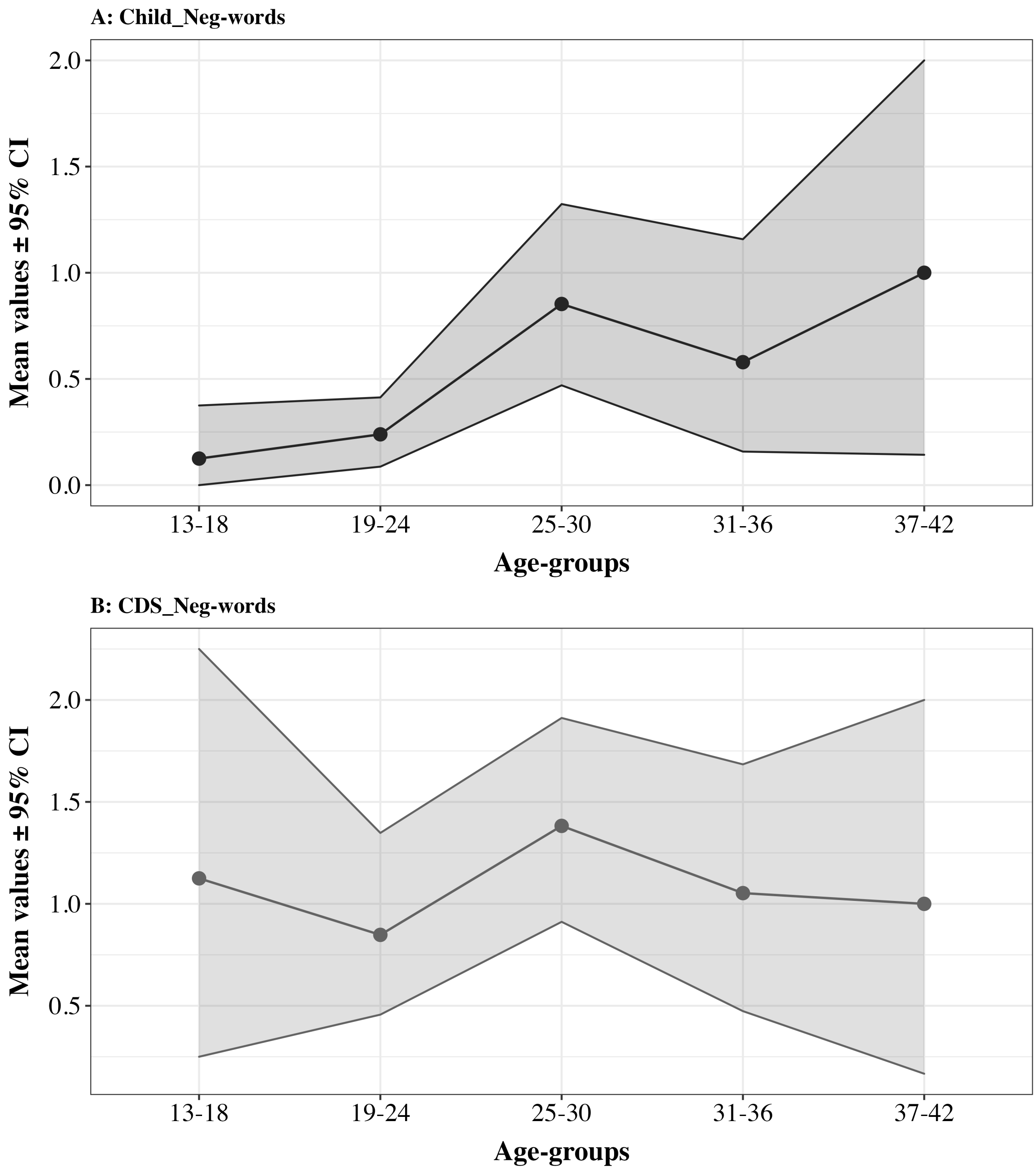

Figure 9.7: Mean use of neg-words as being the single negative element in child and CDS sentences.

Figure 9.7 shows the mean values for the use of neg-words as a negative element in an adult-like manner for children as well as for CDS. The figure shows that mean values for the use of neg-words for CDS are higher than that of children across age-groups. For both of the groups of sentences, the mean values remain 1 for the age-group 37-42. *Mai* was found in child sentences from the month 17th, *niente* at 19th, and *nessuno* at the 25th month of age. All the neg-words were found in CDS sentences from the 17th month of age.

9.5 Negative concord

In this subsection, a detailed view of NC in Italian will be presented. NC sentences involve sentences where the negative marker *non* and neg-word(s) and only (more than one) neg-words are used together in a sentence.

A total of 29 sentences for NC were found in children's negative sentences. Examples are given in (19).

19). a. Qua *non* c' è *niente*. (Tonelli_Target_Child_Elisa: 23)
Here neg there is neg-thing.
There's nothing here.
b. *No non* ce n' è *nessuno*. (Calambrone_Target_Child_Diana: 25)
No neg there of that is neg-one.
None of those is there.
c. *Non* capisse *nulla*. (Calambrone_Target_Child_Rosa: 31)
Neg understand/he neg-thing.
He didn't understand anything.

The sentences shown in (19) exhibit the use of *non* with a post-verbal neg-word. There was no sentence found with a pre-verbal neg-word and a post-verbal neg-word used together in a sentence. There was also no sentence found for pre-verbal neg-word used with *non* to mark stress in the sentence, something that would yield a DN reading in the adult language. Furthermore, there was also no sentence found containing *non* and more than one neg-word.
The first instance of NC was found at the age of 23 months for children.

For the CDS, 289 sentences were found for NC. The most commonly found form of NC in CDS sentences involves *non* and neg-word in the post-verbal position, similar to children's. Examples of NC in CDS are shown in (20-21).

20). *Non* funziona, *non* si sente *niente*! (Roma_Investigator_Child_Francesco: 16)
Neg works, neg you hear neg-thing.
It doesn't work, you can't hear anything!
21). *Non* c' è *nessuno* che ha tre occhi. (Tonelli_Mother_Target_Child_Marco: 19)

Neg there is neg-one that has three keys.

There is no one who has three keys.

There was one sentence found where a pre-verbal and a post-verbal neg-word both were used with *non*. There was no sentence with only a pre-verbal and a post-verbal neg-word used. There was also no sentence found for containing more than one neg-word used with *non*. Figure 9.8 presents the average use of NC for children and CDS sentences.

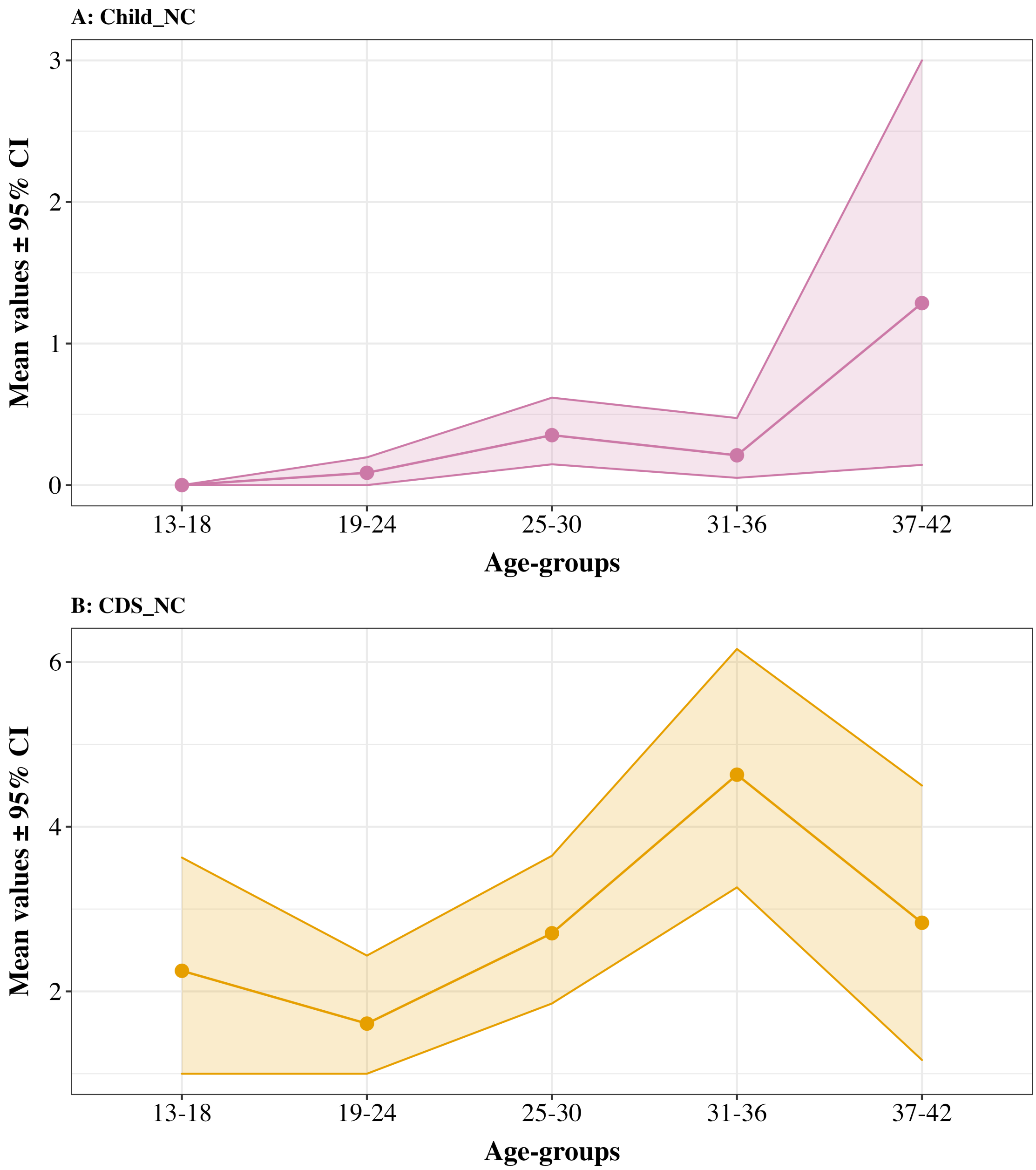

Figure 9.8: Mean values of use of NC for children's and CDS sentences.

Figure 9.8 shows that the mean values for the use of NC for children's first age-group is 0 and the next two age-groups reveal a gradual increase. Age-group 37-42 has the highest mean values for NC for children's sentences which is 1.28. Figure 9.8(B) shows that the mean value for the NC in CDS sentences is never below 1. Age-group 31-36 exhibits the highest mean value for the NC for CDS. The NC was available in CDS sentences from the age of month16th, and the first instance of NC in children's sentence is found at the age of 23 months.

In the next section, the statistical analyses for acquisition of *non* and NC will be presented.

9.6 Statistical Analyses

In this section, the statistical analyses for the acquisition of negation using only *non* as a negative element per clause and NC will be presented.

9.6.1 Methodology

It is argued in chapter 3 and 6 that Italian is a Non-strict NC language. Children acquiring Italian have readily access to the NC input which is considered as essential to acquire the Neg° negative marker *non*. For children acquiring Italian, the CDS input for *non* comes into two forms; i) CDS input containing the use of *non* as the only negative element, ii) CDS input for NC where *non* is used with neg-words.[234]

Prediction: It is predicted in chapter 6 that given the required input, children will acquire the negative marker non with no difficulty and earlier in age.

Predictor variables: Non in CDS, NC in CDS, and age as a continuous predictor.[235]

Response variable: Children's use of non.

In order to estimate the effect of *non* in CDS, NC in CDS, and age on children's use of *non*, a GLMM model with a negative binomial error structure and log link function was used. Since 84% of the children had repeated observations and in order to control the chance of type 1 error rate random intercepts and slopes for the fixed effect predictors taking children (i.e., name) as a grouping factor, were added in the model. The model was fit in R (version 3.6.3; R Core Team

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[234] Non_CDS indicates *non* in CDS sentences, NC_CDS indicate the *NC* in the CDS input.

[235] The term *predictor(s)* is used for the independent variables and *response(s)* is used for dependent variable.

2020)[236], using the function glmer.nb of the package lme4 (version 1.1-28.1; Bates et al., 2015). The sample analysed for the model_non comprised a total of 730 observations of 19 children. For more detailed and step-wise methodology for selecting and measure the model stability, see chapter 7, section 7.7.

The results for the statistical model used for *non* are shown below in section 9.6.2.

9.6.2 Statistical results for *Non*

Table 9.4 presents results (estimates together with SE, confidence intervals, significant tests, p values, dispersion parameter, and VIF) for the model fit for children's use of *non* as a response and *non* in CDS, NC in CDS, and age as predictors.

Model_non: Non_child modelled as a function of Age, Non_cds, and NC_CDS							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**x^2**	**df**	**p**
Intercept	-4.931	1.013	-6.918	-2.944			
Age	0.217	0.044	0.129	0.306	17.14	1	< 0.0001
Non_CDS	0.009	0.002	0.005	0.014	7.67	1	< 0.001
NC_CDS	-0.014	0.072	-0.155	0.127	0.84	1	> 0.05
Full-null					25.20	4	< 0.0001
Disp.P	1.03						
VIF	Maximum VIF: 1						

Table 9.4: Results of the GLMM model modelling *non* by children, age, NC_CDS, Non_CDS.[237]

The model_non estimated the effect of age, *non*_CDS and NC_CDS on *non* by children. The full null model comparison was clearly significant (likelihood ratio test: x^2 (4) = 25.20, $p < 0.0001$). Age and non_CDS showed a significant positive effect on children's use of *non.* NC_CDS did not turn out to be statistically significant (likelihood ratio test: x^2 (4) = 0.84, $p > 0.05$). The model results provide support for the CDS input containing only *non* that it will have a positive effect on children's acquisition of *non*. The model results do not support the positive effect of NC in CDS

[236] See the Appendix-F (SessionInfo) for all the details about the packages and their versions.

[237] All the estimates for the model presented in the table 9.4 are in log link space. i.e., the estimate for age can be derived using the inverse of log of the estimate shown, for example;
age = exp(0.217) = 1.245, Non_CDS = exp(0.009) = 1.009.

input but do support the positive effect of age on children's use of *non*. Overall the mixed effects model described 94% variance in the response from which 50% can be attributed to the fixed effects predictors.

Post hoc multiple group comparisons

Since age was significant in the statistical model shown in table 9.4, in order to see if the estimated average use of *non* varies between children of different age-groups, a new model with the age-group as a predictor was fit while all the other things were the same as Model_non. Random effects were included only for non_CDS and NC_CDS.

The model results showed that non_CDS with (likelihood ratio test: x^2 (1) = 4.74, p = 0.002), NC_CDS with (likelihood ratio test: x^2 (1) = 3.54, p = 0.002), and age-group with (likelihood ratio test: x^2 (4) = 115.72, p < 0.0001) were showing statistical significant effect on children's use of *non*. All the age-groups were significantly different from the reference age-group, 13-18. To see all the post hoc multiple age-group comparisons between all the possible pairs, post hoc multiple age-group comparisons were performed using the function glht() from the package multcomp. See chapter 7 for a detailed and step wise methodology. Table 9.5 shows the results of the post hoc multiple age-group comparisons.

Post hoc multiple comparisons for the estimated average use of *Non* between age-groups					
Age-group	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**P value**
19-24 - 13-18	18.27	0.004	18.26	18.28	< 0.001
25-30 - 19-24	1.795	0.217	1.224	2.366	< 0.001
31-36 - 25-30	0.565	0.231	-0.039	1.170	> 0.05
37-42 - 31-36	0.631	0.352	-0.292	1.554	> 0.05

Table 9.5: Post hoc multiple comparisons between age-groups.[238]

The age-group 19-24 was statistically significantly different in observing the estimated average use of *non* from all the other age-groups. The post hoc multiple comparisons revealed that the estimated average use of *non* does not vary between the children older than 24 months of age. In

[238] The table presents the post hoc multiple comparisons in a linear order. To see all the multiple comparisons see the appendix_L.

addition, the results also suggest that provided the input, children will acquire *non* quite early and once they acquire it, they will exhibit similar behaviour in its use.

Summarising, the results for the statistical model and the post hoc multiple age-group comparisons support the prediction that given the required input, children will acquire the negative marker *non* earlier and easily.

9.6.3 Statistical results for NC

In this section, the statistical results for NC with be presented.

It is predicted in chapter 6 that the NC or doubling effects with respect to negation in the CDS input will lead to the presence of NC in children's negation. In order to test the prediction, a GLMM binomial model with the logit link function was used, taking children's use of NC as the response, and NC_CDS and age as predictor variables. Random effects for both of the fixed effect predictors taking children (i.e., name) as the grouping factor were included in the model similarly, as shown in previous subsection. Table 9.6 shows that results of the GLMM model fit for NC.

Model_NC: NC_child modelled as a function of Age and NC_CDS.							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	x^2	**df**	**p**
Intercept	-14.138	0.001	-14.14	-14.13			
Age	0.163	0.0013	0.160	0.165	11.91	1	< 0.0001
NC_CDS	7.317	0.001	7.314	7.319	9.54	1	< 0.0001
Full-null					11.73	2	0.002
Disp.P	0.52						
VIF	Maximum VIF: 1						

Table 9.6: Results of GLMM model modelling NC.[239]

Table 9.6 shows the results for statistical model modelling the NC by children as a function of age and NC in CDS. The full null model comparison was clearly significant (likelihood ratio test: x^2 (2) = 11.73, p = 0.002). Age and NC in CDS both show a positive effect on children's use of NC. The model results show that age and NC_CDS have statistically significant positive effect on

[239] The model results are shown in the logit link space. The coefficient can be achieved by exp(coef)/1+exp(coef). For example, for age exp(0.163) / (1+exp(0.163) = 0.540

children's NC thus clearly supporting the central prediction for the acquisition of NC suggesting that the NC input in CDS will positively effect the presence of NC in children's language and will lead to the increasing probability of observing NC in children's language too.

Summarising, the model results estimating the effect of NC in CDS and age on children's use of NC support the major prediction associated with the acquisition of NC in child language that the relevant input will positively effect children's use of NC. Furthermore, the presence of doubling effects of negation/formal features of negation in the CDS input will lead to presence of the same in children's grammar also.

In the next subsection, based on the empirical and inferential evidence presented in this chapter, a detailed discussion will be provided.

9.7 Discussion

It was predicted in chapter 6 that children acquiring Italian will acquire *non* as a negative marker since the input containing *non* will be readily available to them. It was also discussed there that the input for *non* comes in two forms, i) CDS provided input of negative sentences containing *non* as the only negative element, and ii) CDS provided input containing morpho semantically marked more than one negative element, i.e., NC.

It is shown in table 9.4 that the CDS input containing *non* showed a stronger positive effect on children's acquisition of *non*, suggesting that CDS input for *non* plays a positive role in the acquisition of *non* by young children acquiring Italian. The positive effect of caregivers' input has already been reported in several studies (see chapters 5 and 8).

It was discussed in chapters 3 and 6 that Zeijlstra (2014, et seq.) argues that i*f there are doubling effects with respect to the negative semantic operator, OPneg, in the input, the language exhibits formal negation and is an NC language.* Zeijlstra argues that NC is a syntactic agreement between the elements carrying [i/uF] formal features. Zeijlstra assigns [iNEG] to *non* and [uNEG] to neg-words for Italian arguing that neg-words do not carry the semantics of negation themselves.

Putting it more clearly, the null hypothesis in Zeijlstra's proposed algorithm states that all elements are semantically negative and that there are no formal negative features. Only the presence of the doubling effects with respect to the negative operator in the CDS input will lead to the presence of the doubling effects of negation in children's language.

Since Italian is an NC language so theoretically, Italian CDS must exhibit the doubling effects for negation. This theoretical prediction was empirically confirmed in the data analysed here that doubling effects of negation were present in the CDS sentences right from the 16th month of child age: the starting point of Italian acquiring children’s age in months, as shown in the data above in the chapter. In the data presented in this chapter, there was no child whose respective CDS speaker did not produce NC at all. The model results for the model_NC show that the input containing the doubling effects/NC trigger the presence of the doubling effects/NC in the child’s negation. It is argued that the missing 1:1 relation between the negative form and meaning in the CDS input leads children to assume the same in their language.

The inferential evidence presented above shows that both types of input show a positive effect on children’s both types of linguistic output, i.e., i) CDS input containing *non* as a single negative marker leads to the acquisition of *non* as a single negative marker, ii) the input containing the doubling effects/NC leads to the probability of observing the same in children’s language.

9.7.1 Formal feature [i/uNEG]

Children receive abundant input containing *non* as the only negative marker which initially leads them to assume that *non* is semantically a negative element in their language. In addition, children also receive input containing neg-words as the only element morpho syntactically marked for negation which could lead them to assume that neg-words are also semantically negative in their language. At the same time, they also receive input where *non* is used with neg-words, and neg-words largely follow *non,* and only this input could potentially violate children's assumption that neg-words are semantically negative themselves.

As it has been shown in (18) in section 9.4, there were only 7 sentences found for neg-words in post-verbal positions which could inform that neg-words are used as seemingly the only and semantically negative words, or could be used to argue that neg-words are assigned [iNEG] by children. This makes almost 7% of the total negative sentences of children. Furthermore, only 3 children produced these 7 sentences (also includes the repetition of the same sentence). Given the 93% accuracy rate, these 7 sentences cannot be taken as evidence sufficient enough to argue for that children could assign [iNEG] to neg-words.

When it comes to assigning formal features to these morpho syntactically markers elements for negation, for instance neg-words, there are two types of evidence of absence that could suggest that children did not assign semantic or formal negative features [iNEG] to them. i) There was no sentence found where a pre-verbal neg-word was used as being seemingly the only negative element. The sentences that were found for children's and CDS were largely the instances of fragment answers or neg-words used in interrogatives.[240] [241] ii) There was also no sentence found in children's sentences where a pre-verbal neg-word would precede *non*. Empirically, both types of the evidence of absence support the prediction that children will not assign [iNEG] to neg-words. Only the presence of both types of evidence could have given some hints about the stages children pass through in the acquisition of negative features of neg-words.

Furthermore, there is one type of evidence of presence that suggests that children do not assign semantically negative or [iNEG] to neg-words and that is the use of NC in their negation, given the abundance of the CDS input containing neg-words following *non*.

Based on the results of both statistical models, the empirical evidence, and following the theoretical framework followed for the analyses presented here, the following interpretations are assigned to children's *non* and neg-words.

22). a. *No* che *non* mi mangia. (Tonelli_Target_Child_Elisa: 23)
No, neg me eat+3SG.
No, he/she/it does not eat me.
b. ¬eat'(he/she/it, me)

23). a. *Non* capisse *nulla*. (Calambrone_Target_Child_Rosa: 31)
Neg understand/he neg-thing.
He didn't understand anything.
b. [$_{\text{NegP}}$ *non*$_{\text{[iNEG]}}$ capisse [$_{\text{vP}}$ *nulla*$_{[\cancel{\text{uNEG}}]}$]]
c. ¬understand'(he, thing)

The following interpretation is assigned to sentences containing neg-words in fragment answers. For details about fragmentary answers, see section 3.7.5 in chapter 3.

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[240] Of course, it still does not exclude the possibility that the CDS speakers never produced neg-words in pre-verbal position showing them as being the only negative word. Also it does not exclude the possibility that children have never heard neg-words in pre-verbal positions.

[241] Although it is widely reported in the literature that in Italian, pre-verbal neg-words can be used as the only (seemingly) negative element per clause, 4 Italian native speakers who helped in proof-reading of the Italian negative sentences said that neg-words in pre-verbal positions (as the only negative element) are hardly produced, and they also argued that the use of neg-words in pre-verbal position relates to the geographical and dialectal reasons. These opinions do not hold any theoretical ground in the analyses reported in this chapter.

24). a. *Niente*. (Calambrone_Target_Child_Martina: 19)

Neg-thing.

Nothing.

b. [*Op*¬[iNEG] *niente*[~~uNEG~~]]

It was discussed in chapter 3 that Zeijlstra (2014, et seq.) correlates a Neg° negative marker to NC. Italian employs the Neg° marker *non* to express sentential negation. The empirical and inferential evidence supports this correlation. Italian children possess NC grammar which is fully aligned with adult grammar. Unlike the double negation languages, the use of neg-words at post-verbal positions was not found.[242]

Summarising, based on the model results and all the empirical evidence presented above, I argue that formal features/ doubling effects/NC in the CDS input trigger the presence of formal features/ doubling effects/NC in children's language. Furthermore, it is also argued that formal features are projected in children's negation as soon as they acquire NC. It has also been reported in section 9.5 that NC was first observed in children's sentences at the age of 23 months. The post hoc multiple comparisons between the age-groups also showed that children from the age of 25 months were behaving similar with respect to the estimated average use of *non*. The onset of *non,* the onset of NC, and the post hoc multiple age-group comparisons are all in line, and suggest that formal features of negation are correctly and timely projected in children's grammar. Tagliani (2019) and Moscati (2006, 2020) also argue children aged 3-5 years are already able to comprehend NC, furthermore, children also prefer NC readings for fragmentary answers.

Based on all the empirical and inferential evidence presented in sections 9.7 and 9.7.1, the alternative hypothesis could not be rejected that formal features are present and all the morphologically marked negative expressions are formally negative in Italian.

9.7.2 Non-adult-like *non*

Children acquiring Italian also produced some expressions where the sentential negative marker *non* was not used in an adult-like manner. Italian children's non-adult-like use of *non* is shown above in section 9.3. Similarly, Italian children's non-adult-like expressions including *non* also contain mismatched forms of verbs with rest to the subject of the sentence, and omissions of

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[242] As it is just discussed above that only 7 sentences were found with neg-words at post-verbal position. Given the accuracy rate of the use of neg-words, these 7 instances are taken to be almost 0.

certain parts of the sentence, for instance an auxiliary or a determiner, etc. Italian acquiring children's few sentences also reflect the incorrect position for *non*. Also see chapters 8 and 10 for Dutch and SE, respectively, for similar patterns for both languages.

From the total of 52 non-adult-like sentences of *non*, 43 were produced by only 4 children. A total of 10 children out of 19 produced *non* in a non-adult-like manner. There was no non-adult-like sentence for 9 out of 19 children. Table 9.3 explicitly shows the ratio of accuracy across the age-groups. It is evident from the table that the ratios of non-adult-like *non* are not sufficient enough to trigger concern for the development of *non* of a typically developing Italian child.

Similar to SE and Dutch, there were also some similarities found between Italian CDS and children's negative sentences.

As was just argued above that some of the patterns that were not found in CDS sentences were also not found in children's negative sentences. And some of the patterns that were found in children's negative sentences were also seen in CDS negative sentences, with a similar ratio. Newport, et al. (1977) among many others have argued that a variety of linguistic properties found in CDS is also reflected in children's language to an extent.

9.8 Conclusion

This chapter presents a detailed view of the acquisition of negation and NC for children acquiring Italian as their L1. The chapter presents the total number of negative sentences by children and CDS. Children's sentences are presented as adult-like and grammatical, or as non-adult-like/ungrammatical. It is also shown that children use *non*, the sentential negative marker in quite an adult-like manner. The GLMM model results for *non* show a positive effect of age and *non* by CDS on children's acquisition of *non*. In addition, supporting the central prediction with respect to the acquisition of NC, the model results show that formal features/doubling effects/NC in CDS input leads to the projection of /formal features/doubling effects/NC in children's acquisition of negation. The missing 1:1 relation between the negative form and negative meaning in CDS negative sentences also leads children to assume the same in their grammar. It is also shown that post-hoc multiple comparisons between children of different age-groups do not show a significant difference in the estimated average use of *non* after the age of 2 years. Furthermore, the presence of Neg° and NC were spotted together in Italian to support the correlation between the both.

Chapter 10

Results
Dutch

This chapter will present empirical, statistical, and inferential results for the acquisition of negation in children acquiring Dutch as their first language or L1.

The first half of the chapter will present the descriptive statistics focusing on presenting, exploring, and highlighting the key characteristics of the data presented and analysed in this chapter, using able summaries e.g., counts, percentages, proportions, confidence intervals, etc. The second part of the chapter will present the inferential statistics presenting statistical modelling that provides the bases for drawing conclusions and inferences.
See chapter 7 for a detailed methodology, the significance of descriptive and inferential statistics, and post hoc multiple group comparisons, and references provided therein.

The chapter will open up by presenting the total number of negative sentences of children acquiring Dutch and of their respective caregivers. After removing all the unclear sentences,[243] sentences with missing details,[244] sentences of non-typically developing children,[245] and sentences of older children[246], a total of 11515 negative sentences of 58 children and 20643 negative sentences of their respective child directed speech[247] were taken in for analyses. The age of children ranges from 19 to 79 months. For being consistent with SE and Italian, and for an easy visual presentation of the negative sentences, the age is divided into age-groups consisting of 6 months each,[248] and also to conduct post hoc multiple age-group comparisons later.

Since one of the aims of this dissertation is to investigate the acquisition path adopted by children to acquire sentential negation, children's and their respective CDS sentences are separated as per negative element i.e., *niet*, negative quantifiers, and negative polar particle *nee*. Furthermore, children's negative sentences for *niet*, and negative quantifiers are again separated into grammatically correct/adult-like and grammatically incorrect/non-adult-like negative sentences in order to get a detailed view of the acquisition pathway.

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[243] There were 63 sentences which contained any of the negative element but the sentences also contained some unclear words which were not informative so the sentences were discarded.

[244] Sentences with missing details like the name of the child, age, and developing group.

[245] Sentences of children who suffered from some mental or speech aphasia, or ADHD, etc.

[246] Sentences of children older than 7 years.

[247] The negative sentences for CDS were also cleaned the same way as children's.

[248] See Appendix_I(A) for details about children per age month and appendix_1(B) for number of children per age-group.

10.1 Negative elements

It was discussed in chapters 3, 4, and 5 that in Dutch, sentential negation is expressed using the negative marker *niet*, and also the negative quantifiers (NQs). Hence a sentence was considered negative if it contained any of the negative elements shown in (1a-b) below.

1). a. *Niet*.
Not.
b. *Geen, niemand, niks, niets, nooit, negens*.
No, nobody/no one, nothing, nothing, never, nowhere.
c. *Nee*.
No

Unlike standard English and Italian, in Dutch, the negative polar particle *nee* meaning *no* in English is only used in its polar uses. It is not used in quantificational negative meaning in any way. Figure 10.1 presents the total number of negative sentences for children and CDS across age-groups. The Y-axis, as well as the length of bars, represent the total counts and the x-axis represents the age-groups.

Figure 10.1(A) presents 11515 negative sentences for children and figure 10.1(B) presents a total of 20643 negative sentences for CDS, across age-groups. Figure 10.1(A) shows that the first age-group contains a total of 517 negative sentences for children. The second age-group contains almost 3000 sentences and the age-group 31-36 contains the highest number of sentences, i.e., around 4000. Figure 10.1(B) also shows that negative sentences are much higher than those of children across the age-groups. The age-group 25-30 contains the highest number of sentences. Overall, the age-groups which show a higher number of sentences in 10.1(A) also exhibit a higher number of sentences in 10.1(B).

