Parallel Architecture, Parallel Acquisition
Cross-Linguistic Evidence from Nominal and Verbal Domains

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Brett R. Sutton, M.S.

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Dissertation Advisors: Donna Lardiere, Ph.D. and Ruth Kramer Ph.D.

Abstract

This dissertation explores parallels between Complementizer Phrase (CP) and Determiner Phrase (DP) semantics, syntax, and morphology–including similarities in case-assignment, subject-verb and possessor-possessum agreement, subject and possessor semantics, and overall syntactic structure–in first language acquisition. Applying theoretical research into CP-DP parallels to child language acquisition, it asks two questions: 1) is there a relationship between the acquisition of case-assignment and agreement within the CP and the DP? and 2) does the appearance of a particular feature or structural position in the CP predict its appearance in the DP?

Child language acquisition research has resulted different conclusions regarding both the type of representations in child grammar and the nature of their grammatical development. Assuming a feature-based grammatical architecture without pre-defined functional categories, the dissertation evaluates these different approaches to whether and how the grammar changes.

The dissertation describes the relevant morphosyntax of Estonian, Hungarian, and English, highlighting the DP-CP parallels and cross-linguistic similarities. Longitudinal data from three children for each language were analyzed, with attention paid to features shared between nominal and verbal domains or indicative of syntactic structure. Results relating to both the main research questions and grammatical development of each child were compared across the three languages.

The study found that for Estonian, CPs and DPs did develop in parallel, with similar syntactic pairs being acquired simultaneously. Case, agreement, and person/number features associated with CP preceded DP counterparts. Hungarian was similar: syntactic development occurred in parallel, though morphological aspects, including possessor agreement, were acquired first in verbal environments. English results differed, with syntactic development again parallel, though case acquisition occurred simultaneously and morphology consistently preferred nominal realization.

The results indicate a parallel and steady syntactic development, contrasted with morphological development influenced by frequency. Additional analysis showed that fewer features represented by a form led to earlier acquisition, with bound functional morphemes preceding free ones. Overall, this supports a weakly continuous view of grammatical development, with a steadily growing linguistic capacity limited by the need to learn particular linguistic features.

INDEX WORDS: First Language Acquisition, Morphology, Agreement, Hungarian, Estonian, English, Possession

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Many people are owed much gratitude

On account of helping this creation:

Rebecca, my wife, whose great attitude

Pushed me to complete this dissertation.[1]

Hours did my committee[2], with fortitude,

Offer acute guidance and mentation.

Long nights did I talk with fellow linguists[3]

Of syntax, phonology, semantics

Growing trees, spacing vowels, and composing.

Ideas evanesced, but one persists

Comparing English, two Finno-Ugrics

And DPs with CPs juxtaposing.

Let[4] us now read all about my theory–

Yearning for better than this poetry

[1]Seriously, she's great. It's a lot to ask to get a non-linguist to proofread something like this. Eternally grateful.

[2]Donna Lardiere, Ruth Kramer, and David Lightfoot all provided guidance, encouragement and direction throughout the process.

[3]Thanks especially to Shreya and Laura and the Agreement Reading Group.

[4]Arguably, there's an L missing here. It was deleted via a morphorthographic process that eliminates redundant letters (Sutton, *p.c.*.)

List of Abbreviations

Abbreviation	**Meaning**	**Abbreviation**	**Meaning**
DAT	Dative	1	First Person
NOM	Nominative	2	Second Person
GEN	Genitive	3	Third Person
ACC	Accusative	SG	Singular
PRT	Partitive	PL	PLURAL
ILL	Illative	DEF	Definite
INE	Inessive	POS	Possessive
ELA	Elative	PSR	Possessor
ALL	Allative	PSM	Possessum
ADE	Adessive	PAST	Past
ABL	Ablative		
TRA	Translative		
TER	Terminative		
ESS	Essive		
ABE	Abessive		
COM	Comitative		
INS	Instrumental		

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Introduction

This dissertation involves a comparative analysis of the acquisition of nominal and verbal morphosyntax in child learners of Estonian, Hungarian, and English. The starting assumption, in its simplest form, is that the *feature* is a fundamental linguistic primitive and the acquisition of language entails the acquisition of features (Travis, 2008). Although the acquisition of words, sounds, and meanings all involve features and are all crucial elements of understanding language learning, this dissertation focuses on morphosyntactic elements shared between the Determiner Phrase (DP) and the Complementizer Phrase (CP). Following the hypothesis that these projections have deep similarities (Abney, 1987), studying grammatical elements shared between the nominal and clausal domains serves to explore the features' independence from the particular lexical items they appear with. In particular, special attention will be paid to the acquisition of case-assignment, agreement and person/number representation, and subjects/possessors. Additionally, this comparison allows an examination of syntactic development through the analysis of the increasingly complex CPs and DPs.

This project has three goals. The first is to examine how and to what extent the theoretical parallels between the DP and the CP are reflected in the acquisition of these syntactic categories and the features they are composed of. The second goal is to better understand the role of features in acquisition. Formal approaches to language acquisition have long focused on the development of the functional aspects of language; this study aims to discuss the development of these functional aspects in

terms of their component features rather than assuming a pre-existing set of functional categories. Finally, the comparison of three different languages in these terms will allow for conclusions to be drawn regarding how particular morphosyntactic differences between languages are reflected in the acquisition process.

The morphysyntactic descriptions of the language will show how, despite a great deal of morphological variation, the underlying syntactic operations are quite similar. The analyses of each individual language's children will show quite similar syntactic and morphological development. Though there are some significant time scale differences between children, the overall path looks the same within a language. The comparative study, on the other hand, indicates that while syntax develops similarly both cross-linguistically and in the CP and DP, morphological development is strongly affected by the details of the particular language and projection. These differences will be used to evaluate various formal approaches to acquisition and explore limiting factors in linguistic development.

Estonian, Hungarian, and English were chosen for a variety of reasons, both theoretical and practical. For the relevant aspects of CP/DP morphosyntax the languages have enough in common to be comparable, but enough differences exist between them that meaningful conclusions might be drawn from that comparison. Specifically, all three have morphological agreement, similar person/number paradigms, and morphological case, though the agreement facts range from rather simple in English to quite complicated in Estonian and the case systems vary greatly in their details. Additionally, Estonian and Hungarian are relatively understudied languages, making their study an important contribution to the body of acquisition work, yet they are not so obscure that there is not also a body of theoretical work to rely on in the analysis. Though many languages fit this description, these three have the final benefit of being well-represented in the CHILDES (MacWhinney, 2000) corpora, allowing a thorough

examination of acquisition for all three during the crucial period of morphosyntactic development.

This dissertation is organized as follows: Chapter (1) outlines the theoretical frameworks, summarizes a variety of formal approaches to language acquisition, and describes the motivating DP-CP parallels. The subsequent three chapters discuss the details of DP and CP morphosyntax and their acquisition in Estonian (Chapter (2)), Hungarian (Chapter (3)), and English (Chapter (4)), respectively. The fifth and final chapter compares and contrasts the language-specific results and their significance to language acquisition.

Chapter 1

Linguistic Theory & Approaches to Acquisition

This chapter provides an overview of the theoretical models guiding the project. The first section describes the morphological and syntactic frameworks to be used in analyzing the target languages of Estonian, Hungarian, and English. The second section describes the many parallels in structure and function between the DP and CP, making the case for using the various similarities between the two as the focus for this study of longitudinal child language data. The final section reviews relevant first language acquisition studies and describes the methodology to be used in the following chapters.

1.1 Minimalism & Distributed Morphology

This section will overview the theoretical syntactic and morphological frameworks to be used to carry out the subsequent analysis. A minimalist syntactic model, following Chomsky (1999) and subsequent work, will be assumed here. Most important to the analysis is the nature of agreement, described as a relationship between a *probe* and a *goal* (Chomsky, 1999):

(1) a. An unvalued feature F (a *probe*) on a head H scans its c-command domain for another instance of F (a *goal*) with which to agree.

b. If the goal has a value, its value is assigned as the value of the probe

This model is assumed to capture the syntactic nature of agreement, though the morphological aspect of agreement may take different forms, to be discussed below. Case-assignment is assumed to be a result of the Agree relation, with nominative case assigned by a (finite) T head (Chomsky, 1998). The clausal analogy, to be discussed in greater detail in section 1.2, has lead to many interesting insights regarding the structure of nominals. It suggests that the CP and DP have similar functional structure and properties. The corresponding case and agreement operation within the DP is the relationship between possessors and a functional head somewhere within the DP. This functional head will agree with the relevant ϕ-features of the possessor. If there is an EPP feature associated with that functional head, the agreed-with item may raise to the specifier position of that head (Chomsky, 1982). A generic example of agreement is represented in Figure (1.1).

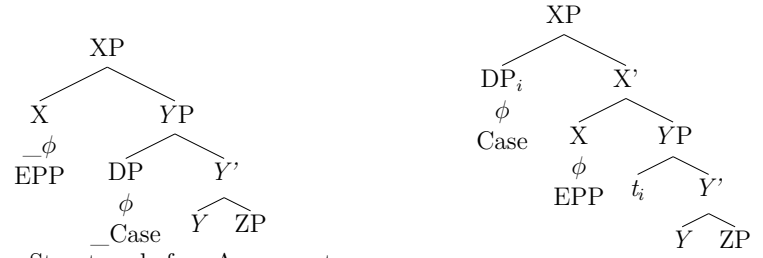


Figure 1.1: Agreement Schema

In this model, X is the *probe*, having unvalued ϕ features, and will seek values for these features on an active *goal* in its c-command domain Chomsky (1999)[1]. The resulting operation leads to the features being valued on the probe, and the goal DP is then assigned case, becoming inactive for future agreement operations. If the probe

[1]Probes are often assumed to consist of ϕ-feature bundles– a single probe that seeks out person, number, or gender features, though recent research, seeking to explain discrepancies between number and person agreement, has begun to suggest particular features may be probed for independently(Preminger, 2011; Adger and Harbour, 2007). This line of thought has been pursued for various reasons, though differences in the acquisition of certain types of ϕ-agreement may provide additional evidence for the separation of probes.

has an EPP feature, this causes the goal to move to a specifier position above the probe.

Additionally important for the analysis is the nature of the *phase*. The phase is important for both syntactic and morphological reasons, serving as the primary unit within which cyclic spell-out occurs. Chomsky (1998) introduced the phase as a syntactic domain crucial for understanding restrictions on movement, with the important phases for the syntax being vP and CP. Only elements in the head and specifiers of a phase are visible to higher elements for agreement and movement purposes. In Figure (1.1)a, only the DP in the specifier of YP or Y, if it has the relevant features, are available for agreement with X. Assuming YP is a phase, elements lower in the structure, such as ZP, are not accessible to agreement.

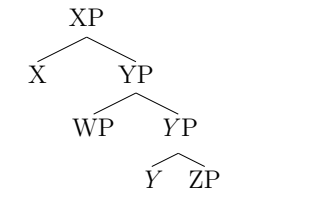
The phase is important to the analysis of possession, as it will determine what DPs are available for agreement and case assignment within the nominal. Phasehood and cyclicity are also important for understanding the nature of allomorphy and the process of vocabulary insertion (Embick, 2010). The spell-out of a phase head and its complements does not occur until the merging of a higher phase head. This means that phase heads delimit the boundary for affecting allomorphy: only elements within the same spell-out domain may affect the phonological form of the word.

The nature of word formation and morphology will be analyzed in the Distributed Morphology (DM) framework, following Halle and Marantz (1993); Embick (1997) and much subsequent work. Though many scholars may differ in the details of their applications, DM approaches have several important characteristics. A distinct generative lexicon is not assumed in DM; the syntax operates not on words but instead on abstract bundles of morphosyntactic features. After the syntactic operations are carried out on these feature bundles, a structure is subject to another set of morphological operations, described below. After all morphological operations have occurred,

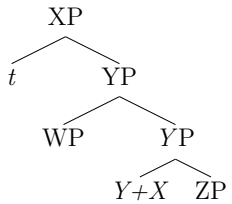
the terminal nodes receive their phonological expression in a step called *vocabulary insertion*. *Late insertion*, which refers to the fact that morphosyntactic structures lack phonology until this final step, is an important element of the DM framework as it maintains a strict division between the abstract features important for syntax and the phonological features ultimately pronounced. Vocabulary insertion is subject to *underspecification*– phonological forms may expone only a subset of features that are represented syntactically at a given node.

There are several operations specific to the morphological component that manipulate nodes of a syntactic structure. These operations are crucial in situations in which the morphology does not appear to map 1:1 with the syntax, as is the case with Hungarian possession (see Section (3.1)). The following definitions are adapted from Harley and Noyer (1999) and Embick and Noyer (2001):

(2) a. *Lowering*: adjunction of one head to another, lower head



a. Structure before Lowering



b. Structure after lowering

b. *Local Dislocation*: an element trades its relation of adjacency to a following constituent with a relation of affixation to the linear head of that constituent.

$$[\text{X} [[\text{Y}] \text{ZP}]] \rightarrow [[\text{Y} + \text{X}] [\text{ZP}]]$$

c. *Impoverishment*: the deletion of morphosyntactic features from functional heads in certain contexts

$$\text{Z}\{\text{a, b, c }\} \rightarrow \text{Z}\{\text{a, c}\} \ / \ \text{X} \_ \ \text{Y}$$

d. *Fission*: the splitting of features on a terminal node into another node, allowing the exponence of multiple Vocabulary Items

$$\{a,b,c,d\} \rightarrow \{a,b\} + \{c,d\}$$

Following the assumptions about agreement discussed above, features on heads drive the syntactic agreement and case-assigning process, though these features do not project their own terminal nodes in the syntax. Chomsky (1995) makes the case for a syntax without distinct AGR nodes, noting that, being compositionally meaningless, they should have no role there. Morphological agreement and case marking are handled in various ways in the DM literature (Embick, 1997, 2010; Arregi and Nevins, 2012). Here, I will follow Embick (1997) in assuming that morphological realizations of both case and agreement are *dissociated* morphemes– inserted after the syntactic operations Merge and Move but before vocabulary insertion, with relevant features copied from the nearest relevant head. In this way, they are not represented in the syntactic derivation that is interpreted by the semantic component and exist solely post-syntactically. The details of the morphological realization of these features will be discussed in greater detail in the discussion of the particular languages' realizations.

Finally, an account of *concord*, which may or may not be formally identical to *agreement*, is important for understanding the mechanisms at work inside the DPs in the target languages. While verbal agreement is co-occurrence of features between items in different extended projections (such as person features of a DP occurring on a verb), concord refers to the co-occurrence of features on items within an extended projection– such as between nouns and their determiners, demonstratives, or adjectives. Though a description of both agreement and concord as feature co-occurrence

is accurate, it is a question whether the process that leads to the feature co-occurence is the same in both cases.

Several different approaches to concord have been suggested in the literature. Baker (2008b) suggests that agreement and concord really are instantiations of the same process, and the differences between the two are based on the direction a head probes for features, with different language have different possible specifications. Brattico (2011) takes the same point of view, arguing from Finnish and Russian data that case concord is simply case assignment occurring multiple times across all items that require case. Other approaches, starting with Chomsky (1981a), suggests a distinction between concord and agreement involving feature percolation. Babby (1987), for example, suggests that case is assigned to a maximal projection (N^{max} in his terms) and that a distinct case-percolation mechanism then copies the case to relevant heads within the nominal. More recently, Norris (2014) proposes that concord happens post-syntactically, with Agr nodes copying the relevant features from the closest element with those features, also via percolation.

For the current acquisition study, a distinction is drawn between concord and agreement. Though a particular mechanism for how concord occurs is not strictly required, a future study that focused on differences between the acquisition of verbal agreement and nominal concord would shed light on whether they were developmentally related. The formal descriptions of the target languages will use concord as evidence for the internal structure of nominals, though any of the approaches above can capture the range of facts important for present purposes.

1.2 The Clausal Analogy

The similarities between clauses and nominals have been discussed in generative linguistics for years. Chomsky (1970) focused on verbal nominalizations, noting that subjects in simple transitives become genitives in the related nominalization, as in (3).

(3) a. The army destroyed the bridge

b. The army's destruction of the bridge

Examples like these not only suggest a relationship between agents and possessors, but also point to the fact that the argument structure of a verb seems to be inherited in related nominalizations. This is clearest in gerunds or nominals with very clear derivational relationship to verbs like in (3b), though still apparently true for a variety of nouns.

Abney (1987), followed by Szabolcsi (1994) and many others, showed that the DP represented a level of functional structure above the NP rather than being simply an adjoined projection in the specifier of a dominating NP. In this sense, the DP and PossP are parts of the extended projection of the noun in the way that IP and CP are parts of the extended projection of the verb (Grimshaw, 2005).

As verbal argument structure allows thematic objects to be raised to subject in passives, the functional structure of nominals also allows objects of nouns to be syntactically moved to the possessor position. This suggests that the intermediate projection in the DP, call it Poss, is very similar to T. Typically, the T will agree with and assign case to the agent in Spec-vP, though it agrees with a lower noun in a passive. Likewise, if there is no possessor, Poss is free to agree with and assign case to an agent or a theme argument if they exist, such as in a verbal nominalization.

Morphological possessors– that is, any genitive-case bearing nominal in English, have a wide variety of thematic relations to their possessa. Examples in (4) show several possibilities.

(4) a. Piccasso's painting (Picasso=Agent)

b. The cake's baking (Cake=Theme)

c. The student's books (Student=Possessor)

This additional parallel is consistent with Baker (1997)'s Uniformity of Theta Assignment Hypothesis (UTAH), which requires that the same theta roles are assigned to DPs in the same location. Agent, theme, and actual semantic possessors must all receive their thematic role in different base positions, entailing that their ultimate realization in the position of the morphological possessor is a result of movement. Following Adger (2003) and merging all semantic possessors at Spec$n$ would allow them to move into the SpecPoss position ahead of any arguments[2]. If non-argument possessors are assigned a Possessor thematic role, merging them all in the same position would satisfy UTAH.

Another unrelated parallel was first brought to attention by Szabolcsi (1983), who capitalized on the possessor agreement in Hungarian. As will be discussed in much greater detail in Chapter (3), Hungarian possessa agree with their possessors, and these agreement morphemes are nearly identical to those seen in the verbal paradigms. This led Szabolcsi to propose an INFL projection within the noun phrase just as in

[2]Merging at SpecNumP, following Ritter (1991) would satisfy the same requirements as merge in Spec$n$P, though may require a more complicated morphological analysis for a language like Hungarian, where possessive morphology comes between the root and the plural morphology. Ultimately, either option is workable.

the clause. The examples in (5) show the second person singular agreement morpheme both in a full sentence and in a possessed noun[3]:

(5) a. a te kalap-**od**
the 2SG.NOM hat-POSS.2SG
your hat

b. te rúg-**od** a fiú-t
you.NOM hit-2SG the boy-ACC
you hit the boy

Clauses and nominals both may have 'subjects' with particular case-marking and argument structure; they both may contain inflection/agreement; they both consist of a lexical core dominated by functional projections. The trees in (1.2) show these broad similarities. Together, these ideas form the basis of the suggested parallelism between DPs and CPs.

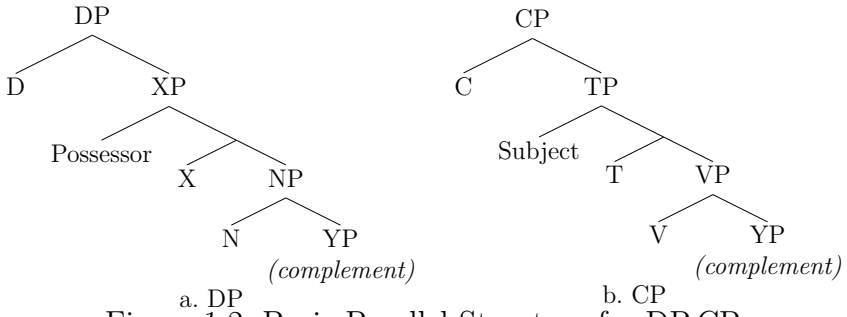


Figure 1.2: Basic Parallel Structure for DP,CP

These simplified trees show the basic parallelism between the two, though in both cases more functional structure may exist, e.g. aspect or mood for verbs and number for nouns. Additionally, the state of the XP in the DP tree is unclear, but will be

[3]Hungarian verbal agreement has two paradigms; the possessive agreement paradigm shares morphemes with each paradigm (See Section (3.1).)

discussed in detail for each language in their respective chapters. For simplicity's sake, this will generally be referred to as Poss (for possessor), though it does not necessarily host semantic possessors.

Beyond the syntactic and morphological similarities between the two, there are also more semantically-oriented aspects. Alexiadou et al. (2007) points out that CPs and DPs may both be arguments of verbs. Additionally, the pragmatic and context-sensitive aspects are encoded at C and D: determiners link nouns to their real-world entities as complementizers relate propositions to truth-values and speech-acts.

There are also counter-arguments to the parallels, especially with regards to the corrrect way to frame the parallel. Horrocks and Stavrou (1987) suggest that the DP is actually more rightly considered a parallel to the TP in many languages, with differences dependent on whether there is a prenominal "subject" position in DPs, with languages like Greek lacking this position, making Greek DPs more akin to TPs. Other conceptions of the maximally maximal projection, so to speak, of nominals is not DP but K(ase)P (e.g. (Lamontagne and Travis, 1987; Bittner and Hale, 1996)). Bruening (2009), on the other hand, suggests that the DP as CP parallel is wrong and that N shares much more with C than with D. Despite these arguments, the study will proceed, with the discussion of each language's facts lending more support to the comparison, though alternate analyses will be evaluated in Section 5.3.1.

1.3 First Language Acquisition

With the discussion of the morphosyntactic model complete, the discussion will now move to questions particularly concerning the problem of acquisition. First, work that explicitly addresses Minimalism/DM in acquisition will be addressed, exploring the benefits of using this approach and understanding the type of predictions that can be

made. The next section reviews a variety of approaches to first language acquisition, with an emphasis on understanding the initial and subsequent states of child language. The final part of this section reviews studies related particularly to the acquisition of possession and related morphology.

1.3.1 Parameters, Minimalism, & DM in Acquisition

The particular way one approaches the study of acquisition determines how specifics of syntax and morphology may inform the theory. Generative approaches to acquisition have been rooted in the Principles and Parameters model of language (Chomsky and Lasnik, 1993), which holds that language can be described in terms of language invariant *principles* (such as subjacency) and language-specific *parameters* (such as the Head-Final parameter). A principles and parameters-based approach constrains the hypothesis space for a learner, significantly reducing the options that must be considered. Linguistic principles are built-in, but the parameters must be learned or 'set' by the child through the acquisition process. Adopting this sort of model requires a solid conception of how parameters are best understood. Baker (2008a) draws a distinction between *macroparameters* and *microparameters*– the former characterizing large statements about what a particular language is like, such as being V2 or *pro*-drop. Approaches consistent with this view include include Hyams and Wexler (1993) and Legate and Yang (2007); a child acquiring language is evaluating their input to find evidence for particular (macro-)parametric settings. Microparameters, in contrast, concern a much more fine-grained analysis of the ways languages may vary, and the joint functioning of a large number of microparameters together lead to large variation (Kayne, 2005). Whereas a macroparameter might be of use for a child to determine whether their language is *pro*-drop, a microparameter would be used in identifying, in one of Kayne's examples, the position of clitics relative to

infinitives. The former has obvious, wide-ranging effects on a language, though the latter is still important and must be learned differently by speakers of otherwise very similar language. Though Baker (2008a:360) concedes that any macroparameter may be recast in terms of several microparameters, he maintains that both are helpful in understanding language variation and acquisition.

Boeckx (2011) describes the macro- and micro-parameter as a distinction between approaching parameters from above versus from below. The first set of approaches question the nature of varying *parameters* from above– assuming the hypothesized parameters and studying how the child comes to set them. The second may be seen as studying parameters from below– begin with the an analysis of lexical items and the parameters emerge. Boeckx (2011:5), in fact, notes that current models of syntax, which assume a uniform syntax and variation only in the lexicon[4], actually leave little room for the type of from-above view of parameters, which raises questions about how they could be involved in the acquisition process.

Yet another perspective on parameters is provided by Biberauer et al. (2013), who add mesoparameters and nanoparameters to the parameter ontology. They understand parameters to be statements about how lexical items, which in their terms includes both lexical and functional items as understood here, behave. If all items in a particular class share a certain feature or behavior, they are macroparameters; an example of this would be languages that consistently linearize head-first. A nanoparameter, on the other hand, would apply only to a very limited subset of items; the example they use is the English degree modifier *enough* which, unlike other degree modifiers, follows rather than precedes its adjective. Parameters for them are not

[4]Lexicon is meant here somewhat atheoretically. In DM terms, there is not a lexicon but an Encyclopedia/Vocabulary. In a DM model, the features/feature bundles associated with vocabulary items would be where variation must exist, in addition to the presyntactic lexicon of feature bundles selected and manipulated by the syntax.

like switches that the children flip but epiphenominal descriptions of the behavior of classes of items. When acquiring the language, children learn facts about particular lexical items and then generalize them until additional facts cause them to adjust their hypothesis.

These various approaches to understanding parameters rely to a large extent on how rich UG is. If a child starts off able evaluate possibilities such as "Is my language pro-drop?" then macroparameters would be very helpful in quickly coming to conclusions about how to organize their particular grammar. On the other hand, a more minimal UG equipped with just a few operations would not be able to take advantage of such a system. In this case, the microparametric view seems to be more in sync with the tools a child has. Biberauer et al.'s description of parameters both takes advantage of a macroparametric view's ability to describe wide classes of languages while also requiring a minimal evaluation system to get to this point.

A feature-acquisition point of view is consistent with what Baker (2008a) calls the Chomsky-Borer Conjecture– that variation is limited to features on functional heads, and that variation is the ultimate result of acquiring a (perhaps subtly) different set of features and feature-bundles. The development of functional categories and the features associated with them is a good place to examine variation. This feature-based approach is also appropriate for the comparative analysis of DPs and CPs proposed here– if *features* are what is being acquired, then evidence for those features could (and perhaps should) appear independently of the functional category or perhaps lexical item in which they are bundled in the adult grammar (Hegarty, 2005).

This type of feature-based acquisition motivates the approach of this project. For example, 2SG agreement on a verb is evidence for the acquisition of *those* features, not necessarily evidence for an adult-like syntactic head T– a bundle consisting of a AGR, Tense, and NOM case assignment. If features are independent of the bun-

dles they frequently appear with, the 2SG feature's presence in the verbal agreement environment suggests that the 2SG feature exists in the grammar and will also be available for use on a pronominal D bundle. In this way, there will be a closer relationship between when a child acquires a pronoun and a corresponding agreement morpheme than there is between one agreement morpheme and another. Alternatively, if the child is not acquiring *features* but the functional heads, it is expected there will be a stronger relationship between when pronouns are acquired as a group and when agreement is acquired as a group. The relationship between acquiring features and functional categories is crucial, as a wide range of studies focus on the development of functional categories (Lust et al., 1994; Verrips and Weissenborn, 1992; Clahsen et al., 1993; Radford, 1996; Vainikka, 1993; Poeppel and Wexler, 1993; Félix-Brasdefer, 2006) These types of approaches will be discussed in depth in the following section.

Many of the acquisition studies cited above are framed in a Government & Binding approach to syntax and morphology and will have to be addressed with the understanding that they rely on similar but ultimately different assumptions about the way the grammar is organized and operates. The research described in these chapters, in contrast, are grounded in the Minimalist approach, and so a brief discussion of specifically Minimalist research into acquisition is warranted. Yang and Roeper (2011) argue for some specifically Minimalist technology in modeling child language acquisition. In particular, the Labelling Algorithm discussed in Chomsky (2006) requires that when merging two items, only one be used as the label. Assuming asymmetric merge is an element in early child language, according to Yang and Roeper (2011), suggests an ability to distinguish between child language pairs such as *ocean blue*, a small clause without a copula, and *blue ocean*, a nominal with an adjective. Additionally, assuming that this type of Merge is basic to human language offers a stepping off

point for the acquisition problem. If knowledge of Merge is a basic part of a Universal Grammar/ Language Faculty, it follows that acquisition will be, in some sense, learning to "un-merge," that is, to parse. Utterances must be decomposed into the words and features they comprise, and early acquisition will consist of the first items (features, roots/"words") first identified by a child.

The importance of and relationships between formal features and agreement in acquisition has also received attention. Roeper (1998) suggests that early child grammars are best described by children acquiring abstract formal features first rather than functional categories. He suggests that if children inherently make a distinction between closed-class functional features/categories and open-class lexical features/categories (e.g. semantically-meaningful features), it will both restrict the positing of functional elements and allow the easy additional of new lexical items. Radford (2000) examines data from CHILDES and shows that children gradually build the feature-bundles associated with functional heads feature-by-feature. This includes the development of both nominal items like gender and number on pronouns, as well as verbal elements like tense and aspect. Corréa (2009) shows how ϕ-features of Brazilian Portuguese nominals would help a child to posit functional features/heads and begin to fill out the details of the grammar. Experimental results show that infants were sensitive to the inclusion of determiners in the language before they were producing them (around 15 months). Slightly older groups of children were tested and shown to be sensitive to both gender and number agreement. Taken together, Corréa says these results show that children are sensitive to these functional features at an early age and that this sensitivity allows them to quickly begin parsing DPs and learning the correct set of features in the language.

Less work has been done on acquisition in terms of distributed morphology, though there are some studies that suggest how it might be approached. Barner and Bale

(2002) show how a model with lexical underspecification is consistent with a variety of psycholinguistic research and argues that underspecification simplifies the acquisition process. For evidence of this, they point to the tendency of children to freely insert roots in noun or verb positions generally unacceptable to adult speakers, such as using *broom* as a verb in lieu of *sweep*, or *gun* as a verb instead of *shoot*, despite not hearing this in the input (Barner and Bale, 2002:777). While children eventually must learn the target forms, the fact that they initially use non-target-like items points to underspecified, acategorical forms in their grammar. They also show that a lexicalist approach that required separate entries for different uses of a word would be more computationally difficult than a comparable root-based system.

Rather than having to learn a variety of derivational processes to turn verbs into nouns, a child may combine roots with category-defining heads. There are not distinct morphological and syntactic derivations that need to be learned– one system is responsible for both. Children do not need to learn first nouns and verbs and then learn another process to turn one into the other. There is just one syntax with category-defining heads that may take roots as complements in the simplest example, or take more complex complements which ultimately result in more complex words.

Though not couched in explicitly Minimalist/DM terms, Harley and Ritter (2002)'s feature hierarchy approach makes predictions regarding person and number acquisition that are potentially relevant for the current proposal. The hierarchy describes dependencies between different features, with the availability of particular features dependent on the acquisition of features/nodes closer to the base. Figure (1.3) shows the hierarchy for pronouns as Harley and Ritter envision it. Rather than pruning features from a universal set, a child will begin discovering features, building the hierarchy and the relevant features from the root out.

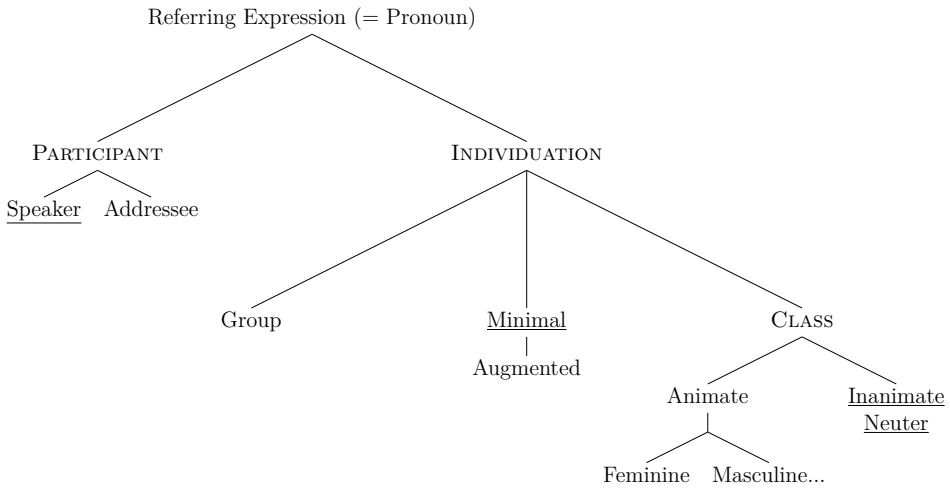


Figure 1.3: Harley and Ritter (2002) Feature Hierarchy

Though the child is exposed to the entire range of pronouns, the acquisition process is predicted to be constrained as the child begins making distinctions, gradually filling out the tree. This allows for variability in acquisition– a child may discover one branch of the hierarchy before another, e.g. by beginning to make distinctions on the Participant branch before making distinctions on the Individuation branch, or vice versa. The hierarchy also constrains acquisition– a child must acquire nodes closer to the root before more deeply embedded ones.

Not only is this a theoretical advantage, but there is evidence for this in a range of acquisition studies Harley and Ritter cite (Schieffelin (1985); Clark (1985); Feuer (1980), among others). The hierarchy predicts that higher nodes are acquired before lower nodes and default (underlined) values before others, but makes no predictions regarding left or right. As such, singular (Minimal) will be acquired before plural (Group), and first (Speaker) before second person (Addressee). The child might begin developing the Participant node, in which case they would discover first person before

second. They might also begin developing the Individuation node, in which case third person singular would come first. No predictions are made with respect to first person (Speaker), which does not involve the individuation node, and third (Minimal), which does not involve the Participant node. Variability of acquisition order does exist between third and first person, which is expected as these features are on distinct branches of the hierarchy.

With respect to the current proposal, the effects of a such a hierarchy may be examined on the acquisition of the *uninterpretable* features present on the verb/possessum as well as interpretable features of the possessor/subject. Though Harley and Ritter do not address agreement, noting both the difference between pronouns and agreement as well as the difficulty to sometimes distinguish them, Béjar (2003) examines ϕ-features in both pronouns and agreement and develops a largely similar hierarchy for understanding relationships between feature sets. If person features, in both their interpretable and uninterpretable versions, are acquired at once, this will support their underlying sameness, while differences in acquisition will suggest more independence between the features. This question will be addressed thoroughly in the chapters to come.

Harley and Ritter do not directly address case, which they consider a syntactic problem, though they acknowledge that in principle a case hierarchy might also play a role in acquisition. Case hierarchies have been referred to for other reasons, such as characterizing typological generalizations or explaining agreement alternations (Bobaljik, 2008; Moravcsik, 1978), though a case-hierarchy organized in a manner helpful for understanding acquisition would have to be independently motivated. Minimally, a case-hierarchy would have to distinguish between subject, object, and possessor cases (NOM, ACC, GEN, DAT), as well as the wide variety of locative cases used in Estonian and Hungarian.

The current section has discussed of a variety of theoretical approaches relevant to language acquisition, especially with respect to how individual features and morphosyntactic phenomena may be understood. The Minimalist/DM morphosyntactic model described will be used fo the ultimate analysis, with an emphasis on features and functional heads as the locus of variation and as a target for acquisition. The next section will address a variety of ways to view the initial state of the child grammar and the manner in which it develops.

1.3.2 Development of the Grammar & Functional Categories

This section reviews three approaches to the development of functional categories in child language, each of which vary in their assumptions about the initial and subsequent state of the grammar. The first account, called the *Maturational* view, holds that the language of an early learner is fundamentally different from an adult speaker–only after a certain period of time does something like a mature grammar "come online," after which the grammar is like an adult's. Another view, the *Strong Continuity* approach, holds that the grammar is essentially adult-like throughout and acquisition proceeds according to factors not dependent on any element suddenly becoming accessible to the child. Finally, several approaches take a split-the-difference approach, holding that the grammar changes over time–either in terms of the categories available or the nature of grammatical processes–but not in the drastic way suggested by Maturational accounts. These views vary in their details, but can be described as *Weak Continuity*. Each of these three approaches to the nature of the developing grammar will be discussed in the next three sections.

1.3.2.1 Maturational Accounts

The maturational approach holds that the initial state of the grammar is qualitatively different from the adult grammar (Platzack, 1996; Ouhalla, 1991). Radford (1996) studies the production of children between 1;8 and 2;6 and is a prime example of this approach. Initial stages of multi-word utterances are not considered to be full sentences with an adult-like grammar, rather they are merely "lexical-thematic" projections– they lack the non-thematic, functional categories that characterize mature adult speech. Functional material such as agreement, tense, modals, determiners, and complementizers will all be absent during this stage in language development– only nouns, verbs, prepositions, and adjectives are accessed. In DM terms, this might be characterized as a syntax that consists only of roots or the category-defining heads n, v, and a and their associated roots. Prepositions, often considered to be functional items, are included in Radford's lexical-thematic stage.

Before the functional structure (CP, IP/TP) is present after around two years, verbal argument structure– the knowledge that verbs take complements– must be acquired. Children make use of simple structures: a verb along with the NPs it theta-marks: complements and subjects. Verbal argument structure minimally entails the category-defining v head to accept a root, plus additional structure for Spec$v$P to have a subject in its specifier or host a complement .

Utterances with functional items optionally occurring along with their functionally-deficient, lexical-thematic counterpart utterances are produced during a transitional stage. This stage will be characterized by both correct and incorrect forms appearing at once, even in consecutive utterances such as "I'm pulling this. Me going make a castle"(Radford, 1996:499). Utterances like these are not what Radford characterizes as thematic/functional code-switching– once children enter the functional

stage, all sentences are underlyingly similar, though children may make use of non-target-like null allomorphs or have trouble generally spelling out the reflexes of agreement(Radford, 1996:507).

Case-assignment errors may also occur, though Radford notes that in his corpora, this only occurs for subjects, which appear in all three case forms. These errors do not indicate a lack of appropriate structure or a lack of case-assignment but simply the *wrong* case assignment. Radford writes that "the nature resides in the child not having mastered the complex conditions under which a particular kind of head licenses a particular kind of specifier"(Radford, 1996:503). This same type of error can be captured in the same spirit through underspecification or incorrect specification of vocabulary items allowing different case forms to be spelled-out. Which of these explanations best describes a particular child's development depends on the sort of utterances they make. A child that seems to randomly choose a pronominal form may have several underspecified vocabulary items, while one who consistently produces a particular form may have incorrectly mapped features to form.

Within a maturational approach, development of the C-system also occurs at the same time the I-system is developing, reflecting the point at which all functional structure is said to "come on-line". The DP being analogous to the CP, in the approach explored here, agreement in nominals should occur at the same time as agreement in sentences, correct genitive case and nominative case assignment should be acquired at the same time, and possessives, determiners, and complementizers should all be produced in the same time period. In terms of features, it could be framed as a stage where grammatical features begin to appear either on their own, in bundles with other functional items, or along with roots.

In his later work, Radford (2000) suggests the driver that pushes a child from a thematic to a functional grammar is the availability of uninterpretable features in

the grammar. Children, he hypothesizes, are perfect learners who assume a perfect linguistic system–one that does not include uninterpretable features or redundant information. As they are learning, the omit these items such a definite articles and agreement morphology. Eventually they learn that uninterpretable and redundant information does exist in their linguistic structures, prodding them to posit and produce items that they previously ignored. This description of the actual maturational process from the initial stage to the next is more in keeping with a minimalist approach to language acquisition, though it seeks to explain the same set of facts as initially described in the earlier article.

This hypothesis broadly accounts for the differences between child and adult speech, but closer examination of the details reveals problems. Functional items like complementizers and pronouns appear much earlier than Radford predicts, and they do not all appear at the same time. The maturational account does not have a clear way to deal with these complicating facts. Radford suggests that the actual utterances do not necessarily reflect the underlying structure during a transitional stage–for example apparent movement may just be base-generation in an adult-like movement target. This may well be the case, but it cuts against the strong predictions made by the model.

Considering the morphosyntactic elements crucial to the DP-CP comparison, a maturational account makes a variety of predictions. If agreement is considered as a distinct process that must be acquired somewhat independently or come on-line at a distinct time, there should be a point in a child's grammar after which agreement suddenly appears, both within nominals and within clauses, prior to which agreement will either not be realized or possibly realized with a default/null form. Another way to characterize this would be that the uninterpretable features that act as probes

in the adult grammar are not acquired until later and not until their interpretable counterparts are well in place.

Similarly, the uninterpretable case features could be acquired at a later point, resulting in an initial stage where unmarked/null or default case is used. Their acquisition would coincide with the additional functional structure required to host them. Similarly, the movement of a possessor to a higher position within a DP must follow the acquisition of a larger functional structure to serve as the target for movement. Evidence of this movement might be found in the relative position of possessors and pre-nominal modifiers or other functional material such as demonstratives and quantifiers.

If there is not a strong relationship between the acquisition of agreement and the different types of case-marking, or the various kinds of movement to each other, either the maturational hypothesis must be abandoned or there must be distinct phases of maturation suggested, though this latter hypothesis effectively makes the Maturational view a flavor of Weak-continuity.

1.3.2.2 Strong Continuity

The Strong Continuity approach is taken by some researchers to be the null hypothesis: without evidence to the contrary, the grammatical system of a developing child grammar is fundamentally the same as the adult system. Pinker summarized the view plainly in 1984: "In the absence of compelling evidence to the contrary, the child's grammatical rules should be drawn from the same basic rule types, and be composed of primitive symbols from the same class, as the grammatical rules attributed to adults in standard linguistic investigations"(Pinker, 1984:7). Pinker rejects a maturational account for reasons of parsimony: a maturational account must have two sets of

principles– one to guide the initial state and one to guide the developed state. He suggests children start with a set of universal semantic notions like *agent* or *patient*, and from these fill out the details of their language. In contrast, other Strong Continuity models (Poeppel and Wexler, 1993; Lust, 1994; Félix-Brasdefer, 2006) impute fine-grained syntactic knowledge to child grammar, which includes functional syntactic categories like CP and TP from the start. Prime evidence for Strong Continuity comes from the fact that a wide range of functional words *do* appear in early child grammar, though not yet in a systematic, adult-like way. These divergences require an explanation, though one that does not rely on positing a deficient grammar for the learner. Most Strong-Continuity studies, following the prevailing grammatical framework of the time, assume a grammar with pre-defined functional categories, which makes considering them from a feature-first point of view somewhat difficult.

Poeppel and Wexler (1993) is an oft-cited example of a Strong-Continuity approach. Studying a German-speaking child at 2;1, they found that at this early stage "the full complement of functional categories [was] available to the child"(Poeppel and Wexler, 1993:1). The focus of their study was primarily I- and C-related constructions, using word order as the primary evidence for various structural positions. The authors capitalized on German's V2 property, requiring I-to-C movement, and studied the various word-order alternations used. The only difference between child grammars and adult grammars for German that they found is that for children, infinitival verbs are permitted in final position in matrix clauses. This suggested to them that I (or T in current terms) was available but was deficient and did not have the same properties as the adult I. The eventual overcoming of a deficiency in I/T seems to actually admit a maturing rather than continuous grammar, though the key difference is the existence of the syntactic projection from the start.