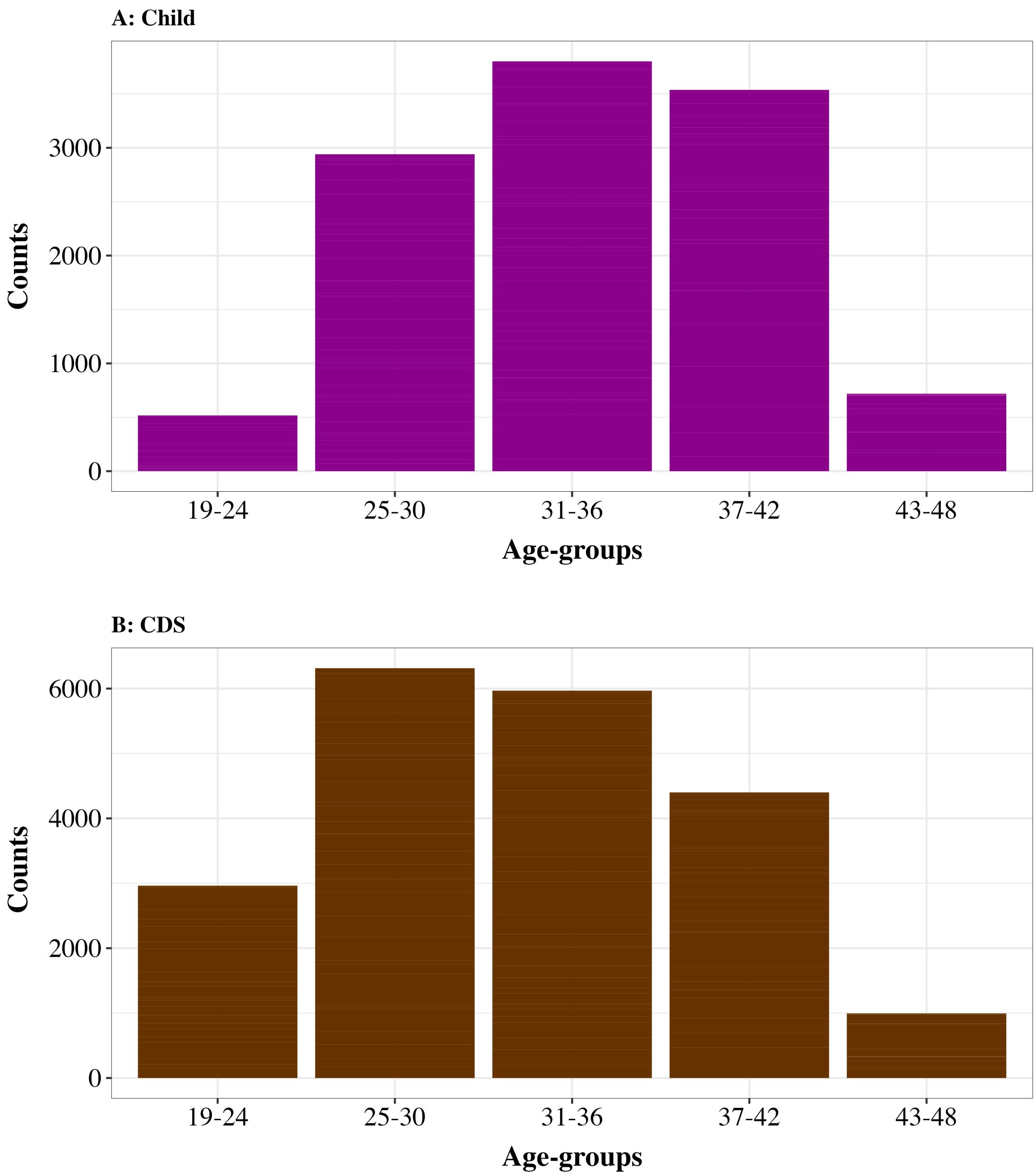

Figure 10.1: Total number of negative sentences for children and CDS across age-groups.[249]

In order to achieve a detailed view of children's use of various negative elements, their negative sentences are separated as per the negative elements, i.e., *nee, niet,* and NQs. Figure 10.2 presents the number of negative sentences for *nee, niet*, and NQs for children, and figure 10.3 presents that of CDS.

[249] It was mentioned above that children's age begin from the month 19th.

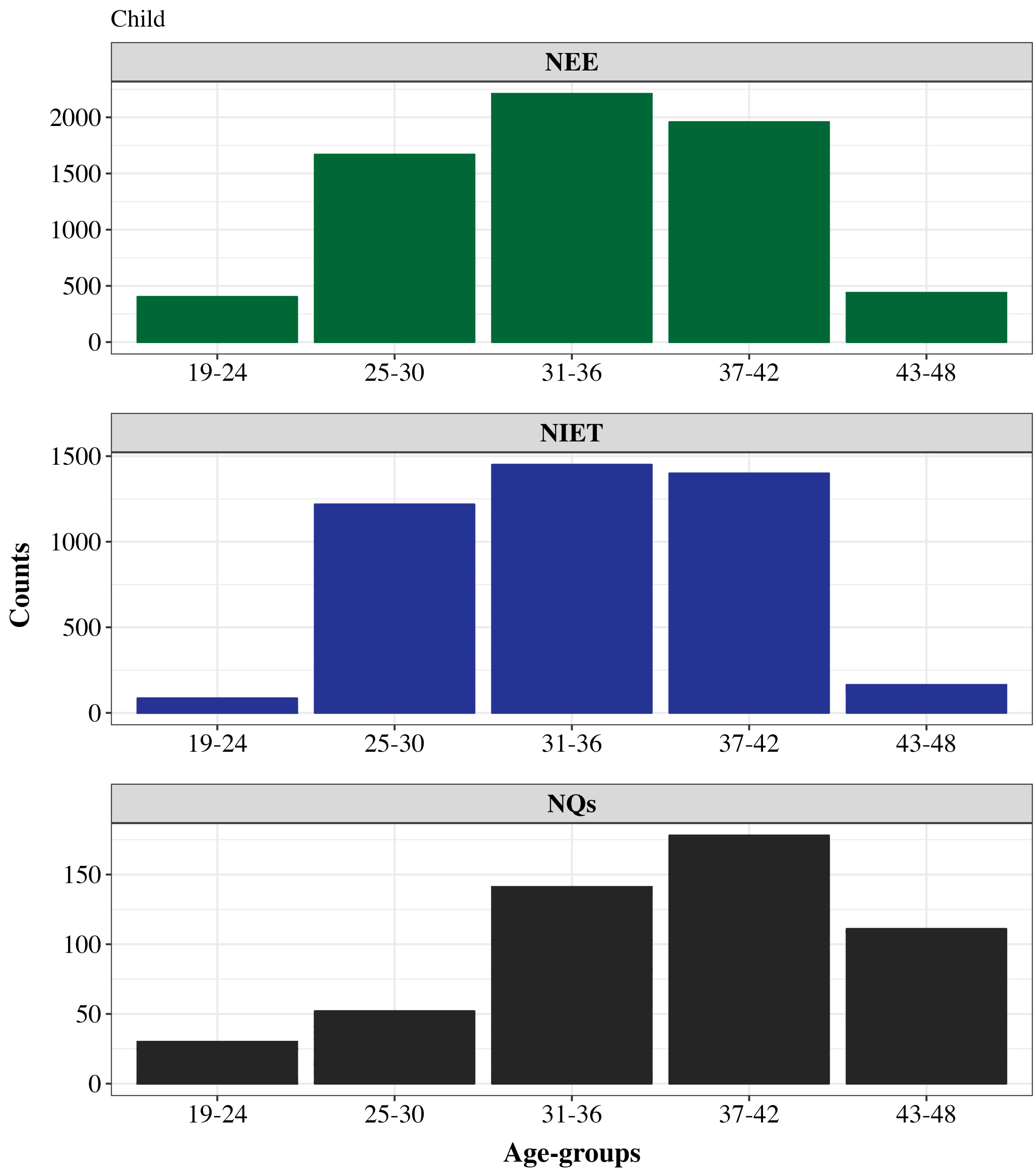

Figure 10.2: Total number of negative sentences for *nee, niet,* and NQs, across age-groups.

Figure 10.2 shows 6672 negative sentences for *nee,* 4315 for *niet,* and 512 sentences for NQs, divided into several age-groups. It is evident from the figure that the negative polar particle makes a big part of the sentences across all the age-groups. The age-group 31-36 contains most of the negative sentences for the sentential negative marker *niet.* The first and the last age-groups contain the least minimum number of sentences for *niet*. It is also evident from the figure that there are not many negative sentences for NQs for the first two age-groups. The next three age-groups contain nearly or more than 150 sentences each. It is also evident that the first and last age-groups contain minimum and the middle 3 age-groups contain most of the sentences for *nee* and *niet*. There is a variation observed for NQs. Figure 10.3 presents the total number of *nee, niet,* and NQs for CDS.

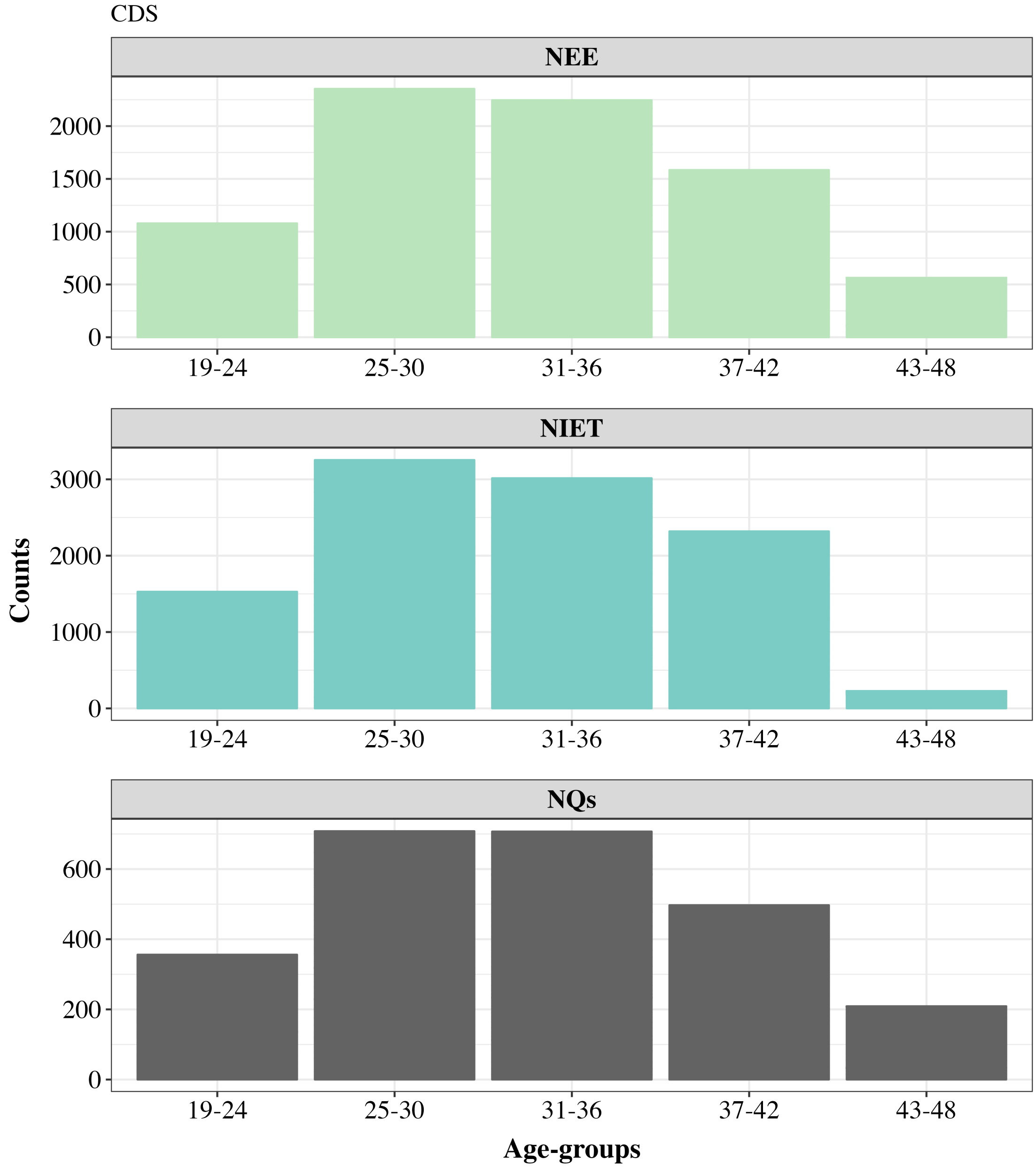

Figure 10.3: Total number of sentences for *nee, niet*, and NQs in CDS across age-groups.

Figure 10.3 shows 7824 negative sentences for *nee,* 10342 for *niet,* and 2477 for NQs, divided into several age-groups. Figure 10.3 shows that the sentential negative marker *niet* has the maximum number of sentences in CDS, across age-groups, as compared to *nee* or NQs. NQs are in the lowest number as compared to *nee* and *niet*. The age-group 25-30 has the maximum number of sentences for all the three negative elements. It is also evident that the middle three age-groups contain most of the sentences in CDS and also children's sentences.

10.2 The negative polar particle *nee*

In this subsection, a detailed view of the negative polar particle *nee* will be presented.

In the previous two chapters, it has been shown that in SE and Italian, the negative element *no* is used as an anaphoric or polar element and also in the negative meaning. Since *no* as an anaphoric element/polar particle and also the negative quantificational element *no* are the same/similar, it has been argued that children acquire the anaphoric *no* prior to the negative *no*. Furthermore, children have been argued to place *no* at several positions before they acquire the adult-like and grammatical position of *no* (see chapters 5 and 8). Situation can be different for the Dutch negative polar particle *nee*. Dutch negative polar particle *nee* is used as a polar particle only. It does not carry any negative quantificational meaning. This subsection will provide a detailed view of the use of *nee* by young children, while highlighting its use in child sentences.
Similar to SE and Italian *no*, the negative polar particle is used as a single word, and also repeatedly, followed by a positive sentence, or a negative sentence. An example for each is shown below in (2).

2). a. *Nee*. (Groningen_Target_Child_Tomas: 19)[250]
No

b. *Nee*, *nee*. (Groningen_Target_Child_Matthijs: 22)
No, no.

c. *Nee*, da. (TD_Target_Child_Tijn: 19)
No, there.

d. *Nee*, *niet* kommen. (Groningen_Target_Child_Abel: 25)
No, neg come+INF
No, don't come.

All the examples shown in 2 are grammatical and taken as adult-like since similar structures were also found in CDS for the use of *nee*. Dutch acquiring children's use of *nee* was found in quite an

[250] The longer name indicates the name of the corpus and the child. The numbers indicate the age of the child in months. For example, *Groningen* (name of the corpus) *_Target_Child* (role of the child) *_Tomas* (name of the child)

adult-like manner and there was no ungrammatical or non-adult-like sentence for *nee* found. There were only 6 sentences found containing the polar particle *nee* where its usage was not clear. These sentences were not included in the analyses. Figure 10.4 presents the average use of *nee* in children's and CDS sentences. The average is indicated as the arithmetic mean. The shaded area around the mean points indicates the 95% confidence interval.

Among the use of descriptive statistics, the use of arithmetic mean is to represent the most typical value observed in the data. See chapter 7, section 7.6 for details and significance of the descriptive statistics, mean, and confidence intervals and the methods to compute them, etc.

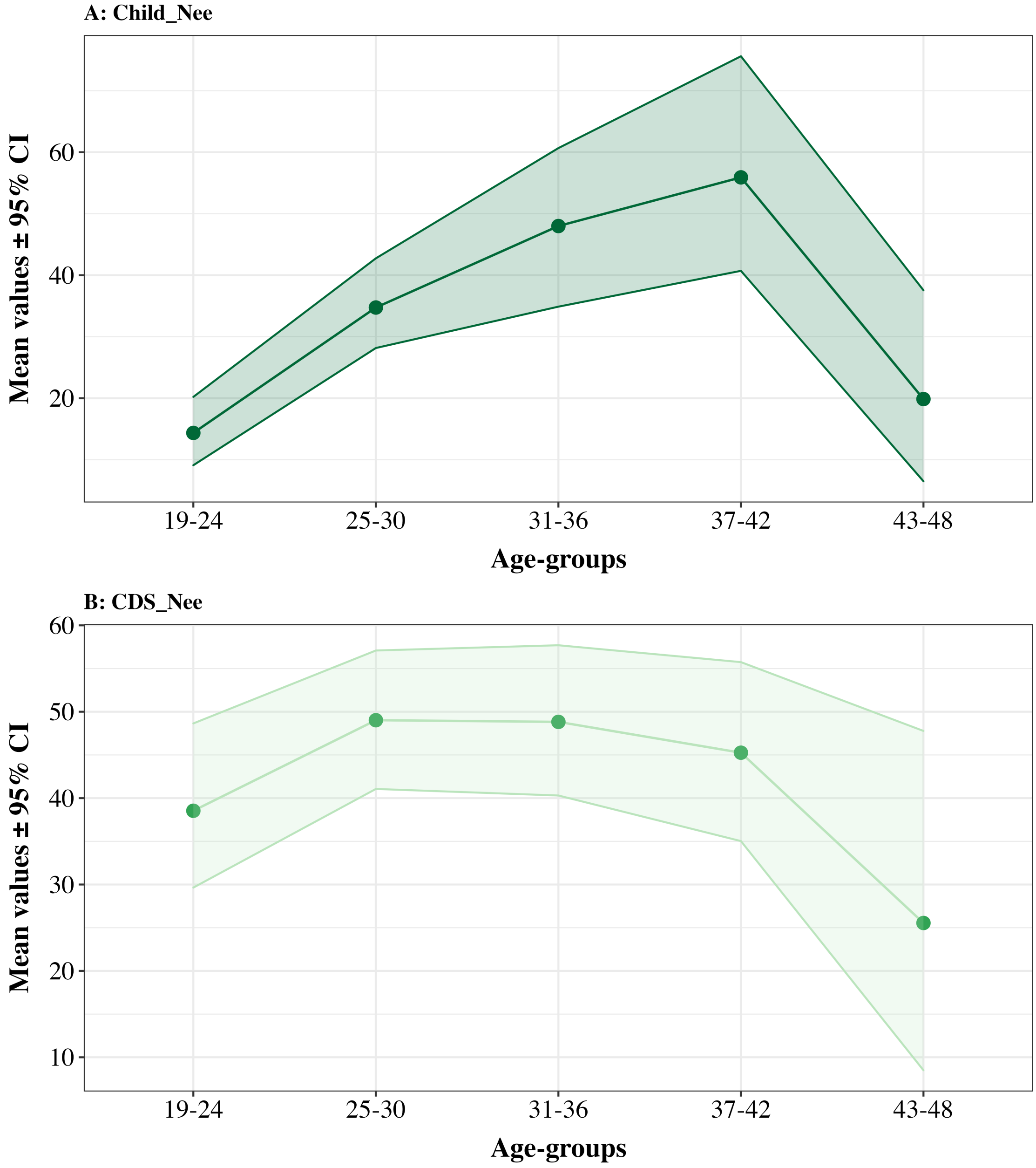

Figure 10.4: Mean values for the use of *nee* in children's and CDS sentences across age-groups.

Figure 10.4(A) shows the mean values for the use of *nee* in children's sentences. The figure shows that the mean values for the use of *nee* are quite higher for the first four age-groups, with an increasing trend from the 1st to 4th age-group. Figure 10.4(B) shows the mean values for the use of *nee* in CDS sentences, exhibiting a decrease from the second to the last age-group except for the first to second one. Overall, the mean values for the use of *nee* in CDS sentences remain visibly higher than those of children, across the age-groups, except for the 4th one.

Upon observing children's use of the polar particle, 4785 sentences were containing the use of *nee* as the only word in the sentence or being only word but used repetitively, as shown above in (2a-b). 1887 sentences were found where *nee* was accompanied by a positive or a negative sentence, as shown in (2c-d). The child *Groningen_Target_Child_Matthijs* alone has 1798 sentences for *nee* from which 1295 are uses of single *nee*, or repetitively like *nee nee,* and 503 accompanied by a sentence, from the age of 22 months to 43 months. Two other children *Groningen_Target_Child_Daan* and *Groningen_Target_Child_Iris* also used *nee* more than some other children (1191 and 723, respectively).[251]

Jordens (2002) and Van der Wal (1996) argue that children's early use of *nee* also reflects its use as a sentential negator. Jordens (2002) argues that Dutch acquiring children's initial uses of *nee* are *holistic* as *nee* has scope over the predicate; the predicate could be a noun, an adjective rather than a verb. Due to this scope, children's initial *nee* operates as a clausal negative operator, no matter if it occurs at the sentence initial or sentence final position (see also chapter 5). Hence, Jorden's concludes that *nee* in children's sentences like the ones shown in (3) is a negative element and not only an anaphoric one. It is important to note that in target Dutch *nee* is used only an anaphoric element.

3). a. *Nee* tafel. (Jasmine: 1:7)[252]

No table.

(There is) no table.[253]

b. Mama schoene. Papa *nee*. (Jasmine(1:7)

Mama shoes. Daddy no.

---

[251] For all these three children 1916, 2068, and 918 sentences containing the *nee* as a polar particle were found in the respective CDS sentences, respectively.

[252] The example sentences are taken from Jordens (2002, 710). The number 1:7 indicate the age of the child in years and months, i.e., 1 year and 7 months as mentioned by Jordens.

[253] Jordens argues that *Nee tafel* means that *there is no table/This is not a table*.

Mama('s) shoes. Daddy('s) not.

c. *Nee* Cynthia afpakke. (Jasmine: 1:8)

No Cynthia snatch away.

Cynthia (does) not snatch away.[254]

Jordens relates such uses of *nee* to the versatile uses of *no* in child English (Bellugi 1967; Clark and Clark 1977, a.o.) and to *nein* in child German (Wode 1977; Felix 1978). See also chapter 5.

It is important to note that a total of 6672 sentences for *nee* for children are analysed in this dissertation. From the 1887 sentences where *nee* is accompanied by any predicate, in 1387 sentences, *nee* was followed by a comma (,) or a period (.), clearly indicating that *nee* stands out of the meaning of the sentence, and is used only as an anaphoric/polar particle, some examples are shown in (4).

4). a. Nee, he? (TD_Target_Child_Thom: 23)

No, right?

b. Mama. Nee. (TD_Target_Child_Rogier: 23)

Mama. No.

506 sentences were found where *nee* was not followed by a comma or a period to indicate its separation from the sentence but the following sentence was itself a complete sentence and it could clearly indicate that *nee* is not used as a negative element but only as a polar particle. Examples are shown in (5).

5). a. *Nee* ik kan *niet* goed. (Groningen_target_child_Daan: 28)

No I can neg good.

No, I am not good.

b. *Nee niet* zo.

No neg like.

No not like this.

[254] Since Jordens (2002) presents data of 3 months of his own two children (32 sentences for *nee* for Jasmine from 1:7-1:9) and (35 sentences for *nee* for Andrea from 1:8-1:11) so he must have known the context of the sentence that helps him to argue that *nee* is used as a negative element here and it means *Cynthia does not snatch away*. Otherwise, the glosses provided by Jordens could also mean that *nee* is used as an anaphoric element i.e., *no, Cynthia snatches away.*

Of these 506, there were only 196 sentences where *nee* was followed by an incomplete sentence, as shown in (6).[255]

6). a. *Nee* die. (Groningen_Target_Child_Daan: 25)
No that.
b. *Nee* deze.
No this one. (Groningen_Target_Child_Daan:29)

The sentences shown in (6) can very clearly show the use of *nee* as a polar particle. Only more information about the context can inform about the other roles of *nee* here.

Van der Wal (1996) presents only two sentences for one child named as Matthijs. The same child is represented in the data analysed in this dissertation as Groningen_Target_Child_Matthijs. Van der Wal argues that the child used *nee* as the sentential negator. One sentence from Van der Wal (1996) was found in our data for *nee*, as shown in (7). The other sentence was not found the way reported in Van der Wal (1996).

7). Ik hoef pit in, *nee*. (Groningen_Target_Child_Matthijs: 34)
I need out in, no.
I need to put it, no.

The sentence shown in (7) clearly contains a comma that separates *nee* from the affirmative part of the sentence. Hence the sentence is just taken as containing the polar particle *nee* in its anaphoric or polar use.[256] No conclusive evidence was found to argue that children used the polar particle *nee* as a clausal negator.

Table 10.1 presents a summary of the sentences containing *nee* in child and CDS sentences.

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[255] A total of 81 sentences were from the same child Groningen_Target_Child_Daan. The child used *nee* a lot. He alone produced 1191 sentences containing *nee* (in 436 sentences *nee* was followed by some predicate and in 755 of them *nee* was used only as a single word or repetitively). The child seemed quite talkative and produced plenty of short sentences like *nee deze, nee die. nee dear*. etc.

[256] Only more context could have helped. Van der Wal (1996) also does not provide any context for the use of *nee* as a sentential negator in this sentence.

	Nee	
Age-group	**Child**	**CDS**
19-24	402	1079
25-30	1668	2353
31-36	2208	2246
37-42	1957	1584
43-48	437	562
Total	6672	7824

Table 10.1: Summary of the use of *nee* in children's and CDS sentences across age-group.

Table 10.1 shows that except for the age-group 37-42, all age-groups contain a higher number of sentences for *nee* in the CDS as compared to children's. It is important to report that for three of children of age month 19th, no sentence with *nee* was found until the age month 23rd while their respective CDS sentences containing *nee* were found from the month 19th.

10.3 The negative marker *niet*

Dutch employs the sentential negative marker *niet* to express sentential negation. In this subsection, a detailed view of the acquisition of *niet* in children's sentences will be presented. This subsection will also present *niet* in CDS sentences.

A total of 4315 sentences for the use of *niet* for children and 10342 sentences for CDS were taken in for analyses. Since one of the aim of this dissertation is to present a detailed view of children's acquisition path for *niet* so their sentences are divided into two main categories i.e., adult-like/grammatical and non-adult-like/ungrammatical. The adult-like category includes sentences which are grammatically correct in written as well as spoken Dutch plus those short expression like *nog niet, ook niet* which are very much prevalent in spoken adult Dutch[257] (also see Van Kampen and Evers, 2006). Children's second category of sentences for *niet* are non-adult-like/ ungrammatical sentences which clearly lack some important information in the sentence, include grammatical errors, mismatched forms of subject and verbs, incorrect position of *niet,* etc.

[257] The researcher asked 9 adult Dutch native speakers about the short expressions and they all confirmed that expressions like *ook niet, nog niet* are very much prevalent in the spoken Dutch and make a part of the input children receive. Since such expressions were found very frequently in the CDS sentences so it was decided to make them the same expressions of children a part of the adult-like and grammatical sentences. These Dutch adult native speakers do not make a part of any further analyses presented in this chapter in later sections.

Some examples for children's grammatical and adult-like uses of *niet* are shown in (8-10) below.

8). a. Weet ik *niet* meer. (Groningen_Target_Child_Tomas: 22

Know I neg more.

I don't know anymore.

b. Peter mag *niet* voelen. (Groningen_Target_Child_Peter: 24)

Peter allowed neg to feel.

Peter is not allowed to feel.

c. Nou nog *niet*. (Groningen_Target_Child_Matthijs: 32)

Well yet neg.

Well, not yet.

d. Jij ook *niet*. (Groningen_Target_Child_Abel: 26)

You either neg.

You neither.

Children's use of *niet* also contains imperatives, shown in (9).

9). a. *Niet* bouwen! (Groningen_Target_Child_Tomas: 26)

Neg build+INF

Don't build!

b. *Niet* doen! (Groningen_Target_Child_Josse: 26

Neg do+INF

Don't do!

Children's grammatical sentences for *niet* also include negative questions like the ones shown in (10).

10). a. Zie je *niet*? (TD_Target_Child_Marieke: 30)

See you neg.

Don't you see?

b. Waarom *niet*? (TD_Target_Child_Otje: 40)

Why neg.

Why not?

Sentences shown in (8-10) are taken as adult-like negative sentences.
Children also produced structures containing *niet* which are not acceptable in spoken and written adult Dutch. Such non-adult-like sentences contain the examples like the ones shown in (11-14).

11). a. Is *niet* sleutel voor pop. (Groningen_Target_Child_Iris: 25)
Is neg key for puppet.
Is not the key for the puppet.
Adult form: Dit is *niet* de sleutel voor de pop.[258]
This is neg the key for the puppet.
This is not the key for the puppet.
b. Kan *niet* van duikplank. (Groningen_Target_Child_Josse: 30)
Can neg from diving board.
Can't get off diving board.
Adult form: Ik kan *niet* van de duikplank af.
I can neg from the diving board off.
I cannot get off the diving board.

The child sentences shown in (11) clearly lack the articles with the nouns. The adult forms provided contain the articles and preposition which were missed out by children in (11). There were also sentences that lack the conversation marker *er*, as shown in (12). Huybregts (1991) argues that *er* is a clitic that can attach to the word coming before or after it. It is used in various forms i.e., *expletive and existential*: used for a grammatical reason, *locative*: referring to a location, *quantitative*: referring to a number, and *prepositional*: used along with a preposition. *Er* is used right after the finite verb in the sentence, or after the subject in the subordinate clauses. *Er* is used for un-stressing. For stress marking, the stronger version *ergens/hier/daar* (meaning *ever/here/there*) is used.[259]

[258] All the adult forms are provided by adult native speakers of Dutch.

[259] Expletive: *Er* wordt gelachen. There is a laughter.
Existential: *Er* kijken veel mannen naar Truus. = Many men are watching Truus.
Locative: Jan woont *er* ook. = Jan also lives there.
Quantitative: Henk bezit *er* dir. = Henk owns three.
Prepositional: Wij sporen *er* de buurvrouw toe aan. = We encourage the neighbour to do it.
Stressed version: Hij heeft *daar* niet gewerkt. = He hasn’t worked there.
All the examples in this footnote are from Huybregts (1991).

The example in (12b) lacks *er* as well as the subject of the sentence.

12).	a.	Peter mocht *niet* aan komen.	(Groningen_Target_Child_Peter: 24)
		Peter allowed neg to touch.	
		Peter was not allowed to touch.	
Adult form:		Peter mocht *er niet* aankomen.	
		Peter was er neg to+touch.	
		Peter was not allowed to touch.	
	b.	Is *niet* meer.	(Groningen_Target_Child_Daan: 31)
		Is neg more.	
		Is not anymore.	
Adult form:		Het is *er niet* meer.	
		It is there neg anymore.	
		It is not there anymore.	

Sentences shown in (13a) show that the use of *het* in child sentences when it must be left out while the example in (13b) lacks *het* when it must be inserted, also indicated by adult forms provided.

13).	a.	He , ik kan het *niet* gymmen.	(TD_Target_Child_Katja: 30)
		He, I can it neg the gymnastics.	
		He, I cannot do gymnastics.	
Adult form:		He, ik kan *niet* gymmen.	
		He, I can neg gymnastic.	
		He, I cannot do gymnastics.	
	b.	Hij kan *niet* opeten.	(Groningen_Target_Child_Abel: 31)
		He can neg eat+INF	
		He cannot eat.	
Adult form:		Hij kan het *niet* opeten.	
		He can it neg eat+INF.	
		He cannot eat it.	

Sentence in (14a) shows that *niet* is placed wrongly i.e., it should precede the verb. Examples in (14b-c) exhibit the mismatched form of verb and auxiliary, example (14d) shows that the preferred negative element in the adult form provided is *geen* while the child sentence contains *niet*.

14). a. Zoek (.) Zoeken *niet*. (Groningen_Target_Child_Matthijs: 32)
Search. Searching neg.
Adult form: *Niet* zoeken.
Not searching.
b. Carl hoeft (he)t *niet* geproeven. (SchlichtingVanKampen_Target_Child_Maike: 42)
Carl need it not tasted.
Adult form: Carl hoeft het *niet* te proeven.
Carl need it neg to taste+INF.
Carl does not have to taste it.
c. Nee , hij zijn nog *niet* droog. (Groningen_Target_Child_Abel: 36)
No, he are yet neg dry.
No, He is not dry yet.
Adult form: Nee, hij is nog *niet* droog.
No, he is yet neg dry.
He is not dry yet.
d. Dat deed *niet* pijn, hoor. (SchlichtingVanKampen_Target_Child_Carl: 44)
That did neg hurt, here.
That did not hurt, here.
Adult form: Dat deed *geen* pijn, hoor.
That did neg hurt, here.
That did not hurt, here.

The sentences shown in (11-14) are taken as ungrammatical or non-adult-like uses of *niet*. Figure 10.5 shows the average use of *niet* in children's and CDS sentences.

Figure 10.5(A) shows that the mean values for the use of *niet* in children's adult-like uses of *niet* is higher than their non-adult-like ones for the first two and the last two age-groups. The mean values for the age-group 31-36 are higher for non-adult-like uses of *niet* than the adult-like ones. Figure 10.5(B) shows that the mean values for the use of *niet* for CDS remain quite higher for the initial 4 age-groups.

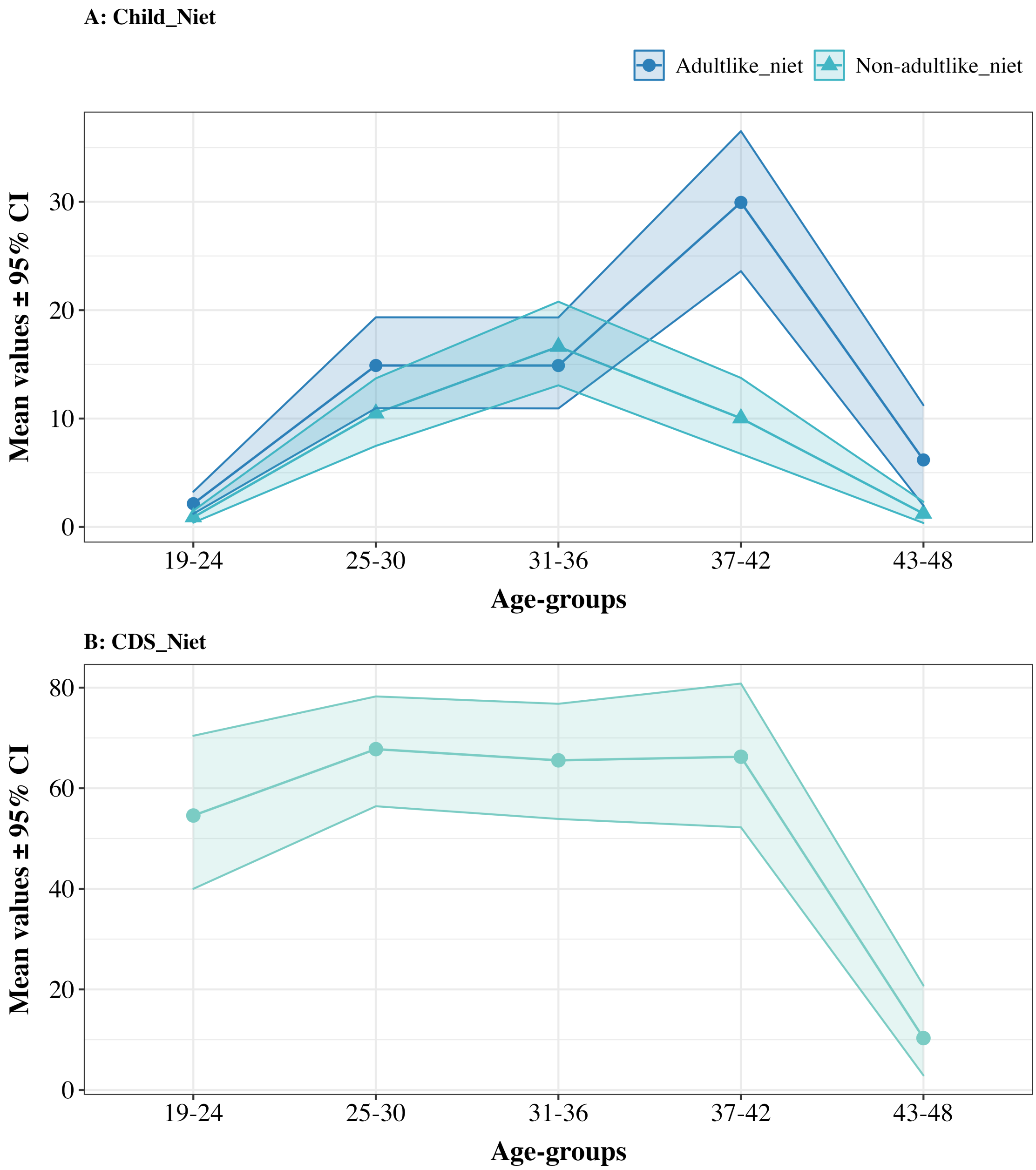

Figure 10.5: Mean use of *niet* in child and CDS sentences, across age-groups.

Upon observing closely children's sentences for *niet*, it was revealed that the first sentence containing *niet* emerged at the age of 20 months in an adult-like manner. The first instance of non-adult-like use of *niet* appeared at the age of 22 months but not by the same child. Few children (*Groningen_Target_Child_Abel, Groningen_Target_Child_Daan, Groningen_Target_Child_Matthijs, and Groningen_Target_Child_Josse*) produced most of the non-adult-like uses of *niet* (1137 from the total of 1678) from the age of 22 until 42 months. The same children produced 1740 instances of *niet* in an adult-like manner in the same duration of age.

Jordens (2000, 2002) argues that initially children acquiring Dutch used *niet* combined with modal auxiliaries like *kan, mag, hoef,* etc., making *kan niet, mag niet, hoef niet,* etc. He also argues that children used *niet* as the sentential negative marker only after the age of 1:10.[260]
The children's sentences containing *niet* presented in this dissertation show a different picture. Sentences containing *niet* for the earliest months are those which contain *niet* used as a negative marker and are combined with modal auxiliaries. Examples are shown below in (15).

15).	a.	Ik hoeft *niet*.	(TD_Target_Child_Corine: 20)
		I need neg.	
		I do not need.	
	b.	Weet ik *niet*.	(Groningen_Target_Child_Tomas: 21)
		Know I neg.	
		I do not know.	
	c.	(Stof)zuiger doet het *niet*.	(Groningen_Target_Child_Peter: 23)
		Vacuum cleaner work does neg.	
		Vacuum cleaner does not work.	

The child Groningen_Target_Child_Tomas used *niet* without any modal verb at the age of 21 and 22 months. But he used *kan niet*, *hoef niet* and *mag niet* at the age of 26 months. The child named Groningen_Target_Child_Peter also used *niet* alone at the age of 23 and 24 months but he used *hoef niet* at the age of 25 months, and *kan niet* at 26. Some other children (Groningen_Target_Child_Abel and Groningen_Target_Child_Daan) used *kan niet* prior to the use of *niet* alone. Such variant patterns were also observed for other children. Hence, it could not be established that *niet* with modals is used prior to its use as the sole negator or vice versa.

Earlier, Van der Wal (1996) and later Lin et al. (2015), regarding the learning path of the NPI *hoeven* with the acquisition of negation, and basing themselves on a corpus and elicited imitation tasks observed that Dutch acquiring younger children used *niet* to license *hoeven* approximately 50% of the time at the average age of 33 month, prior to its licensing under other negative expressions i.e., negative quantifiers. This average usage of *niet* to license *hoeven* increased until 80% of the time at the age of 64 months. Lin et al. argue that the lower repetition

[260] Jorden presents only 7 sentences containing modal auxiliaries used with *niet*, for Jasmine from the age 1:7-1:9.

probabilities for *niet* at a younger age are mainly due to the limited working memory capacity of younger children.

Similarly, it could not be established that if some children are using *niet* combined with modals prior to its use as a sole negator. Not evidence was found to argue that children have not acquired *niet* as a negative marker but only as a combined word making *niet* + modals. Furthermore, to date, there exists no study that could address this point more clearly. Only targeted research studies on this aspect can enlighten more about the subject matter.

It is interesting to note that children's most of the non-adult-like uses of *niet* contain sentences which lack a verb, auxiliary/modal, a preposition, incorrectly positioned *niet*, etc., similar to *not,* in child SE (see chapter 8).

Table 10.2 presents a summary of children's adult-like and non-adult-like uses of *niet* across age-groups.

	Child					**CDS**
	Niet	**Adult-like-niet**		**Non-adult-like-niet**		**Niet**
Age-group	**Total sentences per age-group**	**Sentences per age-group**	**%**	**Sentences per age-group**	**%**	**Total sentences per age-group**
19-24	85	60	70.58	25	29.41	1528
25-30	1218	715	58.70	503	41.29	3253
31-36	1450	685	47.24	765	52.75	3015
37-42	1399	1048	74.91	351	25.08	2319
43-48	163	136	83.43	27	16.56	227
Grand total	4315	2644	60.78	1671	38.41	10342

Table 10.2: Summary of children's adult-like and non-adult-like sentences for *niet* and percentages per age-group.

Table 10.2 shows that except the age-group 31-36, children's adult-like sentences and percentages of *niet* remain higher than their non-adult-like ones, across age-groups. CDS sentences for *niet* remain higher than those of children throughout the age-groups.

In order to get a deep and detailed view of children's use of *niet*, a month-wise view of children's *niet* is presented below.

Figure 10.6 presents a detailed view of children's use of *niet* across all the age-months.

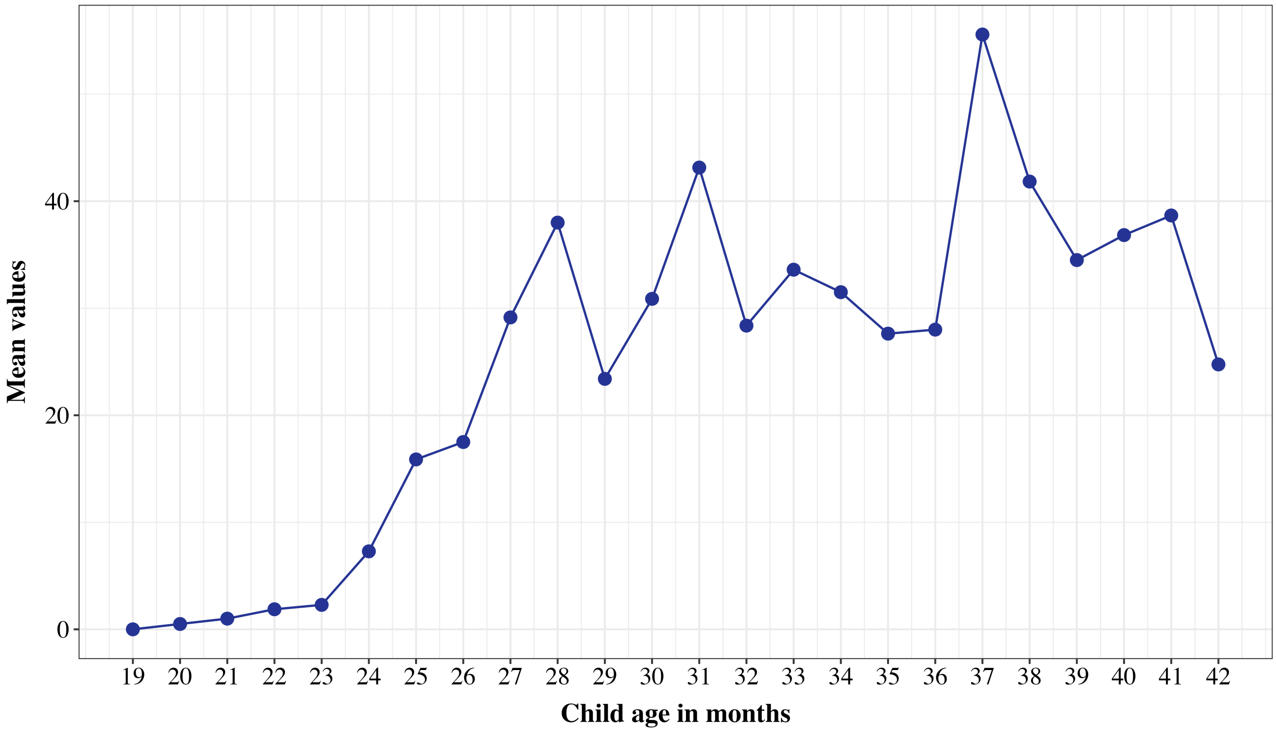

Figure 10.6: Average use of children's *niet* across the age-months 19th to 42nd.

Figure 10.6 shows that the mean values for children's use of *niet* shows an increasing trend from 19th month to 28th month of age. From 29th onwards, there is a variation observed. The average use of *niet* clearly suggests that the use of *niet* to express sentential negation to a greater extent by younger children.

10.4 Negative quantifiers (NQs)

Other than the negative marker *niet* as shown above, in Dutch, sentential negation is also expressed using the NQs. A total of 512 sentences for children and 2477 for CDS were found containing NQs. The NQs searched for children's and CDS sentences are shown in (16) and their use in child sentences is given in (17).

16). *Geen, niemand, niks, niets, nooit, nergens*.

No, nobody, nothing, nothing, never, nowhere.

Some examples of children's use of NQs are given in (17).

17).	a.	*Geen* koffie.	(Groningen_Target_Child_Peter: 23)
		No coffee.	
	b.	*Niemand.*	(Groningen_Target_Child_Tomas: 24)
		Nobody.	
	c.	Zit *niets* in!	(Groningen_Target_Child_Matthijs: 36)
		There neg-thing is.	
		There is nothing in there.	
	d.	*Nee*, ik doe *niks*.	(TD_Target_Child_Marieke: 30)
		Nee, I do neg-thing.	
		No, I do nothing.	

There were also 140 sentences contains NQs in a non-adult-like manner. Such sentences include examples like the ones shown in (18).

18).	a.	*Geen* in mond.	(Groningen_Target_Child_Peter: 25)
		Neg in mouth.	
		No(thing) in mouth	
Adult form:		*Geen* in de mond.	
		No(thing) in the mouth.	
	b.	Die ga *niks* naartoe.	
		It go neg-thing to.	
		It goes to nothing.	
Adult form:		Het gaat *nergens* heen.	
		It go neg-where to.	
		It's not going anywhere.	

Figure 10.7 shows the average use of children's adult-like and non-adult-like uses of NQs across age-groups.

Figure 10.7(A) shows that for the first age-group, the mean value for children's use of NQs in a non-adult-like manner is higher but for rest of the age-groups, the opposite is true. Age-group 37-42 shows the highest mean value, 3.8. Figure 10.7(B) shows the mean values of the use of NQs in CDS sentences. The 2nd and 4th age-groups show the similar average use of NQs. The age-group 31-36 shows the highest mean value for the use of NQs.

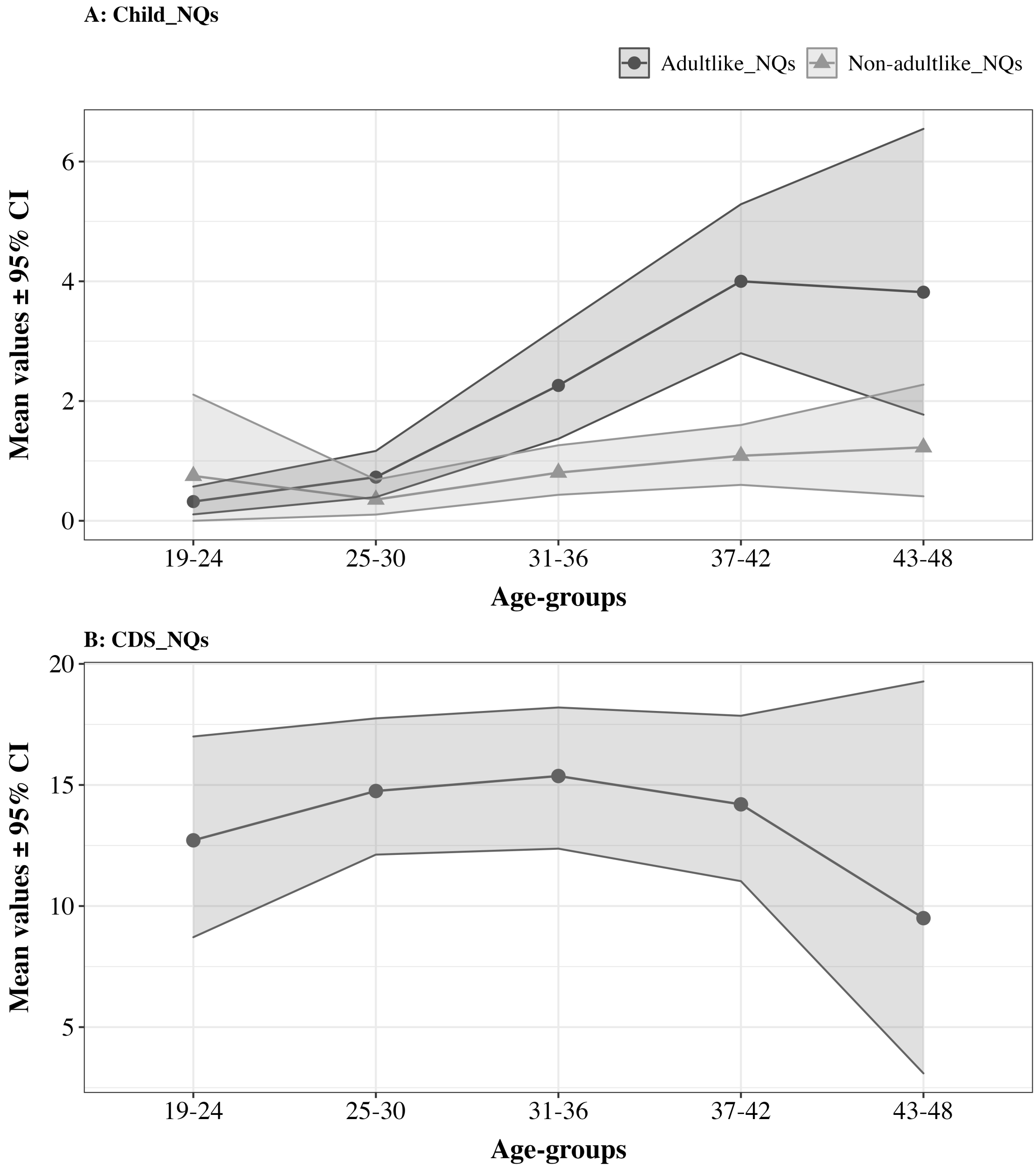

Figure 10.7: Mean values of the use of NQs in children's and CDS sentences per age-group.

It is reported that in the data under investigation, the NQ *niks* (*nothing*) was found at the age of 22 months, *geen* (*no*) at 23 months, *niemand* (*nobody/no- one*) at 24th, and *niets* (*nothing*) at 30th month of age in children's sentences. In the CDS sentences, *niks* (*nothing*), and *geen* (*no*) at the child age of 17 months, *niemand* (*nobody/no-one*) and *niets* (*nothing*) were found at the age of 18th month. *Geen* (*no*) was found the most frequently used NQ in children's sentences, with a total of 365 sentences.

Van der Wal (1996) and Lin et. al. (2015) also reported similar findings for *geen*. The NQ *niets* showed the lowest frequency, found in only 17 sentences. The same NQs were also found in a similar pattern in CDS sentences, the most frequent was *geen* (*no*) with 1672 sentences, and *niets* (*nothing*) showed the lowest frequency, with only 71 sentences.

Table 10.3 presents a summary of use of NQs in children's as well as CDS sentences.

	NQs	**Adult-like-NQs**		**Non-adult-like-NQs**		**CDS_NQs**
Age-group	**Total sentences per age-group**	**Sentences per age-group**	**%**	**Sentences per age-group**	**%**	**Total sentences per age-group**
19-24	30	9	30	21	70	356
25-30	52	35	67.30	17	32.69	708
31-36	141	104	73.94	37	26.05	707
37-42	178	140	78.77	38	21.22	497
43-48	111	84	77.95	27	22.04	209
Grand total	512	372	72.65	140	27.34	2477

Table 10.3: Summary of the use of NQs in children's as well as CDS sentences, across age-groups.

Table 10.3 shows that the number of sentences for NQs per age-groups is higher for CDS than that of children. For children, except for the first age-group, the number of sentences and percentages remain higher for adult-like uses of NQs than those of non-adult-like ones. The higher number of non-adult-like NQs in the age-group 19-24 is due to the child *Groningen_Target_Child_Peter* who used *geen* as the only word in the sentence 25 times from the age of 23-25th month. As in target Dutch, *geen* must be used with some predicate. Its use as the only word in the sentences does not reflect the adult-like use of *geen*.

This next section will present the statistical analyses for the sentential negative marker *niet* and NQs.

10.5 Statistical Analyses:

This section will present the results for the statistical model fitted separately for *niet* and NQs.

10.5.1 Methodology

Prediction: It was predicted in chapter 6 that children acquiring Dutch will acquire the negative marker niet rapidly and easily since the required input is readily available to them.

Predictor variables: Age as a continuous predictor and niet in CDS.[261]

Response variable: Children's use of niet.

The prediction will be tested in two steps: 1) estimating the effect of both of the predictors using a GLMM model, 2) conducting post hoc multiple group comparisons to see the estimated average use of *niet* between various age-groups. Step 2 will help determine the point of age when children of various age-groups are exhibiting similar average use of *niet*.

In order to estimate the effect of two fixed effect predictor; age as the continuous, and *niet* in CDS (Niet_CDS) on children's ice of *niet* (Niet_child), a Generalised Linear Mixed Model (GLMM; Baayen 2008) with a negative binomial error structure and the log link function (McCullagh and Nelder, 1989) was used. Since 41% of the children have repeated observations and to control the chance of type 1 error rate up to the level of 0.05, random intercepts and slopes for both of the predictors age and niet_CDS are also included in the model (Schielzeth and Forstmeier, 2009; Barr et al., 2013) taking children i.e., *name* as a grouping factor for random effects. The sample analysed for the model_niet comprised a total of 4315 observations for *niet* of 51 children. See chapter 7 (section 7.5) for a detail methodology.

[261] As convention, the term *predictor(s)* is used for independent variables and *response* for identifying the dependent variable.

10.5.2 Statistical results for *niet*

Table 10.4 presents the results (estimates together with SE, confidence intervals, significant tests, p values, dispersion parameter, and VIF) for the model fit for children's use of *niet* as a response and *niet* by CDS/input (Niet_CDS) and age as predictors.[262] [263]

Model_niet: Niet_child modelled as a function of Age and Niet_cds.							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**x^2**	**df**	**p**
Intercept	0.521	0.484	-0.466	1.472			
Age	0.036	0.013	0.010	0.065	7.19	1	< 0.001
Niet_CDS	0.018	0.002	0.013	0.022	27.28	1	< 0.0001
Full-null					32.33	2	< 0.0001
Disp.P	0.79						
VIF	Maximum VIF: 1.01						

Table 10.4: Results for the GLMM modelling *niet* of children, age, and *niet* in CDS.

Model_niet estimates the effect of age as a continuous predictor and use of *niet* by CDS on children's use of *niet*. The full model was clearly significant as compared to the null model (likelihood ratio test: x^2 (2) = 32.33, p < 0.0001). Both of the predictors had a significant effect on children's *niet*. Furthermore, the positive effect of *niet* in CDS was found more pronounced on children's *niet* than that of age. The model results support the central prediction associated with the acquisition of *niet* that based on the input, children will acquire *niet* easily. Overall the mixed effects model describe 63% variance in the response from which 32% can be attributed to the fixed effects predictors.

The model results support the central prediction associated with the acquisition of *niet* that the required input will have a positive effect and will play a positive role in children's acquisition or use of *niet*.

[262] All the results of the model_niet indicated are in the log link space, i.e., the estimate for age can be derived using the inverse of log of the estimate shown, for example;
age = exp(0.036) = 1.036, Niet_CDS = exp(0.018) = 1.018.

[263] P values are derived from the significance testing.

Since age showed a significant effect on children's use of *niet*, in order to further confirm the effect of age on children's development of *niet,* a separate model was fit only on the longitudinal data of children for *niet* as a response and age and *niet* in CDS as predictor variables. There was also a statistically strong main effect of age (LRT: x^2 (1) = 14.84, $p < 0.0001$) and *niet* in CDS (LRT: x^2 (1) = 26.111, $p < 0.0001$) on children's use of *niet*.[264]

In order to determine the time point of the acquisition of *niet*, we conducted the post hoc multiple comparisons. The motivation and procedure is s follows:

Post hoc multiple age-group comparisons:

Since age showed a significant effect on children's use of *niet,* in order to see if the average use of *niet* differs between children of various age-groups, a new model was fit using the age-group as a predictor instead of age in months as a continuous along with niet_CDS as the second predictor. The random slopes were added to the model only for the fixed effect predictors niet_CDS.[265] The predictor niet_CDS still had a significant effect with (LRT: x^2 (1) = 28.73, $p < 0.0001$) and age-group also showed a significant effect with (LRT: x^2 (4) = 139.12, $p < 0.0001$) on children's use of *niet*.

All the age-groups were significantly different from the reference age group, 19-24. To see if all the other age-groups are also different from each other in exhibiting the estimated average use of *niet,* besides being different from the reference group, the post hoc multiple comparisons between age-groups were performed using the function glht from the package multcomp. See chapter 7, section 7.8 for details about the post hoc multiple age-group comparisons and references therein for their significance.

Table 10.5 shows the results of the post hoc multiple comparison.

264 LRT stands for Likelihood Ratio Test.

265 See Appendix_G: Model Equations_Dutch for the model equation.

Post hoc multiple comparisons for the estimated average use of *Niet* between age-groups.					
Age-group	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**P value**
25-30 - 19-24	1.802	0.195	1.272	2.332	< 0.001
31-36 - 25-30	0.269	0.135	-0.096	0.634	> 0.05
37-42 - 31-36	0.375	0.146	-0.022	0.772	> 0.05
43-48 - 37-42	-0.789	0.227	-1.403	-0.174	0.001

Table 10.5: Post hoc multiple group comparisons between age-groups.[266]

On a significance level of 0.05, while the youngest age-group 19-24 is statistically different in exhibiting the estimated average use of *niet* from all the other age-groups, the age-group 25-30 was only statistically different from the age-group 37-42. The post hoc multiple comparisons further show that the average use of *niet* varies only between the youngest age-group and the older age-groups but it does not vary between the middle and older age-groups. From the age of 25th months to 36th months, various age-groups are showing similar estimated average use of *niet*. The results further support the prediction that children acquire *niet* quite early and once they acquire it they exhibit its similar use on average.

The acquisition of NQs by Dutch acquiring children has been rarely investigated, following a certain predictive and statistical model. The next subsection will present the statistical modelling for the NQs, taking CDS input for NQs and age as predictors and children's use of NQs as the response variable.

10.5.3 Statistical results for NQs

In order to estimate the effect of predictors of age as a continuous and NQs in CDS (NQs_CDS) on the response, here the use of NQs by children (NQs_child), a Generalised Linear Mixed Model (GLMM; Baayen 2008) with a negative binomial error structure and the log link function (McCullagh and Nelder, 1989) was used. Since 58% of the children have repeated observations and to control the chance of type 1 error rate up to the level of 0.05, random intercepts and slopes for both of the fixed effects predictors are also included in the model (Schielzeth and

[266] One age-group is compared to all the other age-groups. Table 10.5 presents the post hoc multiple age-group comparisons in a linear order. To see all the age-group comparison, see Appendix_H.

Forstmeier, 2009; Barr et al., 2013) taking children i.e., *name* as a grouping factor for random effects. See chapter 7 (section 7.5) for a detail methodology.

Table 10.6 presents the results for the model for NQ, modelling NQs by children (NQs_child) as a response and NQs in CDS (NQs_CDS), and age (continuous) as fixed effect predictors. The sample analysed for the model_NQs comprised a total of 512 observations for NQ of 34 children.

Model_NQs: NQs_child modelled as a function of Age and NQs_cds.							
Term	**Estimate**	**SE**	**Lower CI**	**Upper CI**	**x^2**	**df**	**p**
Intercept	-4.471	0.982	-6.587	-2.576			
Age	0.121	0.026	0.071	0.178	18.24	1	< 0.0001
NQs_CDS	0.059	0.010	0.037	0.082	15.00	1	< 0.0001
Full-null					37.37	2	< 0.0001
Disp.P	0.75						
VIF	Maximum VIF: 1.001						

Table 10.6: Results for the GLMM modelling children's NQs, Age, and NQs in CDS.

Model_NQs models the effect of age as a continuous predictor and NQs by CDS on children's use of NQs. The full model was clearly significant as compared to the null model (likelihood ratio test: x^2 (2) = 37.37, $p < 0.0001$). Both of the predictors had a statistically significant and positive effect on children's use of NQs. Model results support one of the central prediction associated with the acquisition of negation by Dutch acquiring children that the required local language input will positively effect and will play a role in children's acquisition of negation, in this case, expressing negation using NQs.

In the next subsection, based on the empirical and inferential evidence presented in this chapter, a discussion will be provided.

10.6 Discussion

It is predicted in chapter 6 that children acquiring Dutch will acquire the negative marker *niet* without any delay as the required input containing the negative marker *niet* is readily available to them. It is also argued that there is no input containing the doubling effects of negation in Dutch available to children which could make children hypothesise that negation is formal in their language. Based on the input of *niet* used as the only negative element in the clause, children will analyse *niet* as the only negative marker operating in the clause. Zeijlstra (2004, et seq.) argues that the default value for the acquisition of negation is semantic, only the explicit and particular input can guide children to re-hypothesise the value of negation.

It is shown in the previous chapters that Zeijlstra's theory of the acquisition of negation followed in this dissertation explicitly argues and predicts for the sentential negative marker *niet*, and treats negative quantifiers differently. Since the Dutch negative polar particle *nee* is used only in its polar roles so the focus of this chapter has been mainly on *niet* and later to an extent on NQs.

The model results in table 10.4 show that *niet* in the CDS input shows a stronger effect on children's use of *niet.* This effect is suggestive of a positive role and importance of the availability of the required input in the acquisition of *niet*. See also Furrow, et al. (1979), de Villiers & de Villiers (1975) for the positive role of CDS input and for the opposite see Stromwold & Zimmerman (1999).