To demonstrate that this is the only difference, Poeppel and Wexler show that non-finite verb forms systematically appear in verb-final position, while finite forms appear in second position. Children differ from adults in that their grammar allows matrix verbs to be non-finite, suggesting that an elaborate structure is responsible for determining how verbs are marked. Children make a finiteness distinction that, while different from adults, requires functional structure beyond that which is posited by a maturational account. This functional structure consists of at least an I-level structure, which is used with verb final, non-finite sentences, and a C structure, which provides a place for V2, finite verbs.

Verbal agreement was also shown to be acquired mostly successfully, with errors limited to plural subjects, suggesting it is not Agreement *per se* that is lacking but that the rules are not fully developed or the forms are underspecified. Poeppel and Wexler do not make claims about why this should be the case, though distinct person and number probes could play a role in this analysis. One caveat they note, however, is that in natural adult German speech, first person agreement is often reduced, allowing null first-person singular agreement to be reasonably posited by the child, making it unclear whether agreement is present in child data.

The particulars of each language's agreement patterns will affect the predictions Poeppel and Wexler would make. Hungarian's third person singular will present the same analytical problem regarding bare verbs versus null allomorphs. Distinguishing between bare verbs and null allomorphs is also a problem for English, where agreement is only overt on auxiliaries and non-past 3SG. Estonian, on the other hand, has no null person and number verbal agreement and bare verbs only appear as imperatives, so there will be little question regarding correct morphological analysis. Once there is sufficient evidence that the vocabulary items associated with agreement are acquired, a morphological approach could suggest that a particular morpheme is in competition

with a default form. Estonian's lack of null agreement would put this to a test– missing morphemes will be evident and insertion of a null default is not grammatical. This possibility will be discussed in Chapter (2).

As the Poeppel and Wexler (1993) study primarily uses word-order data to justify I and C, no conclusions can be drawn related to other I and C-related behaviors, such as nominative case-marking, questions, and imperatives. Eisenbeiss et al. (2006) found that structural case-marking was accurate for German L1 learners but that lexical case was error-prone, suggesting that the syntactic system was in line with the Strong Continuity approach, though lexically-based case forms must be learned.

Though the structure of the DP was not addressed by Poeppel and Wexler, a Strong Continuity view suggests that both Poss and D functional projections should be available to the learners. Case-marking of possessors, being structural, should also be mostly accurate. Errors in number agreement on possessors would be consistent with Poeppel and Wexler's view of child grammar, though case-marking and word-order should be adult-like. Movement operations will also be available, so possessors will appear in an appropriate place toward the left edge of the DP. Félix-Brasdefer (2006) examined longitudinal data from three children learning Spanish between 1;7 and 2;5 and found evidence for Strong Continuity. Subject agreement, tense, negation, and complementizers were all analyzed, requiring a particular morpheme be used in at least two different lexical items before it was considered acquired. Agreement evidence was found at the very start– between 1;7 and 1;9– for first and third person singular. Like the previously cited studies, agreement in all singular contexts appeared before agreement in plural contexts–earlier plural subjects included no agreement morphology or using the 3SG forms. These results not only conform to the continuity expectations but also to the predictions of the hierarchy in Harley and Ritter (2002). The early appearance of this data is encouraging support for a strong-continuity

hypothesis, though this analysis is not without problems. The third person singular morphology is unmarked, consisting of just the verbal root and the verb's theme vowel. First person agreement, which has unique morphology, is attested at this point, though to a lesser degree than third person. Evidence for tense was also found very early for two of the children at 1;7, though the third child showed no tense alternations until near the end of the data collection period. Negation was appropriately used by all children throughout the recorded sessions.

Imperatives and correctly formed *wh*-questions served as evidence for an adult-like CP. Questions actually appear a bit later in the children's data, ranging from 1;11 to 2;2, though one of the children only produced one question, and only at the oldest period. Imperatives were found in two children's data, though not until 2;3 and 2;4, though the imperative, like the 3SG present, is also identical to an uninflected verb and could be analyzed much differently–for example, as a bare verb without additional syntactic structure. Despite the generally later display and sometime absence of the complementizer data, Félix-Brasdefer takes this to be evidence that the C category is essentially present from the beginning. Borer and Rohrbacher (2002) also argue for Strong Continuity, suggesting that *missing* functional material is in fact *evidence* of functional structure. This result comes from the non-random nature of functional material in child language. If there were no functional structure in child language, they argue, then functional material should appear unsystematically and unconstrained throughout child-speech. That it does not suggests something is limiting the types of utterances a child produces. This is contrasted against the speech of adults with speech pathologies, who are shown to produce language with random errors. Phillips (1995) likewise finds the consistent types of error in child production to be the result of an adult-like grammar that has difficulty with accessing morphological knowledge.

Assuming that all the functional structure is available to the child means that missing inflectional information is the result of a morphological rather than syntactic deficit, as in Phillips (1995). Inconsistent use before some point only indicates trouble with the particular vocabulary items– the correct features will be present but the wrong VIs inserted into terminal nodes, whereas a maturational or weakly continuous approach relies on the unavailability of the relevant functional heads. A missing [+Animate] feature on a determiner would lead to *her* being spelled out as *it*, or a missing [+DEF] could lead to incorrect agreement morphology in Hungarian. Poeppel and Wexler (1993) use German word-order differences as evidence feature sets and functional categories clearly. When only morphology indicates the presence of a particular projection or word order is freer, as in the study languages here, the inventory of features/feature-bundles are more difficult to assess. Focusing on morphosyntactic features and functional categories as feature-bundles themselves suggests one potential flaw in a Strong Continuity approach. This position requires that functional categories are distinct from the morphosyntactic features that are realized on them: T exists even if tense, nominative case, and agreement (the comprising features) do not. Strong Continuity proponents assume the existence of independent functional categories to be the null hypothesis, but this may not be correct. If functional heads are just bundles of features and these features must be learned, it is unclear what the functional structure *is* that already exists. To rescue Strong Continuity, it would have to be said that even if children do not already have full projections like CP in their grammar, they are capable of learning C-related features (like Force, for example) from the start. All the features would be available to children and the operations (Merge, Move, Agree) as well, but the children would have to learn the features and how they go together. This would effectively push them toward Weak Continuity, to be discussed next.

A feature-geometric approach that goes beyond pronouns and attempts to organize broader categories may provide some guidance here– different root nodes for different elements of the grammar, for example, may be available at the start, guiding child grammars in a constrained way, with related features appearing over time. Strong Continuity's assumption of full-functional structure, as Borer and Rohrbacher (2002) point out, explains why children's utterances are constrained, but it does not offer any obvious answers to the questions about why certain categories appear first. Pinker (1984)'s semantic bootstrapping could provide the primitive structure, or functional projections specified with inherent category defining extended projections (Grimshaw, 2005) like [+N] and [+V] could form the initial structure that are elaborated on over time. The next approaches represent attempts to understand the acquisition paths that are attested in child language while maintaining the parsimonious benefits of maintaining a single continuous grammar.

1.3.2.3 Weak Continuity

The Weak Continuity approach differs from Strong Continuity in that it acknowledges and seeks to explain differences between child and adult grammars, in particular as they relate to functional items. Unlike the Maturational view, however, there is no step-wise change from a child state to an adult state but functional structure is developed gradually but continuously. The two approaches outlined here both provide a way to account for early grammar complexity and provide a means to explain the change of a grammar from an initial state to a final state.

Using alternations between accusative and nominative case-marking in English acquisition, Vainikka (1993) makes a case for one version of the weak-continuity hypothesis. Using a large corpus of speech from three children between 1;1 and 5;1 and focusing on the case-marking of subjects, she identifies three distinct stages of

language development: utterances which are only VPs, followed by utterances with TP+VP, and finally CP+TP+VP utterances. In this first stage, nominative subjects are used rarely, followed by a stage with both nominative and oblique subjects, leading eventually to the adult-like grammar.

Case-marking alternations are due to the interaction between the functional category responsible for nominative case-marking (T) and the gradual but steady development of the child's syntax. Early oblique case-marking of subjects is due to the lack of T in early child language. When C-level morphemes such as *wh-* words, first occur, they do not appear in CP, but in the specifier of T, which precludes movement of the subject to this position. The result of this is that subjects in questions will remain in an oblique case. This intermediate stage lasts for several months after the first appearance of *wh*-questions. Once full C projections are acquired, pronominal subjects appear in the appropriate nominative case.

Vainikka assumes that case-assignment is the result of a Spec-Head configuration alone– nominative is assigned to whatever is in SpecTP and the oblique cases are assigned by nouns and verbs. Current assumptions about case assignment require a different explanation. The availability of a functional head entails a specifier position, and an Agree relation in addition to an EPP feature could explain movement to this position, so Vainikka's assumption can be maintained to some degree. What changes is the explanation that a *wh-* item in SpecTP can block assignment of nominative case. One possibility is that constructions like these lack T entirely, which is consistent with the general relationship Vainikka found between nominative case and inflection and modals. Unlike adult grammars, *wh-* elements at this point could be in C, selecting a VP with the oblique subjects being in SpecVP. This loses the smooth VP to IP to CP transition she suggests, but it is line with Hegarty (2005)'s ideas about the development of functional categories, which I turn to now.

Hegarty (2005) begins from a position similar to the strong-continuity approaches, suggesting that children's grammar may contain all the relevant functional *features* from the earliest stages. The important distinction that makes his approach a weakly continuous one is that he considers atomic features to be the important elements of acquisition, not functional categories themselves. This may seem like a small point– functional categories are just feature bundles themselves. Importantly, the distinction allows a focus on individual elements of the grammar independently. Elements of a single adult functional head such as T (verbal subject agreement, nominative case marking, tense) may all be considered separately. For the purposes of possession, the uninterpretable ϕ-features driving possessor agreement are the same features that drive agreement on verbs, while a DP's need for case is important for both possessors and subjects. Hegarty suggests that children may acquire functional features as soon as they learn the associated vocabulary items/morphemes, but they do have pre-existing functional projections waiting to have the appropriate features assigned to them beforehand. As they learn morphosyntactic features, children may incorrectly bundle various functional features together into non-adult-like functional heads. For example, T may be described as a functional head with a tense feature with unvalued ϕ features, and an EPP. A child may only acquire a partial bundle initially, missing a feature present in the adult grammar or simply not including it in the appropriate bundle. Acquisition is limited by the gradually developing ability of the child to process and build additional functional heads. Children proceed stepwise from being able to process just one functional head at a time to two, three, four, *etc.* Pressure from processing constraints force children to put combinations of functional features together into a single functional head in ways that adults do not. To illustrate, consider the features for Tense, Nominative Case Assignment, Agreement, and [WH]. In a mature grammar, these first three will be combined to form T and the last will

be associated with C. In the developing grammar, however, a child may learn these features but incorrectly develop a hybrid category that is [+WH] and assigns nominative case. As the child learns the language, the features will be disassembled into the correct functional heads and as processing power increases, the child will make use of a growing number of functional heads.

Hegarty limits the analysis to just a handful of features related to C, I, and Neg (Q, WH, Tns, NOM, Neg), though a much larger or more diverse set could also be taken into consideration. Using three children between 1;9 to 3;5, Hegarty notes the first appearance and first evidence of a productive paradigm for each of the features. After this, the increasing level of phrase structure complexity is calculated across the samples. Finally, the first appearance of the various features were mapped against the increasing complexity. The results show that the overall potential phrasal complexity required to support distinct numbers of functional categories always precedes the actual use of distinct functional categories.

For example, consider the sentences in (6):

(6) a. I want to put the toys away,

I_{fin} V_{fin} I_{inf} D N , *Peter age 2;01.18*

b. Why can't we open this piano?

C_{+WH} I+Neg I_{fin} V D N *Nina age 2;09.21*

The child Peter produces (6a) at age 2;01.18, which shows a *selectional chain*–meaning a sequence of constituents selecting another– of length five, (not including *away*, as it is not selected by the previous item). This shows that Peter is capable of producing long utterances. It is not until 3;01.20 that Peter produces an utterance with three *functional* projections. Hegarty does not include an example of one of Peter's

utterances with three functional projections, though (6b) is an example of one such utterance from the child Nina.

The conclusion Hegarty draws from this is that, though the functional features are available to the child and evident in the production from the earliest times, in line with a strong-continuity hypothesis, complexity constraints on the child's developing/maturing grammar cause the differences between early and end-state grammars. Hegarty summarizes the process as follows: "the maturation involved is actually the growth of a basic representational resource, rather than a growth of functional structure directly"(Hegarty, 2005:265). Generally, this approach allows for the acquisition of any single feature to proceed like the acquisition of any other feature in the language, without respect to how it is bundled in the adult grammar, while placing the responsibility for the unique nature of child grammar on the child's processing deficit. Hegarty does not constrain this acquisition– in principle 2SG may be acquired before 1SG, although a hierarchically organized feature set, like Harley and Ritter (2002), could also work in determining when particular features were produced.

This paradigm could easily be transferred to the acquisition of possession. It predicts that possessed nouns, which require more functional structure than simple nouns, may be produced at the same time subjects occur appropriately with verbs– that is, when a child can support two functional categories. A verb with a subject will require a functional projection to host the subject and a vP for the verb; a possessed noun will require a Poss projection and an nP below it. Each of these require two functional projections. However, a child will not be able to have a possessed noun as the subject of a sentence even while other subjects are allowed– a more structurally complex subject is ruled out at this time, as this would require three functional projections at a stage when only two are possible. To illustrate, the first two sentences in the simple structures in (7) will be possible whenever the child has the capacity

to produce utterances with two functional categories. The third example, with three functional categories, will not be produced until the child's capacity grows.

(7) a. [$_{DP}$ [$_{PossP}$ My] hat]: Two functional categories

b. [$_{VP}$ [$_{DP}$ Hat] fall]: Two functional categories

c. [$_{VP}$ [$_{DP}$ [$_{PossP}$ My hat]] fall]: Three functional categories

Agreement within DPs may occur at the same time as verbal agreement, though both will only occur in situations where the target utterance does not require surpassing the functional category limit the child has attained.

This model suggests the possibility of a very fine-grained analysis and is very much in spirit with DM, though carrying out this sort of analysis requires many careful assumptions about how to describe the child's utterances. Every utterance has several possible structures, especially when movement is considered. Determining the appropriate structural description for a given utterance at a particular stage of development requires establishing specific guidelines that can be applied consistently across children, languages, and ages. Problems like these are discussed in more detail in the next section.

1.3.3 Acquisition of Possession

There are multiple compelling reasons to study the acquisition of possession. First, as was mentioned previously, possession may make use of case and agreement patterns just like subjects and verbs, yet it has not received as much attention. By comparing the development of agreement and case-assignment within a DP in possessives to subject agreement and case-assignment on verbs, an understanding of how the process of syntactic and morphological agreement is represented in the developing grammar

can be achieved. For example, if agreement morphology in possession develops along a distinct path from the agreement on verbs, such as appearing at a much different time or in a much different order, this is evidence that there is some important difference between the two. Differences could be the result of lower frequency in the input, a more complicated agreement paradigm, or a different underlying mechanism controlling agreement in the nominal domain that is acquired separately. Frequency normalization could potentially be useful for determining the effect of the first of these. Observed differences in the appearance of features in different domains would create problems for an acquisition approach that assumes that the features are the same, regardless of which particular bundles they appear in. An explanation would be needed if, for example, second person agreement was produced first on verbal agreement but much later in possession. If this were the case, it would suggest that the features were not being learned independently *u2SG*, but that a verbal agreement morpheme was learned first and a possessive agreement morpheme was learned second, with their similarity not playing a role in the learning. Alternatively, if a particular number/person agreement morpheme develops similarly across its instantiations, this is plausible evidence for an underlying similarity in the mechanism and the unity of their linguistic representation.

Radford (1998), studying non-target genitive subjects in English, suggested that deficiencies in the overall pronominal system (vocabulary items) led to non-target use of genitives as subjects, rather than any functional category deficiency. That is, they have a possessor projection assigning case, but the morphology is non-targetlike, resulting in incorrect case forms. Radford and Galasso, in a case-study of a single child, found that accusative possessors were most common initially, with genitive possessors slowly overtaking them, which they relate to a morphology developing on a similar time course within the DP and CP. Nominative subjects appear around the

same time as genitive possessors, and nominative possessors were never seen. Some example utterances they found are reproduced below:

(8) a. That Mommy car, *2;6*

b. That me car, *2;6*

c. Baby have bottle, *2;8*

d. Daddy's turn, *3;2*

e. I want my key, *3;1*

f. This car works, *3;2*

These examples are typical of the types of utterances produced; early utterances, like the first three, have syntactic structure and make use of pronouns, though not in an appropriate way, missing Poss, genitive case, and agreement, respectively. The last three examples show these grammatical issues resolved, with the Poss head, appropriate case marking, and agreement morphology all apparent.

Rispoli (1998), studying the same phenomenon but limited to first person singular pronouns, noted that nominative subjects were mostly used correctly never used inappropriately, though children did use both genitive and accusative subjects incorrectly around 6% of the time, with particular children generally opting for one or the other. He ultimately comes to a phonological explanation, arguing that words with onsets are more salient for children, leading to problems acquiring the [1SG, NOM] *I* /aI/. While this may well be the case, it is only applicable to that particular pronoun paradigm. Schütze and Wexler (1996), alternatively, suggests that pronoun errors are the result of a case-assignment mechanism that is not fully developed. Gavruseva and Thornton (2001) shows how children will move *who* independently from *-s* where

an adult would move the entire DP unit *whose book* in a sentence such as *Who did you see* ***t****'s book?*(=Whose book did you see?). This shows the independence of the possessive *-s* and the possessor as well as differences in pied-piping between child and adult language. These studies all highlight the importance of case in the study of English, though there is an opportunity to expand the target of research not only beyond English but beyond the nominative/tense relationship that has informed so much research.

1.4 Methodology & Predictions

With the discussion of the variety of approaches to language acquisition complete, the discussion may now go to the particular approach advanced here, how it will be operationalized, and the predictions it makes.

The Minimalist/DM model assumes a system that combines roots and features into words and sentences. The posited CP-DP parallels suggest that many of the same features that are active in forming one are also active in forming the other. Examining the development of both CP- and DP-related morphosyntax in children can illuminate the relationship between them and show whether the parallels are artifacts of theoretical analysis or whether they are reflections of an actual underlying homology. The acquisition paths described above, save Hegarty's, share a view of the grammar where functional categories exist in some pre-specified form, differing in whether they are available from the start or don't "come online" until some later point. The task for the child is, in addition to learning the roots, selecting and learning the properties of the functional heads. The problem with this point of view is deciding which functional heads are to be included. C, T, V are easy to decide on, though categories like Poss aren't so clear. This is not just a question for acquisition but

for theoretical syntax generally– some scholars, like Rizzi (1997) or Cinque (1999), suggest every language as a wide range of often never pronounced heads. On the other hand, Bošković (2005), for one, provides evidence that some languages do not even have a DP.

Fortunately, this question seems testable in the sort of cross-linguistic comparison being developed. If the categories are given, then the differences between the languages should matter less and the acquisition path for children in each language should be similar: children will in a sense know what to look for. The other option is that the categories are not given and the children have to discover them themselves in the process. If this is true, then more morphosyntactic evidence for a functional head in the input should ease the acquisition process– allowing a child to posit a functional head earlier.

Understanding the acquisition process as learning roots and learnings heads/features allows some of the differences between the approaches to be reconciled. A child whose language resembles the Lexical-Thematic grammar Radford posits in his Maturational account is a child whose language is mostly roots, while the period of time where a child is vacillating between including and excluding functional material can also be placed in terms of including or excluding functional heads. Single word utterances without other morphology may be considered bare roots or roots combined with nominalizing/verbalizing heads, depending on one's view of the pronouncability of roots. These languages lack other grammatical features associated with these heads, such as gender for n, so it is unclear how one could determine when a child has acquired these heads. Another complication involves whether roots or n, v take complements. If it is the functional heads which take complements, then the production of complements is indicative of the acquisition of these heads and thus functional material. This would be at odds with Radford, for whom functional material is only available at a later

stage of acquisition, though it would be consistent with a weakly continuous view. Ultimately, different views of acquisition can easily conform to different accounts of the characteristics of the roots and the most basic heads. Issues concerning the pronouncability and complement-taking properties of roots are discussed at length in Harley (2014)'s target article and the subsequent discussion.

Strongly Continuous approaches like Poeppel and Wexler (1993) are a bit harder to frame, as they take advantage of word-order for evidence of functional structure that does not necessarily have a morphological reflex. Studies like Félix-Brasdefer (2006), which also shows early evidence of functional material, demonstrate an acquisition of functional features not necessarily combined in the same way as in the adult state: for example, agreement forms which in the adult grammar necessarily represent both person and number only represented person in the child grammar. For this dissertation, it is assumed that functional categories, which are just feature bundles, and features individually do not have to be identical to the adult grammar to still be said to exist in the child grammar. Functional material can be learned at early stages, though it is possible and even expected that functional features be learned somewhat independently from their ultimate, adult-like state bundled into heads.

1.4.1 Language Details

The languages under investigation are English, Estonian, and Hungarian. These languages were chosen not only because of the wide range of available data, but also because they represent morphosyntactic contrasts that could lead to different and interesting results. Table (1.1) shows the most important features in the related domains, the details of which will be addressed for each language in the following chapters.

		English	Estonian	Hungarian
DP				
	Poss	Overt Assigns GEN	Null Assigns GEN	Overt Assigns DAT
	AGR	Null	Null	Person, #
	Pronouns	1, 2, 3 persons M-Animate, F-Animate, Inimate	1, 2, 3 persons	1, 2, 3 persons
	D	def, indef, null	n/a	def, indef, null
	Demonstratives	singular, plural		
		distal, proximal	proximal	distal, proximal
	Extraction of Possessors	Disallowed	Disallowed	Allowed
	Promotion of non-Possessors to Poss	Allowed	Allowed	Allowed
	Concord	Demonstratives (Number)	Demonstratives (Number, Case) Adjectives (Number, Case)	Demonstratives (Number, Case)
CP				
	T	Overt Assigns NOM,	Overt Assigns NOM	Overt Assigns NOM
	AGR	1, 2, 3 Person on *be* 3SG on PRES verbs	1, 2, 3 Person	1, 2, 3 Person Definiteness
	Extraction of Subjects	Allowed	Allowed	Allowed
	Promotion of non-Agents to T	Allowed	Allowed	Allowed

Table 1.1: Relevant DP and CP Features
Shaded cells indicate features with most direct parallels across domains

The highlighted cells indicate which features are thought to be most amenable to a comparative analysis of acquisition. POSS and T both assign a particular case to their respective DPs, and both may host agreement features, which will also be represented in their pronouns. Importantly, these are all elements that are common enough in the first few years of child language that it is possible to study them. Though aspects like similarities in extraction and argument promotion are important to make the case for the parallelism between CP and DP, they are not common enough in child language to be useful variables to find. Pronouns, agreement, possessors, and subjects, on the other hand, are all relatively common and can be tracked.

Given the feature sets in Table (1.2), a child learning Hungarian will have morphological evidence for person and number features appearing not just on pronouns, but also on verbal and nominal agreement morphology. Estonian provides evidence for person features on pronouns and on verbal agreement, while English has evidence for these features only on pronouns and on verbs/auxiliaries in a very limited capacity. The differences in the environments where these features are found should be reflected in the acquisition paths: evidence for a feature in more environments should lead to earlier acquisition of the feature. Hungarian, following this logic, should have earlier person feature acquisition than English, as the number of environments where person appears is much larger. Likewise, evidence for a Poss head within the DP is more salient in Hungarian, where it has not only its own dedicated morpheme –j- but also agreement markers. English and Estonian do not show agreement, however the English coronals *–n* and *-s* which show up with null possessa and lexical possessors (*e.g.* on *mine*, *ours*, *John's*) should be better evidence for a functional category than the entirely null Estonian Poss head. This difference provides more concrete evidence for English learners than Estonians of the presence of this intermediate head.

	Hungarian	Estonian	English
Poss	[ϕ, POSS, uCase]	[POSS, uCase]	[POSS, uCase]
T	[ϕ, T, uCase, DefOBJ]	[ϕ, T, uCase]	[ϕ3sg, T, uCase]
Pro	[ϕ, Case] (3 Person, 2 Number)	[ϕ, Case] (3 Person, 2 Number)	[ϕ, Case] (3 Person, 2 Number)

Table 1.2: DP and CP Features to be acquired

The acquisition of DP morphology in these specific languages allows interesting questions to be asked. A particular functional feature may appear on a variety of heads. The independence of these features and the divisibility of the heads should be evident in their acquisition. This might be manifested in different ways. One possibility is that a particular feature will appear in a variety of paradigms before any one paradigm is completely acquired. A [1SG] feature may be acquired in a few domains (pronominal, agreement) before any particular paradigm is filled out, so the question may be asked when a particular feature is acquired rather than a particular category or functional head. Alternatively, there may be no evidence that features are acquired in any way independently from the functional heads they appear with.

The question now is how to go about examining the acquisition of CP- and DP-related aspects of the grammar in order to draw meaningful conclusions. The first step is to find and organize the relevant data. To do so, transcripts from the CHILDES databases (MacWhinney, 2000) were examined for each language, choosing children for whom there is the widest range of data in the relevant, early stages of acquisition. Each child's data was hand-tagged, utterance by utterance, with the part of speech and any relevant morphology (including plurality, agreement, person, number, tense, aspect, etc.) This gave a larger corpus of tagged data from which to identify and analyze broad trends in the data.

From here, MLU was calculated, and the growth rate of important elements of the DP and CP were tracked. These items include overt case, pronouns, agreement, tense, and definiteness. Utterance-level analysis allowed the appearance of subjects and possessors to be tracked as well. These data together show how the CP and DP each grew in morphological complexity, which could be compared to each other, both within the production of each child and across children. This analysis will show whether there is a relationship between CP and DP acquisition, as well as how the morphosyntactic differences between the languages affect the acquisition trajectories of the children.

This description of the structure of language and the nature of acqusition lead to the research questions this study aims to answer. They are as follows:

- Does child language acquisition data provide evidence for a relationship between case assignment and agreement both within the clause and those phenomena within the noun phrase?

- Does the appearance of a particular feature or structural position in one domain predict its appearance in another domain?

The first question concerns the relationship between acquiring an uninterpretable case feature on Poss (assigning GEN/DAT) and on T (assigning NOM), e.g. developing the knowledge that nouns need case and these functional heads may assign it, and whether uninterpretable ϕ-features that are reflected in agreement are acquired on Poss at the same time as on T. The second questions whether there is a relationship between the acquisition of uninterpretable features on different heads and a relationship between interpretable features and their uninterpretable counterparts– so between the acquisition of pronouns and agreement morphology. Additionally, the

structural positions defined by the functional heads (specifically SpecTP and SpecPossP) each host subjects and possessors. Not only may DP/CP parallels exhibit themselves in the features that are projected in each, but in how the availability of these positions relate to the acquisition of the thematic roles associated with them.

With the assumptions and model of the study now described and the questions posed, the process of answering those questions may begin. The following chapters will review the acquisition of the relevant linguistic features for each language, providing partial and provisional answers along the way. Afterwards, the results from each language can be synthesized to draw larger conclusions about language acquisition and the relationship between the various elements of the grammar.

Chapter 2

Estonian

This chapter discusses nominal and verbal morphology in Estonian and their acquisition in a first language. The first section provides an overview of DP morphosyntax and agreement morphology. The second section discusses the acquisition path of three Estonian children, and the third and final section compares the paths of each and summarizes the findings. The results indicate that functional feature representations grow for nearly all verbal and nominal categories at similar rates, with overall DP and CP complexity growth increasing steadily. Morphological growth is similar, though there is not a one-to-one relationship between morphological elements across the domains. Subjects and possessors also exhibit differences in the child data: subject growth is continual and large, while possessors remain rare throughout.

2.1 Overview of Estonian

This overview of Estonian will focus primarily on DP syntax, though a brief discussion of Subject-Verb agreement will also be included. Compared to the other target languages, Estonian represents a sort of middle-ground with respect to DP-CP morphosyntactic complexity. The case morphology is quite similar to Hungarian (see Chapter (3)) as is verbal agreement. Like English, on the other hand, Estonian lacks possessor agreement.

Estonian distinguishes three persons and two numbers in its pronouns, which are shown below in Table (2.1) in the three grammatical cases[1]. The nominative case is used primarily for subjects, and the genitive is used for complements of postpositions, definite/whole objects, and, importantly, possessors. Norris (2014) suggests that Estonian also has an underlyingly accusative case which is suppletive with the nominative in the singular and with the genitive in the plural. Because of the inability to distinguish whether a genitive or nominative case form is *underlyingly* accusative in a child's production, accusative case will not be coded in the children's input. Nonetheless, its presence in the grammar highlights the structural and morphological parallels between the three target languages.

	Singular			Plural		
	NOM	GEN	PRT	NOM	GEN	PRT
1	mina, ma	minu, mu	mind	meie, me	meie, me	meid
2	sina, sa	sinu, su	sind	teie, te	teie, te	teid
3	tema, ta	tema, ta	teda	nemad, nad	nende	neid
DEM	see	selle	seda	need	nende	neid

Table 2.1: Estonian Pronouns- Grammatical Cases.
Long and short forms are included where they exist.

One aspect of the Estonian case system not shared by the other target languages is its partitive case, which may be used for both subjects and objects. Use of partitive subjects is related to both the definiteness of the subject as well as polarity/modality of the sentence, with negative or uncertain moods yielding a partitive case. The choice of partitive objects relates again to definiteness and wholeness of the object, as well as the telicity of the verbs, with atelic verbs requiring a partitive object.

[1]Here and throughout. I draw a distinction between the *grammatical* cases and the *semantic* ones. Grammatical cases serve a grammatical function– distinguishing between subjects and objects, for example, and are assumed to be assigned structurally– that is, dependent on their syntactic position. The semantic cases are locative cases and mostly (though not always) reserved for adjuncts, serving similar roles as prepositions in English, for example.

Many pronouns come in long or short forms, both of which are indicated in the table when applicable. There is no grammatical gender, and number is limited to singular and plural. There are no articles, but definiteness may be represented via demonstratives, which may be plural or singular. The standard dialect does not make distal/proximal distinctions, though some varieties, such as Southern Estonian, do (Pajusalu, 2006). Traditionally, as in Tauli (1973), Estonian has been considered to have 14 cases, as Table (2.2) shows. The four highlighted cells at the end have been more recently analyzed as postpositions by Norris (2014) due to their not triggering case-concord in adjectives and quantifiers adjoined to their nouns. Following this, they will not be addressed in subsequent discussions of case acquisition.

Case	Singular	Plural	Meaning/Function
Nominative	raamat	raamatud	Subject
Genitive	raamatu	raamatute	Possessor
Accusative	raamatu	raamatud	Object
Partitive	raamatut	raamatuid	Partial Object
Illative	raamatusse	raamatutesse	*onto a book*
Inessive	raamatus	raamatutes	*on a book*
Elative	raamatust	raamatutest	*from on a book*
Allative	raamatule	raamatutele	*into a book*
Adessive	raamatul	raamatutel	*to a book*
Ablative	raamatult	raamatutelt	*from inside a book*
Translative	raamatuks	raamatuteks	*into a book*
Terminative	raamatuni	raamatuteni	*up to a book*
Essive	raamatuna	raamatutena	*as a book*
Abessive	raamatuta	raamatuteta	*without a book*
Comitative	raamatuga	raamatutega	*with a book*

Table 2.2: Estonian Case Forms for *raamat* 'book'

.

Semantic case forms and the nominative plural are be formed by adding an appropriate suffix to the genitive form. The genitive itself, as well as the singular nominative and partitive forms, however, are unpredictable, with syncretisms commonly seen between two or even three of these forms. Tauli (1973) offers a detailed declension

class analysis, suggesting 15 different classes for partitives and 68 for genitives. Table (2.3) shows the case forms for a handful of words to show the patterns that exist, with varying degrees of suppletion.

Case	*book*	*green*	*earth*	*honor*
Nominative	raamat	roheline	maa	au
Genitive	raamatu	rohelise	maa	au
Partitive	raamatut	rohelist	maad	au

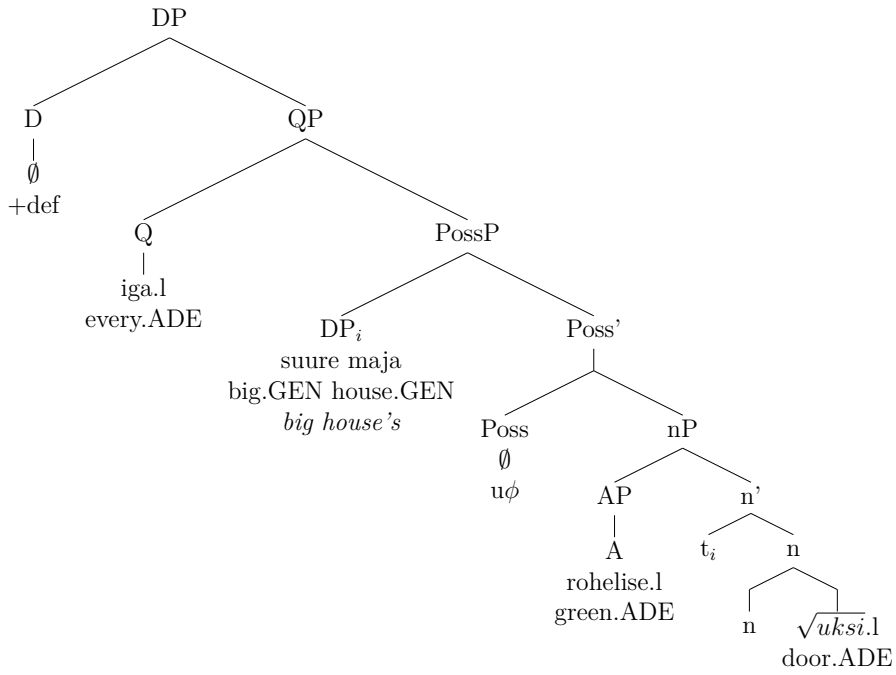
Table 2.3: Estonian Declension Examples

Example (9) shows concord between the possessor and the possessor's modifier, as well as between the possessum and its modifiers, including the phrase-initial quantifier *iga* 'every'. The possessor *maja* 'house' and its adjective *suure* 'big' are both genitive; the possessum *uks* 'door' and its modifiers (*iga* 'every' and *rohelise* 'green') are in the adessive case, ending with *-l*. Because the genitive form is the same as an unmarked form, it could be argued that the adjective and the noun of the possessum have not had their case-feature valued or that possessors are not DPs but something smaller. If this were true, however, it would mean that a caseless adjective appeared within a larger environment where both a preceding quantifier and a following adjective element appeared with overt semantic case. This would be surprising and require an explanation for why these nominal elements do not receive case yet do not crash the derivation.

(9) igal suure maja rohelisel uksel
every.ADE big.GEN house.GEN green.ADE door.ADE
on every green door of the big house

The possessor receives genitive case via the functional *Poss* head within the possessum, giving the structure seen in Figure (9), below. The adjective within the possessor DP receives the genitive case via case concord. Following the syntactic approach

of Baker (2008b), concord would be achieved via direct assignment of genitive to the adjective and the head noun from Poss. Alternatively, following Norris (2014), the case feature is assigned to the possessor DP and copied to dissociated AGR nodes post-syntactically. Importantly, the case feature of the possessor will be valued and will not participate in the round of case concord that gives case to other elements of the possessum DP. In the example in Figure 2.1, this is the adessive *-l*.



igal suure maja rohelisel uksil
on every green door of the big house
Figure 2.1: Proposed structure for Estonian Possessed DP

The precise mechanics of case concord in Estonian are not crucial to this project, though a brief note on the grammatical cases is warranted to gain an understanding of the acquisition problem for the child. Nominative is assumed to be assigned by T and accusative assignment is considered to be the result of agreement and case-assignment by a functional head in the extended projection of the verb, such as Voice (Kratzer, 1996) or *v* (Chomsky, 1995), within the verbal extended projection. As mentioned earlier, however, because accusative surfaces as genitive in the singular

and because it is difficult to impute underlying forms in a developing grammar, it is assumed that genitive objects receive their abstract case feature from v, even though the morphological realization is often the same as case assigned DP-internally. True genitive, on the other hand, is assigned within the DP. The examples in (10) illustrate several types of subjects and objects in various case forms.

(10) a. küülik-ud hüppa-sid hein-ale
rabbit-PL.NOM hop-PAST.3PL hay-ALL
The rabbits hopped into the grass.

b. küülik-uid hüppa-s hein-ale
rabbit-PL.PRT hop-PAST hay-ALL
Some rabbits hopped into the grass / There were rabbits hopping into the grass.

c. Peeter jahu-s küülik-u
Peter.NOM hunt-PAST.3SG rabbit-GEN
Peter hunted the rabbit (*Telic/definite*)

d. Peeter jahu-s küülik-ut
Peter.NOM hunt-PAST.3SG rabbit-PRT
Peter hunted for rabbit (*Atelic/indefinite*)

Argus (2009) takes a close look at both Hendrik and Andreas– two of the children studied in the next sections. Argus concludes that they *begin* to make the correct semantic distinction early, before 2;0, yet they do not achieve 90% correct use of case morphemes for another year. She suggests this is because of the complicated rules

regarding both telicity and whole/partial distinctions that determine which case form is appropriate.

As the correct acquisition is a challenge for the child, the structural locus of partitive case-assignment is difficult to pin-down for the theoretician. Partitive DPs can be both subjects and objects, (see (10b) and (10d), above), though not possessors. Kiparsky (1998) discusses the Finnish partitive, which is quite similar to the Estonian partitive. He first shows that partitive is structural, and, pointing out that partitive subjects are intransitive or existential, suggests partitive case is assigned VP internally both for subjects and objects. Hiietam (2004) explores the connection between partitivity and transitivity and shows that partitivity is related to phrases with low transitivity. These findings together suggest that the locus somewhere in the verbal extended projection– a head above v but below T- perhaps Aspect or Voice. How to account for this while still satisfying T's need to assign nominative case is still is an open question, though the fact that partitive subjects do not agree both confirms the connection between agreement and nominative case and suggests more questions regarding the role of partitivity in the grammar.

The genitive case assigned by a functional head is not limited to possessors. Themes, such as *house* in (11a), or agents, as *Peter* in (11b), may also be assigned case by this head and move to the prenominal position, as seen in (11)[2]:

(11) a. maja-de ehita-mine Peetri poolt
house.GEN-PL build-NML Peetri.GEN by[3]
houses' building by Peter

[2]Examples in (11) from (Koptjevskaja-Tamm, 2002:294). Other examples are from my own fieldwork, unless otherwise cited.

b. Petri maja(-*d)-ehita-mine
Peter.GEN house(*PL)-build.NML
Peter's house building

These examples show an argument being promoted to the possessor position. In (11a) it is the theme *maja* 'house', and, in (11b), the agent *Peetri* is promoted to this position. The second example's possessum *ehitamine* 'house-building' is a nominalized compound. As such, it does not combine a full DP with a verb but, following Harley (2009), simply a root. This rules out plural marking, as indicated, and means that any case on *maja* 'house' would be ungrammatical.

The aim of this project, ultimately, is to examine the way children acquire seemingly parallel morphosyntactic elements in their language. Partitive case is not clearly related to either T nor to Poss, though nominative and genitive cases are assigned by parallel functional heads in the extended projections of N and V, so these are clearly elements whose features need to be studied. Despite Estonian not having morphological agreement between possessors and possessa, agreement between subjects and verbs will be tracked as well. This will provide additional information about the development of the head T and may be useful when comparing to Hungarian, which features subject agreement as well as possessor agreement. The rich agreement paradigm for all persons and numbers is shown in Table (2.4).

	Singular	Plural
1	-n	-me
2	-d	-te
3	-b	-vad

Table 2.4: Estonian Verbal Agreement present tense paradigm

In addition to agreement, T is also the locus of nominative case-marking and the tense morphology itself (-∅ for present, -*s* for past). The development of all these

features will also be tracked for the Estonian children in order to give a sense as to how the features of T come to be acquired.

With the description of the relevant aspects of Estonian completed, the predictions of the approach outlined in Chapter (1) can be reviewed. First, recall that T and Poss are assumed to be parallel projections in a meaningful way– both being intermediate heads within their respective extended projections and both assigning case. The prediction, then, is that these two projections will be acquired around the same time, as each represents a similar feature-set. T's presence will be indicated by tense or agreement morphology; Estonian provides no direct evidence for the acquisition of Poss. That said, each projection is responsible for the case-assignment and structural position of subjects and possessors. This suggests that subjects and possessors will also be present at the same time– once there is a position for them and a head to assign them case. The following sections will closely look at the development of case-marking, agreement, and subjects/possessors to determine whether these predictions are borne out.

2.2 Acquisition of Estonian Morphosyntax

To carry out this study, corpora from CHILDES (MacWhinney, 2000) for three different Estonian children were analyzed, for the periods described in Table (2.5). For each child, the presence of agreement morphology on verbs, case-marking on nouns, and the appearance of pronouns were all tracked in order to get a sense for the state of the child's developing morphosyntactic system. Words per Utterance and MLU were calculated over time for each child. Appearance of subjects and possessors were also tracked. This section will address each child in turn, noting their particular paths and any interesting contingencies that show up in the data.

Corpus	Speaker	Start	End	Sessions	Avg Utterances	Avg. MLU
Vija	Andreas	1;07.24	3;01.3	8	400	3.67
Argus	Hendrik	1;8.13	2;5.30	17	87.9	2.5
Kohler	Martina	1;5.11	1;11.28	10	363	4.97

Table 2.5: CHILDES Corpora for Estonian

2.2.1 Andreas

Andreas's data represents the most complete picture of Estonian acquisition. The 8 sessions for Andreas cover an age of 1;07.24 through 3;01.13. Each session has an average of 400 utterances, which would seem to present a very clear picture of his productive capability at any point. His MLU increases steadily over time with no sessions having a significantly lower average than the previous sessions[4]– his final session includes an utterance with 26 morphemes. This progress is graphed in Figure (2.2). The horizontal axis plots Andreas's age in days (which begin at 1;08.13 or 518 days) against his Mean Length Utterance. It shows a very steady increase across the sessions, with the initial sessions cataloging less than two morphemes per utterance and the final session five times longer at approximately 9 morphemes. Also of note, his longest utterance in the first session was just two monomorphemic words, while his last session featured an utterance with 26 morphemes. Andreas is quite clearly learning the target language.