The positive effect of age shows the importance and significance of age. The post hoc multiple age-group comparisons further inform that after the age month 24th, children were exhibiting a similar estimated average use of *niet*.

Zeijlstra (2014) argues that *if there are no doubling effects with respect to a semantic operator* OP_F *in the language input, all features of F are semantic features ([F])*. It means, Zeijlstra's proposed learning algorithm predicts that children acquiring Dutch will only be able to acquire the formal features of negation if they find overt evidence for it in the linguistic input they receive from their caregivers. The absence of the overt input will lead to the absence of the acquisition of the formal features. Zeijlstra's algorithm proposes the null hypothesis that the formal features are not present in the linguistic input and the morphological expressions i.e., *niet*, will directly reflect the semantic features. This means that every morphosyntactic element used for expressing negation will be considered as the carrier of the semantic feature of negation, i.e., it will be considered negative itself. If the 1:1 relation between the morphological negative element and it's being semantically negative is missing, only then formal features will be proposed for the language being acquired.

The results of the data presented here show that there were no doubling effects found for negation in CDS input sentences, consequently there was also no sentence found in child sentences containing more than one negative element and presenting one negation. The prediction was supported empirically. The exhibited 1:1 relation between the morphologically negative form and meaning in the CDS input must have led children to assume the same for sentential negation in Dutch. The inclusion of *niet* as the only negative element in child sentences exhibits that *niet* is presented as the only semantically negative element, confirming that Dutch acquiring children assumed a 1:1 relationship between the negative form and negative meaning. Since it is the default value for negation in their language, they don't have to re-hypothesise the value of negation. The results fully support the hypothesis that the absence of doubling effects with respect to a semantic operator OP_F in the language input will also lead all the features of F as semantic features.

Zeijlstra (2004, et seq.) also argues that Neg° and NC are correlated i.e., languages that lack a negative marker that is a Neg° will also lack the NC. Dutch is a language that lacks a Neg° negative marker (see chapters 2 and 3) and exhibits the double negation grammar. Since Dutch is a double negation language but due to the complexity of double negative sentences, they are hardly produced (see chapter 5 for references). No sentence containing two negative markers and expressing double negation were found in CDS sentences. Also, no sentence containing more than one negative element and expressing single negation (NC), was found in the CDS sentences. No sentences for both f these types were found in children's sentences too. No negative sentence containing more than one negative element and expressing double negation was found for German data as well (unpublished German data of our project, Arshad & Zeijlstra, in prep). See chapter 9 for Italian where it is argued that a language like Italian which possess the Neg° negative marker also exhibits NC.

Still, the absence of doubly negated sentences in both groups of sentences (child and CDS) does not exclude the possibility of their existence in children or adults' grammar. Double negation in a language like Dutch or German has been studied rather very less. Since all the major theories of negation (discussed in detail in chapter 3) also could not present the clear analyses for double negation sentences other than arguing that double negation sentences are syntactically complex and are rarely produced. Further studies are needed to investigate the phenomenon of double negation in detail.

Consequently, based on multi-dimensional empirical and inferential evidence, we could not reject the null hypothesis that formal features are not present and all the morphologically negative expressions are semantically negative themselves in Dutch. The results fully support the prediction that input will play a positive role in the acquisition of negation by young children.

After that we argue that negative elements used by children acquiring Dutch are semantically negative themselves, the following meaning and syntactic interpretations are assigned to the children's negative elements *niet*, shown in (19), and NQs, shown in (20). Examples are already shown in (8a) and (17c), respectively.

19). a. Weet ik *niet* meer. (Groningen_Target_Child_Tomas: 22
Know I neg more.
I don't know anymore.
b ¬ know'(I)

20). a. Zit *niets* in! (Groningen_Target_Child_Matthijs: 36)
There neg-thing is.
There is nothing in there.
b. ¬∃x.[thing'(x) & is there'(x)]

In addition, the results fully support the claim that the absence of doubling effects/formal features/NC in the input will lead to the absence of the acquisition of doubling effects/formal features/NC. For the testing of the other side of the hypothesis that the presence of doubling effects/ formal features/NC in the input will lead to the presence of the same, see chapter 9 which presents the results and statistical analyses for Italian, a NC language.

There were plenty of sentences with negative quantifier at the object position (as shown in 20), unlike a NC language which does not allow neg-words at object position (see chapter 9 for Italian results). It further brings in line that Dutch acquiring children are analysing NQs as semantically negative elements and exhibit the possession of a double negation grammar. See also (Nicolae, et al. 2022).

No support for the claims of Van Kampen and Evers (2006) was found that Dutch acquiring children pass through a stage where they use two negative markers (double *niet*) per clause and assume Dutch as a NC language for sometime (see chapter 5, section 5.9.3).
Results for the analyses for the longitudinal children further suggest that children's use of *niet* improved with age (see also Nordmeyer, et al. 2013).

The post hoc comparisons between the age-groups solidly support the prediction of early acquisition of *niet*. Since there was not a statistically significant difference found for the estimated average use of *niet* between the children older than 24 month, this further shows that the process of the acquisition of *niet* was almost similar between the children above 24 months of age.

10.6.1 Non-adult-like *niet*

Section 10.3 shows the variety of Dutch children's use of *niet* in a non-adult-like or ungrammatical way. When we closely observe children's use of *niet* in the non-adult-like manner, it shows that the errors containing the incorrect position of *niet* are rather less frequent than the other types of errors. The most frequently observed error structures regarding the position of *niet* are those where *niet* is followed by the predicate of the sentence when it should precede it or vice versa, i.e., *luisteren niet* instead of *niet luisteren*.

Most of the time, it is other sentential information that is used incorrectly. For example, one of the common erroneous structures in the negative sentence is regarding the subject (mismatched forms of articles, determiners, and pronouns for the subject) (Brown, 1973; Bloom, 1970; Greenfield & Smith, 1976; Deprez & Pierce, 1993; Wexler, 1994, 1998), and the verb (mismatched form regarding the infiniteness or finiteness) (Wexler, 1994, 1998; Shütze, 2010; Verhagen, 2009; Wijnen, 1994).

90% of the non-adult-like sentences (1513 from a total of 1671) were produced by 12% of the total children (7 out of 58). The use of the non-adult-like *niet* does not contain the erroneous structure regarding the position of *niet* up to the level that could trigger concerns for the development of negation of a typically developing child. Rather such non-adult-like uses of negation reflect lower-level negation problems for young children. The average accuracy percentage of using *niet* for the age-group 31-36 is 47% and within the next 6 months, the accuracy level of the same children is up to 74.91 % that is a remarkable improvement for children who are only 3.5 years old.

NQs were used in an adult-like manner quite frequently and naturally as the only negative element per clause. Non-adult-like uses of NQs are mainly driven by one child in the first age-group (section 10.4). Other children showed the accuracy percentage up to 75% on average for the use of NQs. The non-adult-like structures for NQs also do not raise any serious concerns for typically developing children acquiring Dutch.

Summarising, for children acquiring Dutch, the individual variability in producing the non-adult-like uses of *niet* lies in two main areas, i), the partial immaturity in the mastery for *niet* (Van Kampen & Evers, 2006), and ii) higher cognitive demands of some of the syntactic structures of the sentences i.e., subject and verb. The second area has already been well reported in the literature. See Hyams, 2011; McNeil, 1968; Clahsen, 2016; Jordens, 1987; Koopman & Sportiche, 1987; Bowerman, 1973; and Nordmeyer, et al., 2013, 2018. It has also been argued that negation is also among the syntactic linguistic structures that could show more variability (Kornev. N. Aleksandr &

Balciuniene Ingrida (2021). See also (chapter 5) and (Klima & Bellugi, 1966; Cameron- Faulkner, Lieven, & Theakston, 2007).

10.6.2 CDS and child negative sentences in Dutch

The patterns of negation in CDS have been investigated quite less. This section will present the most unique and frequently found features of CDS negation.

There are several characteristics of CDS observed during the process of data collection, cleaning, and processing. Those include the short expressions like *ook niet* (neither), *mag niet* (may not), *kan niet* (cannot), *past niet* (does not), *toch niet* (not yet), *ik niet* (me not), etc., that are not very common in written language but they were found quite commonly in the CDS negative sentence for the majority of the CDS speakers. CDS sentences for *niet* contained the highest frequency of assertive negative sentences, followed by negative questions, and short expressions.

Newport, et al. (1977) argue that the typical properties that they found in adults' language are also reflected in the children's language and positively correlated with children's language development. They also argue that speaker specific variation in the language input affected children's overall language development in a very limited way (see also Furrow, et al. 1979; Bellugi, 1967; Maratsos & Kuczaj, 1976; Pea, 1979; Habib, 2017; a.o. for similar, and see Stromwold & Zimmerman (1999) for the opposite findings, also see chapter 5).

As per the research questions and hypothesis investigated here, based on all the theoretical, empirical, and inferential evidence presented here, it is concluded that Dutch acquiring child's grammar aligns with Dutch adult grammar to a maximum extent and age and input both have a significant positive role in the acquisition of negation.

10.8 Conclusion

This chapter presents a detailed view of the acquisition of negation by young children acquiring Dutch. The chapter opens up by presenting the total number of negative sentences for *niet* and NQs, for children as well as for CDS. It is shown that children use the negative elements in a fully grammatical way or in an adult-like manner, and also in non-adult-like and ungrammatical ways, to some extent. It has been shown that the ratio of accuracy in using the negative elements remains higher than that of ungrammatical uses for most of the time. Children's non-adult-like uses express their ongoing development in various syntactic areas of the sentence.

It is concluded that children acquire the Dutch negative marker *niet* quite early and rapidly. The results of GLMM models show that input has a positive role in the acquisition of negation by children. In addition, age also plays a role in the acquisition patterns children display until they reach the final stage of negation of their language. This chapter also presents some unique features of CDS negative sentences. The results fully support the prediction that the absence of the formal features from the input will lead to the absence of the acquisition of formal features by children. The 1:1 relation between the negative form and meaning exhibited in the language input children receive also triggers them to pose a 1:1 relationship between negative form and meaning in their language from early on. The evidence presented in this chapter also supports the theoretical prediction that a language like Dutch which lacks a Neg° negative marker also lacks NC and possess double negation grammar, for both, child and adult language.

Chapter 11

Results

Negative Concord English

Similar to other chapters, the first half of this chapter (sections 11.1-11.5) will present children's and CDS negative sentences per age-group making extensive use of descriptive statistics (i.e., summaries, tables of counts, percentages, proportions, averages, etc.) and the second half of the chapter (section 11.6) will present the statistical analyses and modelling which will provide bases for drawing conclusions and inferences. Sections 11.7 and 11.8 will serve discussions and conclusions, respectively.

We start by presenting the total number of negative sentences for children and CDS in Negative Concord English. Negative Concord English is represented here by dialects of English that exhibit NC.[267] [268] After removing all the sentences for non-typically developing children, unclear sentences, and sentences with missing details, a total of 8888 negative sentences were taken in for children and 23865 for CDS (see chapter 7 for a detailed methodology).[269] The age of the children ranges from 24-83 months. The age-groups for the children are divided into several age-groups such that every age-group consists of 6 months. See appendix_M(A) for details about children in each age month and Appendix_M(B) for that of age-group. See chapter 5 for details about NC in NC English.

Similar to SE, a sentence is considered negative if it contains any of the negative elements shown in (1).

1). *not, ain't, isn't, can't, don't, aren't, doesn't, needn't, won't, hasn't , haven't, cannot, shouldn't, wouldn't, couldn't, hadn't, wasn't, weren't, no, nobody, nothing, never, no one, none, neither, nor*

11.1 Total negative sentences

All the negative elements were found used in the child and CDS sentences.

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[267] The access to the African American English corpus was granted by Pearson and colleagues (2010, 2013) and Edwards and colleagues (2014) upon special request. For reference, see Edwards, J., Gross, M., Chen, J., MacDonald, M. C., Brown, M., & Seidenberg, M. S. (2014), Pearson (2010), and Pearson et. al., 2013).

[268] See the appendix_B for the list of corpora for NC-E.

[269] For Edwards corpus there are no CDS sentences.

Figure 11.1 presents the total number of negative sentences for children and CDS across age-groups for NC English. The y-axis, as well as the length of bars represent the total counts and the x-axis represents the age-groups.

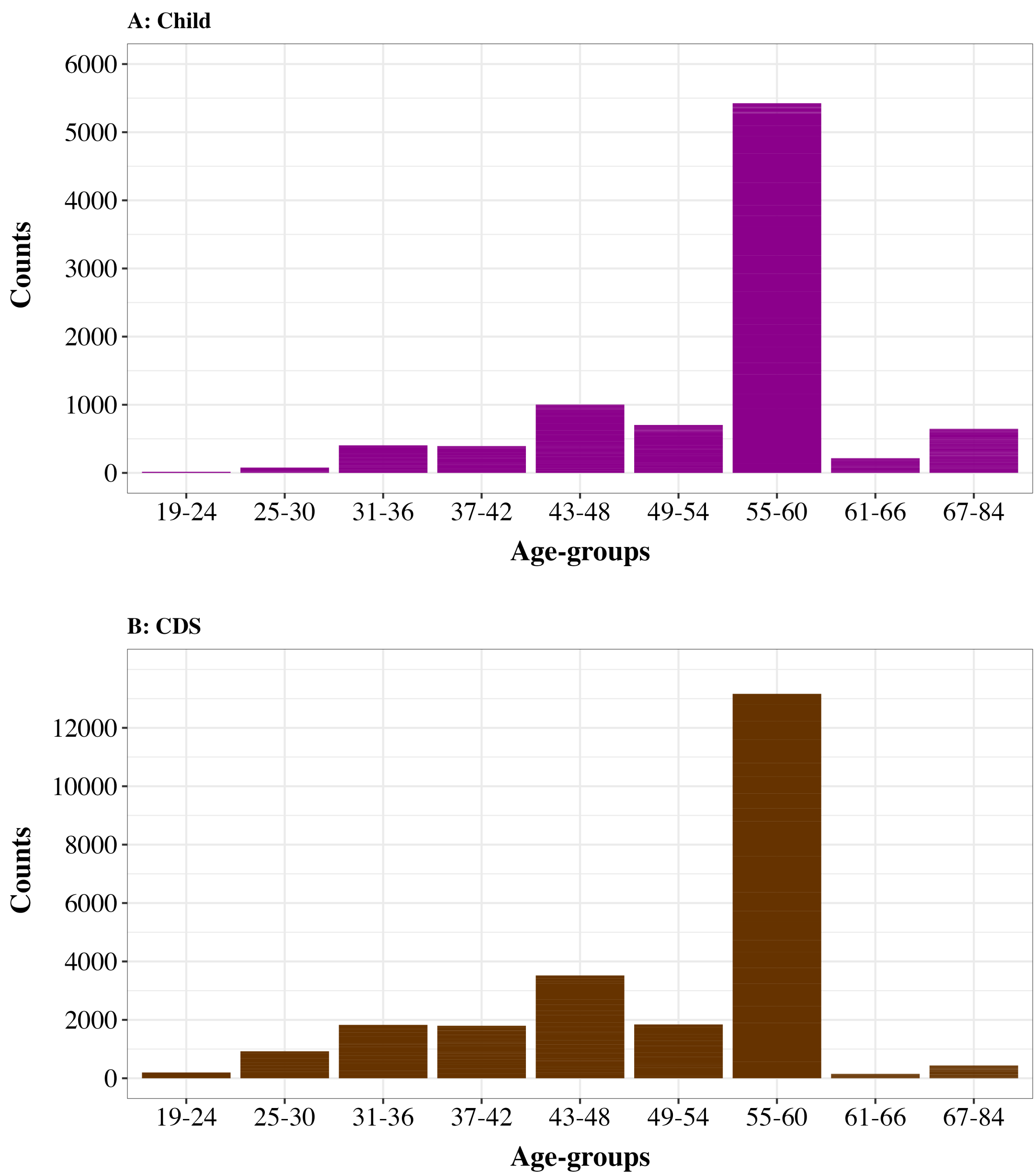

Figure 11.1: Total number of negative sentences for child and CDS in NC-E.

Figure 11.1(A) presents the total number of 8888 negative sentences for children across age-groups. It is evident that the first two age-groups contain below 100 sentences each. The age-group 55-60 contains most of the negative sentences for children. Figure 11.1(B) shows a total of 23865 negative sentences for CDS. Figure 11.1(B) also shows that all the age-groups contain more sentences than those of children. Similar to 11.1(A), age-group 55-60 contains most of the sentences.

Similar to SE data, children's and CDS sentences for NC English are also separated as per the negative element. Table 11.1 shows the number of sentences for *no, not,* and *n't*, for children and CDS.

Age-group	**NO**		**NOT**		**NT**	
	Child	CDS	Child	CDS	Child	CDS
19-24	14	44	0	32	2	114
25-30	43	125	8	222	26	536
31-36	129	325	51	422	217	995
37-42	122	303	53	340	201	1071
43-48	257	767	170	759	536	1861
49-54	164	400	136	446	372	937
55-60	1742	3797	907	2375	2533	6525
61-66	10	37	44	17	140	84
67-84	32	114	99	74	446	211
Grand total	2513	5912	1468	4687	4473	12335

Table 11.1: Summary of total number of sentences per negative element for children and CDS sentences.

The sentences shown in the column *NO* contain sentences for only anaphoric use of *no*. The use of *no* as a negative quantifier is shown along with other negative quantifiers in subsection 11.4.

11.2 The negative marker *not*

It was stated in chapter 7 that to get a detailed view of children's acquisition of negation, their sentences were read thoroughly and grammatical/adult-like sentences were separated from their ungrammatical/non-adult-like ones. For the negative marker *not,* children's adult-like negative sentences contain examples similar to that of SE, shown in chapter 8. The negative marker *not* was found used with all the auxiliaries shown in (2a.) Examples containing the use of *not* with auxiliaries are shown in (2b-c) below.

2). a. [*is, am, are, do, does, was, were, has ,have, had, can, could, need, will, would, should*]

b. They're *not* in here. (Edwards_rb_Target_Child_017a: 28)[270]

c. This is *not* opening. (Edwards_rb_Target_Child_428: 52)

Non-adult-like sentences for *not* include the uses like the ones shown in (3) below. There were only 10 sentences containing the non-adult-like use of *not*.

3). You *not* want any? (Belfast_Target_Child_Conor: 54)

The example in (3) lacks the use of any auxiliary used with *not*.

It is argued in chapter 7 that in order to get the typical value for the use of any negative element per age-group, averaging was performed using the arithmetic mean. Arithmetic mean is one of the means to get averages which includes all the data points for each child. See chapter 7 section 7.6 for more details. Figure 11.2 shows the mean use of *not* in child and CDS sentences. The mean values are computed by dividing the total number of sentences containing *not* by the number of child speakers who spoke, in each age-group. It is also important to note that arithmetic mean tends to give the most typical observed value in the data for a particular group.

Figure 11.2 shows that the mean values for children's use of *not* in an adult-like manner are always much higher than that of their non-adult-like ones which are always closer to 0, across age-groups. The shaded area around the mean point and the mean line shows a 95% confidence interval. As it has been shown above in table 11.1 that there was no sentence for the age-group 19-24 for *not,* that is why the mean value is 0.

[270] The long name indicates the following details about the name of the child: *Edwards_rb* indicates the name of the corpus, *Target_Child* stands for child's role, and child's ID or name is indicated by *017a*. The number *28* indicates the age of the child in months.

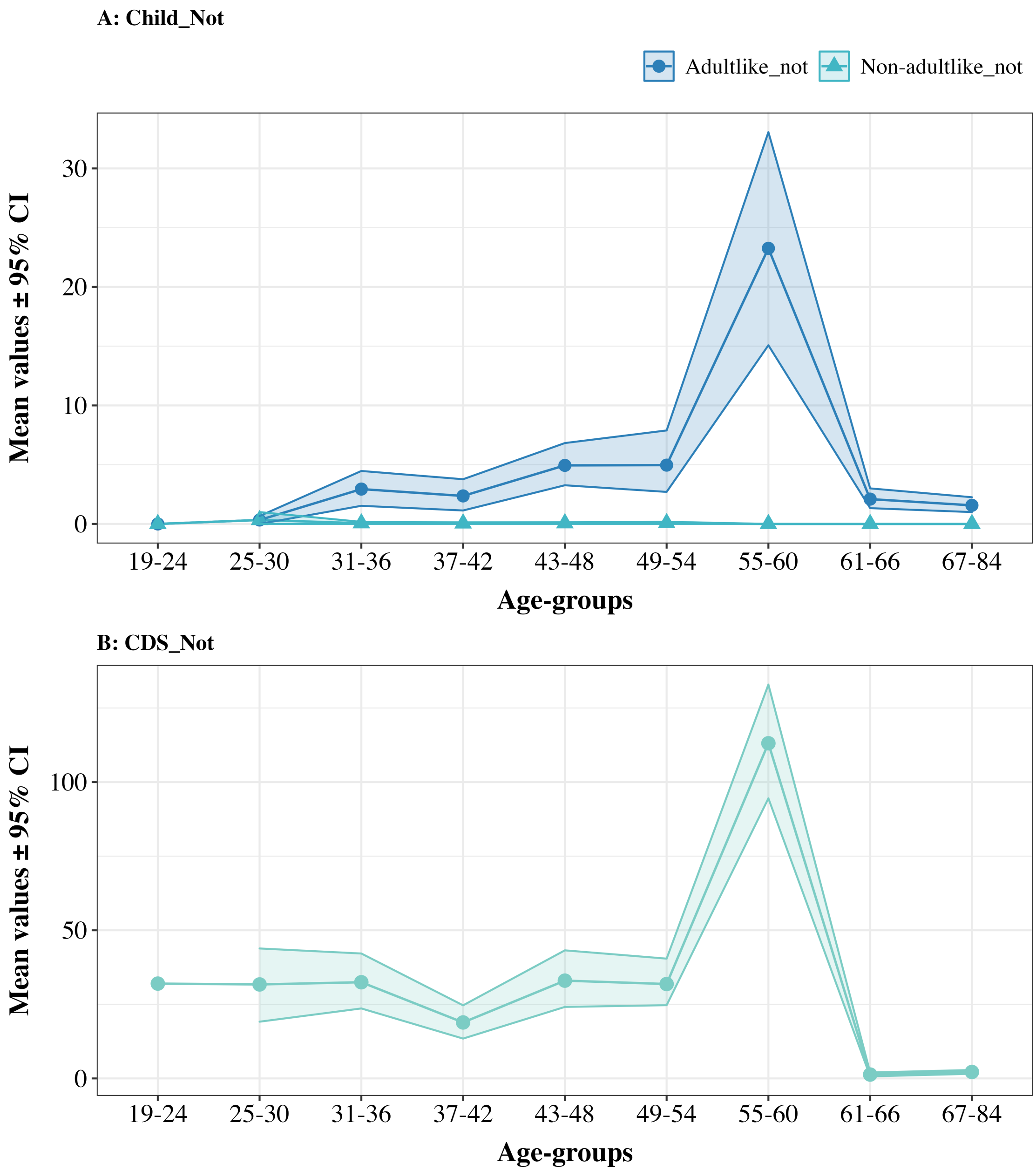

Figure 11.2: mean use of children's adult-like and non-adult-like use of *not* across age-group, and that of CDS.

Furthermore, for CDS sentences for *not*, in the first age-group, there was only one CDS speaker so the 95% confidence interval band could not be traced. It is evident from the figure that the mean values for the use of *not* remain higher than that of children's sentences, across age-groups.

11.3 The negative marker *n't*

Examples of sentences containing the negative marker *n't* in an adult-like manner are shown below in (4) and of non-adult-like ones are shown in (5).[271]

4). a. I *don't* know how. (DELV_Target_Child_92JTA1: 60)

b. *Ain't* enough room! (Edwards_rb_Target_Child_402b: 44)

There were just 4 sentences found for the use of mismatched negative auxiliary with regard to the subject of the sentence. [272]

5). a. This *don't* go in here. (Edwards_rb_Target_Child_406: 40)

b. It *don't* fit. (Edwards_rb_Target_Child_017a: 28).

Figure 11.3 shows the mean use of children's and CDS sentences containing *n't*.

Figure 11.3 shows that children's use of *n't* in a grammatical or adult-like manner is much higher than that of non-adult-like one. It was mentioned in table 11.1 that there were just 2 sentences for *n't* in the first age-group, and there was only one speaker who spoke, the same is the case for CDS sentences for the first age-group which is why the confidence interval bands are not detectable for that group. Furthermore, the higher mean values for children and CDS sentences for the age-group 55-60 is due to more sentences in that group.

[271] No sentence was found that could exhibit the use of external negation, the use of double auxiliary, the use of negative auxiliary with inflected main verb, or the use of negative auxiliary with non inflected main verb. Consequently, there are not much non-adult-like negative sentences available for NC English.

[272] It has been mentioned in chapter 5 that in Negative concord varieties of English, it is often the case that the negative auxiliary does not match with the 3rd person singular subject. Although there were just few of such sentences found which are not enough to raise any concerns.

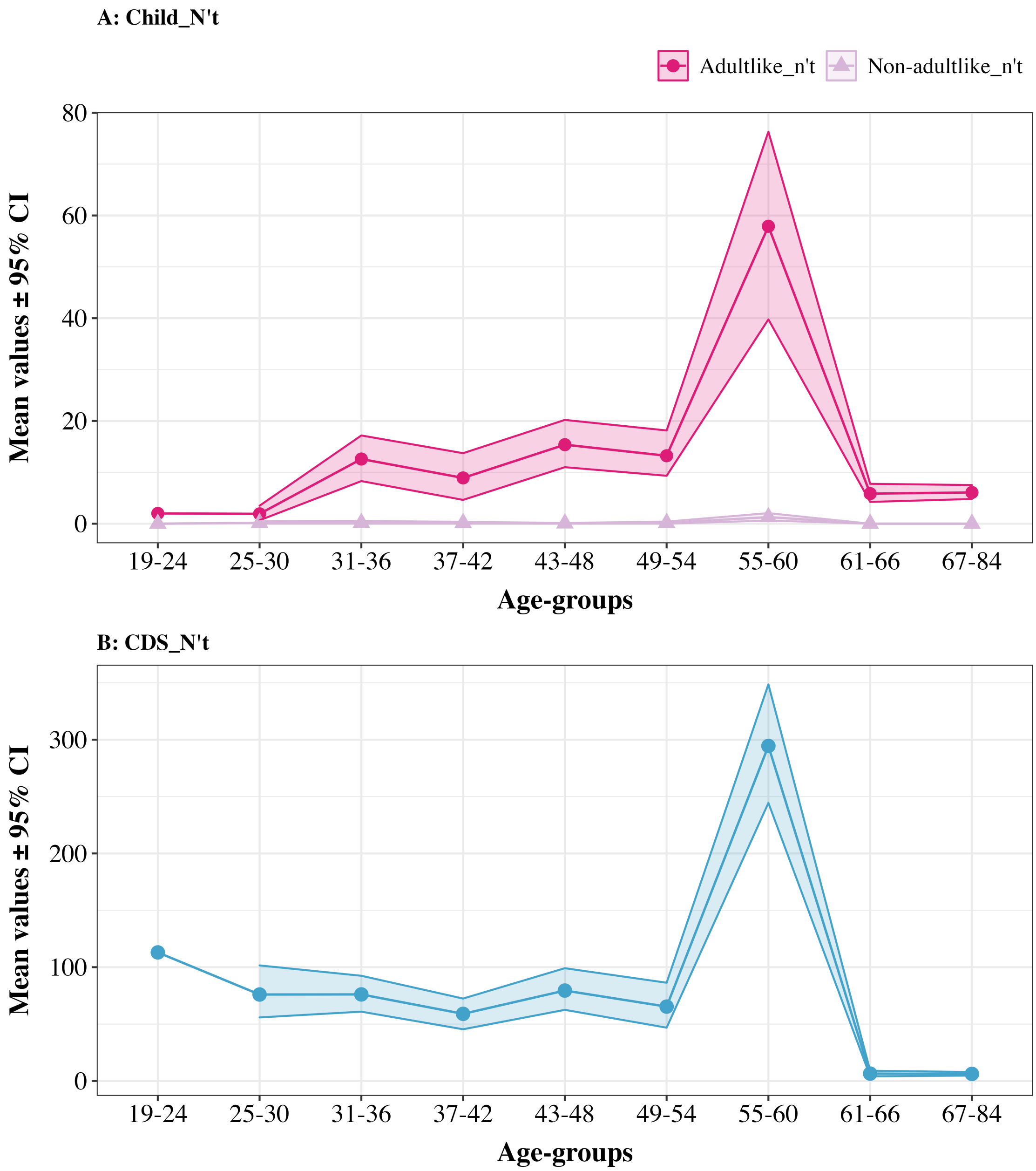

Figure 11.3: Mean values for children's adult-like and non-adult-like use of *n't* across age-groups, along with that of CDS.

In order to get a detailed view of children's use of *n't* and *not*, a month wise mean use is presented in figure 11.4.

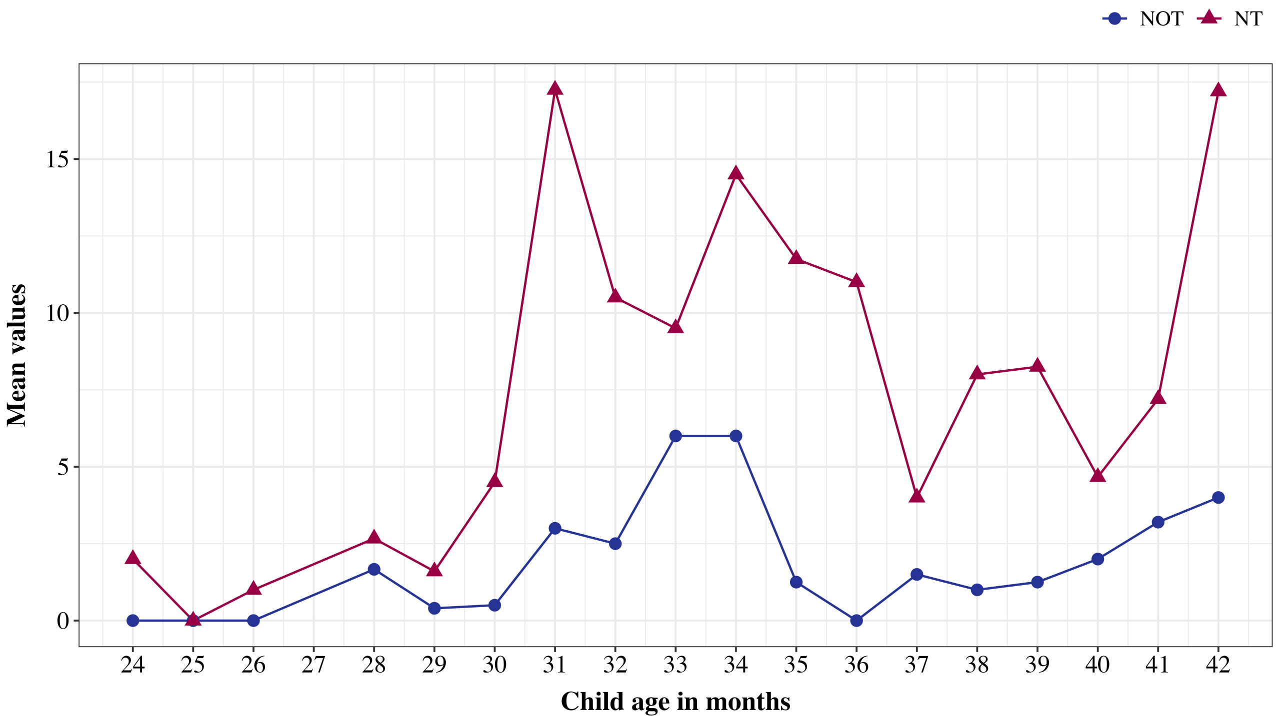

Figure 11.4 Mean values for children's use of *not* and *n't* across the age of 42 months.