Like MLU, Andreas's percentage of items appearing with functional material also increases steadily across the time of his recordings– showing that utterances are not just getting longer but the individual words themselves are becoming more complex. This growth is depicted in Figure (2.3). Each set of data indicates the growth of a

[4]Between 2;08.13 and 3;00.02, Andrea's MLU goes from 4.9 to 4.8. A two-tailed T-Test shows this is not a significant difference (p=.31)

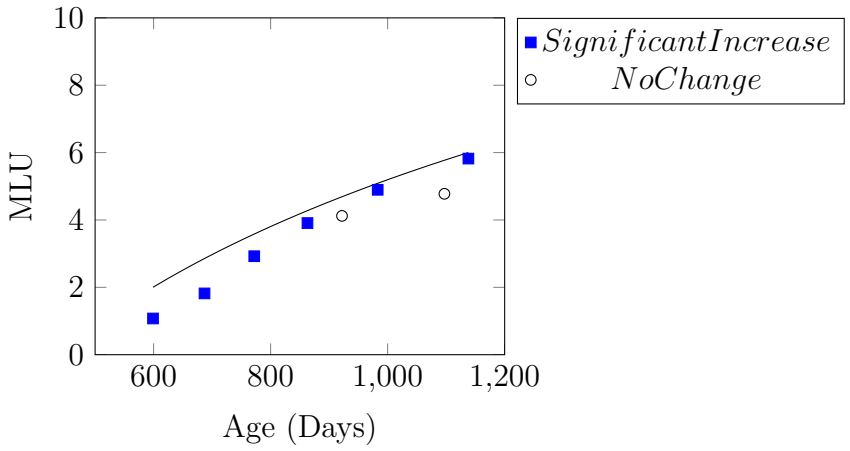


Figure 2.2: Andreas MLU

particular type of feature as a percentage. For example, in the initial sessions, no verbs appeared with agreement morphology (represented by blue square and a blue trend line), while at the final sessions, more than 40% of verbs appeared with agreement morphology- lower than the 65% in the input, but as high as was seen for the Estonian children. This is an indication of the growing capacity for the child to represent formal features. Another manifestation of purely formal features is represented in red. This is the portion of all nominal items that are pronouns. In early stages, the child uses no pronouns whatsoever, though after months of steady growth, the final sessions show approximately 30% of all nominal elements are pronouns, not including any non-overt, dropped subjects. Finally, the green circles and trend-line represent overt case– that is, any case-markers other than nominative. This number also increases steadily, confirming again the growth of functional elements in the child's utterances.

There are a few dips, but the trend is consistently upwards. Overt case and verbal agreement nearly perfectly parallel each other in their trends. This is important as

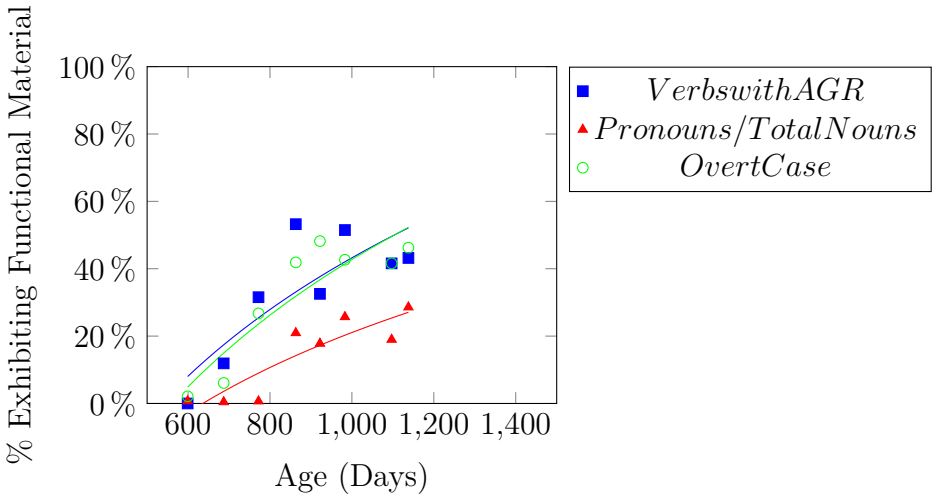


Figure 2.3: Andreas Functional Heads Over Time

it indicates that there is not a preference for DP morphology over CP or vice-versa. Object case-marking will be assigned by the same head responsible for agreement, so seeing such a close temporal relationship between case and agreement here is promising. That said, tracking overt case misses nominative case purposefully, as it is unmarked in Estonian. Nonetheless, it is good to see functional material inclusion increasing in both domains, as expected.

No personal pronouns whatsoever appear for the first few sessions, and the earliest pronominal elements are demonstratives, but once they appear, they also steadily increase. All categories show a jump around 2 years— a growth spurt commonly found across all language cohorts studied in this dissertation. A closer look at the relationship between agreement and personal pronouns, which are both reflections of person and number feature combinations, is below.

Table (2.6) shows the appearance and acquisition of person and number feature combinations, with blue shades representing pronouns with that feature combination and gray shades showing verbal agreement with that combination. Lighter shades indicate the first appearance of a feature set, while darker ones show that a set has been acquired– meaning that it has appeared in a variety of case-forms or attached to more than one verb root.

P,#	Category	1;07.24	1;10.22	2;01.12	2;04.13	2;06.12	2;08.13	3;00.02	3;01.13
1SG	Pronoun								
	V-Agr								
2SG	Pronoun								
	V-Agr								
3SG	Pronoun								
	V-Agr								
1PL	Pronoun								
	V-Agr								
2PL	Pronoun								
	V-Agr								
3PL	Pronoun								
	V-Agr								

Table 2.6: Andreas Acquisition of Person/Number Features

Pronouns, AGR

First Use light shaded, Evidence for Partial Paradigm dark shade

For Andreas, a feature combination is first manifested as verbal agreement, or as a pronoun and an agreement morpheme in the same sessions. The order in which different person and number combinations are produced is only partially consistent with the predictions made by Harley and Ritter (2002)'s feature-geometry. They predict that first person will precede second and that singular will precede plural, but that there will not necessarily be a relationship between first and third persons. Andreas acquires first and second person singular pronouns at the same time, followed shortly by first person plural. This is expected. In contrast, the third person plural appears

before singular. In contrast, 3SG *agreement* occurs before plural agreement, which is expected. The early examples of 3G agreement occur along with overt subjects, so it is not the case that early pronouns are dropped. Considering the length of each recording, it seems somewhat unlikely that this is just an artifact of the recording process.

Andreas has a tendency to refer to himself by his name ("Atsu" actually), which may have led to a delay in first-person pronouns, though they still appear rather early. Another interesting point is that verbal agreement for first-person plural appears before agreement for first person singular. This could be related to his preference for referring to himself by name. This hunch is confirmed by utterances such as (12), below[5]:

(12) Atsu aita.p
Andreas help.3SG
Andreas helps, 1;10.22

To gain a more qualitative sense of Andreas's progress, the utterances which contain the relevant features in the sessions where they were first considered *acquired* are shown in Figure (2.4). A few notable things can be seen from the examples. First, by the first session in which agreement is manifested, there is also evidence for past tense (in *kadu-s-id* disappear-PAST-3PL). The previous session (1;07.12) had neither agreement nor tense, suggesting that Andreas acquired the [+PAST] and ϕ features in close succession. Most of the first appearances of agreement occur with dropped subjects. In contrast, early pronouns tend to occur as objects in utterances that also contain an agreeing verb or negation, both indicators of an elaborate verbal structure.

[5]Third person singular agreement morpheme should be *-b*, though Andreas consistently pronounces it as *-p*. Estonian does not distinguish voicing in stops; Andreas is apparently still learning the nuances of the phonology.

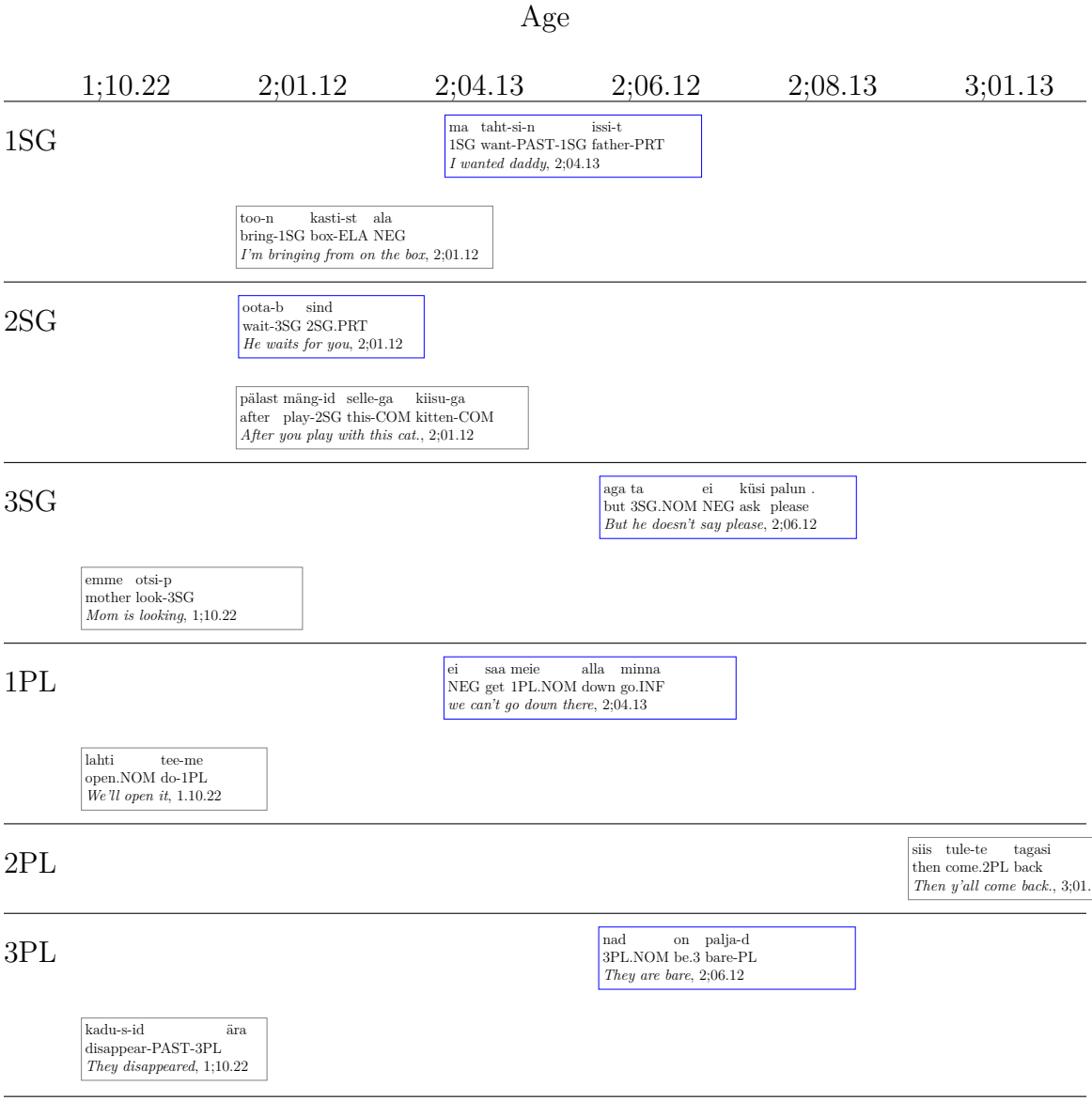


Figure 2.4: Andreas Example Utterances
Gray boxes are for agreement, blue boxes for pronouns

Andreas has the most fully filled case paradigm of all the Estonian children, as shown in Table (2.7), which makes sense given the length and breadth his sessions represent. Like the previous table, light shades indicate the first instance of a case, while darker shades indicate acquisition, as evidenced by the appearance on at least two different roots or person/number combinations. Nominals show the widest variety of case markers, appearing with all grammatical and semantic cases.

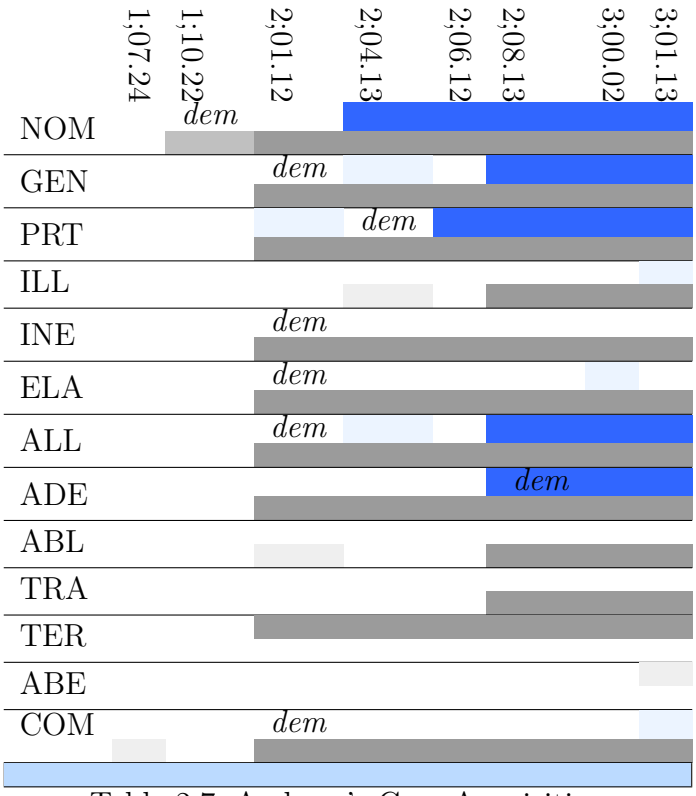


Table 2.7: Andreas's Case Acquisition

Pronouns, Nominals

First Use light shaded, Evidence for Partial Paradigm dark shade

Pronouns do appear with all the grammatical cases, but only a handful of the semantic cases. The table also shows where demonstratives appeared for the first time, which were in nearly all cases before personal pronouns and at the same time as lexical nouns. Demonstratives share properties with personal pronouns and lexical

nominals. Like pronouns, they are referential, represent a bundle of features such as [+DEF, 3SG], and may replace full nominals. Demonstratives may also appear alongside nominals within a DP, and their acquisition behavior is much closer to nominals.

	Pronouns	Substantives	Demonstratives	Total
Nominative	76%	42%	65%	56%
Genitive	6.2%	15%	17%	12%
Partitive	6.1%	14%	13%	11%
Semantic	11%	29%	5%	22%

Table 2.8: Andreas: Percentage of Cases in Input

The frequency with which various cases appear in the input may affect the time at which the forms appear. When comparing semantic case forms to grammatical case forms in the input, as shown in Table (2.8), some important differences emerge. Though there are plenty of pronouns and full nominals in the input, pronouns occur in a grammatical case form nearly 90% of the time, the vast majority of the time as nominative. Genitive and partitive forms account for only around 6% of the input, yet both appear for the first time around the same time as nominatives, though evidence for their full acquisition is not present until later.

Full nominals also skew toward structural forms, though the spread is not as extreme, with 70% in NOM, GEN, or PRT case forms. For both pronouns and lexical nouns, the percentage of genitive and partitive combined is equal to the semantic cases. This suggests that the difference in acquisition is affected by frequency, though there are enough pronouns in semantic case in the input that there must be something else delaying their appearance in the child's language. Interestingly, the demonstrative *see* 'this' has a distribution in the input whose distribution is right between that of lexical nouns and pronouns, which surely contributes to the early and wide-ranging case morphology of demonstratives seen in Andreas's utterances.

After seeing the trajectory of the functional elements in Andreas's developing grammar, the data for possessors and subjects can be analyzed. Recall Figure (2.3), which showed a steady increase of both verbal and nominal functional items, indicating a steady growth in Andreas' capacity for functional material. The picture presented in Figure (2.5) is not straightforward and does not coincide with the overall functional growth. It shows the percentage of all nouns which are subjects (in red) and the percentage of all nouns which are possessors.

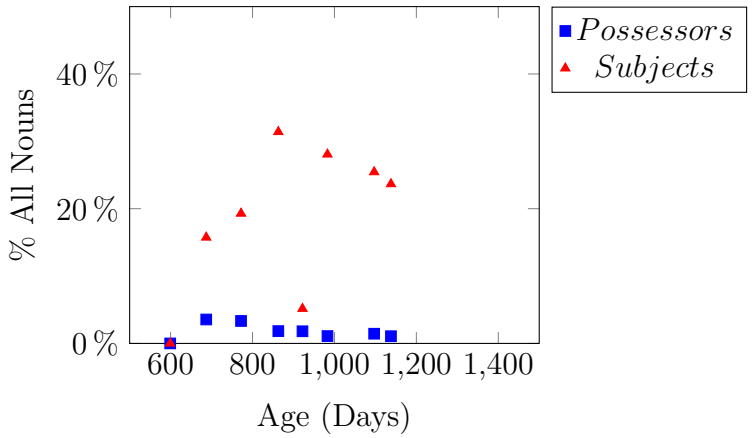


Figure 2.5: Andreas Subjects and Possessors Over Time

Though growth of subjects increases over the first few sessions, it seems to level off, while possessors begin low and stay low. What this ultimately means to the overall analysis is unclear. The first conclusion that can be drawn is that the lack of subjects initially and subsequent growth may be related to the developing capacity of children. With possessors, however, there is little growth– there even appears to be a dip in the middle sessions. Whatever changes in the extended projection of the verb that allow for a rise in subjects does not correspond to any sort of similar gains in DPs. A fuller discussion is included in Section (2.3). For now, the data in Figure (2.5) shows how the occurrence of possessors and subjects change over time.

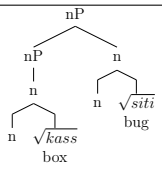
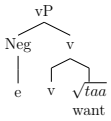
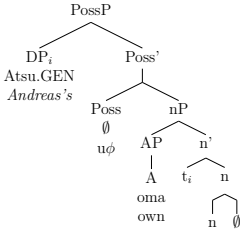
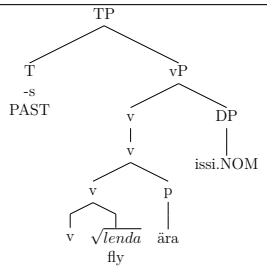
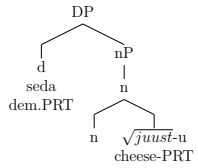
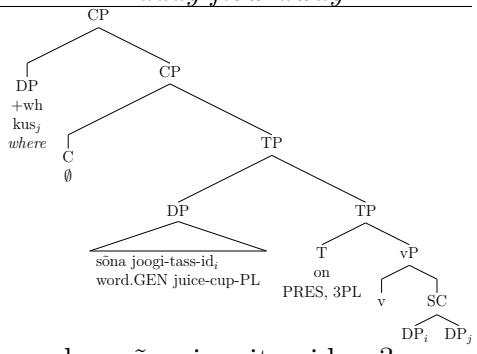
	Largest Nominal Projection	Largest Verbal Projection
1;07.24 First N First V	 kass siti *box bug*	 ettaa *don't want*
1;10.22 First Poss First T	 Atsu oma *Andreas's own*	 lendas ära issi *Daddy flew away*
2;01.12 First D First C	 seda juustu *this cheese*	 kus sõna joogitassid on? *Where is the word for juicecups?*

Table 2.9: Andreas Structure Development

The final data address how the extended projections of the noun and the verb develop relative to each other. Figure (2.9) shows the structure of the largest nominal and verbal phrases produced in the sessions during which various syntactic objects were first attested. Andreas first produces a noun in his first session, and his largest nominal structure from this session is included in the first row. Utterances his his first verbs, possessors, tense-markings, complementizers, and determiners are included in the figures other cells.

For Andreas, the data is actually very suggestive. The first evidence for a noun occurs at 1;07.24– the first session. This is also the first session where a verb is attested; it is also the first session recorded. It is not surprising that he will have early use of verbs and nouns. What is surprising is that at the next session, both the first tense markings and the first possessors appear, and in the third session, the first determiners and complementizers appear. This pattern is just what one would expect given the architectural parallels discussed.

2.2.2 Hendrik

Hendrik was recorded 17 times from an age of 1;08.13 until 2;05.30, with an average of 115 utterances per session. Figure (2.6) shows that MLU, represented on the vertical axis, rose steadily, though slowly, throughout the time he was tracked. Blue squares represent sessions where the MLU was significantly higher than the previous session ($p<.05$), white circles are sessions with no significant change from the previous session, and the red triangle represents a significant decrease. The majority of sessions showed significant increases, providing reasonable confidence that Hendrik's overall linguistic capacity is steadily growing over the course of the sessions.

Hendrik's functional element growth rate, shown in Figure (2.7), is similar to his MLU growth. He is clearly acquiring functional material in the nominal domain:

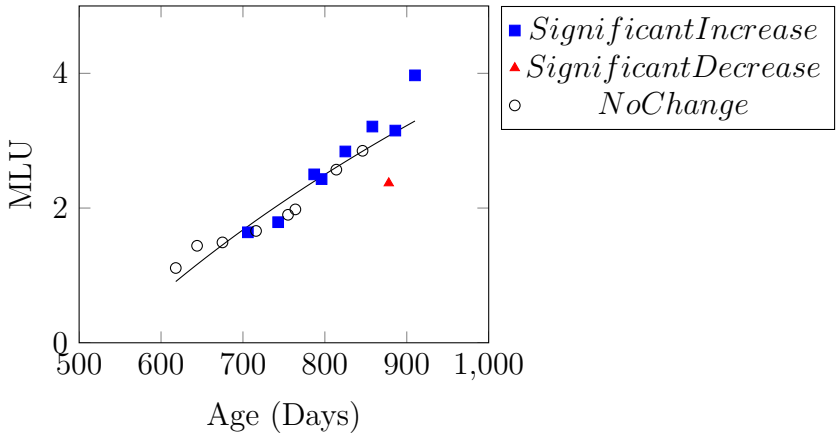


Figure 2.6: Hendrik MLU over Time

pronoun percentage and overt case-marking percentage (shown in red and green, respectively) trend upwards at a consistent rate. The lowest line in the figure is Hendrik's verbal agreement— it is basically non-existent. This suggests a problem with the the verbal extended projection. Because of the large discrepancy between verbal and nominal morphology, the percentage of verbs which exhibit some tense, mood, or aspect morphology was also tracked, shown with the violet X marks. The trend here indicates that verbal morphology is increasing, at a similar rate as nominal elements, though relatively delayed. It appears that Hendrik's difficulty is just with agreement.