Figure 11.4 shows that right from the early months, children children's use of *n't* contains higher mean values than *not*. From the month of 25th to onwards, the use of *n't* exhibits an increasing trend while the use of *not* shows a gradual increase until the age month 34th. From there on, both negative markers exhibit variation.

11.4 Negative quantifiers (NQs)

Other than expressing sentential negation using *not* and *n't*, children and CDS speakers were also using NQs. A total of 434 sentences for children and 931 sentences for CDS were found, containing the use of NQs. NQs searched and found are shown in (6) and examples of children's use of NQs are shown in (7) below.

6). [*nobody, nothing, never, nowhere, none*]

7). a. Because *nothing* down, the basement is a game down there. (Edwards_wid_Target_Child_215: 49)

b. Its *no* farmer. (Edwards_rb_Target_Child_066b: 35)

There was one example of using *no* as sentential negator instead of the negative quantifier which was discarded and not taken into any further analyses.

8). Yeah but my turkey *no* fall. (Edwards_rb_Target_Child_024b: 29)

Figure 11.5 shows the average use of NQs in child and CDS sentences.

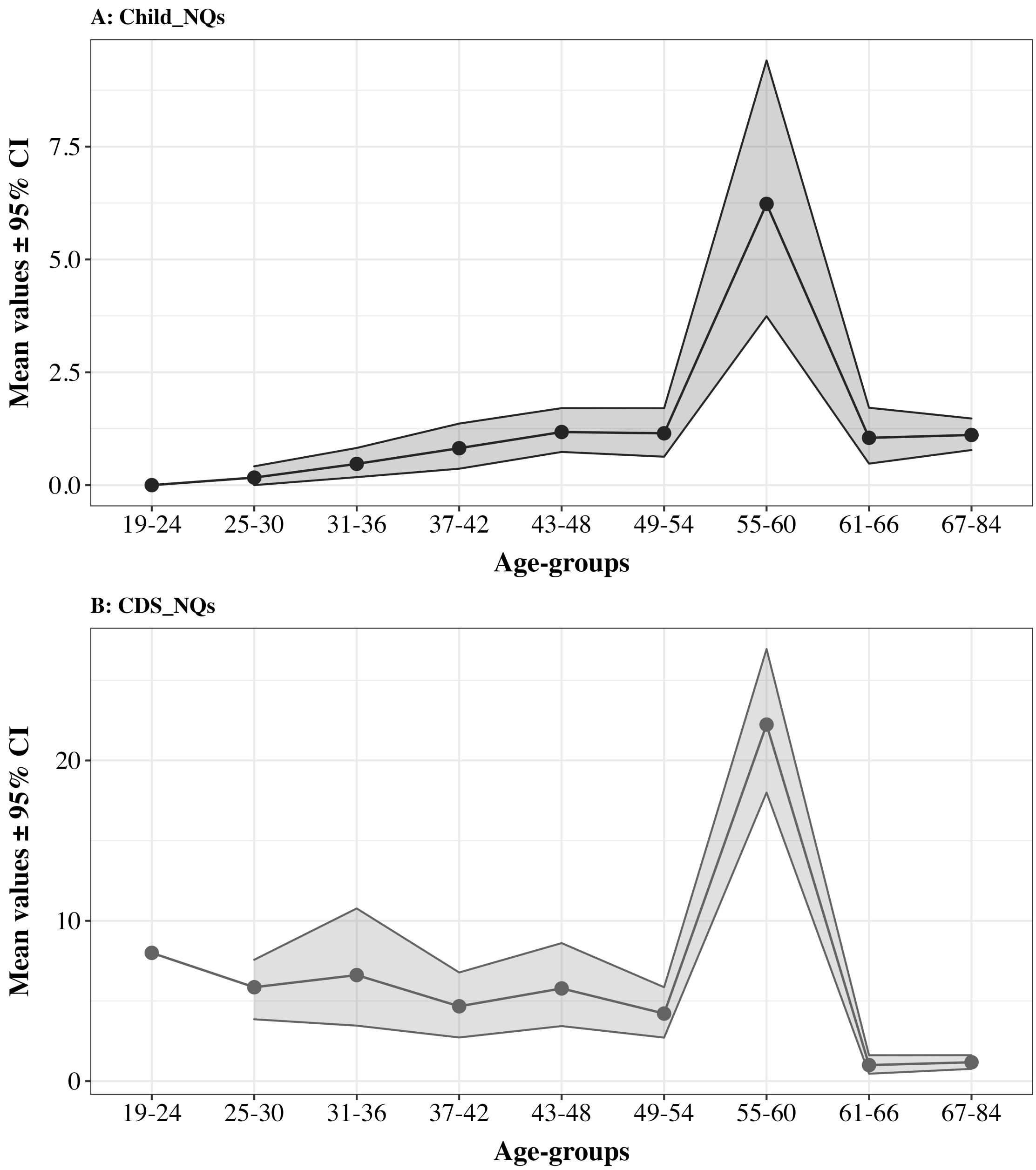

Figure 11.5: Mean use of NQs for children and CDS across age-groups.

Figure 11.5 shows that the average use of NQs in child and CDS sentences. The use of NQs in CDS sentences is quite higher throughout the age-groups as compared to that of children's. All the negative quantifiers were found in children's sentences right from the early months, and quite frequently.

11.5 NC in Negative Concord English

A total of 330 sentences were found for NC in child sentences. Both varieties of Negative concord, Strict and Non-strict NC are found in children's negative sentences.[273] The sentences exemplified in (9) can typically represent both, Strict and Non-strict NC. A negative auxiliary preceding the negative quantifier in the object position in (9) represents the Non-strict NC and the examples shown in (10) can well represent Strict NC: a negative quantifier in the subject position precedes the negative auxiliary.

9). a. It *ain't no* fish in here. (Edwards_rb_Target_Child_415: 44)
b. It *don't* smell like *nothing*. (Edwards_rb_Target_Child_202: 49)

10). a. When *nobody wouldn't* buy me *nothing*. (DELV_Target_Child_ 59DGR1: 74)[274]
b. *No* teacher *won't* let me. (DELV_Target_Child_ 87KDI: 74)

There were only a few sentences where negative auxiliary, NQ, and NPIs were found together in a sentence, as shown below.

11). a. And I'm *not* giving *anyone none*. (Hall_Target_Child_Bobby: 57)
b. I do*n't* love *anybody no* more. (Belfast_Target_Child_Conor: 53)

There was no sentence found in the data showing negative auxiliary inversion.
A total of 417 NC sentences were found for CDS, examples are shown in (12) below.

12). a. *Don't* push *nothing*. (DELV_Target_Child_ 07TFO: 61)
b. And he *didn't* know *nothing*. (DELV_Target_Child_ 55LNE2: 73)

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[273] There were only two sentences found for NC for CDS in DELV corpus. There were no NC sentences found for CDS for Edwards corpus.

[274] Sentences containing more than two negative markers are just a handful. The most frequent form of NC found in Negative Concord English child data were the sentences with two negative markers, i.e., negative auxiliaries preceding negative quantifiers.

Figure 11.6 presents the mean values for NC sentences for children in NC-English.

Figure 11.6 presents the mean values for the use of NC in child sentences for Negative Concord English. The figure shows that the mean values for the first 2 groups remain 0 and 0.08 respectively. The next three groups show slightly higher mean values and the highest of 5.76 makes a spike representing the age-group 55-60. A similar pattern is also observed for the same age-group in figure 11.6(B).

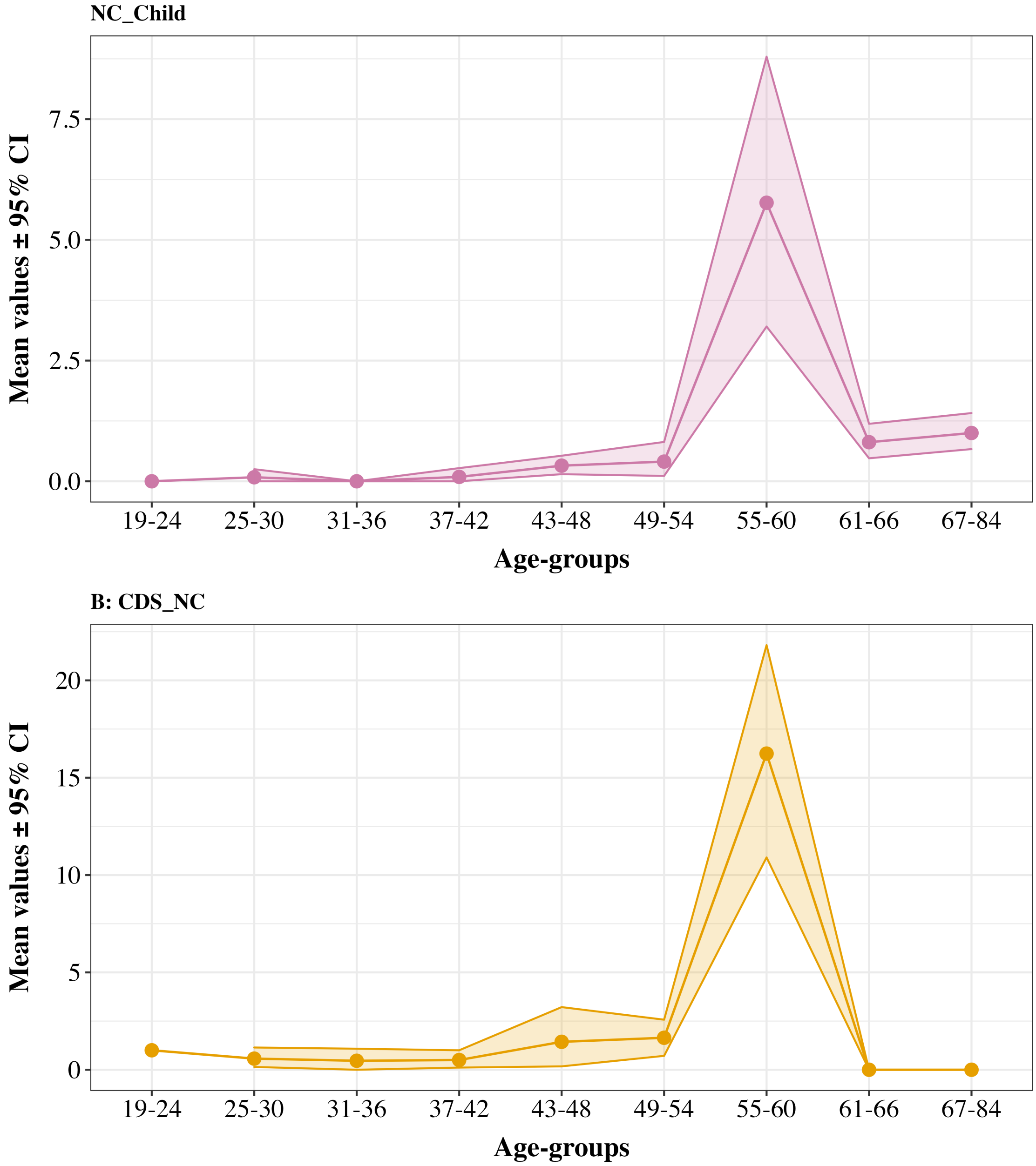

Figure 11.6: Mean values for children's use of NC across age-groups in NC English.

Table 11.2 provides a summary of NC sentences for children and CDS.

	NC	
Age-group	**Child**	**CDS**
19-24	0	1
25-30	1	4
31-36	0	6
37-42	2	9
43-48	11	33
49-54	11	23
55-60	225	341
61-66	17	0
67-84	63	0
Grand total	330	417

Table 11.2: Summary of the NC for children and CDS, across age-groups.

Table 11.2 shows a higher number of NC sentences for CDS as compared to children's, across all the age-groups, except the last two.

In the coming section statistical analyses for the acquisition of *not, n't* and NC in children acquiring NC English will be presented.

11.6 Statistical Analyses

In the first place, subsection 11.6.1 will elaborate on further methodology, in subsection 11.6.2, the acquisition of *not* by young children will be modelled taking not_CDS and age as predictor variables.[275] [276] Secondly, in subsection 11.6.3, for the acquisition of *n't,* children's use of *n't* being taken as a response and *n't* by CDS and age as predictors will be modelled. After that in

[275] CDS sentences for *not*.

[276] Age is taken as a continuous predictor.

subsection 11.6.5, the acquisition of NC will be analysed taking NC in CDS and age as predictors and children's NC as a response variable.

In order to determine the average use of *not* and *n't* between the children of various age-groups, and to compare NC English acquiring children with their SE peers, age-group comparisons will be established.

11.6.1 Methodology

In order to estimate the effect of predictors, a Generalised Linear Mixed Model (GLMM; Baayen, 2008) with negative a binomial error structure and the log link function (McCullagh and Nelder, 1989) was used. The model contained only intercepts taking children (i.e., name) as the grouping factor. The sample analysed for modelling *not* comprised a total of 1343 observations of 82 children. The sample analysed for *n't* comprised a total of 4045 observations of 82 children.

11.6.2 Statistical results for the negative marker *not*

The full model modelled the effect of age and *not* by CDS on children's use of *not*. The full model was clearly significant as compared to the null model (likelihood ratio test: $x^2 = 84.17$, df = 2, $p < 0.0001$). Not_CDS has a significant positive effect with (likelihood ratio test: $x^2 = 81.93$, df = 1, $p < 0.0001$) on children's acquisition of *not*, and age as a continuous predictor does not have a statistically significant effect (likelihood ratio test: $x^2 = 0.043$, df = 1, $p > 0.05$). Since the mean age of children was 54, the non significant effect of age was not unpredictable or unexpected. The model could explain 42% variance in the response from which 34% could be attributed to fixed effect predictors.

The model results confirm one of the central predictions that provided with the required linguistic input, children acquiring NC English will acquire *not* without any difficulty and the adults' provided input will have an effect on children's acquisition of *not*.

11.6.3 Statistical results for the negative marker *n't*

The model estimated the effect of continuous predictor of age and the use of *n't* in CDS (n't_CDS) on children's use of *n't*. The full null model was clearly significant (likelihood ratio test: $x^2 = 106.67$, df = 1, $p < 0.0001$). N't_CDS has a significant positive effect on children's use of *n't* (likelihood ratio test: $x^2 = 107.76$, df = 1, $p < 0.0001$). Age didn't show any significant effect (likelihood ratio test: $x^2 = 0.42$, df = 1, $p > 0.05$). The model could explain 52% variance in the response from which 47% could be attributed to fixed effect predictors. The model results confirm the prediction that adults' input will positively effect children's acquisition of *n't*.

11.6.4 Statistical results for NC

As mentioned above, NC sentences were not found for the CDS in Edwards corpus. It is also mentioned above that for DELV corpus, there were only 2 NC sentences found for the CDS. Children from both of these corpora were not included in the statistical model modelling the acquisition of NC. Consequently, in order to model the acquisition of NC, NC speaking children were divided into two groups, i) children for whom CDS NC sentences were available (group-1) and ii) children whose CDS NC sentences were not available (group-2).

The modelling of NC will be conducted for both the groups separately.

The procedure of the upcoming sections will be following: subsection 11.6.5 will present the modelling of NC first. Then in order to see if children that received NC input differ in acquiring *not* and *n't, not* and *n't* will be modelled using age-group as one of the predictors instead of age as a continuous predictor while all the other things in the model will remain the same. The analyses will be further followed by the post hoc multiple comparisons between children of various age-groups.

11.6.4.1 Group-1: NC

Prediction: Provided the doubling effects/NC input, children will exhibit the presence of NC.
Predictor variables: NC in CDS, and age.
Response variable: Children's use of NC.

Children acquiring NC English received input for NC from their respective CDS speakers. In order to see the effect of CDS NC input and age on children's acquisition of NC, a GLMM model with negative binomial distribution and log link function was used. Since only 25% (8 out of 32) children have repeated observations, only random intercepts were included in the model. The sample analysed for NC comprised a total of 231 observations of 32 children.

The full null model comparison was clearly significant (likelihood ratio test: $x^2 = 57.45$, df = 3, $p < 0.0001$). NC_CDS with (likelihood ratio test: $x^2 = 15.97$, df = 1, $p < 0.0001$) and age with (likelihood ratio test: $x^2 = 35.32$, df = 1, $p < 0.0001$) have a significant positive effect on NC of children.

The model confirms one of the predictions for Negative Concord English that when children are provided with the input containing the doubling effects/NC, they also exhibit the presence of doubling effects/NC in their grammar.

11.6.4.2 Group-1: *n't*

Since NC English acquiring children received NC input which is required to acquire the Neg° marker, in order to see the effect of CDS input for NC, CDS input for *n't* and age (as a continuous predictor) on children's use of *n't,* a GLMM model was fit. The model results showed that n't_CDS with (likelihood ratio test: $x^2 = 26.91$, df = 1, $p < 0.0001$), and age with (likelihood ratio test: $x^2 = 17.41$, df = 1, $p < 0.0001$) showed a significant effect on children's use of *n't*. CDS input for NC does not show any significant effect on children's use of *n't* (likelihood ratio test: $x^2 = 0.58$, df = 1, $p > 0.05$). The model result for CDS NC input does not support the prediction that NC input will have a positive effect on children's acquisition of *n't*.

Post hoc multiple age-group comparisons:

Since it is confirmed that NC English acquiring children receive NC input and show the presence of NC in their grammar, it was predicted that these children will acquire *n't* earlier than their SE acquiring peers since SE peers don't have access to the NC input. In order to see this:

- First, a new model will be fit to see the effect of NC in CDS and *n't* in CDS on children's use of *n't.* A new model will also be used to see the effect of *not* in CDS and age-group on children's use of *not*.
- Second, to see the variation in the estimated average use of *n't* between the children of various age-groups, post hoc multiple group comparisons will be conducted.
- Third, the results for the post hoc multiple comparisons will be compared to that of SE acquiring children.
- Fourth, these post hoc multiple comparisons will be compared to that of *not* to see the inter variation.

N’t: The model fit with the age-group as a predictor showed that while n’t_CDS was positively significant with (LRT: $x^2 = 15.59$, df = 1, $p < 0.0001$). NC_CDS wasn’t statistically significant with (LRT: $x^2 = 1.09$, df = 1, $p > 0.05$). Age-group was also showing positively significant effect with (LRT: $x^2 = 66.25$, df = 7, $p < 0.0001$) on children’s use of *n’t*. All the age-groups were significantly different from the reference age-group, 19-24. In order to see all the age-group differences, post hoc multiple age-group comparisons were conducted using the glht() function from the multcomp package. Age-group 25-30 was significantly different from the age-group 31-36, and age-group 37-42 was also significantly different from its following age-group in exhibiting the estimated average use of *n’t*. No other age-group was found significantly different from its following age-group.

In order to compare the acquisition or estimated average use of *not* and *n’t* between children of various age-groups, separate statistical GLMM models with not_CDS and age-group as predictor variables and children’s use of *not* is used.

Not: In the model fit with age-group and not_CDS as predictors showed that not_CDS was showing a significant effect with (likelihood ratio test: $x^2 = 48.50$, df = 1, $p < 0.0001$) on children’s *not*. Age-group was also showing a statistically significant effect with (likelihood ratio test: $x^2 = 94.87$, df = 6, $p < 0.0001$) on children’s *not*. But no age-group was significantly different from the reference age-group 14-24. Post hoc multiple age-group comparisons conducted with the function glht showed that the age-group 25-31 was significantly different from the age-group 31-37. No other age-group pair was found significantly different in observing the estimated average use of *not*.

Table 11.3 shows the results for post hoc multiple age-group comparisons for the estimated average use of *not* and *n’t* across age-groups for group-1.

Age-group	Estimate		SE		Lower CI		Upper CI		P value	
	not	*n't*	*not*	*n't*	*not*	*n't*	*not*	*n't*	*not*	*n't*
25-30 - 19-24	13.138	0.256	80.959	0.949	-213.67	-2.479	239.95	2.991	> 0.05	> 0.05
31-36 - 25-30	2.984	1.675	1.006	0.356	0.163	0.649	5.805	2.700	0.03	< 0.001
37-42 - 31-36	-0.024	-0.293	0.216	0.231	-0.631	-0.960	0.582	0.373	> 0.05	> 0.05
43-48 - 37-42	0.729	0.702	0.173	0.197	0.243	0.135	1.215	0.127	< 0.001	0.005
49-54 - 43-48	0.176	0.070	0.136	0.203	-0.208	-0.515	0.561	0.656	> 0.05	> 0.05
55-60 - 49-54	0.548	0.864	0.292	0.331	-0.270	-0.090	1.367	1.818	> 0.05	> 0.05

Table 11.3: Results for post hoc multiple age-group comparisons for the estimated average use of *not* and *n't* across age-groups.

The results for post hoc multiple age-group comparisons shown in table 11.3 exhibit that the estimated average use of *not* and *n't* does not differ significantly between the first pair of age-groups but differs between the second pair. The results further suggest that age-groups show similar variation for *not* and *n't*. Thus the post hoc analyses suggest that children acquiring NC English were acquiring the Neg° negative marker *n't* simultaneously to *not*. The results also support the prediction that NC English acquiring children who receive NC input will exhibit the simultaneous acquisition of adverbial and Neg° negative markers, *not* and *n't.*

11.6.4.2 Group-2

For children whose NC input was not available, in order to check if age has any effect on children's NC, a GLMM model with only age as a continuous predictor was fit. The age did not turn out to be significant (likelihood ratio test: $x^2 = 1.36$, df = 1, $p > 0.05$). Since the age did not turn out to be significant, we did not conduct post hoc multiple age-group comparisons for further investigations.

11.7 Discussion

In chapter 6, Zeijlstra's proposed FFFH and the learning algorithm propose that children acquiring Negative concord English will initially hypothesis that negation is semantic in their language. Since children have readily access to the NC input which explicitly shows the exhibition of formal features/doubling effects of negation, children will have to re-hypothesise the value for negation, i.e., they will revalue the value of negation from semantic to formal negation. This section will provide the discussion based on the empirical and inferential evidence gathered in this chapter.

11.7.1 Projection of formal features through Neg° and NC

Zeijlstra's proposed algorithm for the acquisition of negation states that initially, children will assume that formal features are not present in the language input and all the features are semantic. Only the presence of the doubling effect with respect to negation will lead children to re-hypothesise that formal features of negation are present in their language.

NC English allows the use of more than one negative element per clause and exhibits the presence of doubling effects of negation, explicitly. Data presented in this chapter for NC English exhibits the presence of NC in CDS input and thus confirms that NC or doubling effects with respect to negation are present in NC English speaking adults. The presence of NC was also found for all the children acquiring NC-English. Theoretically and empirically it was confirmed that children who receive NC input from their caregivers exhibit the presence of NC in their grammar, and the theoretical and empirical observations were further confirmed by the statistical model results which clearly showed the strong positive effect of NC input of caregivers on children's NC.

Similar to the arguments presented for SE, based on the adult-like use of *n't* for up to 97%, it is argued that children acquire *n't* very early and in an adult-like manner. Based on these findings, it is also argued that the projection of formal features of negation is projected in children's grammar as soon as they acquire the negative head marker *n't*. IN addition, the active and productive use of *n't* also helps determine the acquisition of *n't*. Children's transition from the semantic to formal negation stage is rapid and barely traceable.

11.7.2 Cross-linguistic comparison for NC

It is important to note that data for children acquiring NC English was available from the 24th month of age. The presence of the use of *n't* was found right from the 24th month of age but NC was found from the 42nd month of age. It is also important to note that same children were receiving NC from their caregivers right from the 24th month of age. Henry (2016), Wilson and Henry (1998), and Henry et al. (2005) argue that children acquiring NC English master NC soon after their 3rd birthday and become productive until the age of 4 years.

It is also important to note that NC was found in SE acquiring children's negative sentences from the 23rd month but for NC English acquiring children, it was found from the 42nd month.

It is shown in chapter 9 for Italian that children were having access to NC right from the age of month 16th from where the data is available, but the first NC in English children's sentences was found from the age month 23rd. It might be the possibility that children acquiring NC English do possess NC earlier than it was found in their data. It is important to note that children for both varieties of English were using *n't* before NC was found in their negative sentences. It is also important to note that NC was found for 45% (78 out of 171) of the children acquiring NC English and only 17% of children acquiring SE produced NC. 100% of children acquiring Italian produced NC, see chapter 8 for details about SE and chapter 9 for detailed results for Italian.

11.7.3 Double negation and Negative Concord grammar

When it comes to exhibiting the NC or double negation grammar, children acquiring NC English exhibit the existence of both of them, similar to their SE peers. To generate NC, children used NQs in combination with negative marker *n't,* and also used more than one NQ per sentence. Interestingly, children also used NQs in object positions as the only negative elements, similar to DN languages, e.g., Dutch and SE.

Green (2015) argues that children used NQs as the only negative elements in their sentences and thus exhibit that NC is only optional in African American English and not a norm, unlike Italian where it is compulsory. Green also argues that children acquire NC assuming that it is a structural pattern of their language (see also Green (2015), also personal communication).

Furthermore, based on the data findings, it is argued that there is some overlap observed between children acquiring SE and their NC English acquiring peers with respect to the exhibition of NC, i.e., i) they both show similar patterns and varieties of NC, ii) similar patterns for the use of NQs, and iii) the presence of *n't* earlier to NC. Similar findings are also reported in Stokes (1976). Similar to studies studying NC in SE acquiring children through elicitation and imitation tasks Stokes argues that children assigned NC readings to sentences with more than one negative element, the same is reported for children acquiring NC English in Coles-White (2004).

11.7.4 Acquisition of *n't* and *not* between children acquiring SE and NC English

It was predicted in chapter 6 that children acquiring NC English will acquire *n't* earlier and without any difficulty since the required input (i.e., NC) for the acquisition of *n't* is readily available to them, and also earlier than their SE peers because they have access to the NC input from their caregivers which SE peers don't. There are 4 subgroups for SE and only two for NC-E, a very cautious comparison will be drawn in this section for SE group-3 which contains children who didn't receive any NC input from their adult speakers but themselves produced NC, and also with SE group-4 since they also received NC input (in principle, SE group-4 is similar to NC English group-1).

SE subgroup group-3: children in SE subgroup group-3 did not receive any NC input but themselves produced NC. When we compare the results for post hoc multiple age-group comparisons for NC English group-1 and SE group-3, we see that children in both of these groups exhibit similar behaviour with respect to the estimated average use of *not* and *n't*. Furthermore, the estimated average use of *n't* does not differ among children of the age-group pair (25-30 – 31-36) but it still differs for NC English children.

SE subgroup group-4: children in SE subgroup group-4 were identical to their NC English acquiring peers since they also received NC input from their CDS speakers. When comparing the post hoc multiple age-group comparison results of NC English in group-1 and SE group-4, it is shown that children in both of these groups behave similar with respect to the average use of *not* and *n't*. Based on this comparison it is argued that children acquiring NC English do not differ in acquiring the Neg° marker *n't* from that of their SE acquiring peers.

It is important to note that these both comparisons have only a limited interpretation since the number of children acquiring NC English in each age-group is less than the number of children acquiring SE in each age-group. Also, the number of sentences containing *n't* and *not* is higher in SE across age-groups as compared to NC-E.

11.8 Conclusion

This chapter presents the empirical findings and results for the acquisition of sentential negation and negative concord for Negative Concord English acquiring children. The chapter presents the total number of negative sentences for children's as well as CDS negative sentences. It is shown that children's negative sentences are very much adult-like and grammatical. It was also shown that CDS input for *not* and *n't* used as a single negative marker has a positive significant effect on children's respective negative marker. NC input in CDS also showed a significant effect on children's NC. Besides, there was no significant effect of NC found on the acquisition of the Neg° negative marker *n't*. Furthermore, children who received NC input were found showing similar estimated average use of the adverbial and Neg° negative marker, across age-groups. The results for post hoc multiple comparisons show the support for the simultaneous acquisition of adverbial and Neg° negative marker for children who receive NC input from their adult speakers. The correlation between predicted Neg° negative marker and NC correlation is also confirmed.

Chapter 12

Major conclusions

This chapter will present the major conclusions drawn based on the cross linguistic theoretical, empirical, and inferential evidence presented in this thesis. This dissertation presents large scale analyses of more than 200,000 negative sentences of 1432 children of 1 to 7 years of age and 300,000 negative sentences by their caregivers. This thesis excessively investigates the acquisition of negation and negative concord by young children acquiring first language. Dutch, Italian, Standard English, and Negative Concord English constitute the sample languages for the data investigated in this thesis.

The study supersedes existing studies of negation on three levels of sampling, i) the number of sample children studied, ii) the number of negative sentences per sample child, and iii) the number of total negative sentences investigated, for each sample language.

12.1 Descriptive statistics

This thesis presents detailed descriptive statistics of children's negative sentences throughout the age months, for every sample language investigated, prior to conducting the inferential statistical analyses. A comprehensive and detailed view using summary statistics (total counts, averages, relative frequencies, and percentages) is presented for children's negative sentences across the age months and age-groups. Furthermore, the quantitative analyses presented that include inferential evidence (i.e., significant testing, p values, confidence intervals, etc.) are considered to bear more advantage than the descriptive and qualitative analyses due to their ability in providing more generalisable conclusions and reflecting the relation of predictors and response variables (Yarkoni, 2022; Baayen, 2008; McCullagh and Nelder, 1989).

12.2 Theoretical background

It has been argued in the existing literature on the acquisition of sentential negation that young children pass through various stages until they reach the adult-like stage of expression of negation. There have been numerous theories presented, which propose different syntactic structures for different negative elements. Sentential negative markers have been divided into pre-verbal and post-verbal negative markers. Syntactic theories of negation assign different interpretations and syntactic statuses to negative markers, negative quantifiers and their counterparts, e.g., neg-words. Based on the varying nature of negative elements, natural languages are divided into Double Negation (DN) and Negative Concord languages (NC). These theories have been discussed in detail in this thesis in chapters 2 and 3.

One of the major theories includes Zeijlstra's theory of negation and negative concord. Zeijlstra (2004, et seq.) presented his theory of sentential negation and negative concord and argues that negative markers that are syntactic heads, Neg°, will host their own functional projection, NegP, while adverbial negative markers will sit as XPs in the Spec-Neg position of NegP. Based on the syntactic status of negative markers, Zeijlstra divides natural languages into NC and DN languages. NC languages are argued to exhibit the presence of negative markers that are syntactic heads while DN languages use adverbial negative markers to express sentential negation. He further argues that NC is a syntactic agreement between more than one elements containing the formal features of negation and presents a multi-step process to identify them. Zeijlstra presents a learning algorithm that predicts a process for the acquisition of sentential negation and NC in a child's first language. Zeijlstra's theory and proposed learning algorithm is followed in this thesis to investigate the acquisition of sentential negation and NC in child language.