Whether Hendrik's lack of agreement is an issue with representing person features in general or just with agreement in particular can be seen in the analysis of pronouns. Table (2.10) shows the first appearance of a particular feature combination and the point at which a partial paradigm was evidenced. For pronouns, this means the appearance of a person-number combination in at least two case forms. For verbs, a partial paradigm for person agreement consists of the use of correct agreement mor-

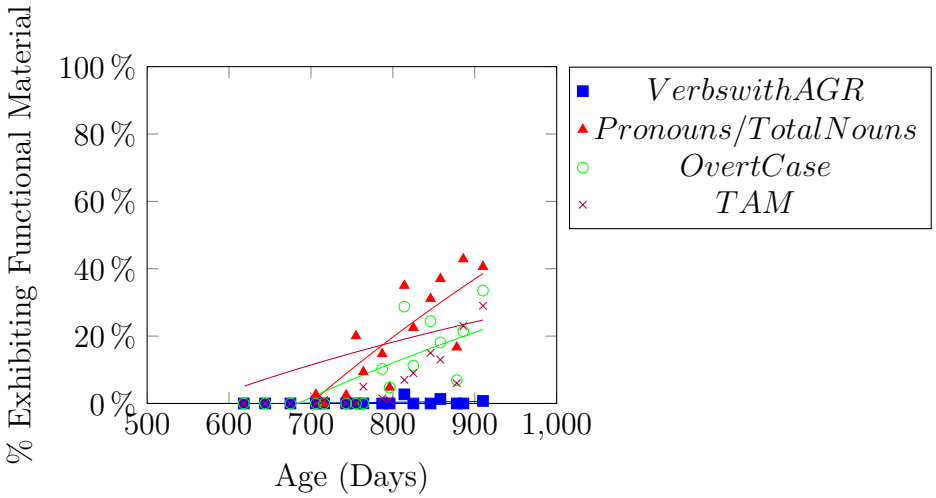


Figure 2.7: Hendrik Functional Heads Over Time (%)

phology for a feature set on at least two distinct verbs. Hendrik was slow to make use of this kind of functional morphology; the first seven sessions did not have any example of person or number features. By 2;02.24, first-person plural and singular pronouns are observed, but it's not until several sessions later than first person plural is really acquired, while another instance of the singular does not occur until 2;04.28. This is the same session that finds a third-person plural pronoun. Second person never occurs.

Hendrik's data is surprising for a few reasons. Primarily, the low amount of person features throughout is notable– no other child is so slow to use pronouns and agreement. He did make early use of demonstratives– the first use was at 1;11.11 with evidence for a case paradigm appearing already at 2;01.27. This is indicative of nominal functional features, but it is independent of true person/number features.

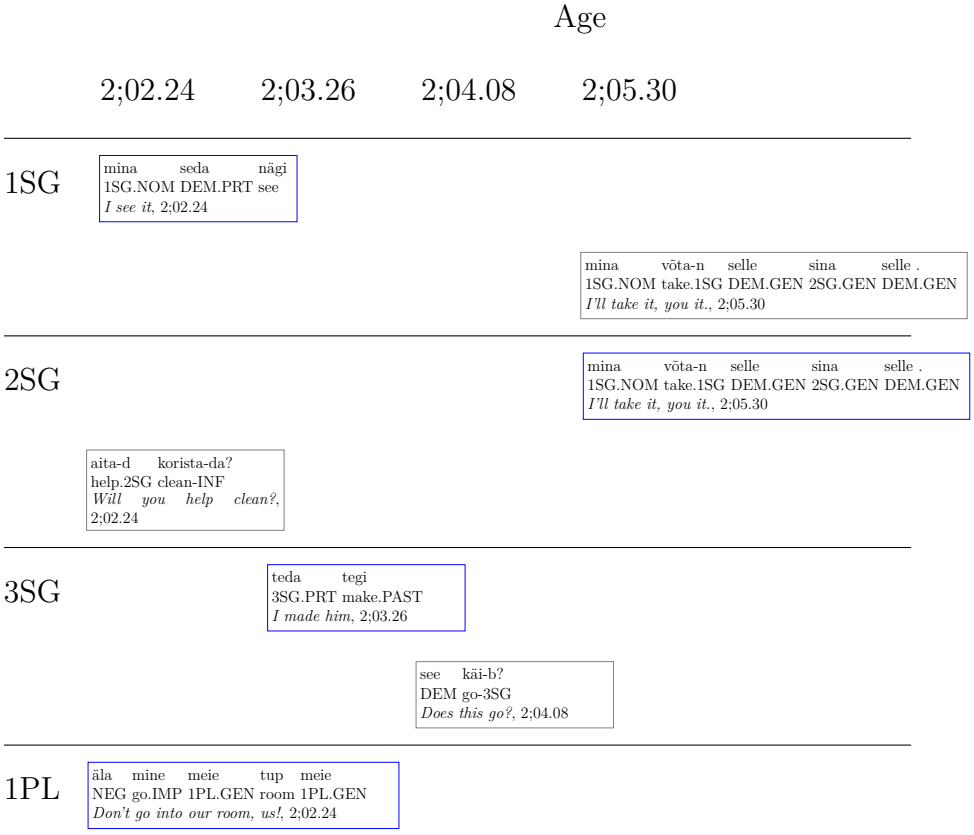


Figure 2.8: Hendrik Example Utterances
Blue boxes are for pronouns, gray boxes for agreement

P,#	Category		2;02.24	2;03.05	2;03.26	2;04.08	2;04.28	2;05.06	2;05.30
1SG	Pronoun V-Agr	First 7 Sessions Contain no ϕ features							
2SG	Pronoun V-Agr								
3SG	Pronoun V-Agr								
1PL	Pronoun V-Agr								
2PL	Pronoun V-Agr								
3PL	Pronoun V-Agr								

Table 2.10: Hendrik Acqusition of Person/Number Features

Pronouns, AGR

First Use light shaded, Evidence for Partial Paradigm dark shade

A more thorough look at the sorts of utterances Hendrik was producing at the time of each milestone for the different person and number combinations can be seen in Figure (2.8). Each box in the figure shows a particular utterance of Hendrik's at the time when the person/number combination was first acquired. Unlike Andreas, who generally acquired the agreement morphemes before corresponding pronouns, most of Hendrik's agreement came second, an expected outcome given the general paucity of agreement. The only place where agreement occurs before the pronoun is for 2SG, though it suggests that there is a dropped pronoun which triggers the agreement. The total lack of agreement forms for plural subjects is not surprising either, given that plural pronouns only appear as first person.

Hendrik's case acquisition is more complete and also indicates access to nominal functional features. Full nominals appear in the widest variety of cases, while the pronouns and demonstratives appear only with the grammatical cases, somewhat similar to the preferences Andreas showed. Reminiscent of Hegarty (2005), this might reflect some difficulty with multiple features on a single functional head– combining person, number, and case on D might be more challenging than suffixing a case-marker to a noun. Demonstratives appeared much earlier than pronouns, often around the same time full nominals appeared with that case. Table (2.11) shows the order in which they rolled out.

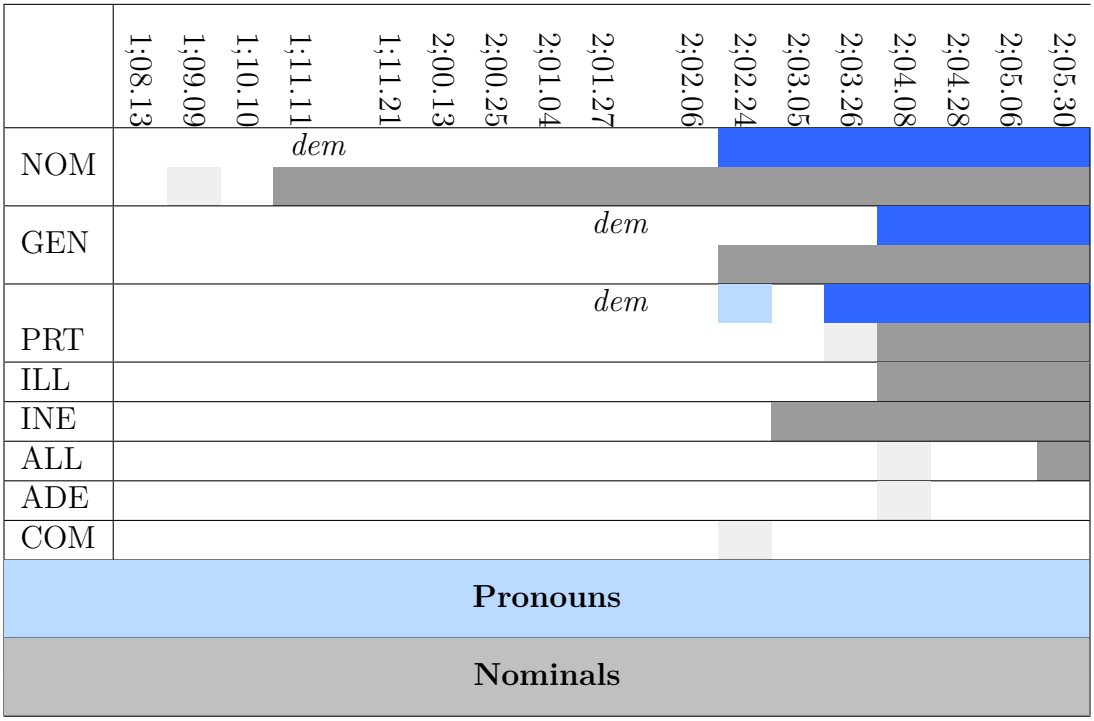


Table 2.11: Hendrik Case Acquisition

Pronouns, Nominals

First Use light shaded, Evidence for Partial Paradigm dark shade

As with Andreas, it is also possible that input is responsible for the differences. As Table (2.12) shows, pronouns do tend to appear in the grammatical cases a large majority of the time. For Andreas, the percent of genitive and partitive combined

equaled the semantic cases for both types of nominals. For Hendrik, pronouns occur in GEN and PRT three times more often as other cases, while full nouns are like Andreas. Demonstratives pattern like personal pronouns- they are very rarely in semantic forms and have a weaker preference for nominative case. This frequency is clearly seen in the production– demonstratives do not appear in semantic cases. Nonetheless, they appear well before pronouns for the three grammatical cases- like lexical nouns.

	Pronouns	Substantives	Demonstratives	Total
Nominative	71.27%	40.34%	64.8%	52.96%
Genitive	14.12%	18.91%	17.3%	16.96%
Partitive	7.80%	12.72%	12.6%	10.71%
Semantic	6.81%	28.03%	4.6%	19.37%

Table 2.12: Hendrik: Percentage of Cases in Input

The final question to address is whether there are significant trends to discover in Hendrik's use of subjects and possessors. The data shows that Hendrik lacks agreement morphology, but he does make use of other verbal morphology. This morphology reflects that the T head is available, but it is non-adult like. Whether the lack of agreement also leads to issues with subjects can be seen by examining this data. If there is a dearth of subjects, the lack of agreement may be indicative of a larger problem with T beyond the missing agreement. If subjects are used and their use increases, it seems Hendrik's problem is with agreement alone. Turning to possessors, it has been shown that nominal morphology has increased steadily, suggesting that the features and structures of the DP are growing. With this growth, the potential for possessors is also increasing: Figure (2.9) clarifies whether this growth is, in fact, occuring .

Looking at subject and possessor growth, we do not see a clear picture- neither subjects nor possessors seem to consistently move with time. Possessors, in blue, seemingly randomly bounce around in the middle sessions, stabilizing around 5%, while subjects grow a small amount. This little amount of growth still fails to support

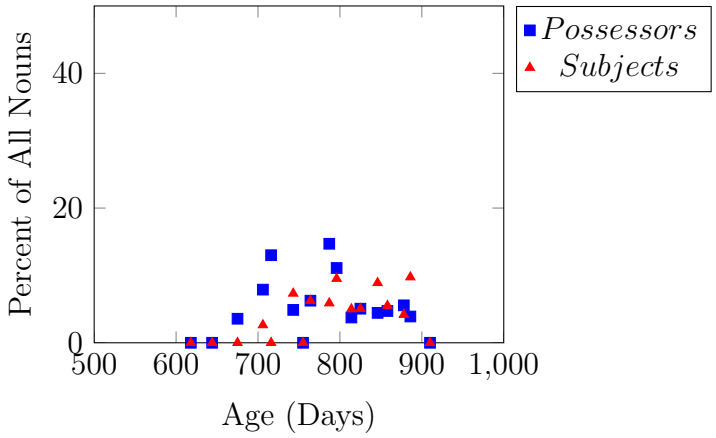


Figure 2.9: Hendrik Subjects and Possessors Over Time

any relationship between agreement and subjecthood, as even this little growth seems independent from non-existent agreement morphology. Hendrik, like Andreas, does not produce results that indicate a relationship between possessors and subjects, nor with these types of nominals and other functional elements in their respective domains.

The final aspect looks at the development of Hendrik's syntax at various milestones. Table (2.13) shows his longest nominal and verbal phrases at the stage where he showed evidence of achieving three important heads in each domain: N, Poss, and D for the nominals, and V, T, and C for verbs. Like Andreas, each pair of parallel heads appears in the same session– the first session shows N and V, followed by Poss and T a few sessions later, and finally D a couple sessions later. C is not attested overtly, though the longest utterance (included in the table) is a question, indicating a null [+WH] element. In the adult grammar, [+WH] is indicated by the morpheme *kas*. Hendrik's avoidance of a vocabulary item that instantiates only formal features in C is reminiscent of his avoidance of agreement morphemes.

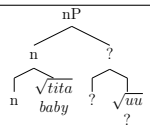
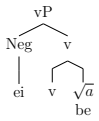
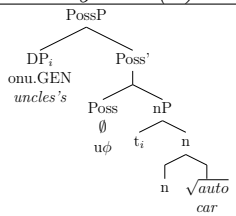
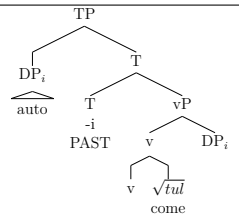
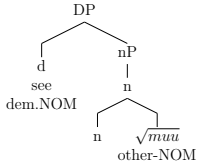
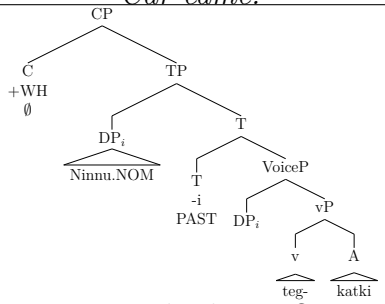
	Largest Nominal Projection	Largest Verbal Projection
1;08.13 First N First V	 tita uu *baby new(?)*	 ei a *isn't*
1;10.10 First Poss First T	 onu auto . *uncles's car*	 auto tuli *Car came.*
2;01.04 First D	 see muu *this other one*	 Ninnu katki tegi? *Ninu made it broken?*
Overt C unattested		

Table 2.13: Hendrik Structure Development

Importantly, the development is not just a matter of utterance length. The very first session shows several two word utterances, but no utterances that show evidence of an actual extended projection. Likewise, intermediate sessions before POSS and T were accounted for had longer utterances that still did not exhibit the same level of functional complexity. This pattern whereby each posited head occurs at the same time as its complement supports the analysis that verbal and nominal structures are developing in parallel. Hendrik's problems with agreement notwithstanding, his development is very much like the other children, as we'll see in Section (2.3).

2.2.3 Martina

Martina's six recordings range from 1;03.15 until 1;11.28, with around 370 utterances in each file. There are actually several more transcripts available; however Martina was a precocious learner. By 2 years, her MLU was as high as Andreas at 3, and her initial MLU was nearly what Hendrik's was at the end of his recordings. MLU consistently goes up across the sessions, as seen in Figure (2.10). The blue circles on the graph indicate sessions with statisticially significantly higher MLU than the previous session. These indicate that each session except for the last shows real growth in her linguistic capacity.

All Martina's functional categories also increase steadily, shown in Figure (2.11), and all at very similar rates, as can be seen from the nearly parallel trendlines indicated. There does appear to be something like a jump in the appearance of agreement and case after the first session, which may correspond to the jumps seen in the other children around 2 years (though recall that Hendrik's agreement did not undergo a rapid increase). All the variables coded for appear to follow similar trajectories—nothing in particular stands out as aberrant except for the exceptionally early age.

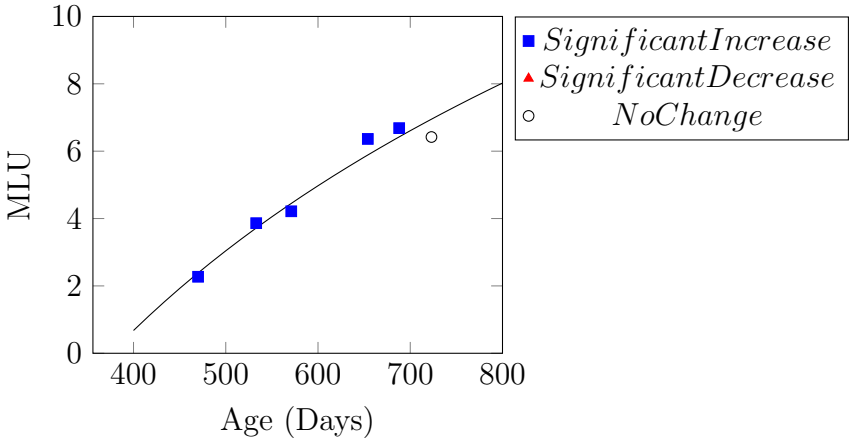


Figure 2.10: Martina MLU

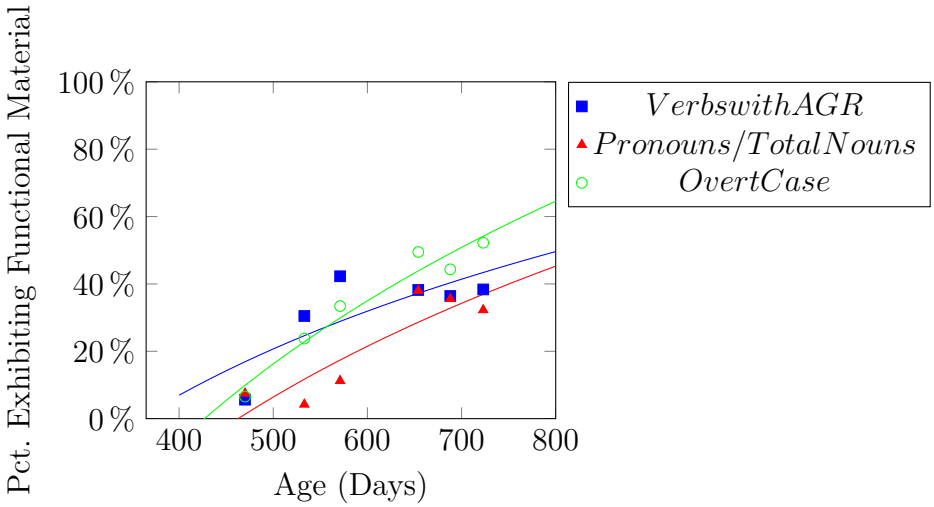


Figure 2.11: Martina Functional Heads Over Time (%)

Martina's acquisition of person and number features, depicted in Table (2.14) happens so early it is difficult to discern any real patterns. By the second session, verbal agreement, indicated in gray, is at least used one time for all but second person plural. Given that her interlocutor is primarily her mother, it is not surprising to see 2PL lacking. Still, a few generalizations can be made. Like Andreas and much different from Hendrik, verbal agreement appears either at the same time or before the corresponding pronoun, with the exception of the relatively rare second-person plural. Singular features are always acquired before their plural counterparts, and first and third persons appear before second. All of this is in accord with the predictions made by Harley and Ritter (2002).

P,#	Category	1;03.15	1;05.18	1;06.26	1;09.19	1;10.23	1;11.28
1SG	Pronoun						
	VERB AGR						
2SG	Pronoun						
	VERB AGR						
3SG	Pronoun						
	VERB AGR						
1PL	Pronoun						
	VERB AGR						
2PL	Pronoun						
	VERB AGR						
3PL	Pronoun						
	VERB AGR						

Table 2.14: Martina Acqusition of Person/Number Features
Pronouns, AGR
First Use light shaded, Evidence for Partial Paradigm dark shade

Figure (2.12) shows examples of utterances from sessions where particular feature combinations were first attested. As with Andreas and (again) in contrast with Hendrik, Martina's agreement consistently appears before the corresponding pronoun. When the pronouns do occur, they are in the nominative case and they occur along with the agreement marker, with the exception of the first-person singular example,

where the verb is left without agreement. This shows that the verb phrases are always much more elaborated than the noun phrases where the pronouns occur– the first instance of these pronouns occur alongside verbs that not only show agreement but in most cases take complements– even *wh-* complements in several cases. Taken together, this suggests a general VP-extended projection that is developing earlier than corresponding parts of the NP.