12.3 Operationalising the variables

Chomsky (1959) and Yarkoni (2022) among others argue that a psychological and cognitive behaviour like the acquisition of language is hard to evaluate. What can we do is operationalise the language into a measurable variable and investigate its acquisition. In this dissertation, we operationalised the acquisition of language into the acquisition of negation and NC. That could also translate into acquiring sentential negation using one and more than one negative elements. We focus on, for example, when do children show the use of a particular negative element, when do they establish the acquisition of a certain negative element, when do they acquire expressing sentential negation using more than one negative elements, how far children on average are grammatical and correct in expressing sentential negation using one or more than one negative elements, depending on her local language, at the age of e.g., 2.5 or 3 years? We also focused what predictors play a significant role in children's acquisition of negation and NC, and what do not, etc.?

In the next subsection, the major conclusions of this thesis will be presented.

12.4 Major conclusions

In this section, the major conclusions based on empirical results and inferential evidence following Zeijlstra's predictions will be presented which are as follows:

12.4.1 The Role of CDS input

CDS or caregivers' provided language input is an important predictor which is associated with children's acquisition of negation and NC. The CDS input was fully grammatical and complete, e.g., even when children are just 13 months old and they are only able to utter one word, e.g., *no*, the input provided to them contains whole sentences. In short, it is argued that the quality of CDS input for negation is the same as when it is directed either to 1 year old or a 7 year old child.

Based on the inferential evidence gathered in this thesis, it is argued that CDS input for negation has a highly significant positive effect on children's acquisition of negation. In various first language acquisition studies, the effect of CDS input has been established on various grounds. For instance, the quality of input has shown a positive effect on language development (Hirsh-Pasek et al, 2015). The input quantity has also been shown as a predictor for language development after the second year of child's life (Rowe, 2012). The proportion of time of receiving CDS input (Cartmil et al., 2013) and healthy interaction between child and CDS input providers (Bruner, 1983; Romeo et al., 2018) also have been shown as a positive predictors for language development of children.

It has been often reported in the literature that CDS input must be age-appropriate, i.e., parents should/must use simpler vocabulary, or simple sentence structure when speaking to children. The effect of simpler speech might be visible when investigating children's acquisition of nouns and verbs, for instance. Parents may use singular nouns, or easy verbs with regular endings, etc. When it comes to using negation in CDS language input, there seems less role for simplistic speech or age-appropriateness. In all the languages investigated in this thesis, to express negation, caregivers used the specified negative elements (*not/niet*, *nobody/niemand*, etc.) for their local language to express negation. Caregivers did not make these negative elements any simpler, adapted or modified by themselves. They used them in the sentence in the same way when addressing 1 year old or older children. The form, meaning, and function of the negative elements wasn't changed or made simpler or age-appropriate at any stage of age range investigated here.

In addition, there is very little to almost no variation observed across CDS speakers in their negative sentences. CDS speakers of children of younger age and older age reflect the same/similar use of negative elements. The seemingly complex expressions of negation (so-called hard English negative auxiliaries e.g., *doesn't, weren't*, NC in Italian, use of Dutch negative marker *niet* in sentences with complex verbs, etc) are present in all CDS speakers' negative sentences from the very first year of child's life.

Based on the data investigated and evidence gathered, it is argued that the positive effect of CDS input is reflected in the acquisition of negation by young children in several ways, i) the negative elements are used in the correct form to a large extent even by younger children, ii) the negative elements are used in the correct position in the sentences, up to 97%, iii) all the negative elements used by CDS input providers are also used by children, iv) children picked up a majority of the negative elements from very early months of their second year of age.

12.4.2 The effect of age

The role or effect of age in the course of language acquisition in adults' second and children's first language acquisition has also been established. At the same time, the role of age is different for children and adults. For instance, age plays a positive role in children's acquisition of language as with growing age their mental cognitive abilities improve and make language development easier. But age is not said to play the same positive role in growing adults' acquisition of a new language because for adults, growing age can be associated with a decline in certain cognitive abilities that can hinder the easy development of a new language. See Badea (2008).

The effect of age is not only shown in terms of being positive or negative but also by displaying the relationship of age with children's expression of negation in general, the relationship of age with adult-like/grammatical expression of negation, and also with non-adult-like/ ungrammatical expression of negation. Children's use and expression of negation develop, change, improve, and become more intelligible as they grow older. It is also important to note that the acquisition or use of any particular negative element does not differ between children of age-group older than 25-30 months. The acquisition process is a rapid one. As soon as the age and proficiency level of children's expression of negation increase, inter-subject variation and individual differences also increase which tends to enhance the role of other factor also.

12.4.3 One to one mapping between negative form and meaning in DN language

It has been predicted that a DN languages like Dutch exhibits a clear 1:1 mapping between the negative form and meaning. This predicted 1:1 mapping was empirically observed in the CDS negative sentences. The same was also observed in children's negative sentences. Children used one negative element, for instance, the negative marker *niet* or any of the NQs, per clause in 100% of the cases. No sentences containing more than one negative element were found either in CDS or child negative sentences. Furthermore, results of statistical models show the statistically highly significant positive effect of CDS input for negation which further validates the empirical results.

12.4.4 Correlation between Neg° negative marker and NC

Zeijlstra's proposed theory of NC predicts a correlation between the negative marker Neg° and NC. Zeijlstra argues that any language that exhibits the presence of a negative head marker, Neg°, also exhibits the presence of NC. The empirical and inferential evidence from the child and adult data of Italian, and that of Negative Concord English fully support the proposed correlation between Neg° and NC. Both of these languages exhibit NC and also the presence of a Neg° negative marker. All the children and their respective caregivers who were found producing NC were already using the Neg°, for example, negative maker *non* for Italian and *n't* for NC English. Furthermore, Standard English which is not an explicit NC language but exhibits the presence of Neg° negative marker *n't*, also showed the presence of NC in child data in 2 of the subgroups.

12.4.5 Correlation between NC in adult's input and NC in child's grammar

Zeijlstra predicts that the presence of doubling effects or formal features of negation in the caregivers' language input will lead to the presence of the doubling effects or formal features of negation in the child's language. The prediction is supported by the empirical and inferential evidence collected from CDS and child data of Italian and Negative Concord English. All the Italian acquiring children who exhibited the presence of doubling effects of negation were already receiving the input for it from their caregivers. Same was the case for Negative Concord English. The evidence from one subgroup of Standard English also supports this predicted correlation.

In addition, empirical and inferential evident collected form the DN language, Dutch, shows that the absence of the doubling effects or formal features of negation in the adults's language input is also reflected in children's grammar. No doubling effects or NC was found in CDS and child data for Dutch.

12.4.6 Correlation between the NC input and the acquisition of Neg°

Zeijlstra's proposed theory of negation and negative concord predicts that for the early or timely acquisition of the negative head marker, NC is the required input. This correlation is supported empirically for Italian, Negative Concord English, and Standard English.

Children acquiring Italian, children of two subgroups acquiring Standard English and children acquiring Negative Concord English who were using the Neg° negative markers (*non* in Italian and *n't* in SE and NC English) were receiving NC input from their caregivers. Although only partial inferential support was found for this correlation from Italian, Negative Concord English, and another subgroup of SE.

12.4.7 Earlier acquisition of the adverbial negative marker than of the Neg° marker

It was also predicted particularly for Standard English that children who do not receive the required input of NC for the timely acquisition of the negative head marker *n't*, their acquisition of the negative head marker will be bit delayed. Or they will acquire the Neg° negative marker *n't* later than the adverbial negative marker, *not*. The post hoc multiple age-group comparisons for subgroup 3 and subgroup-1 for Standard English provide only partial support for this prediction. The magnitude of the estimated difference between the age-groups for the estimated average use of *n't* is greater as compared to *not* but overall the estimated difference was not found statistically significant. For children of both of these subgroups, no NC input was found in their respective CDS.

12.4.8 Simultaneous acquisition of adverbial and Neg° negative markers

It was also predicted for Standard English that children who do not receive complete input (input containing NC and also *n't* as the only negative marker) will acquire the adverbial negative marker *not* earlier than Neg° negative marker *n't*. As it was mentioned that data for SE were divided into 4 subgroups based on the presence or absence of NC in children's and their respective CDS data. The prediction is fully supported by the post hoc multiple comparisons of subgroups group-2 and group-4 who received the NC input along with the input containing only *n't*. Children of both of the subgroups were exhibiting similar estimated average use of both of the negative markers across age-groups that suggests that children receiving the required input exhibit the simultaneous acquisition of *not* and *n't*.

12.4.9 The role of individual children

Other than age and CDS input, still there is a substantial amount of effects that could solely be explained by the individual variation and role of children. Chomsky (1959, et seq.) argues that studying the acquisition of the language or a particular part of a language that involves the role of human organisms is a hard task, particularly in the absence of neurophysiological evidence. In that case, multi level evidence must be collected from the data. The inferences about the role of humans will have to be largely drawn on the bases of detailed observations of input, output, and several dimensions of the data for which the conclusions are drawn.

There are several levels of individual specific roles or variations that tend to happen in children's expression of negation in the data investigated in this thesis. For example, i) it is naturally clear that not all children are the same in their production of language in general or particularly in the expression of negation. ii) The ability of children's production of negation would be different at a particular age. iii) Not all children will bear the same effect of their caregivers' provided language input. iv) The effect of caregivers' input will be different on children of different ages. v) It is also important to note that caregivers' provided language input will not have a constant effect throughout the different time points of age (e.g., from age month 18th to 24th) for any particular child. The input will have a varying effect on children's ability to use negation. In short, there is a substantial amount of individual specific variability between children, cross linguistically.

Any statistical analyses that do not account for this variation will not be able to present a conclusion in an objective and precise way. Any conclusion presented based only on the frequency of the presence of a particular feature in children's grammar entirely differs from a conclusion that is based on selecting a statistical model which measures the effect of a set of predictors while taking into account the child specific variation with respect to the predictors. This is exactly where this research study on children's acquisition of negation differs from the existing ones. To test any particular prediction related to any particular negative element, children's individual specific variation was taken into account while setting the statistical models. Every conclusion presented above and below holds its generalisability while accounting for the individual specific variation and is primarily based on the inferential statistics.

Based on the evidence gathered, it is argued that on average children acquired sentential negation of their language very early, for instance until the age of 30 months, most of the children have developed adult-like expressions of negation and the average use of negation wasn't different among them anymore. When we closely observe children's expression of negation, it is revealed that as soon as they cross the age of 25 months, their abilities to the expression of negation get a boost. Almost all children are talking more, more correctly, and freely. It has been a weak perception in the existing child language acquisition research that if children talk more, they make more mistakes. This assumption does not hold validity for the data presented in this thesis. As soon as children have crossed 30 months of age, their expression of negation not only increases in quantity but also becomes more adult-like and grammatically correct.

12.5 Summary

It has been shown in this thesis that the expression of negation in children's naturalistic spoken speech is adult-like to an maximum extent (with 97% ratio of correct and grammatical expression). If a language exhibits NC in adult language, NC is also reflected in children's language. If a language does not exhibit the presence of NC in adult language input, the same will also be reflected in children's grammar until or unless there is a strong motivation to do otherwise.

Based on the cross linguistic evidence gathered in this thesis, it is also argued that stages of the acquisition of negation cannot be completely established based on the onset of particular negative elements (e.g., the time when a negative element appears in a child's language), as has been extensively reported in the literature so far. Evidence presented here strongly suggests that there is a clear overlap in the onset of certain negative elements, i.e., more than one negative elements appear simultaneously.

The evidence presented in this thesis also suggests that it is very tricky to predict the stage of the acquisition of negation even based on age. As soon as children reach the age of 13-18 months, they begin expressing negation used in sentences of 2-3 words. After the age of 30 months, children are up to 97% of the time adult-like in their expression of negation. Some of the early-talking children are adult-like even before reaching the age of 30 months.

12.6 Open questions

Recently, there have been research studies based on imitation, elicitation, and other experimental techniques studying the comprehension of negation in child language which argue that children acquiring a DN language, e.g. German, display the exhibition of NC (Nicolae, et al., 2022). Children acquiring German assign NC interpretations to negative sentences containing two negative elements. We did not find the presence of NC in our production data for German (unpublished data of our project, Arshad & Zeijlstra, in prep). Assigning the interpretation of NC reading to truly double negation sentences has also been reported even for NC languages, e.g. Italian (Moscati, 2020/2021).

Just as research studies studying the production of negation and NC, based on a small set of samples (e.g., 2-5 children), lack the ability to generalise over to a broader population, the studies investigating the comprehension of sentential negation of more than one negative element also lack the ability to provide a comprehensive answer to the question why, when NC is not present in children's production data, is it still present in children's comprehension.

Just like this cross linguistic large-scale study investigating children's production data, a cross-linguistic large-scale study studying the comprehension data of children could provide enlightenment on the questions just raised above, and explain the mismatch between the production and comprehension of children's understanding of negation.

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Appendices

Appendix_A: List of all the languages investigated.

Index	Name
1	Standard English US
2	Standard English UK
3	Negative Concord English
4	Dutch
5	Italian

Appendix_B: List of all the corpora used per language investigated.

	Languages			
SE: USA	**SE: UK**	**Dutch**	**Italian**	**NC English**
Bates	Conti4	Asymmetries	Antelmi	DELV_December 2019
Bernstein Ratner	Cruttenden	BolKuikenTD	Calambrone	Edwards-2
Bliss	Fletcher	DeHouwer	D_Odorico	Edwards-4
Bloom_70	Forrester	Groningen	Klammler	Belfast
Bohannon	Howe	SchlichtingVanKampen	Roma	HALL_Black
Braunwald	Lara	Utrecht 2	Tonelli	Total = 5
Brent	Manchester	VanKampen	vanOosten	
Brown	MPI-EVA-Manchester	vanOosten	Total = 7	
Clark	Thomas	Wijnen		
Cornell	Thomardahl	Zink		
Demetras-Trevor	Wells	Schaerlaekens		
Demetras-Working	Smith	Dutch-AarssenBos		
EllisWeismer	Korman	Gillis		
Evans	Gathburn	Total = 13		
Feldmann	Conti1			
Garvey	Total = 15			
Gathercole				
Gelman				
Gillam				
Gleason				
Haggerty				
Hall_White				
Higginson				
HSLLD				
Kuczaj				
MacWhinney				

McCune				
McMillan				
Morriset				
Nelson				
New England				
Newman Ratner				
NH				
Normal				
Peters/Wilson				
POLER-Controls				
Post				
Providence				
Rollins				
Sachs				
Snow				
Suppes				
Tardiff				
Valian				
Van Houten				
van Kleeck				
Warren_Leubecker				
Weist				
ComptonPater				
Davis				
Goad				
Inkelas				
Providence				
Bloom-73				
Carterette				
ComptonPater				
Davis				
Goad				

NewmanRatner				
Narrative				
PaidoEnglish				
Sawyer				
Soderstrom				
Sprott				
StanfordEnglish				
Twins				
Total = 66				

Appendix_C: List of total number of chat files searched per language and corpora.

		Language			
	SE: USA	SE: UK	Dutch	Italian	NC-English
Chat_files	11893	2925	1195	210	609
Grand_total	16432				

Appendix_D: Total number of sentences in each language for children and CDS.

		Language				
Sentences	**SE: USA**	**SE: UK**	**Dutch**	**Italian**	**NC-E**	**Total**
Child	83959	85897	11515	3035	8888	193294
CDS	124111	142626	20643	6919	23865	318164
Total	208070	228523	32158	9954	32753	511458

Appendix_E: List of major Python SessionInfo:

session_info.show(html=False, std_lib=True, dependencies=False)

```
collections         NA
math                NA
numpy               1.20.1
os                  NA
pandas              1.2.4
pprint              NA
pylangacq           0.15.0
pymongo             3.11.0
session_info        1.0.0
time                NA
-----
IPython             7.22.0
jupyter_client      6.1.12
jupyter_core        4.7.1
jupyterlab          3.0.14
notebook            6.3.0
-----
Python 3.8.8 (default, Apr 13 2021, 12:59:45) [Clang 10.0.0 ]
macOS-10.13.6-x86_64-i386-64bit
```

Appendix_F: sessionInfo()

R version 3.6.3 (2020-02-29)
Platform: x86_64-apple-darwin15.6.0 (64-bit)
Running under: macOS High Sierra 10.13.6

Matrix products: default
BLAS: /System/Library/Frameworks/Accelerate.framework/Versions/A/Frameworks/vecLib.framework/Versions/A/libBLAS.dylib
LAPACK: /Library/Frameworks/R.framework/Versions/3.6/Resources/lib/libRlapack.dylib

locale:
[1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8

Attached base packages:
[1] stats graphics grDevices utils datasets methods base

Other attached packages:

multcomp_1.4-20	TH.data_1.1-0	mvtnorm_1.1-3	brms_2.18.0
AER_1.2-10	sandwich_3.0-1	lmtest_0.9-39	zoo_1.8-9
pscl_1.5.5	MuMIn_1.46.0	GLMMadaptive_0.8-5	GGally_2.1.2
Formula_1.2-4	survival_3.3-1	qpcR_1.4-1	robustbase_0.93-9 r
minpack.lm_1.2-1	MASS_7.3-55	lmerTest_3.1-3	forcats_0.5.1
readr_2.1.2	tibble_3.1.6	tidyverse_1.3.1	broom_0.7.12
car_3.0-12	carData_3.0-5	caret_6.0-91	lattice_0.20-45
gridExtra_2.3	plotly_4.10.0	gganimate_1.0.7	patchwork_1.1.1
RColorBrewer_1.1-2	viridis_0.6.2	viridisLite_0.4.0	reshape2_1.4.4
lme4_1.1-28	Matrix_1.2-18	table1_1.4.2	dplyr_1.0.8
ggplot2_3.3.5	Rcpp_1.0.8.3	afex_1.1-1	Hmisc_4.6-0
gl_0.108.3	stringr_1.4.0	purrr_0.3.4	ggpubr_0.4.0
nlme_3.1-153	tidyr_1.2.0		

Loaded via a namespace (and not attached):

utf8_1.2.2	tidyselect_1.1.2	htmlwidgets_1.5.4	grid_3.6.3
pROC_1.18.0	munsell_0.5.0	codetools_0.2-18	DT_0.25
miniUI_0.1.1.1	future_1.24.0	withr_2.5.0	Brobdingnag_1.2-7
colorspace_2.0-3	knitr_1.38	rstudioapi_0.13	stats4_3.6.3
ggsignif_0.6.3	bayesplot_1.9.0	listenv_0.8.0	labeling_0.4.2
rstan_2.21.3	farver_2.1.0	bridgesampling_1.1-2	coda_0.19-4
parallelly_1.30.0	vctrs_0.3.8	generics_0.1.2	ipred_0.9-12
xfun_0.30	markdown_1.1	R6_2.5.1	cachem_1.0.6
reshape_0.8.9	assertthat_0.2.1	promises_1.2.0.1	scales_1.1.1
nnet_7.3-17	gtable_0.3.0	globals_0.14.0	processx_3.5.3
timeDate_3043.102	rlang_1.0.4	splines_3.6.3	rstatix_0.7.0
lazyeval_0.2.2	ModelMetrics_1.2.2.2	inline_0.3.19	checkmate_2.0.0
yaml_2.3.5	abind_1.4-5	modelr_0.1.8	crosstalk_1.2.0
threejs_0.3.3	backports_1.4.1	httpuv_1.6.5	tensorA_0.36.2

tools_3.6.3	lava_1.6.10	ellipsis_0.3.2	jquerylib_0.1.4
posterior_1.3.1	ggridges_0.5.3	plyr_1.8.7	base64enc_0.1-3
progress_1.2.2	ps_1.6.0	prettyunits_1.1.1	rpart_4.1.16
haven_2.4.3	cluster_2.1.2	fs_1.5.2	survey_4.1-1
magrittr_2.0.2	data.table_1.14.2	colourpicker_1.1.1	reprex_2.0.1
effects_4.2-1	matrixStats_0.61.0	shinyjs_2.1.0	xtable_1.8-4
mime_0.12	hms_1.1.1	evaluate_0.15	shinystan_2.6.0
jpeg_0.1-9	readxl_1.3.1	rstantools_2.2.0	compiler_3.6.3
crayon_1.5.1	StanHeaders_2.21.0-7	minqa_1.2.4	htmltools_0.5.2
later_1.3.0	tzdb_0.2.0	RcppParallel_5.1.5	lubridate_1.8.0
DBI_1.1.2	tweenr_1.0.2	dbplyr_2.1.1	boot_1.3-28
cli_3.3.0	mitools_2.4	igraph_1.2.11	parallel_3.6.3
insight_0.18.3	gower_1.0.0	pkgconfig_2.0.3	pkgdown_2.0.6
numDeriv_2016.8-1.1	foreign_0.8-75	recipes_0.2.0	xml2_1.3.3
foreach_1.5.2	dygraphs_1.1.1.6	bslib_0.3.1	hardhat_0.2.0
prodlim_2019.11.13	rvest_1.0.2	callr_3.7.0	distributional_0.3.1
digest_0.6.29	rmarkdown_2.13	cellranger_1.1.0	htmlTable_2.4.0
gtools_3.9.2	shiny_1.7.1	nloptr_1.2.2.2	lifecycle_1.0.1
jsonlite_1.8.0	fansi_1.0.3	pillar_1.7.0	loo_2.5.1
pkgbuild_1.3.1	fastmap_1.1.0	httr_1.4.2	DEoptimR_1.0-10
xts_0.12.1	glue_1.6.2	shinythemes_1.2.0	png_0.1-7
iterators_1.0.14	class_7.3-20	stringi_1.7.6	sass_0.4.1
latticeExtra_0.6-29	memoise_2.0.1	future.apply_1.8.1	

Appendix_G: Sample of Model Equations: Dutch

Full_Model:

```
niet_model= glmer.nb(NIET~ age_month + TAGniet_cds +
                (1+age_month|name) +
                  (1+TAGniet_cds|name),
            data=chi_niet)
```

Null_model:

```
null_model= glmer.nb(NIET~ 1 +
                (1+age_month|name) +
                  (1+TAGniet_cds|name),
            data=chi_niet)
```

Age_group_Model:

```
niet_grp_model= glmer.nb(NIET~ age_group + TAGniet_cds +
                  (1+TAGniet_cds|name),
            data=chi_niet)
```

Appendix_H: **Post hoc multiple age-group comparisons: Dutch**

```
Fit: glmer(formula = NIET ~ age_group + TAGniet_cds + (1 + TAGniet_cds |
    name), data = chi_niet, family = MASS::negative.binomial(theta = 2.94480252371024))

Linear Hypotheses:
                     Estimate Std. Error z value Pr(>|z|)
25-30 - 19-24 == 0   1.8026     0.1959   9.202  < 0.001 ***
31-36 - 19-24 == 0   2.0717     0.1960  10.571  < 0.001 ***
37-42 - 19-24 == 0   2.4469     0.2080  11.766  < 0.001 ***
43-48 - 19-24 == 0   1.6578     0.2655   6.245  < 0.001 ***
31-36 - 25-30 == 0   0.2692     0.1351   1.993  0.25857
37-42 - 25-30 == 0   0.6444     0.1539   4.186  < 0.001 ***
43-48 - 25-30 == 0  -0.1447     0.2292  -0.632  0.96835
37-42 - 31-36 == 0   0.3752     0.1468   2.555  0.07447 .
43-48 - 31-36 == 0  -0.4139     0.2265  -1.828  0.34535
43-48 - 37-42 == 0  -0.7891     0.2271  -3.475  0.00431 **
```

Appendix_I: (A) Number of children in each age month: Dutch

X.	Age-month	Num of children	X.	Age-month	Num of children
1	19	2	21	39	6
2	20	2	22	40	6
3	21	2	23	41	6
4	22	8	24	42	4
5	23	7	25	43	2
6	24	7	26	44	2
7	25	8	27	50	1
8	26	8	28	51	1
9	27	7	29	52	1
10	28	7	30	56	3
11	29	10	31	58	1
12	30	8	32	59	2
13	31	7	33	60	1
14	32	8	34	63	2
15	33	5	35	65	1
16	34	8	36	69	1
17	35	8	37	72	1
18	36	10	38	77	1
19	37	7	39	79	1
20	38	6	40	97	1

(B) Children in each age-group

X.	Age-group	Num of children
1	19-24	28
2	25-30	48
3	31-36	46
4	37-42	35
5	43-48	22

Appendix_J: (A) Number of children in each age month: Standard English

X.	Age_month	Num. of Children
1	13	11
2	14	21
3	15	13
4	16	15
5	17	29
6	18	74
7	19	60
8	20	81
9	21	73
10	22	36
11	23	65
12	24	177
13	25	51
14	26	78
15	27	79
16	28	103
17	29	80
18	30	236
19	31	59
20	32	72
21	33	75
22	34	52
23	35	56
24	36	117
25	37	41
26	38	41
27	39	95
28	40	37
29	41	38
30	42	108
31	43	32
32	44	26
33	45	43
34	46	31
35	47	31
36	48	60
37	49	34
38	50	27
39	51	24
40	52	19
41	53	23
42	54	78
43	55	29
44	56	17
45	57	48
46	58	23
47	59	28
48	60	34
49	61	31
50	62	21
51	63	16
52	64	15
53	65	11
54	66	54
55	67	19
56	68	13
57	69	14
58	70	11
59	71	12
60	72	12
61	73	15
62	74	14
63	75	6
64	76	9
65	77	8
66	78	6
67	79	6
68	80	7
69	81	9
70	82	6
71	83	16
72	84	21

Appendix_J:(B) Children in each age-group

X.	Age-group	Num. of children
1	13-18	163
2	19-24	492
3	25-30	627
4	31-36	431
5	37-42	360
6	43-48	223
7	49-54	205
8	55-60	179
9	61-66	148
10	67-84	204

Appendix_K: (A) Number of children in each age month: Italian

X.	Age_month	Num. of children
1	16	2
2	17	3
3	18	3
4	19	8
5	20	8
6	21	5
7	22	7
8	23	8
9	24	10
10	25	7
11	26	4
12	27	4
13	28	7
14	29	7
15	30	5
16	31	5
17	32	2
18	33	4
19	34	3
20	35	4
21	36	1
22	37	2
23	39	1
24	40	1
25	56	1
26	72	1

Appendix_K: (B) Number of children in each age group: Italian

X.	Age_group	Num. of children
1	13-18	8
2	19-24	46
3	25-30	34
4	31-36	19
5	37-42	6

Appendix_L: Post hoc multiple comparisons: Italian

Simultaneous Tests for General Linear Hypotheses

Multiple Comparisons of Means: Tukey Contrasts

```
Fit: glmer(formula = NON ~ TAGSCDS_Non + TAGSCDS_NC + age_group +
    (1 + TAGSCDS_Non | name), data = tab_child_cds, family = MASS::negative.binomial(theta =
2.92964520529238))

Linear Hypotheses:
                    Estimate Std. Error  z value Pr(>|z|)
19-24 - 13-18 == 0 18.275191   0.004003 4565.153  < 1e-04 ***
25-30 - 13-18 == 0 20.070593   0.217975   92.077  < 1e-04 ***
31-36 - 13-18 == 0 20.635838   0.281607   73.279  < 1e-04 ***
37-42 - 13-18 == 0 21.266945   0.369302   57.587  < 1e-04 ***
25-30 - 19-24 == 0  1.795402   0.217962    8.237  < 1e-04 ***
31-36 - 19-24 == 0  2.360646   0.281599    8.383  < 1e-04 ***
37-42 - 19-24 == 0  2.991753   0.369300    8.101  < 1e-04 ***
31-36 - 25-30 == 0  0.565245   0.231053    2.446  0.07896 .
37-42 - 25-30 == 0  1.196352   0.348337    3.434  0.00375 **
37-42 - 31-36 == 0  0.631107   0.352648    1.790  0.32303
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
(Adjusted p values reported -- single-step method)
```

Appendix_M: (A) Number of children in each age month: Negative concord English

X.	Age_month	Num. of children
1	24	1
2	25	1
3	26	1
4	28	3
5	29	5
6	30	2
7	31	4
8	32	4
9	33	2
10	34	2
11	35	4
12	36	1
13	37	2
14	38	3
15	39	4
16	40	3
17	41	5
18	42	5
19	43	4
20	44	7
21	45	5
22	46	6
23	47	7
24	48	5
25	49	5
26	50	4
27	51	1
28	52	10
29	53	5
30	54	2
31	55	2
32	56	1
33	57	21
34	58	5
35	59	5
36	60	5
37	61	4
38	62	1
39	63	4
40	64	5
41	65	5
42	66	2
43	67	5
44	68	2
45	69	3
46	70	5
47	72	4
48	73	5
49	74	6
50	75	3
51	76	5
52	77	2
53	78	8
54	79	4
55	81	7
56	82	1
57	83	3

Appendix_M: (B) Number of children in each age group: Negative concord English

X.	Age-group	Num. of children
1	19-24	1
2	25-30	12
3	31-36	17
4	37-42	22
5	43-48	34
6	49-54	27
7	55-60	39
8	61-66	21
9	67-84	63

Appendix_N (A): Post hoc multiple comparisons for *n't*: NC-English

```
Fit: glmer(formula = NT ~ TAGNC_cds + TAGnegaux_cds + age_group +
    (1 | name), data = nc_chi, family = MASS::negative.binomial(theta = 3.54418132934712))

Linear Hypotheses:
                   Estimate Std. Error z value Pr(>|z|)
25-30 - 19-24 == 0  0.25609    0.94987   0.270  0.99996
31-36 - 19-24 == 0  1.93123    0.91303   2.115  0.30598
37-42 - 19-24 == 0  1.63749    0.91061   1.798  0.50795
43-48 - 19-24 == 0  2.34035    0.90726   2.580  0.11223
49-54 - 19-24 == 0  2.41100    0.91534   2.634  0.09745 .
55-60 - 19-24 == 0  3.27527    0.93177   3.515  0.00626 **
31-36 - 25-30 == 0  1.67513    0.35618   4.703  < 0.001 ***
37-42 - 25-30 == 0  1.38139    0.34942   3.953  0.00115 **
43-48 - 25-30 == 0  2.08426    0.34413   6.057  < 0.001 ***
49-54 - 25-30 == 0  2.15490    0.36217   5.950  < 0.001 ***
55-60 - 25-30 == 0  3.01917    0.41919   7.202  < 0.001 ***
37-42 - 31-36 == 0 -0.29374    0.23169  -1.268  0.84528
43-48 - 31-36 == 0  0.40912    0.22828   1.792  0.51248
49-54 - 31-36 == 0  0.47977    0.25271   1.898  0.43997
55-60 - 31-36 == 0  1.34404    0.32601   4.123  < 0.001 ***
43-48 - 37-42 == 0  0.70286    0.19706   3.567  0.00524 **
49-54 - 37-42 == 0  0.77351    0.22906   3.377  0.01070 *
55-60 - 37-42 == 0  1.63778    0.31985   5.120  < 0.001 ***
49-54 - 43-48 == 0  0.07065    0.20356   0.347  0.99983
55-60 - 43-48 == 0  0.93492    0.29334   3.187  0.02008 *
55-60 - 49-54 == 0  0.86427    0.33147   2.607  0.10450
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

Appendix_N (B): Post hoc multiple comparisons for *not*: NC-English