Martina's case acquisition pathway is similar to the others (grammatical before semantic, case on nouns before pronouns), though the patterns shown in Table (2.15) are more robust. Personal pronouns appear at least once in seven of the different case forms, though real acquisition is only achieved with the grammatical cases and allative. Martina distinguishes herself from the others by the variety of cases used– neither of the other children exhibited the same wide range. Unlike the others, her use of demonstratives more closely tracks with the other pronouns. Other nominals occur in nearly all the Estonian cases and are mostly acquired before the personal pronouns are acquired for the grammatical cases. This highlights again the difference between how case works with the two types of nominals.

As was done for the other children, Table (2.16) shows the distribution of types of case morphology in her input. A similar distribution is seen here as with the other children: grammatical cases account for a large majority of pronouns and a substantial though reduced portion of full nominals. Demonstratives differ the most from her peers; they occur mainly in subject or object cases, with the semantic cases appearing less frequently. This difference seems to be reflected in their similarly low frequency in Martina's production.

The final question is how Martina's use of subjects and possessors changes over time. With the most consistent increase in all categories and the fullest paradigms for case, agreement, and pronouns, Martina might offer the clearest example of how

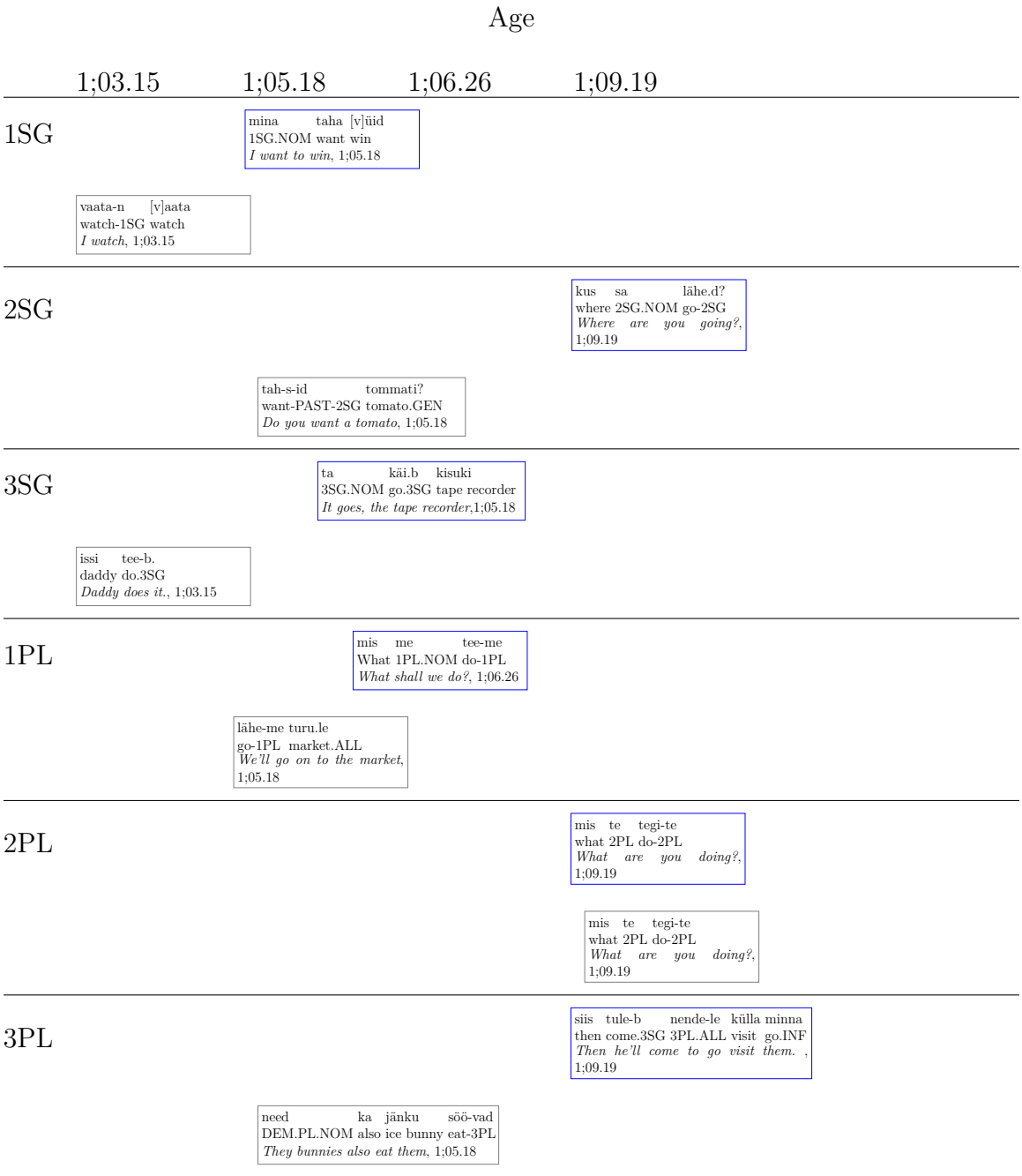


Figure 2.12: Martina Example Utterances
Gray boxes are for agreement, blue boxes for pronouns

		1;03.15	1;05.18	1;06.26	1;09.19	1;10.23	1;11.28
NOM	Pronoun	*dem*					
	Nominal						
GEN	Pronoun				*dem*		
	Nominal						
PRT	Pronoun	*dem*					
	Nominal						
ILL	Pronoun						
	Nominal						
INE	Pronoun						*dem*
	Nominal						
ELA	Pronoun						*dem*
	Nominal						
ALL	Pronoun						
	Nominal						
ADE	Nominal						
ABL	Nominal						
TRA	Nominal						
TER	Nominal						
ESS	Nominal						
ABE	Nominal						
COM	Pronoun				*dem*		
	Nominal						
Pronouns							
Nominals							

Table 2.15: Martina Case Acquisition
First Appearance (light), Paradigm (dark)

	Pronouns	Substantives	Demonstratives	Total
Nominative	68%	41%	73%	51%
Genitive	12%	21%	12%	18%
Partitive	5.6%	15%	12%	11%
Semantic	14%	24%	4%	20%

Table 2.16: Martina: Percentage of Cases in Input

possessors and subjects develop over time. Figure (2.13), depicting the percentage of nouns that were subjects (red) and possessors (blue), does show some sort of an initial increase in subjects, though no such trend can be gleaned from possessors, which starts low and stays low. This is a recurring pattern for child language, as will be seen in Chapter 5.

Table (2.17) shows the longest nominal phrases and verb phrases at the points in her data collection that Martina first showed the relevant projections. Nouns and verbs both appeared by the first session, and both tense and possessors appeared in the next session. This session was also the first instance of a determiner appearing, unlike the other children who did not use determiners until after they had shown signs of acquiring the Poss head. C shows up immediately afterwards. These hypothesized structures provide another glimpse into how the two projections seem to be acquired in parallel, even though the actual rates of subject and possessor inclusion do not follow this pattern.

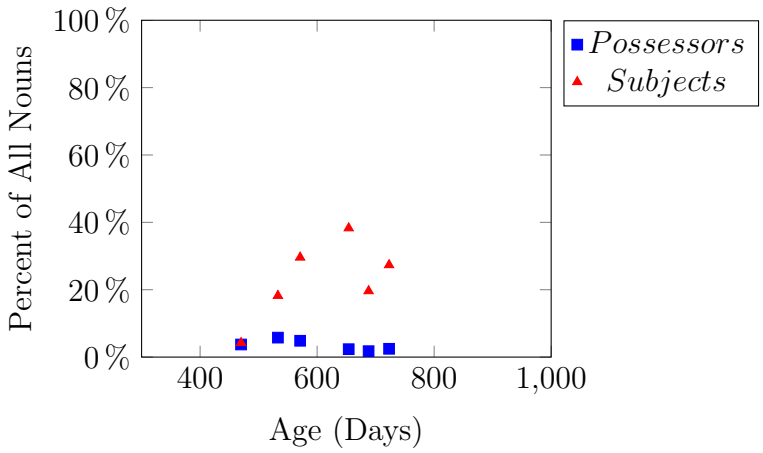


Figure 2.13: Martina Subjects and Possessors Over Time

Martina's data showed consistent growth in nominal and verbal morphology, having acquired nearly all the various features being tracked. Nonetheless, there did

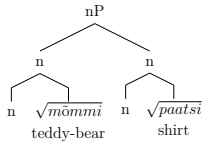
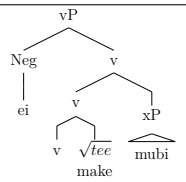
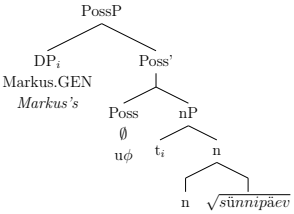
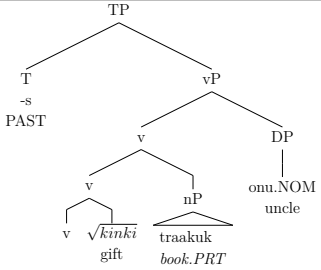
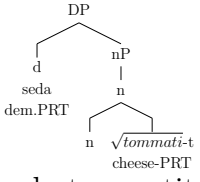
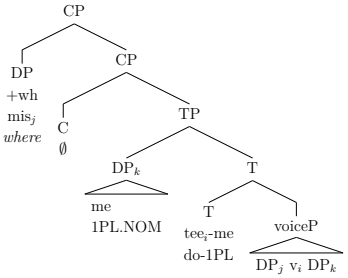
	Largest Nominal Projection	Largest Verbal Projection
1;03.15 First N First V	 mõmmi paatsi *teddy-bear shirt*	 ei tee mubi *don't make truck*
1;05.18 First Poss First T	 Makkus sünnipäev *Markus's birthday*	 kinkis traakuk onu *Uncle gifted a book*
1;06.26 First C		
1;05.18 First D	 seda tommatit *this tomato*	 mis me teeme? *What do we do?*

Table 2.17: Martina Structure Development

not seem to be any relationship between the acquisition of these features and her use of subjects and possessors. The final section specifically compares Martina and the other two Estonian learners; some possible explanations for the different patterns will be discussed.

2.3 Comparison and Summary

With the individual children's acquisition paths discussed, this section turns to a comparison of their paths and what their similarities and differences can show. Each of the factors discussed in the previous sections will be addressed in turn. Table (2.18) summarizes some of the important milestones in their syntactic development.

	N/V		Poss/T		C/D	
	Age	MLU	Age	MLU	Age	MLU
Andreas	1;07.24	1.1	1;10.22	2.6	2;01.12	4.0
Hendrik	1;08.13	1.1	1;10.10	1.5	2;01.04	1.98
Martina	1;03.15	2.27	1;05.18	3.86	1;05.18 (D) 1;06.26 (C)	3.86 4.22

Table 2.18: Summary of Acquisition Points for Parallel Structural Positions

An important note must be made regarding the method of comparison. In the previous discussion of the individuals, all comparisons were made with respect to the age of the child. In this section, that comparison must necessarily change. Figure (2.14) shows a best-fit curve for the change in each child's MLU over the time they were analyzed.

This graph shows that each child develops at a different period of time. This is to be expected, of course, but it also means that comparing the children at particular ages will not suffice to make appropriate conclusions. If we talk about what a child is doing at a certain age, we cannot expect another child to be at a comparable stage.

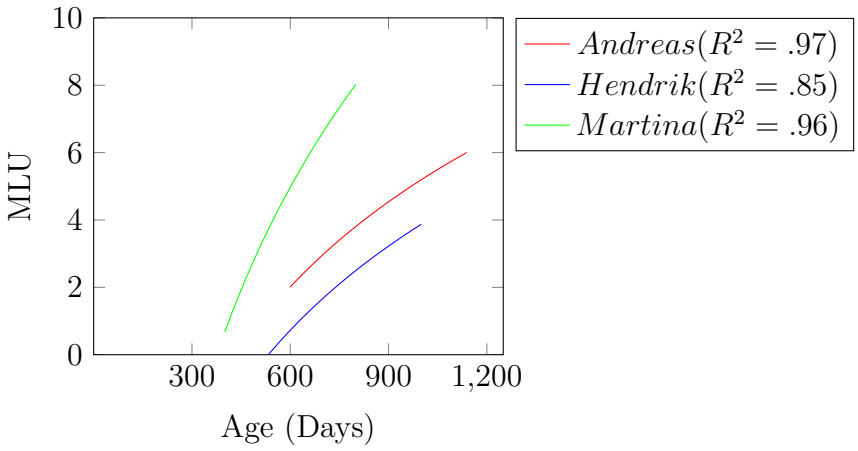


Figure 2.14: Estonian Children MLU Comparison

To work around this, all comparisons between the children will be done based on their MLU.

The second point to be made from this figure is that it also shows some broad similarities and differences between the three children. Andreas and Hendrik show very similar trajectories for MLU. Though Martina seems to be around 150 days earlier than Andreas for any MLU, their rate of increase is very similar. The high R^2 values (.85 being the lowest) indicate that this curve fits the data well and growth is steady.

This figure also shows how Hendrik contrasts with the other two. His MLU is significantly behind both the others, achieving by three years what Andreas had around two and Martina around 18 months. The rate of increase is also much slower– at around 600 days he and Andreas are at nearly the same point, with an MLU around two, however by the end, Andreas's utterances are nearly double his.

We can expect that Andreas and Martina will, all other things being equal, show similar results for any particular data comparison. Ways that they are different, if they appear, will require a further look because their overall productive language ability seems similar. The flip side of that is that we expect Hendrik to be different from the other two. If Andreas or Martina, who show very quick MLU growth, nonetheless show other developmental trajectories like the relatively delayed Hendrik, this will need explanation. With this broad MLU overview in mind, the discussion may move to the details of the functional categories to be examined.

Recall that the reason for tracking the particular elements chosen is to give a sense of the development and growth of functional elements in the child's grammar. The first aspect to address is the prevalence of overt case morphology, which is taken as an indicator of the existence of full DPs. For Estonian, this can be a bit of a tricky area to pin down. For the semantic cases, it is easy to decide whether a particular noun has overt case morphology, as there are clearly different case suffixes that are unambiguous. On the other hand, nominative, genitive, and partitive forms have no entirely regular forms, and often two or more will share the same form.

For simplicity's sake, however, all clearly non-nominative nouns were counted as having overt case. This has the affect of slightly under-counting prevalence of non-nominative case when nouns have identical nominative and genitive forms. Because this was consistently done for each child and session, the comparison should still be reliable for showing relevant differences.

Initial sessions with the children contain plenty of nouns, though relatively little syntax, thus little to suggest functional structure beyond *n*. Some typical example utterances are shown in (13), below:

(13) a. must kiisu

black kitten

Andreas, age 1:10.22

b. kommi ei

candy NEG

Hendrik, age 2:01.04

c. see kati

DEM broken

Martina, age 1:03.15

These kinds of utterances definitely indicate nouns, but there is no evidence in them for extended projections, just a nominal being combined with an attributive adjective (13a), a negation marker (13b), and a predicative adjective (13c). These indicate Merge and suggest headedness, but they do not indicate anything more complicated. Any noun with overt morphology must, by assumption, have functional structure. Other evidence for functional structure could be demonstrative determiners or quantifiers, however these are always optional. Case, on the other hand, is necessary once acquired. As the children approach the levels of case-morphology supply that matches their input, it shows that their production is becoming more adult-like. Examining Figure (2.15) reveals that all three children have similar amounts of case markers at given MLUs.

The dotted line segments along the vertical axis show the level of overt case in each child's input, with the colors matching the color that child's line. Andreas's and Hendrik's input levels are nearly identical, with Martina's just slightly below

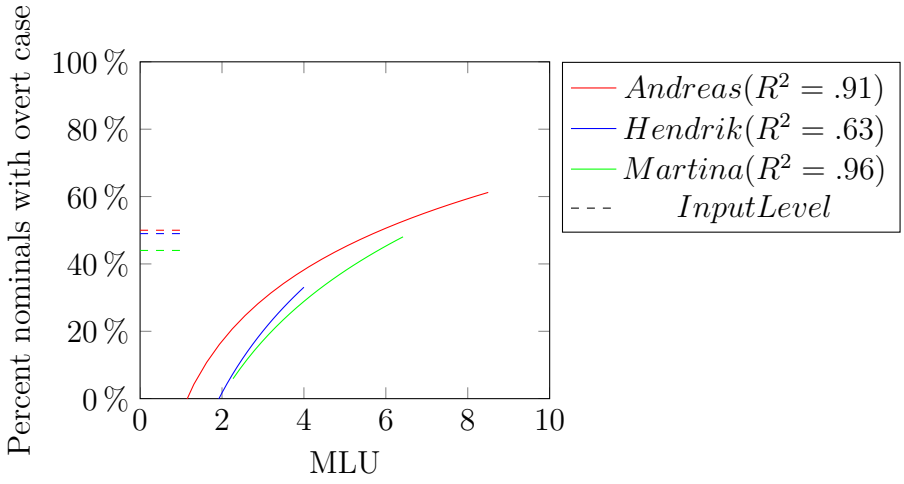


Figure 2.15: Estonian Children Case Comparison

them. Their closely-aligned input is mirrored by the similarities in the output. For the MLUs where there is data for all children (between 2-4, roughly), the lines are nearly on top of each other. Because Andreas's and Martina's trends approach their input level, it seems that, quantitatively, they have a rather adult-like use of case marking. Hendrik is on his way there. Taking into consideration Hendrik's slower MLU growth suggests that his delay in producing longer utterances is not the result of a difficulty with nominal morphology–case is supplied as often as by the other children– and pronouns, another indicator of functional DPs, appear more often.

Another look at case is provided in (2.16). For each child, there are four sets of lines representing the acquisition of each of the grammatical cases and semantic case, with the dotted line in each set representing case on pronouns and the solid showing case on full nominals. The lines represent the MLU achieved by each child when the case is first acquired, while the symbols show the very first example of each case marker. The graph allows us to compare when different cases were acquired on

which nominal elements across the children. One important consideration is whether the syncretism of accusative and genitive is hiding any important differences in the acquisition of genitive case. To determine this, each child's data was examined at the earliest stages where distinct case forms were first being acquired. Though there were many instances of genitive nouns that were objects rather than possessors, this did not change the point at which a POSS-assigned genitive case could be said to be acquired for any of the three.

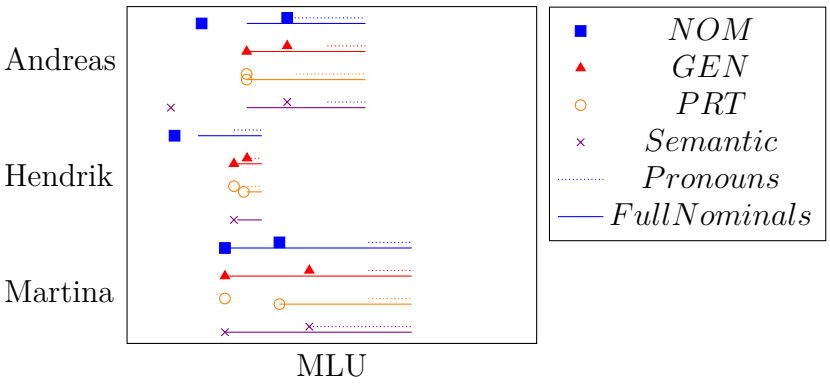


Figure 2.16: Estonian Case Acquisition Timeline
Symbols indicate first appearance of particular case form; line segments indicate point at which case form was considered *acquired*, which was determined by its appearance on multiple nouns/pronouns.

The large differences in the children's MLUs when different cases are acquired shows some independence between MLU and these features, though the fact that many cases are acquired so early may obscure initial differences. There are some general patterns that are shown. With one exception, case is acquired on nominals before pronominals. The exception is Hendrik's early use of a partitive pronoun, shown by the orange lines in the middle of the graph. Hendrik's MLU does not get to the same length as the other children, though he acquired pronoun paradigms much earlier– even under an average utterance length of four, Hendrik has a variety of pronouns, which Andreas and Martina do not achieve until beyond six.

Relating this to subjects and possessors suggests a closer look at genitive and nominative case-marking, which are assumed to be related to the extended projections of the noun and verb, respectively. For Andreas and Hendrik, we see that genitive pronouns are acquired after nominative. For Martina, they are acquired at the same time. This suggests that the capacity for subjects comes somewhat before the capacity for possessors. In Section (2.1), it was suggested that accusative case is syncretic with nominative and genitive forms, which has the unfortunate effect of blurring the acquisition of the grammatical cases. If some nouns that are genitive on the surface are underlyingly accusative, this creates more potential distance between when NOM and GEN are acquired. Because nominative never comes second, it still shows a preference for T-related morphology.

Another attempt at understanding the children's grammar related to DPs is their use of pronouns, which is depicted in Figure (2.17). The dashed lines along the vertical axis indicate levels of pronouns in the input, while the solid lines show the growth in percentage of nouns that are pronouns. Following Abney (1987) and others, pronouns are functional, represented as a D. Though there is no complement, the D represents the highest level of a nominal's extended projection. Growth of this category indicates a developing ability to produce functional structure and make use of the kind of projections necessary for assigning case and agreeing. Children's facility with these features, like case-morphology, demonstrates an ability to produce functional structure.