```
Fit: glmer(formula = NOT ~ TAGnot_cds + age_group + (1 | name), data = nc_chi,
    family = poisson)

Linear Hypotheses:
                   Estimate Std. Error z value Pr(>|z|)
25-30 - 19-24 == 0 13.13850   80.95952   0.162  1.00000
31-36 - 19-24 == 0 16.12291   80.95451   0.199  0.99999
37-42 - 19-24 == 0 16.09836   80.95445   0.199  0.99999
43-48 - 19-24 == 0 16.82789   80.95442   0.208  0.99999
49-54 - 19-24 == 0 17.00421   80.95443   0.210  0.99999
55-60 - 19-24 == 0 17.55258   80.95470   0.217  0.99999
31-36 - 25-30 == 0  2.98441    1.00679   2.964  0.03118 *
37-42 - 25-30 == 0  2.95986    1.00877   2.934  0.03401 *
43-48 - 25-30 == 0  3.68939    1.00328   3.677  0.00284 **
49-54 - 25-30 == 0  3.86571    1.00566   3.844  0.00140 **
55-60 - 25-30 == 0  4.41409    1.02762   4.295  < 0.001 ***
37-42 - 31-36 == 0 -0.02455    0.21678  -0.113  1.00000
43-48 - 31-36 == 0  0.70499    0.18889   3.732  0.00208 **
49-54 - 31-36 == 0  0.88130    0.20006   4.405  < 0.001 ***
55-60 - 31-36 == 0  1.42968    0.29671   4.818  < 0.001 ***
43-48 - 37-42 == 0  0.72953    0.17348   4.205  < 0.001 ***
49-54 - 37-42 == 0  0.90585    0.18566   4.879  < 0.001 ***
55-60 - 37-42 == 0  1.45422    0.31164   4.666  < 0.001 ***
49-54 - 43-48 == 0  0.17631    0.13749   1.282  0.80852
55-60 - 43-48 == 0  0.72469    0.26941   2.690  0.06814 .
55-60 - 49-54 == 0  0.54838    0.29235   1.876  0.40806
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

Appendix_O (A): Post hoc multiple comparisons for *not* & *n't*: Standard English: group-1

Not:

```
Fit: glmer(formula = NOT ~ age_group + TAGnot_cds + (1 | name),
data = tab1,
   family = MASS::negative.binomial(theta = 1.75221842387742),
   control = control)

Linear Hypotheses:
                  Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  1.680884  0.441218  3.810  0.00429 **
25-30 - 13-18 == 0  2.959638  0.432712  6.840  < 0.001 ***
31-36 - 13-18 == 0  3.408998  0.433258  7.868  < 0.001 ***
37-42 - 13-18 == 0  3.461812  0.437423  7.914  < 0.001 ***
43-48 - 13-18 == 0  3.758533  0.444947  8.447  < 0.001 ***
49-54 - 13-18 == 0  3.613296  0.445857  8.104  < 0.001 ***
55-60 - 13-18 == 0  3.672263  0.456024  8.053  < 0.001 ***
61-66 - 13-18 == 0  3.676392  0.449826  8.173  < 0.001 ***
67-84 - 13-18 == 0  3.480095  0.448355  7.762  < 0.001 ***
25-30 - 19-24 == 0  1.278754  0.155884  8.203  < 0.001 ***
31-36 - 19-24 == 0  1.728114  0.164296  10.518  < 0.001 ***
37-42 - 19-24 == 0  1.780928  0.169643  10.498  < 0.001 ***
43-48 - 19-24 == 0  2.077649  0.191475  10.851  < 0.001 ***
49-54 - 19-24 == 0  1.932412  0.188671  10.242  < 0.001 ***
55-60 - 19-24 == 0  1.991379  0.214103  9.301  < 0.001 ***
61-66 - 19-24 == 0  1.995508  0.196784  10.141  < 0.001 ***
67-84 - 19-24 == 0  1.799210  0.193457  9.300  < 0.001 ***
31-36 - 25-30 == 0  0.449360  0.117651  3.819  0.00439 **
37-42 - 25-30 == 0  0.502174  0.120449  4.169  < 0.001 ***
43-48 - 25-30 == 0  0.798895  0.152426  5.241  < 0.001 ***
49-54 - 25-30 == 0  0.653658  0.144881  4.512  < 0.001 ***
55-60 - 25-30 == 0  0.712625  0.179521  3.970  0.00259 **
61-66 - 25-30 == 0  0.716754  0.155661  4.605  < 0.001 ***
67-84 - 25-30 == 0  0.520456  0.154194  3.375  0.02234 *
37-42 - 31-36 == 0  0.052814  0.126588  0.417  0.99999
43-48 - 31-36 == 0  0.349534  0.156797  2.229  0.40651
49-54 - 31-36 == 0  0.204298  0.152478  1.340  0.93605
55-60 - 31-36 == 0  0.263264  0.184264  1.429  0.90709
61-66 - 31-36 == 0  0.267394  0.165293  1.618  0.82101
67-84 - 31-36 == 0  0.071096  0.161516  0.440  0.99999
43-48 - 37-42 == 0  0.296721  0.157898  1.879  0.65587
49-54 - 37-42 == 0  0.151484  0.148448  1.020  0.98945
55-60 - 37-42 == 0  0.210451  0.184829  1.139  0.97739
61-66 - 37-42 == 0  0.214580  0.162075  1.324  0.94053
67-84 - 37-42 == 0  0.018282  0.160997  0.114  1.00000
49-54 - 43-48 == 0 -0.145236  0.175491  -0.828  0.99779
55-60 - 43-48 == 0 -0.086270  0.200916  -0.429  0.99999
61-66 - 43-48 == 0 -0.082141  0.186130  -0.441  0.99999
67-84 - 43-48 == 0 -0.278438  0.180954  -1.539  0.86107
55-60 - 49-54 == 0  0.058966  0.199418  0.296  1.00000
61-66 - 49-54 == 0  0.063095  0.173639  0.363  1.00000
67-84 - 49-54 == 0 -0.133202  0.175956  -0.757  0.99890
61-66 - 55-60 == 0  0.004129  0.206422  0.020  1.00000
67-84 - 55-60 == 0 -0.192168  0.200266  -0.960  0.99324
67-84 - 61-66 == 0 -0.196297  0.184347  -1.065  0.98573
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

NT:

```
Fit: glmer(formula = NT ~ age_group + TAGnegaux_cds + (1 | name),
   data = tab1, family = MASS::negative.binomial(theta =
2.02558328539329),
   control = control)

Linear Hypotheses:
                  Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  1.07654  0.27703  3.886  0.00345 **
25-30 - 13-18 == 0  2.32608  0.26833  8.669  < 0.001 ***
31-36 - 13-18 == 0  2.87172  0.27091  10.600  < 0.001 ***
37-42 - 13-18 == 0  3.00262  0.27311  10.994  < 0.001 ***
43-48 - 13-18 == 0  3.33385  0.28395  11.741  < 0.001 ***
49-54 - 13-18 == 0  3.25372  0.28181  11.546  < 0.001 ***
55-60 - 13-18 == 0  3.41937  0.29285  11.676  < 0.001 ***
61-66 - 13-18 == 0  3.28061  0.28496  11.513  < 0.001 ***
67-84 - 13-18 == 0  3.06906  0.28275  10.854  < 0.001 ***
25-30 - 19-24 == 0  1.24955  0.11572  10.798  < 0.001 ***
31-36 - 19-24 == 0  1.79519  0.12422  14.452  < 0.001 ***
37-42 - 19-24 == 0  1.92608  0.12792  15.057  < 0.001 ***
43-48 - 19-24 == 0  2.25731  0.14968  15.081  < 0.001 ***
49-54 - 19-24 == 0  2.17718  0.14503  15.011  < 0.001 ***
55-60 - 19-24 == 0  2.34284  0.16549  14.157  < 0.001 ***
61-66 - 19-24 == 0  2.20407  0.15117  14.580  < 0.001 ***
67-84 - 19-24 == 0  1.99253  0.14666  13.586  < 0.001 ***
31-36 - 25-30 == 0  0.54564  0.09425  5.789  < 0.001 ***
37-42 - 25-30 == 0  0.67654  0.09641  7.017  < 0.001 ***
43-48 - 25-30 == 0  1.00776  0.12578  8.012  < 0.001 ***
49-54 - 25-30 == 0  0.92763  0.11790  7.868  < 0.001 ***
55-60 - 25-30 == 0  1.09329  0.14417  7.583  < 0.001 ***
61-66 - 25-30 == 0  0.95453  0.12567  7.595  < 0.001 ***
67-84 - 25-30 == 0  0.74298  0.12210  6.085  < 0.001 ***
37-42 - 31-36 == 0  0.13090  0.10384  1.261  0.95710
43-48 - 31-36 == 0  0.46212  0.13038  3.545  0.01294 *
49-54 - 31-36 == 0  0.38200  0.12498  3.056  0.06132 .
55-60 - 31-36 == 0  0.54765  0.14848  3.688  0.00767 **
61-66 - 31-36 == 0  0.40889  0.13324  3.069  0.05949 .
67-84 - 31-36 == 0  0.19734  0.12808  1.541  0.86257
43-48 - 37-42 == 0  0.33123  0.13081  2.532  0.23206
49-54 - 37-42 == 0  0.25110  0.12215  2.056  0.53464
55-60 - 37-42 == 0  0.41675  0.14857  2.805  0.12200
61-66 - 37-42 == 0  0.27799  0.13126  2.118  0.48973
67-84 - 37-42 == 0  0.06644  0.12827  0.518  0.99995
49-54 - 43-48 == 0 -0.08013  0.14462  -0.554  0.99992
55-60 - 43-48 == 0  0.08553  0.16428  0.521  0.99995
61-66 - 43-48 == 0 -0.05324  0.15236  -0.349  1.00000
67-84 - 43-48 == 0 -0.26478  0.14597  -1.814  0.70506
55-60 - 49-54 == 0  0.16565  0.16066  1.031  0.98894
61-66 - 49-54 == 0  0.02689  0.14039  0.192  1.00000
67-84 - 49-54 == 0 -0.18465  0.14003  -1.319  0.94326
61-66 - 55-60 == 0 -0.13876  0.16585  -0.837  0.99767
67-84 - 55-60 == 0 -0.35031  0.15817  -2.215  0.42142
67-84 - 61-66 == 0 -0.21155  0.14755  -1.434  0.90721
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

Appendix_O (B): Post hoc multiple comparisons for *not* & *n't*: Standard English: group-2

Not:

```
Fit: glmer(formula = NOT ~ age_group + TAGnot_cds + (1 +
TAGnot_cds |
   name), data = tab2, family = MASS::negative.binomial(theta =
1.22843513286722))

Linear Hypotheses:
              Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  0.90196    0.41479   2.175  0.44162
25-30 - 13-18 == 0  1.93323    0.40434   4.781  < 0.001 ***
31-36 - 13-18 == 0  2.55925    0.41278   6.200  < 0.001 ***
37-42 - 13-18 == 0  2.49207    0.44110   5.650  < 0.001 ***
43-48 - 13-18 == 0  2.09371    0.50556   4.141  0.00117 **
49-54 - 13-18 == 0  2.02173    0.55308   3.655  0.00860 **
55-60 - 13-18 == 0  2.69737    0.47159   5.720  < 0.001 ***
61-66 - 13-18 == 0  2.78590    0.55005   5.065  < 0.001 ***
67-84 - 13-18 == 0  3.04423    0.53873   5.651  < 0.001 ***
25-30 - 19-24 == 0  1.03127    0.21114   4.884  < 0.001 ***
31-36 - 19-24 == 0  1.65729    0.22745   7.286  < 0.001 ***
37-42 - 19-24 == 0  1.59011    0.27838   5.712  < 0.001 ***
43-48 - 19-24 == 0  1.19175    0.37608   3.169  0.04325 *
49-54 - 19-24 == 0  1.11977    0.43635   2.566  0.21061
55-60 - 19-24 == 0  1.79541    0.32745   5.483  < 0.001 ***
61-66 - 19-24 == 0  1.88394    0.43288   4.352  < 0.001 ***
67-84 - 19-24 == 0  2.14227    0.41873   5.116  < 0.001 ***
31-36 - 25-30 == 0  0.62602    0.16835   3.719  0.00662 **
37-42 - 25-30 == 0  0.55884    0.23474   2.381  0.30822
43-48 - 25-30 == 0  0.16048    0.34135   0.470  0.99998
49-54 - 25-30 == 0  0.08850    0.40978   0.216  1.00000
55-60 - 25-30 == 0  0.76414    0.29189   2.618  0.18714
61-66 - 25-30 == 0  0.85266    0.40574   2.102  0.49289
67-84 - 25-30 == 0  1.11100    0.38999   2.849  0.10629
37-42 - 31-36 == 0 -0.06718    0.23892  -0.281  1.00000
43-48 - 31-36 == 0 -0.46554    0.34652  -1.343  0.93405
49-54 - 31-36 == 0 -0.53752    0.41635  -1.291  0.94821
55-60 - 31-36 == 0  0.13812    0.29399   0.470  0.99998
61-66 - 31-36 == 0  0.22665    0.41088   0.552  0.99992
67-84 - 31-36 == 0  0.48498    0.39633   1.224  0.96305
43-48 - 37-42 == 0 -0.39836    0.37084  -1.074  0.98454
49-54 - 37-42 == 0 -0.47034    0.43520  -1.081  0.98389
55-60 - 37-42 == 0  0.20530    0.32575   0.630  0.99975
61-66 - 37-42 == 0  0.29383    0.43202   0.680  0.99953
67-84 - 37-42 == 0  0.55216    0.41507   1.330  0.93779
49-54 - 43-48 == 0 -0.07198    0.45394  -0.159  1.00000
55-60 - 43-48 == 0  0.60366    0.38281   1.577  0.84057
61-66 - 43-48 == 0  0.69219    0.44514   1.555  0.85150
67-84 - 43-48 == 0  0.95052    0.43557   2.182  0.43643
55-60 - 49-54 == 0  0.67564    0.44428   1.521  0.86767
61-66 - 49-54 == 0  0.76416    0.50637   1.509  0.87302
67-84 - 49-54 == 0  1.02250    0.47423   2.156  0.45455
61-66 - 55-60 == 0  0.08853    0.43851   0.202  1.00000
67-84 - 55-60 == 0  0.34686    0.41824   0.829  0.99771
67-84 - 61-66 == 0  0.25834    0.49362   0.523  0.99995
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

NT:

```
Fit: glmer(formula = NT ~ age_group + TAGnegaux_cds +
TAGNC_cds +
   (1 + TAGnegaux_cds | name) + (1 + TAGNC_cds | name), data =
tab2,
   family = MASS::negative.binomial(theta = 1.47255610093333),
   control = control)

Linear Hypotheses:
              Estimate Std. Error  z value Pr(>|z|)
19-24 - 13-18 == 0  1.908811   0.003228  591.362  < 0.001 ***
25-30 - 13-18 == 0  3.177326   0.003226  985.059  < 0.001 ***
31-36 - 13-18 == 0  4.124840   0.003226 1278.751  < 0.001 ***
37-42 - 13-18 == 0  4.199337   0.003227 1301.497  < 0.001 ***
43-48 - 13-18 == 0  4.406743   0.003226 1365.843  < 0.001 ***
49-54 - 13-18 == 0  4.272047   0.307878   13.876  < 0.001 ***
55-60 - 13-18 == 0  4.410107   0.229541   19.213  < 0.001 ***
61-66 - 13-18 == 0  4.895406   0.339865   14.404  < 0.001 ***
67-84 - 13-18 == 0  4.554357   0.307338   14.819  < 0.001 ***
25-30 - 19-24 == 0  1.268516   0.004563  278.000  < 0.001 ***
31-36 - 19-24 == 0  2.216030   0.004563  485.623  < 0.001 ***
37-42 - 19-24 == 0  2.290527   0.004564  501.837  < 0.001 ***
43-48 - 19-24 == 0  2.497933   0.004564  547.320  < 0.001 ***
49-54 - 19-24 == 0  2.363237   0.307895    7.675  < 0.001 ***
55-60 - 19-24 == 0  2.501296   0.229561   10.896  < 0.001 ***
61-66 - 19-24 == 0  2.986595   0.339880    8.787  < 0.001 ***
67-84 - 19-24 == 0  2.645546   0.307354    8.607  < 0.001 ***
31-36 - 25-30 == 0  0.947514   0.004561  207.747  < 0.001 ***
37-42 - 25-30 == 0  1.022011   0.004562  224.031  < 0.001 ***
43-48 - 25-30 == 0  1.229417   0.004562  269.488  < 0.001 ***
49-54 - 25-30 == 0  1.094721   0.307893    3.556  0.00806 **
55-60 - 25-30 == 0  1.232781   0.229559    5.370  < 0.001 ***
61-66 - 25-30 == 0  1.718079   0.339878    5.055  < 0.001 ***
67-84 - 25-30 == 0  1.377030   0.307354    4.480  < 0.001 ***
37-42 - 31-36 == 0  0.074497   0.004562   16.330  < 0.001 ***
43-48 - 31-36 == 0  0.281903   0.004562   61.792  < 0.001 ***
49-54 - 31-36 == 0  0.147207   0.307894    0.478  0.99996
55-60 - 31-36 == 0  0.285266   0.229557    1.243  0.94045
61-66 - 31-36 == 0  0.770565   0.339878    2.267  0.30873
67-84 - 31-36 == 0  0.429516   0.307353    1.397  0.88428
43-48 - 37-42 == 0  0.207406   0.004563   45.456  < 0.001 ***
49-54 - 37-42 == 0  0.072710   0.307893    0.236  1.00000
55-60 - 37-42 == 0  0.210769   0.229558    0.918  0.99204
61-66 - 37-42 == 0  0.696068   0.339879    2.048  0.45441
67-84 - 37-42 == 0  0.355019   0.307354    1.155  0.96200
49-54 - 43-48 == 0 -0.134696   0.307889   -0.437  0.99998
55-60 - 43-48 == 0  0.003363   0.229556    0.015  1.00000
61-66 - 43-48 == 0  0.488662   0.339873    1.438  0.86578
67-84 - 43-48 == 0  0.147613   0.307347    0.480  0.99995
55-60 - 49-54 == 0  0.138060   0.367368    0.376  0.99999
61-66 - 49-54 == 0  0.623359   0.427065    1.460  0.85490
67-84 - 49-54 == 0  0.282310   0.390032    0.724  0.99868
61-66 - 55-60 == 0  0.485299   0.390363    1.243  0.94027
67-84 - 55-60 == 0  0.144250   0.360095    0.401  0.99999
67-84 - 61-66 == 0 -0.341049   0.436336   -0.782  0.99761
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

Appendix_O (C): Post hoc multiple comparisons for *not* & *n't*: Standard English: group-3

Not:

```
Fit: glmer(formula = NOT ~ age_group + TAGnot_cds + (1 +
TAGnot_cds |
   name), data = tab3, family = MASS::negative.binomial(theta =
2.27380772691609))

Linear Hypotheses:
                   Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  1.03946    0.49026  2.120  0.4774
25-30 - 13-18 == 0  2.27954    0.47719  4.777  <0.001 ***
31-36 - 13-18 == 0  2.63375    0.47824  5.507  <0.001 ***
37-42 - 13-18 == 0  2.45114    0.48280  5.077  <0.001 ***
43-48 - 13-18 == 0  2.68870    0.49388  5.444  <0.001 ***
49-54 - 13-18 == 0  2.60104    0.49921  5.210  <0.001 ***
55-60 - 13-18 == 0  2.71522    0.49821  5.450  <0.001 ***
61-66 - 13-18 == 0  3.05838    0.52883  5.783  <0.001 ***
67-84 - 13-18 == 0  2.90486    0.51485  5.642  <0.001 ***
25-30 - 19-24 == 0  1.24009    0.17900  6.928  <0.001 ***
31-36 - 19-24 == 0  1.59429    0.18493  8.621  <0.001 ***
37-42 - 19-24 == 0  1.41168    0.20349  6.937  <0.001 ***
43-48 - 19-24 == 0  1.64925    0.22797  7.235  <0.001 ***
49-54 - 19-24 == 0  1.56158    0.24042  6.495  <0.001 ***
55-60 - 19-24 == 0  1.67577    0.23890  7.015  <0.001 ***
61-66 - 19-24 == 0  2.01893    0.29746  6.787  <0.001 ***
67-84 - 19-24 == 0  1.86540    0.27373  6.815  <0.001 ***
31-36 - 25-30 == 0  0.35421    0.12592  2.813  0.1163
37-42 - 25-30 == 0  0.17159    0.14813  1.158  0.9739
43-48 - 25-30 == 0  0.40916    0.18263  2.240  0.3948
49-54 - 25-30 == 0  0.32150    0.19420  1.656  0.7962
55-60 - 25-30 == 0  0.43568    0.19598  2.223  0.4061
61-66 - 25-30 == 0  0.77884    0.26072  2.987  0.0717 .
67-84 - 25-30 == 0  0.62531    0.23659  2.643  0.1758
37-42 - 31-36 == 0 -0.18262    0.14660 -1.246  0.9580
43-48 - 31-36 == 0  0.05495    0.18033  0.305  1.0000
49-54 - 31-36 == 0 -0.03271    0.19456 -0.168  1.0000
55-60 - 31-36 == 0  0.08147    0.19391  0.420  1.0000
61-66 - 31-36 == 0  0.42463    0.26295  1.615  0.8192
67-84 - 31-36 == 0  0.27111    0.23328  1.162  0.9732
43-48 - 37-42 == 0  0.23757    0.18526  1.282  0.9495
49-54 - 37-42 == 0  0.14990    0.19498  0.769  0.9987
55-60 - 37-42 == 0  0.26409    0.20126  1.312  0.9421
61-66 - 37-42 == 0  0.60725    0.26403  2.300  0.3558
67-84 - 37-42 == 0  0.45372    0.24058  1.886  0.6465
49-54 - 43-48 == 0 -0.08766    0.19840 -0.442  1.0000
55-60 - 43-48 == 0  0.02652    0.20692  0.128  1.0000
61-66 - 43-48 == 0  0.36968    0.26712  1.384  0.9206
67-84 - 43-48 == 0  0.21615    0.24076  0.898  0.9957
55-60 - 49-54 == 0  0.11418    0.21752  0.525  0.9999
61-66 - 49-54 == 0  0.45734    0.26348  1.736  0.7477
67-84 - 49-54 == 0  0.30382    0.24307  1.250  0.9572
61-66 - 55-60 == 0  0.34316    0.28064  1.223  0.9627
67-84 - 55-60 == 0  0.18964    0.23977  0.791  0.9984
67-84 - 61-66 == 0 -0.15352    0.28693 -0.535  0.9999
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
(Adjusted p values reported -- single-step method)
```

NT:

```
Fit: glmer(formula = NT ~ age_group + TAGnegaux_cds + (1 +
TAGnegaux_cds |
   name), data = tab3, family = MASS::negative.binomial(theta =
2.25837151121314),
   control = control)

Linear Hypotheses:
                   Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  1.68462    0.43916  3.836  0.0042 **
25-30 - 13-18 == 0  3.07145    0.43054  7.134  <0.001 ***
31-36 - 13-18 == 0  3.25764    0.43237  7.534  <0.001 ***
37-42 - 13-18 == 0  3.22286    0.43385  7.428  <0.001 ***
43-48 - 13-18 == 0  3.27934    0.44351  7.394  <0.001 ***
49-54 - 13-18 == 0  3.41482    0.44557  7.664  <0.001 ***
55-60 - 13-18 == 0  3.42833    0.44362  7.728  <0.001 ***
61-66 - 13-18 == 0  3.58178    0.46894  7.638  <0.001 ***
67-84 - 13-18 == 0  3.31416    0.45297  7.317  <0.001 ***
25-30 - 19-24 == 0  1.38684    0.15712  8.827  <0.001 ***
31-36 - 19-24 == 0  1.57302    0.15927  9.876  <0.001 ***
37-42 - 19-24 == 0  1.53824    0.16840  9.134  <0.001 ***
43-48 - 19-24 == 0  1.59473    0.19427  8.209  <0.001 ***
49-54 - 19-24 == 0  1.73021    0.20143  8.590  <0.001 ***
55-60 - 19-24 == 0  1.74371    0.19605  8.894  <0.001 ***
61-66 - 19-24 == 0  1.89716    0.24778  7.657  <0.001 ***
67-84 - 19-24 == 0  1.62954    0.22091  7.376  <0.001 ***
31-36 - 25-30 == 0  0.18618    0.11712  1.590  0.8348
37-42 - 25-30 == 0  0.15141    0.13000  1.165  0.9734
43-48 - 25-30 == 0  0.20789    0.15987  1.300  0.9462
49-54 - 25-30 == 0  0.34337    0.16494  2.082  0.5083
55-60 - 25-30 == 0  0.35688    0.16457  2.169  0.4470
61-66 - 25-30 == 0  0.51033    0.22065  2.313  0.3508
67-84 - 25-30 == 0  0.24271    0.19134  1.268  0.9539
37-42 - 31-36 == 0 -0.03478    0.13199 -0.263  1.0000
43-48 - 31-36 == 0  0.02171    0.16379  0.133  1.0000
49-54 - 31-36 == 0  0.15719    0.17232  0.912  0.9953
55-60 - 31-36 == 0  0.17069    0.16859  1.012  0.9899
61-66 - 31-36 == 0  0.32415    0.22570  1.436  0.9035
67-84 - 31-36 == 0  0.05653    0.19404  0.291  1.0000
43-48 - 37-42 == 0  0.05648    0.16376  0.345  1.0000
49-54 - 37-42 == 0  0.19196    0.16959  1.132  0.9780
55-60 - 37-42 == 0  0.20547    0.17076  1.203  0.9670
61-66 - 37-42 == 0  0.35892    0.22370  1.604  0.8267
67-84 - 37-42 == 0  0.09130    0.19676  0.464  1.0000
49-54 - 43-48 == 0  0.13548    0.17473  0.775  0.9987
55-60 - 43-48 == 0  0.14899    0.17689  0.842  0.9974
61-66 - 43-48 == 0  0.30244    0.22824  1.325  0.9396
67-84 - 43-48 == 0  0.03482    0.19897  0.175  1.0000
55-60 - 49-54 == 0  0.01351    0.18177  0.074  1.0000
61-66 - 49-54 == 0  0.16696    0.22238  0.751  0.9990
67-84 - 49-54 == 0 -0.10066    0.20030 -0.503  1.0000
61-66 - 55-60 == 0  0.15345    0.23502  0.653  0.9997
67-84 - 55-60 == 0 -0.11417    0.19868 -0.575  0.9999
67-84 - 61-66 == 0 -0.26762    0.23951 -1.117  0.9799
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
(Adjusted p values reported -- single-step method)
```

Appendix_O (D): Post hoc multiple comparisons for *not & n't*: Standard English: group-4

Not:

```
Fit: glmer(formula = NOT ~ age_group + TAGnot_cds + (1 + 
TAGnot_cds | 
   name), data = tab4, family = MASS::negative.binomial(theta = 
2.70651143481781))

Linear Hypotheses:
                 Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  2.13598    0.50940   4.193    <0.01 ***
25-30 - 13-18 == 0  3.09097    0.49777   6.210    <0.01 ***
31-36 - 13-18 == 0  3.59727    0.49735   7.233    <0.01 ***
37-42 - 13-18 == 0  3.62495    0.49778   7.282    <0.01 ***
43-48 - 13-18 == 0  3.69825    0.49948   7.404    <0.01 ***
49-54 - 13-18 == 0  3.75454    0.50308   7.463    <0.01 ***
55-60 - 13-18 == 0  3.74769    0.50216   7.463    <0.01 ***
61-66 - 13-18 == 0  3.77186    0.51323   7.349    <0.01 ***
67-84 - 13-18 == 0  3.12416    0.50854   6.143    <0.01 ***
25-30 - 19-24 == 0  0.95499    0.16040   5.954    <0.01 ***
31-36 - 19-24 == 0  1.46129    0.16810   8.693    <0.01 ***
37-42 - 19-24 == 0  1.48897    0.17330   8.592    <0.01 ***
43-48 - 19-24 == 0  1.56227    0.18487   8.451    <0.01 ***
49-54 - 19-24 == 0  1.61856    0.19454   8.320    <0.01 ***
55-60 - 19-24 == 0  1.61171    0.19087   8.444    <0.01 ***
61-66 - 19-24 == 0  1.63588    0.22252   7.352    <0.01 ***
67-84 - 19-24 == 0  0.98818    0.20597   4.798    <0.01 ***
31-36 - 25-30 == 0  0.50630    0.11168   4.533    <0.01 ***
37-42 - 25-30 == 0  0.53398    0.12102   4.412    <0.01 ***
43-48 - 25-30 == 0  0.60728    0.13624   4.457    <0.01 ***
49-54 - 25-30 == 0  0.66357    0.14836   4.473    <0.01 ***
55-60 - 25-30 == 0  0.65672    0.14443   4.547    <0.01 ***
61-66 - 25-30 == 0  0.68089    0.18389   3.703    <0.01 **
67-84 - 25-30 == 0  0.03319    0.16478   0.201    1.0000
37-42 - 31-36 == 0  0.02769    0.11277   0.246    1.0000
43-48 - 31-36 == 0  0.10099    0.12757   0.792    0.9984
49-54 - 31-36 == 0  0.15728    0.13947   1.128    0.9778
55-60 - 31-36 == 0  0.15043    0.13603   1.106    0.9806
61-66 - 31-36 == 0  0.17459    0.17729   0.985    0.9914
67-84 - 31-36 == 0 -0.47311    0.15838  -2.987    0.0719 .
43-48 - 37-42 == 0  0.07330    0.12570   0.583    0.9999
49-54 - 37-42 == 0  0.12959    0.13740   0.943    0.9938
55-60 - 37-42 == 0  0.12274    0.13351   0.919    0.9948
61-66 - 37-42 == 0  0.14691    0.17585   0.835    0.9975
67-84 - 37-42 == 0 -0.50080    0.15778  -3.174    0.0414 *
49-54 - 43-48 == 0  0.05629    0.13094   0.430    1.0000
55-60 - 43-48 == 0  0.04944    0.12724   0.389    1.0000
61-66 - 43-48 == 0  0.07361    0.16409   0.449    1.0000
67-84 - 43-48 == 0 -0.57410    0.15212  -3.774    <0.01 **
55-60 - 49-54 == 0 -0.00685    0.13595  -0.050    1.0000
61-66 - 49-54 == 0  0.01732    0.17564   0.099    1.0000
67-84 - 49-54 == 0 -0.63038    0.16364  -3.852    <0.01 **
61-66 - 55-60 == 0  0.02417    0.17370   0.139    1.0000
67-84 - 55-60 == 0 -0.62354    0.15604  -3.996    <0.01 **
67-84 - 61-66 == 0 -0.64770    0.18643  -3.474    0.0152 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

NT:

```
Fit: glmer(formula = NT ~ TAGNC_cds + age_group + 
TAGnegaux_cds + 
   (1 + TAGNC_cds | name) + (1 + TAGnegaux_cds | name), data = 
tab4, 
   family = MASS::negative.binomial(theta = 2.16519702859518), 
   control = control)

Linear Hypotheses:
                 Estimate Std. Error z value Pr(>|z|)
19-24 - 13-18 == 0  1.024099   0.313807   3.263  0.03278 *
25-30 - 13-18 == 0  2.095350   0.295669   7.087  < 0.001 ***
31-36 - 13-18 == 0  2.817261   0.294296   9.573  < 0.001 ***
37-42 - 13-18 == 0  3.136873   0.295921  10.600  < 0.001 ***
43-48 - 13-18 == 0  3.194496   0.297964  10.721  < 0.001 ***
49-54 - 13-18 == 0  3.323569   0.302818  10.975  < 0.001 ***
55-60 - 13-18 == 0  3.329866   0.300828  11.069  < 0.001 ***
61-66 - 13-18 == 0  3.184935   0.316746  10.055  < 0.001 ***
67-84 - 13-18 == 0  2.760831   0.312285   8.841  < 0.001 ***
25-30 - 19-24 == 0  1.071251   0.161889   6.617  < 0.001 ***
31-36 - 19-24 == 0  1.793162   0.169385  10.586  < 0.001 ***
37-42 - 19-24 == 0  2.112775   0.175991  12.005  < 0.001 ***
43-48 - 19-24 == 0  2.170398   0.185250  11.716  < 0.001 ***
49-54 - 19-24 == 0  2.299470   0.192414  11.951  < 0.001 ***
55-60 - 19-24 == 0  2.305768   0.188880  12.208  < 0.001 ***
61-66 - 19-24 == 0  2.160836   0.216145   9.997  < 0.001 ***
67-84 - 19-24 == 0  1.736732   0.204817   8.479  < 0.001 ***
31-36 - 25-30 == 0  0.721911   0.118017   6.117  < 0.001 ***
37-42 - 25-30 == 0  1.041523   0.128143   8.128  < 0.001 ***
43-48 - 25-30 == 0  1.099147   0.138813   7.918  < 0.001 ***
49-54 - 25-30 == 0  1.228219   0.148718   8.259  < 0.001 ***
55-60 - 25-30 == 0  1.234517   0.144570   8.539  < 0.001 ***
61-66 - 25-30 == 0  1.089585   0.177449   6.140  < 0.001 ***
67-84 - 25-30 == 0  0.665481   0.165099   4.031  0.00201 **
37-42 - 31-36 == 0  0.319612   0.117724   2.715  0.15286
43-48 - 31-36 == 0  0.377235   0.128987   2.925  0.08891 .
49-54 - 31-36 == 0  0.506308   0.139699   3.624  0.00974 **
55-60 - 31-36 == 0  0.512605   0.136109   3.766  0.00561 **
61-66 - 31-36 == 0  0.367674   0.170603   2.155  0.46187
67-84 - 31-36 == 0 -0.056430   0.157688  -0.358  1.00000
43-48 - 37-42 == 0  0.057623   0.126415   0.456  0.99998
49-54 - 37-42 == 0  0.186696   0.136860   1.364  0.92991
55-60 - 37-42 == 0  0.192993   0.132953   1.452  0.89980
61-66 - 37-42 == 0  0.048062   0.168785   0.285  1.00000
67-84 - 37-42 == 0 -0.376043   0.156419  -2.404  0.30044
49-54 - 43-48 == 0  0.129072   0.131316   0.983  0.99209
55-60 - 43-48 == 0  0.135370   0.126029   1.074  0.98506
61-66 - 43-48 == 0 -0.009561   0.157974  -0.061  1.00000
67-84 - 43-48 == 0 -0.433666   0.149653  -2.898  0.09537 .
55-60 - 49-54 == 0  0.006298   0.136583   0.046  1.00000
61-66 - 49-54 == 0 -0.138634   0.169373  -0.819  0.99801
67-84 - 49-54 == 0 -0.562738   0.158370  -3.553  0.01226 *
61-66 - 55-60 == 0 -0.144932   0.164529  -0.881  0.99650
67-84 - 55-60 == 0 -0.569036   0.152279  -3.737  0.00640 **
67-84 - 61-66 == 0 -0.424104   0.176591  -2.402  0.30201
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```

Deutschsprachige Zusammenfassung

Satznegation und Negative Concord im Spracherwerb

In der Entwicklung von Spracherwerbstheorien haben Untersuchungen zum Erwerb der Negation eine Schlüsselrolle gespielt. Ziel der vorliegenden Dissertation ist, die spezifischen Merkmale der Satznegation im kindlichen Erstspracherwerb zu untersuchen, beispielsweise die Möglichkeit, die Satznegation durch ein oder mehrere Negationselemente auszudrücken. Bezüglich der Realisierung der Satznegation lassen sich die natürlichen Sprachen in zwei Kategorien einteilen: i) Negative-Concord-Sprachen (NC-Sprachen), die mehr als ein Negationselement pro Teilsatz zulassen und ii) Doppelnegationssprachen (DN-Sprachen), in denen die Satznegation durch ein einziges Negationselement pro Satz ausgedrückt werden muss. Der aktuelle Wissensstand zur Satznegation in der mit natürlichen kindlichen Sprachdaten arbeitenden Spracherwerbsforschung basiert auf einer eingeschränkten Anzahl von Kindern aus einer eingeschränkten Altersgruppe. Noch weniger Studien gibt es zu Negative Concord im Erwerb, was sogar für NC-Sprachen gilt.

Diese Dissertation leistet einen Forschungsbeitrag zu bisher nur wenig untersuchten Bereichen des Erwerbs von Negation und Negative Concord, indem empirische Beobachtungen und inferenzstatistische Analysen zu sprachübergreifenden Daten von Kindern aus einem größeren Alterszeitraum (1-7 Jahre) vorgestellt werden. Weiters wird für eine Erweiterung des Methoden- und Datenspektrums argumentiert, das eingesetzt wird, um Schlüsse aus linguistischen Daten zu ziehen.

Die Dissertation beginnt mit einem detaillierten Überblick über die Literatur zur Syntax der Negation. Auf Basis von Beispielen aus verschiedenen Sprachen wird der syntaktische und semantische Status verschiedener Negationselemente vorgestellt, die über die letzten 50 Jahre hinweg im Rahmen unterschiedlicher Theorien vorgeschlagen wurden. Es wird auch eine allgemeine Beschreibung von Theorien gegeben, die verschiedene Mechanismen vorschlagen, um die vielfältigen Strategien zur Realisierung der Satznegation in natürlichen Sprachen zu erfassen. In einer kritischen Betrachtung dieser Theorien wird sowohl auf ihre Stärken und auf den Beitrag eingegangen, den sie zu einem sprachübergreifenden Verständnis der Funktionsweise der Negation leisten, als auch auf ihre Leerstellen und auf Phänomene der Satznegation, die von ihnen nicht erklärt werden.

Zeijlstras (2004 u.a.) Theorie des Erwerbs von Negation und Negative Concord macht die Vorhersage, dass in Doppelnegationssprachen wie dem Niederländischen, das bei Erwachsenen keine formalen Negationsmerkmale oder Dopplungseffekte bezüglich der Negation aufweist, das Gleiche auch für die Kindersprache gilt. Weiters wird vorhergesagt, dass in Negative-Concord-Sprachen, in denen der sprachliche Input von Erwachsenen aufgrund der Projektion formaler Merkmale Dopplungseffekte bei der Negation aufweist, derartiger Input analoge Effekte in der Kindersprache hervorruft. Zeijlstras Theorie zufolge lassen Sprachen, deren Negationselement ein Kopf Neg° ist, auch Negative Concord zu. Diese Vorhersage ist für das Italienische, eine NC-Sprache, unproblematisch. Anders ist die Situation im Standardenglischen. Das Standardenglische besitzt ein Neg°-Element, *n't,* und sollte daher nach Zeijlstras Theorie eine NC-Sprache sein. Der notwendige Input für einen frühen Erwerb des Neg°-Elements sind Sätze mit Negative Concord. Da das Standardenglische bei Erwachsenen keinen Negative Concord aufweist und im sprachlichen Input, den Kinder von Erwachsenen bekommen, die für den frühen Erwerb eines Neg°-Elements notwendigen formalen Negationsmerkmale fehlen, sind Kinder auf Inputsätze angewiesen, in denen *n't* als einziges Negationselement vorkommt. Es ist daher zu erwarten, dass *n't* etwas später erworben wird als das adverbiale Negationselement *not*. Für Kinder, die mit Negative-Concord-Varietäten des Englischen aufwachsen, sagt Zeijlstras Theorie hingegen voraus, dass Daten mit Negative Concord und Dopplungseffekten schon früh verfügbar sind, sodass zu erwarten ist, dass diese Kinder *n't* früh oder gleichzeitig mit *not* erwerben.

Um die wichtigsten Vorhersagen Zeijlstra zu DN- und NC-Sprachen zu überprüfen, wurden natürliche Sprachdaten von Kindern aus dem Niederländischen, Italienischen, Standardenglischen und Negative-Concord-Varietäten des Englischen analysiert. Für diese Dissertation wurden insgesamt 193294 negierte Sätze aus den vier Sprachen von 1423 zufällig ausgewählten, sich typisch entwickelnden Kindern und 318164 Sätze ihrer jeweiligen erwachsenen Bezugspersonen untersucht. Die Daten decken den Alterszeitraum von 1-7 Jahren und damit mehrere Altersgruppen ab.

Natürliche gesprochene Sprache hat mehrere Vorteile gegenüber im Labor erhobenen, kontrollierten Experimentdaten: i) Sie gibt Forscher*innen die Möglichkeit, den natürlichen Sprachgebrauch von Kindern in realen Kontexten auf transparente Weise zu untersuchen; ii) sie gibt Forscher*innen die Möglichkeit, Veränderungen und einzigartige Muster in der Grammatik von Kindern zu erkennen und neue Information über beliebige Strukturen und über die Entwicklung der Grammatik über längere Zeiträume hinweg im Verlauf des kindlichen Spracherwerbs zu bekommen; iii) sie hilft Forscher*innen, den natürlichen Redefluss von Kleinkindern zu untersuchen und den Einfluss von Faktoren wie z.B. Input durch Bezugspersonen, Alter oder individuellen Unterschieden auf die kindliche Sprachentwicklung zu verstehen. Gesprochene

Sprachdaten, die unter kontrollierten experimentellen Bedingungen oder im Labor erhoben wurden, haben diese breite Palette von Vorteilen nicht.

In dieser Arbeit werden zeitgemäße und leistungsfähige inferenzstatistische Methoden eingesetzt: Die Effekte der Prädiktorvariablen auf die Antwortvariablen werden mittels verallgemeinerter linearer gemischter Modelle (GLMMs) geschätzt. Die Ergebnisse dieser Modelle einschließlich der Parameterschätzungen, Konfidenzintervalle, Signifikanztests und Effektgrößen werden im Detail dargestellt. Weiters werden in dieser Arbeit als neuer Analyseansatz Post-hoc-Mehrfachvergleiche eingesetzt, um Unterschiede in der durchschnittlichen Häufigkeit eines bestimmten Satznegationselements zwischen Kindern unterschiedlicher Altersgruppen zu vergleichen. Die sprachübergreifenden Post-hoc-Mehrfachvergleiche zeigen, dass Kinder ab einem Alter von 30 Monaten — nach einem 1.5 Jahre langen Prozess des aktiven Erwerbs der Negation, der im Alter von 13 Monaten einsetzt — die Negationselements ähnlich wie Erwachsene gebrauchen. Diese Ergebnisse zeigen i) den Effekt des Inputs, den Kinder erhalten, ii) die Rolle des Alters und iii) das klar erkennbare Zusammenspiel von Kompetenz und Performanz bezüglich des Erwerbs von Negationselementen. Um einen detaillierten und umfassenden Überblick über Negative Concord bei Kindern im Standardenglischen und in NC-Varietäten des Englischen zu bekommen, werden in dieser Arbeit Untergruppen von Kindern untersucht.

Auf Basis der in dieser Arbeit vorgelegten theoretischen, empirischen und inferenzstatistischen Belege wird gezeigt, wie bemerkenswert der Prozess des Erwerbs der Satznegation in der Erstsprache ist: Dieser Erwerbsprozess verläuft sehr schnell, d.h. nur wenige Monate nachdem der Erwerb eines bestimmten Negationselements eingesetzt hat, wird dieses Element bereits vollständig beherrscht. Nur in seltenen Fällen ist zusätzlicher Aufwand nötig, um den Gebrauch von Negationselementen in einer bestimmten Struktur vollständig zu erwerben. In solchen Fällen erkunden Kinder zunächst ihre Sprachkompetenz, indem sie die Negation in einer unkonventionellen, in der Erwachsenensprache ausgeschlossenen Weise gebrauchen. An dieser Stelle ist es wichtig anzumerken, dass bei Kindern, für die Langzeitdaten über 12 Monate hinweg verfügbar sind, im Verlauf der ersten drei Jahre des aktiven Erwerbs der Negation die Vorkommen von Negationselementen, die den Normen der Erwachsenensprache nicht entsprechen, im Durchschnitt nur 0-3% des sprachlichen Inputs ausmachen. Bei zu 97% fehlerfreiem Input können diese 3% nicht ausreichend sein, um die komplexen Eigenschaften der Entwicklung der Negation bei sich typisch entwickelnden Kindern zu erklären.

Ein Schwerpunkt der empirischen und inferenzstatistischen Untersuchung ist die Bedeutung des sprachlichen Inputs für den Verlauf des Erwerbs der Negation. Bei der Verarbeitung und

Analyse der Daten hat sich gezeigt, dass der kindliche Gebrauch der Negation in großem Ausmaß den Charakteristika des von Bezugspersonen ausgehenden sprachlichen Inputs entspricht. Dadurch bestätigt sich, dass der natürliche Sprachgebrauch von Kindern den Sprachgebrauch ihrer Bezugspersonen widerspiegelt.

Ein Schwerpunkt dieser Arbeit liegt darin, die Evidenz für das Vorhandensein eines bestimmten Merkmals der Negation herauszuarbeiten und auf dieser Basis das Auftreten dieses Merkmals in der Kindersprache zu verstehen. Was die Identifikation von Phasen im kindlichen Erwerb der Negation betrifft, wird in dieser Arbeit argumentiert, dass das bloße Vorkommen einiger Beispiele einer bestimmten Struktur bei einigen Kindern nicht ausreichend ist, um eine Erwerbsphase für diese Struktur anzusetzen. In keiner der in dieser Arbeit untersuchten Sprachen wurde auch nur ein Muster gefunden, das bei einer größeren Zahl von Kindern über einige Monate hinweg stabil genug war, um es mit einer Erwerbsphase zu identifizieren. Die einzigen konsistenten Muster im kindlichen Gebrauch der Negation sind jene, die in der Erwachsenensprache vollkommen grammatisch sind.

In allen untersuchten Sprachen wurde auch Negative Concord in der Kindersprache ausführlich betrachtet. Je nachdem, ob der von Bezugspersonen ausgehende Input eine 1:1-Entsprechung zwischen formalen Negationselementen und negativer Bedeutung aufweist, ist diese Entsprechung entweder auch in der Kindersprache vorhanden (wie im Italienischen) oder nicht (wie im Niederländischen).

Die Stärke dieser Arbeit liegt einerseits darin, dass versucht wurde, das Verhalten der Negation in der Kindersprache im Detail zu erfassen und nicht nur eine große Menge negierter Sätze aufzulisten, und andererseits in der Vielfalt der Datenquellen, die zu diesem Zweck eingesetzt wurden.

Urdu summary

اردو خلاصہ

جذباتی نفی اور منفی اتفاق کا حصول

نفی کے حصول کا مطالعہ زبان کے حصول کے نظریہ کو تیار کرنے میں کلیدی کردار ادا کرتا رہا ہے۔ موجودہ پی ایچ ڈی تھیسس کا مقصد جذباتی نفی کے حصول کی تحقیقات کرنا ہے اور اس کی خاص خصوصیات پر توجہ مرکوز کرنا ہے جیسے بچوں کی پہلی زبان کے حصول میں ایک یا ایک سے زیادہ منفی عناصر کا استعمال کرتے ہوئے نفی کا اظہار کرنا۔ فطری زبانوں کو جذباتی نفی کے اظہار کے حوالے سے دو اہم زمروں میں تقسیم کیا گیا ہے، i) منفی اتفاق (NC) زبانیں، جو فی شق ایک سے زیادہ منفی عناصر کے استعمال کی اجازت دیتی ہیں اور ii) ڈبل نفی (DN) زبانیں جو جذباتی نفی کے اظہار کے لیے فی شق ایک منفی عنصر صرف اجازت دیتی ہیں۔ بچوں کی زبان کے حصول کے فطری مطالعہ کے میدان میں علم کی موجودہ حالت بنیادی طور پر ایک محدود عمر کی حد کے بچوں کی محدود تعداد سے پیدا ہوتی ہے۔ NC زبانوں میں بھی منفی اتفاق کے حصول کے مطالعے کم رہے ہیں۔ اس سیکشن میں، مصنف اس بات پر دلائل کی ایک سیریز فراہم کرنے کے موقع سے فائدہ اٹھائے گا کہ یہ مقالہ کس طرح نفی اور منفی اتفاق کے حصول کے نمایاں طور پر کم دریافت شدہ شعبوں میں حصہ ڈالتا ہے،اور تجرباتی مشاہدات اور 7-1 سال تک کی وسیع مدت عمر کے کراس لسانی بچوں کے اعداد و شمار کا تخمینہ ثبوت فراہم کرتا ہے۔ مصنف نے اس بات کی بھی دلیل دی ہے کہ لسانی تحقیق میں استعمال ہونے والی تکنیکوں اور شواہد کو وسعت دینے کی اہمیت اور ضرورت ہے۔

مقالہ نفی کے نحو کے بارے میں ادب کا ایک تفصیلی جائزہ فراہم کرنے، مختلف لسانی مثالوں کو پیش کرنے اور پچھلی 5 دہائیوں کے دوران پیش آنے والے مختلف افسانوی اور عصری نظریات میں تجویز کردہ مختلف منفی عناصر کی نحوی اور معنوی حیثیت کی عکاسی کرنے سے شروع ہوتا ہے۔ ایک میٹا تفصیل بھی پیش کی جاتی ہے نظریات کے لیے مختلف فریم ورک اور میکانزم کی تجویز پیش کی جاتی ہے جس میں مختلف طریقوں اور حکمت عملیوں کا حساب کتاب کیا جاتا ہے جو قدرتی زبانیں جذباتی نفی کے اظہار کے لیے لاگو ہوتی ہیں۔ اس کے علاوہ، نظریات کی ایک تفصیلی تنقید ان طاقتوں، شراکتوں کی تعریف کرتی ہے جو یہ نظریات نفی کی نوعیت کو لسانی طور پر سمجھنے میں کرتے ہیں، ساتھ ہی ان خلاوں اور خالی جگہوں کو بھی اجاگر کرتے ہیں جہاں ان میں فقہی نفی کے ایک خاص قسم کے رجحان کی وضاحت کرنے کے رجحان کی کمی ہے۔

Zeijlstra's (2004, et seq.) نفی اور منفی اتفاق کے حصول کا نظریہ پیش گوئی کرتا ہے کہ ڈچ جیسی دوہری نفی کی زبان بالغ زبان میں نفی کے حوالے سے رسمی خصوصیات یا دوہرے اثرات کو ظاہر نہیں کرتی ہے، اور بچوں کی زبان میں بھی اسی کی عکاسی بھی ہوگی۔

مزید یہ پیش گوئی کی گئی ہے کہ منفی ہم آہنگی والی زبانوں میں رسمی خصوصیات کا تخمینہ بالغوں کی زبان کے ان پٹ میں نفی کے دوگنا اثرات کی صورت میں پیش کیا جاتا ہے اور اس طرح یہ ان پٹ بچوں کی زبان میں بھی اسی کی نمائش کا باعث بنے گا۔ Zeijlstra کے منفی ہم آہنگی کے نظریہ کے تحت ایک ایسی زبان جو منفی مارکر، Neg° رکھتی ہے، منفی ہم آہنگی کی بھی اجازت دیتی ہے۔ پیشین گوئیاں اطالوی، ایک NC زبان کے لیے سیدھی لگتی ہیں۔ جب معیاری انگریزی کی بات آتی ہے تو صورتحال مختلف ہوتی ہے۔ معیاری انگریزی میں منفی Neg° مارکر ہوتا ہے جو کہ Zeijlstra کے نظریہ کے مطابق اسے منفی ہم آہنگی کی زبان بناتا ہے۔ Neg° منفی مارکر کے بروقت حصول کے لیے، مطلوبہ ان پٹ NC ہے۔ چونکہ بالغوں کی معیاری انگریزی منفی ہم آہنگی کی نمائش نہیں کرتی ہے اور بالغوں کی زبان میں جو ان پٹ

بچوں کو ملتا ہے اس میں نفی کی رسمی خصوصیات شامل نہیں ہوتی ہیں جو Neg° منفی مارکر کے حصول کے لیے مطلوبہ ان پٹ ہے، اس لیے بچوں کو صرف ان پٹ پر انحصار کرنا پڑتا ہے جو ظاہر کرتا ہے۔ n't کا استعمال صرف منفی عنصر کے طور پر نہیں۔ اس طرح، n't کا حصول فعل منفی مارکر سے تھوڑی دیر بعد ہوتا ہے، یعنی نہیں. Zeijlstra نے یہ بھی پیشین گوئی کی ہے کہ NC زبانوں کی طرح، انگریزی کی منفی کنکارڈ اقسام کو حاصل کرنے والے بچوں کو NC یا دوگنا اثرات کے ان پٹ تک جلد رسائی حاصل ہو گی تاکہ بچے بروقت not & n't حاصل کر سکیں۔

DN اور NC زبانوں کے حوالے سے Zeijlstra کی پیش کردہ بڑی پیشین گوئیوں کو جانچنے کے لیے، ڈچ، اطالوی، SE، اور Negative Concord English کے لیے بچوں کے فطری طور پر بولے جانے والے ڈیٹا کی چھان بین اور تجزیہ کیا جاتا ہے۔ مقالہ بے ترتیب طور پر منتخب 1423 عام طور پر نشوونما پانے والے بچوں کے لیے 193294 منفی جملوں کا مطالعہ کرتا ہے اور ان کے متعلقہ نگہداشت کرنے والوں کے لیے مجموعی طور پر چار زبانوں کے لیے 318164 جملوں کا مطالعہ کرتا ہے، جو 1-7 سال کی عمر کے دوران پھیلے ہوئے ہیں، جو کئی عمر کے گروپوں کی نمائندگی کرتے ہیں۔ قدرتی طور پر بولی جانے والی تقریر کئی وجوہات کی بناء پر لیبارٹری، کنٹرول شدہ اور تجرباتی ڈیٹا پر اہمیت رکھتی ہے، i) یہ محققین کو بچوں کی فطری طور پر بولی جانے والی تقریر کا حقیقی دنیا کے تناظر میں واضح انداز میں مطالعہ کرنے کی اجازت دیتی ہے، ii) یہ محققین کو پتہ لگانے کی اجازت دیتی ہے۔ تبدیلیاں، انوکھے نمونے، بچوں کے گرامر میں کسی خاص ڈھانچے کے بارے میں نئی معلومات، بچوں کی زبان کی نشوونما کے دوران زیادہ وقت میں گرامر کی ترقی، iii) اس سے محققین کو چھوٹے بچوں کی بولی جانے والی تقریر کے قدرتی بہاؤ کا مطالعہ کرنے میں مدد ملتی ہے اور انہیں بہت سے مختلف عوامل کا مطالعہ کرنے کی اجازت دیتا ہے جیسے کہ دیکھ بھال کرنے والوں کا ان پٹ، عمر، انفرادی فرق وغیرہ، جو بچوں کی زبان کی نشوونما میں اہم کردار ادا کرتے ہیں۔ کنٹرول شدہ، تجرباتی، اور لیبارٹری میں بولے جانے والے ڈیٹا میں وسیع پیمانے پر فوائد کا فقدان ہے جو قدرتی طور پر بولے جانے والے ڈیٹا کو حاصل ہے۔

مقالہ وسیع پیمانے پر استنباط کرنے کے لیے جدید اور طاقتور شماریاتی طریقوں کے استعمال سے فائدہ اٹھاتا ہے۔ جنرلائزڈ لائنر مکسڈ میتھڈز (GLMMs) جوابی متغیرات پر پیشین گوئی کرنے والے متغیرات کے اثر کا اندازہ لگانے کے لیے استعمال کیے جاتے ہیں۔ ماڈل کے نتائج جامع تفصیلات میں پیش کیے گئے ہیں جس میں تخمینوں، اعتماد کے وقفوں، اہم جانچ، اور اثر کے سائز کا احاطہ کیا گیا ہے۔

یہ مقالہ مختلف عمر کے گروپوں کے بچوں کا موازنہ کرنے کے لیے پوسٹ ہاک متعدد موازنہوں کے جدید تجزیاتی اور طریقہ کار کا استعمال پیش کرتا ہے تاکہ کسی خاص جذباتی منفی مارکر کے تخمینی اوسط استعمال میں فرق کو دیکھا جا سکے۔ کراس لسانی پوسٹ ہاک ایک سے زیادہ موازنہ کے شواہد سے پتہ چلتا ہے کہ 30 ماہ کی عمر کے بعد، صرف 2.5 سال کی عمر میں اور نفی کے فعال حصول (13 ماہ کی عمر سے شروع ہونے والے) کے 1.5 سال کے سفر پر، بچے، اوسطاً، منفی عناصر کو اسی طرح استعمال کریں۔ ثبوت اس بات کی نشاندہی کرتا ہے کہ i) بچوں کو ملنے والی ان پٹ کی طاقت کا اثر، ii) عمر کا مثبت کردار اور iii) منفی عناصر کے حصول کے سلسلے میں قابلیت اور کارکردگی کا واضح مظاہرہ۔ یہ مقالہ ذیلی گروپوں کا مطالعہ کرتا ہے تاکہ چائلڈ سٹینڈرڈ انگلش اور نیگیٹو کنکورڈ انگلش میں منفی ہم آہنگی کا تفصیلی اور جامع جائزہ حاصل کیا جا سکے۔

اس مقالے میں پیش کیے گئے مکمل نظریاتی، تجرباتی، اور استنباطی شواہد کی بنیاد پر، یہ استدلال کیا جاتا ہے کہ چھوٹے بچے اپنی مقامی زبان کی جذباتی نفی ایک قابل ذکر طریقے سے حاصل کرتے ہیں۔ بچوں کا نفی کے حصول کا سفر ایک تیز رفتار ہے، یعنی ایک بار جب وہ کسی منفی عنصر کو حاصل کرنا شروع کر دیتے ہیں، تو وہ اگلے چند مہینوں کے اندر

اس پر تیزی سے عبور حاصل کر لیتے ہیں۔ صرف بعض اوقات بچوں کو کسی خاص ڈھانچے میں منفی عنصر کے استعمال میں مہارت حاصل کرنے میں اضافی کوشش کرنی پڑتی ہے۔ اس وقت تک وہ اپنی لسانی قابلیت کو کچھ انوکھے طریقوں سے استعمال کرتے ہوئے دریافت کرتے ہیں جنہیں غیر روایتی یا غیر بالغوں کی طرح سمجھا جاتا ہے۔ یہ نوٹ کرنا ضروری ہے کہ اوسطاً 12 مہینوں کے دورانیے میں طول بلد ڈیٹا والے بچوں کے لیے، چوٹی کے پہلے 3 سالوں کے لیے جو نفی کے فعال حصول کو پیش کرتے ہیں، کسی بھی منفی عنصر کا غیر بالغوں کی طرح استعمال نمونہ کی زبان 0-3% کے درمیان رہتی ہے۔ 97% تک درستگی کی شرح کو دیکھتے ہوئے، اس 3% کو کسی بھی عام طور پر ترقی پذیر بچے میں نفی کی نشوونما میں پیچیدگیوں کو متحرک کرنے کے لیے کافی نہیں لیا جا سکتا۔

تجرباتی اور مفروضہ ثبوت نفی کے حصول کے سفر میں لسانی ان پٹ کی مطابقت کی اہمیت پر مرکوز ہیں۔ ڈیٹا پروسیسنگ اور تجزیوں کے دوران، یہ پایا گیا کہ نفی کے لیے دیکھ بھال کرنے والوں کے لسانی ان پٹ میں پائی جانے والی خصوصیات بچوں کے نفی کے اظہار میں بھی بہت زیادہ جھلکتی ہیں۔ اس بات پر بھی زور دیا جاتا ہے کہ بچوں کی فطری زبان ان کی دیکھ بھال کرنے والوں کی زبان کی آئینہ دار ہوتی ہے۔

یہ مقالہ نفی کی کسی خاص خصوصیت کی موجودگی کے ثبوت کی نشاندہی کرنے اور بچے کی زبان میں بھی اس کی موجودگی کو سمجھنے کے لیے اسے وسعت دینے پر بہت زور دیتا ہے۔

بچوں کے حصول نفی کے مراحل کی نشاندہی کے میدان میں، مقالے میں یہ استدلال کیا گیا ہے کہ چند بچوں میں کسی خاص ڈھانچے کی صرف چند مثالوں کا مشاہدہ کرنا بچوں کے حصول کے راستے میں اس ساخت کے کسی مرحلے کی شناخت کے لیے کافی نہیں ہے۔ اس مقالے میں چھان بین کی گئی تمام نمونہ زبانوں میں، چند مہینوں کے دوران بچوں کی قابل لحاظ تعداد کے لیے ایک بھی نمونہ نہیں ملا جو اسے بچوں کی زبان میں ایک مرحلے کا دعویٰ کرنے کے لیے کافی ثبوت فراہم کر سکے۔ بچوں کی نفی میں نفی کے واحد مستقل نمونے بالغوں کی طرح اور زیادہ سے زیادہ حد تک گرائمر ہیں۔ بچوں کی زبان میں NC کی تحقیقات کے لیے، تمام نمونہ زبانوں کی مکمل چھان بین کی گئی ہے۔ ان پٹ کی بنیاد پر، دیکھ بھال کرنے والوں کے ان پٹ میں منفی شکل اور معنی کے درمیان 1:1 کا تعلق موجود پایا جا سکتا ہے، جیسا کہ اطالوی میں، یا بچے کی زبان میں غائب، جیسا کہ ڈچ میں۔

آخر میں یہ استدلال کیا جاتا ہے کہ اس مقالے کی طاقت بچوں کی زبان میں نفی کی وضاحت کرنے اور نہ صرف منفی جملوں کی کثیر تعداد کو پیش کرنے میں بھی تفصیلات کی گہرائی میں پنہاں ہے۔ شواہد کا تنوع ایک اور مضبوط علاقہ ہے جو یہاں بڑی حد تک پیش کیا گیا ہے۔