Input is again similar for the two boys, with Martina's input supplying relatively fewer pronouns. In production, however, each of them uses consistently higher and higher percentages of pronouns in their speech. Andreas and Martina show very similar patterns, though Hendrik has a quite impressive rate of pronoun use. As noted previously, Andreas has the habit of referring to himself as *Atsu*, which surely reduces

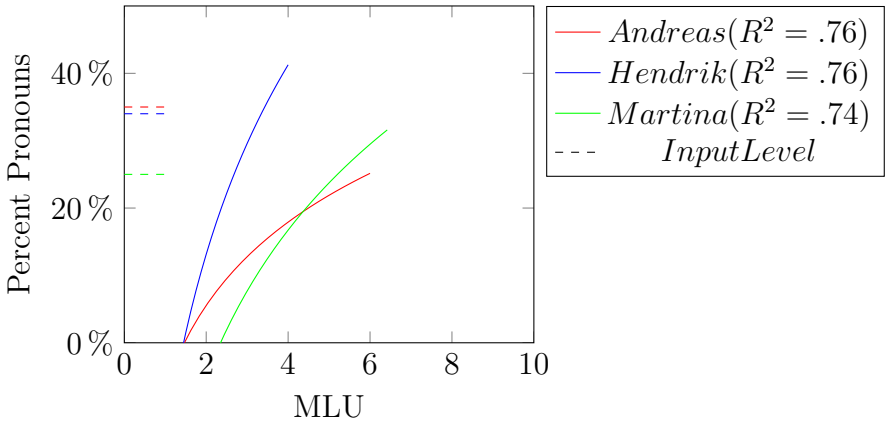


Figure 2.17: Estonian Children Pronoun Comparison

his rate of pronouns, though it is unknown whether this would significantly impact his overall production rate. Though the trends indicated here do not model the data as well as seen for MLU above, the R^2 values above .7 suggest a reasonably good fit for all.

Moving into the development of functional material in the verbal extended projection takes us first to verbal agreement. Figure (2.18) shows the growth in agreement morphology compared against MLU, with the input levels again shown along the vertical axis. Martina and Andreas (green and red, respectively) are nearly identical, with Hendrik's agreement basically missing. The possibility that Hendrik simply is not exposed to agreement is rejected by the input rates that are nearly identical to the other children's.

The difference between Hendrik's capacity for functional material in the nominal domain compared to verbal agreement is striking. Whether Hendrik's issue is one with morphological agreement or one with morphology more general to the verbal domain should be able to be seen via analyzing how often tense and aspect are

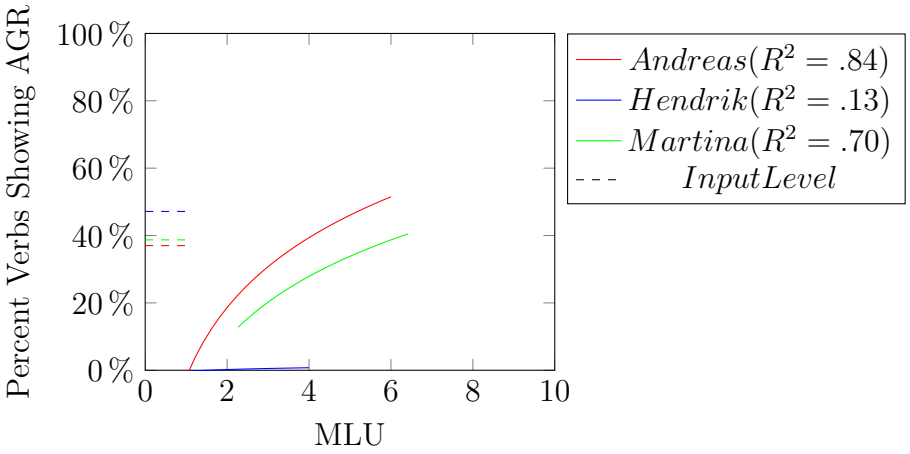


Figure 2.18: Estonian Children Verbal Agreement Comparison

marked compared to the other children. Hendrik's facility with other indicators of functional features might also suggest a difference in his ability to manage elements in the extended projections of nouns versus verbs.

Figure (2.19) shows the percentage of verbs that appear with additional morphology (tense, mood, and aspect) plotted against MLU. Once again, Martina and Andreas are rather similar. Unlike with agreement, Hendrik also appears to be in control of this element of morphology. Though much less consistently growing than the other two, as indicated by the relatively poor fit of the trendline shown in the figure, Hendrik produces verbal morphology at a slightly greater rate than the other two. This indicates that Hendrik's problem is specifically with ϕ-features and agreement, not an issue with projecting an additional head in the syntax. Whether this issue also extends to subject- and possessor-related elements will be addressed in the pages ahead.

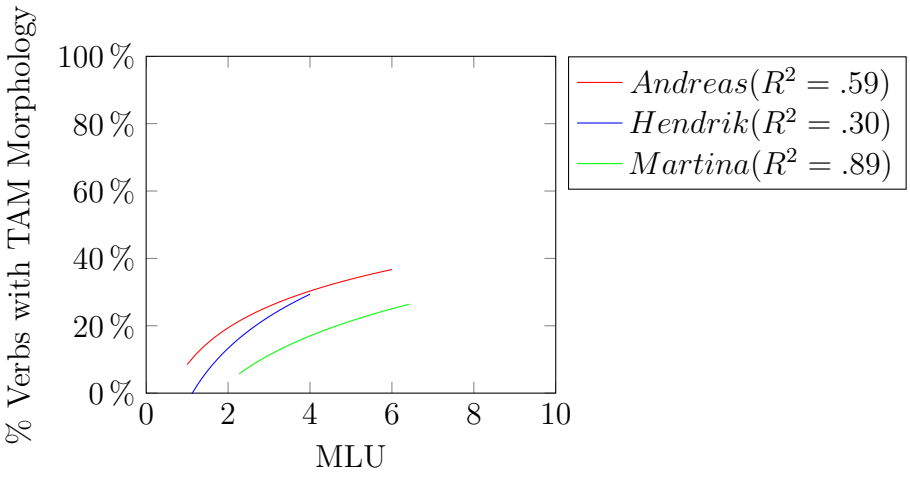


Figure 2.19: Estonian Children Verbal Morphology Comparison

With a thorough comparison of the development of functional material related to the extended projections of the noun and the verb, the initial research question can be posed. The first question asked whether there is a relationship between genitive case-assignment by Poss the DP to nominative case-assignment by T. Table (2.20) repeats the case acquisition data from Table (2.16) with some more information added.

Unlike the previous version of this table, this version also indicates the position where the first subject was attested, the first possessor, as well as the first agreement morphemes and tense marker. In this way, it can be seen whether there is a relationship between the different case assignment and the structural positions available. Andreas and Martina both showed all tense, agreement, possessors, and subjects for the first time during the same session. There was, however, a slight difference between nominative and genitive case-marking, as indicated by the difference between the blue lines and the red lines. If there were a strong relationship between a particular type of case-marking and the structural position associated with that case, then we would

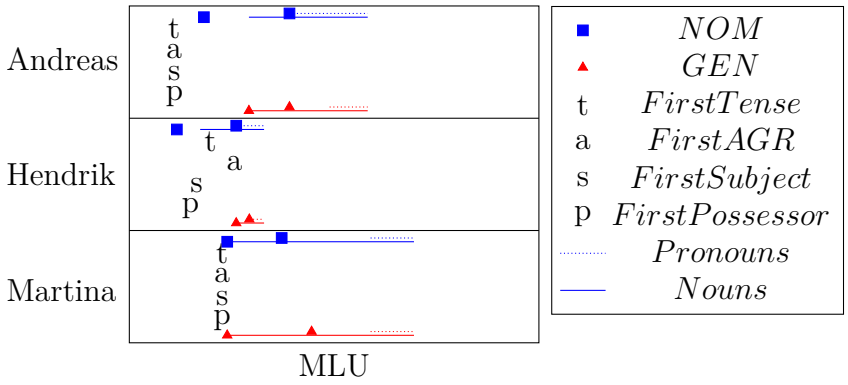


Figure 2.20: Estonian NOM-GEN Case Acquisition Timeline
Letters indicate the MLU at which an item was first uttered by the child; symbols indicate first appearance of pronoun/noun in specified case.

expect to see that nominative case and tense or agreement to have some association. Likewise, the appearance of subjects would be related to nominative case and possessors genitive case. None of this is seen.

Hendrik provides slightly more informative data, with a slight spread in the first appearance of the important features, as well as a spread between appearance of nominative and genitive case. The relationship is not what would be expected. Nominative case precedes genitive case; however, the items which cluster with nominative (tense, agreement, subjects) actually appear after the first possessor. Whereas Andreas's and Martina's data offers all the morphological data at the very start of the sessions, thus not illuminating things one way or another, Hendrik's data indicated a focus on T-related elements before he moves on to Poss-related ones.

The second research question identified earlier concerns whether the appearance of a particular feature or structural position in one domain predicts its appearance in another domain. This can be divided into two discussions: one for features and

one for structural positions. For features, the idea is that once a feature or feature combination is acquired, it should be accessible to grammatical operations in both verbal and nominal domains. For Estonian, this means that verbal agreement for a feature will appear along with pronouns with the same features.

To determine whether such a relationship exists, the difference in MLU between the sessions where a feature combination was first uttered in a nominal context and first uttered in a verbal context were compared– that is, agreement and pronouns. Numbers closer to zero indicate a close relationship; numbers further from zero indicate a preference for either nominal or verbal environment. The results are shown in Figure (2.21):

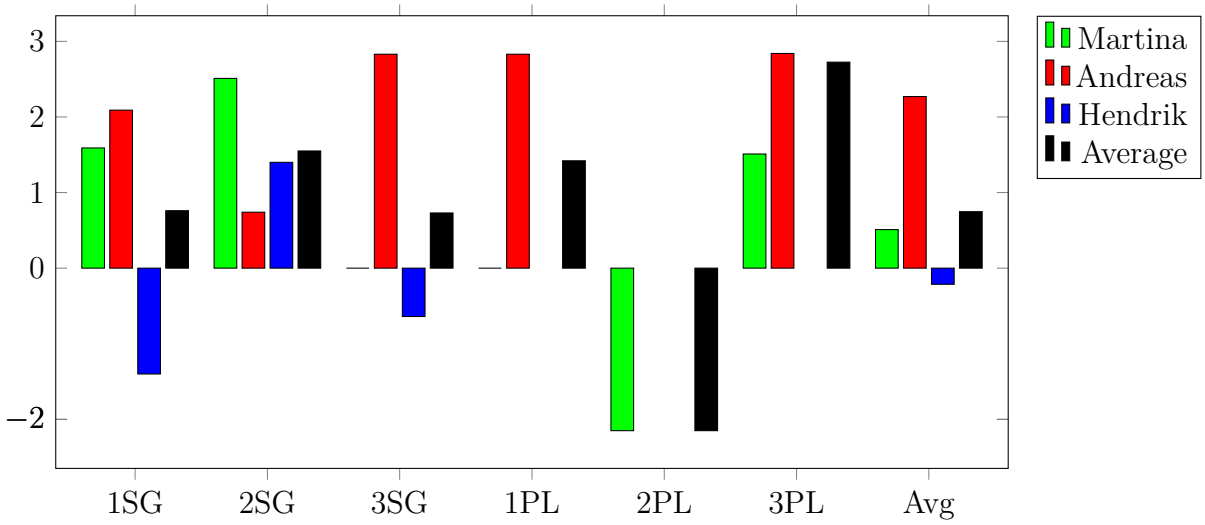


Figure 2.21: Nominal / Verbal Feature Preference
Positive numbers indicate agreement preference; negative numbers indicate pronoun preference

Once again, the data represented in Figure (2.21) suggests no close relationship between the acquisition of features in the verbal and nominal domains. Andreas shows a very strong tendency to acquire agreement morphology first. Martina's data presents a mixed picture, with two of the six combinations appearing at the same time, one favoring the nominal domain, and three favoring agreement. Finally, Hendrik shows

no agreement whatsoever for plurals, and singulars come out mixed. Of the three, Martina is most suggestive of some sort of a relationship between the two domains, but this is mostly due to the very large preference for 2PL; otherwise her data also shows a preference for agreement.

Moving on from shared features in verbal and nominal domains, grammatical functions associated with structural positions will be analyzed next. As outlined in Chapter (1), subjects in sentences are structurally parallel to possessors in DPs. The data for the three children show that the development paths for nominals are largely similar at a given MLU. For verbs, it was shown that agreement morphology, which is a feature of the T head, was not mastered by Hendrik, though other elements of verbal morphology were seemingly acquired by all children. If the parallel between subjects and possessors is used by the children as they learn, then this will be reflected in the data on possessors and subjects. If any differences emerge between Hendrik's possessors and subjects and the others, it suggests that Hendrik's issue is not with T/Agr itself, but a broader issue with functional features within the different extended projections. This was confirmed when Hendrik's tense morphology was shown to be growing just as steadily as the other children.

The comparison between subjects and possessors is interesting structurally, though it is not clear how to best examine this relationship in the actual production data. Though nearly all utterances will have subjects, there is never a requirement that any noun be possessed. Despite the difference in the obligatoriness of subjects and possessors, both are expected to increase over time. Whether this increase in subjects and possessors is related to other morphology, such as tense-marking, agreement, or to each other, for any particular child will show whether the theoretical parallels described are being used in by the children.

With that background in mind, the trends for each child's subject and possessor rates may be examined. Figure (2.22) shows the development of subjects in two different ways[6]. The solid lines plot the MLU against the percentage of all nouns that are subjects. The dashed line plots the percentage of all utterances which contain a subject. These two methods were done to find both the total rate of subjects (the solid line) as well as one that takes into consideration the fact the adjunct phrases will also potentially be growing (the dashed line.)

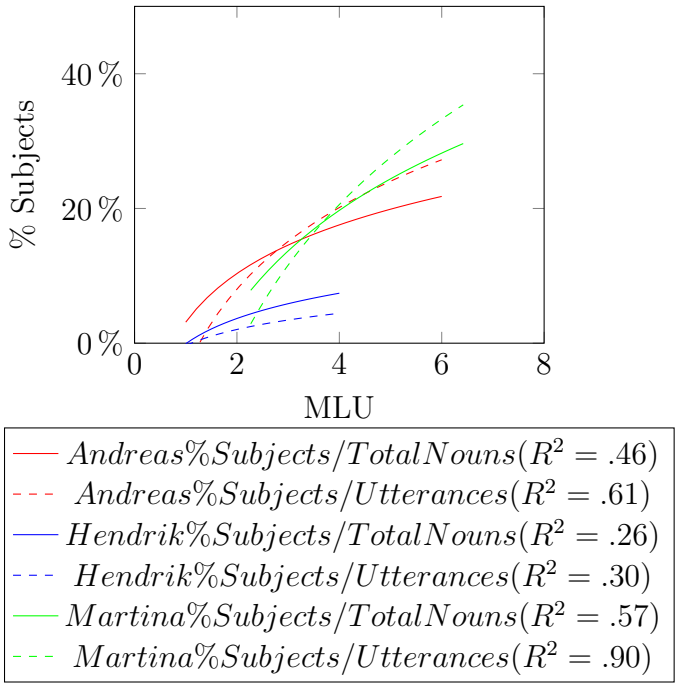


Figure 2.22: Estonian Children Subject Rate

The solid line's low R^2 values indicate a poor fit to the data, with only Martina's production data with a relatively good fit. This is somewhat to be expected, however, as subject growth will likely coincide with object and adjunct growth. The dotted

[6]A noun was considered a subject if it was nominative, appeared along with a verb, and was not the object. This ruled out nominals in utterances smaller than a clause. Pro-drop is a possibility, though potentially null-nouns were not counted as subjects. In many cases, the verb would agree with the subject, though to make sure to not simply be reiterating agreement trends, agreement on a verb was not necessary to consider the noun a subject.

lines in the figure suggest a relatively higher rate of subject inclusion in Martina and Andreas, though it actually reduced the percentage of subjects seen for Hendrik. Nonetheless, for all three children, the subjects/utterance measure reflects a consistent trend more clearly than looking at the percentage of all nouns.

Hendrik's relatively lower dotted line is actually an illuminating result. Recall that Hendrik also has difficulty with agreement marking, indicating at least some discrepancy between his T and the target T. The fact that the solid line shows higher growth indicates his adjuncts and object nominals are increasing at a good rate, but that subjects are not. The semantically meaningful parts of T (being tense, aspect, and mood) are growing, but the functional elements (case-marking, agreement, EPP) are lacking. What remains to be seen is whether there is a similar relationship with possessors with Hendrik and the other two Estonians.

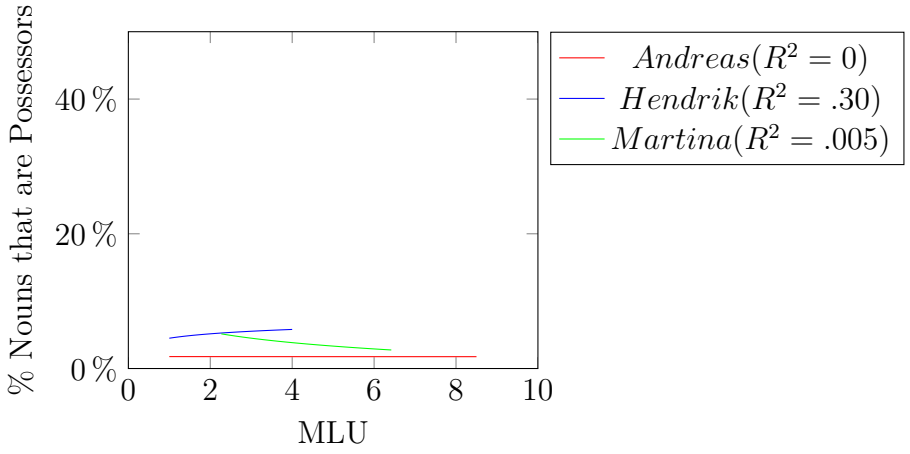


Figure 2.23: Estonian Possessor Percentage

The data for the three Estonian children is graphed in Figure (2.23), with the percentage of all nouns that are possessors compared against the growing MLU. The figure above shows, basically, no relationship between MLU and Possessors. Despite the strong relationship across every other feature tested, the production of possessors

does not seem to grow in relation to MLU. Similarly, the ability to make use of functional projections (measured via use of pronouns or overt case-marking) does not correlate. While functional projections are necessary for case-assignment, agreement, and providing a syntactic position for possessors, their presence is apparently not sufficient for possessors to appear often.

There is possibly another variable that correlates with the rate of possessor use. Perhaps possessors simply increase with time and not with respect to any grammatical variables This fact was shown to be slightly true in the previous sections. Alternatively, they might not grow as a percentage of all nouns: over the same time period we expect possessors to grow, we also expect to find more nominals in adjunct phrases, so possibly the number of utterances with possessors increased. This comparison, seen in Figure (2.24), indicates a slight increase in the likelihood to find possessors in an utterance as the grammar grows in complexity:

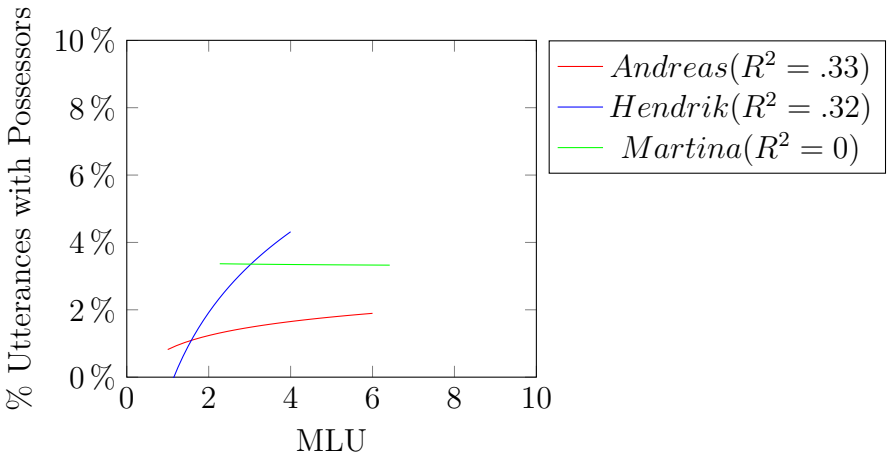


Figure 2.24: Estonian Percentage Utterances with Possessors

The results for Estonian, in summary, do not indicate a relationship between how the children acquire features and case-marking across nominal and verbal domains. Morphological details of each part of the language seem to be acquired independently.

Syntactically, on the ohter hand, it seems that there is a relationship, with parallel projections in each domain appearig in the children's production at the same time. This might be a characteristic of language acquisition, or it may simply be characteristic of Estonian. Perhaps other languages where the parallels are more explicit, such as Hungarian with its possessor agreement, allow for the parallels to guide the children. Alternatively, the complicated morphology of the Estonian DP might place burdens on the learner that an acquirer of a language such as English, with its simpler nominals, does not face. This could allow the parallels to be more easily accessible. These comparative questions will be discussed in greater detail in Chapter (5).

Chapter 3

Hungarian

This chapter discusses nominal and verbal morphology in Hungarian and their acquisition in a first language context. Hungarian morphosyntax and agreement, both in the nominal and verbal domains, are discussed in the first section. Longitudinal studies of three Hungarian-learning children are analyzed in the second section, with an emphasis on the acquisition of agreement and case morphology. The final section compares the acquisition trajectories of each child and summarizes the findings. The results found suggest that the syntactic development of the DP and CP do show a striking resemblance to each other, but morphological reflexes of the parallels operate differently, seemingly more affected by frequency and the morphological complexity of the forms to be acquired.

3.1 Overview of Hungarian

The important issues involved in Hungarian are the case and syntactic position of the possessor, though unlike Estonian and English, Hungarian possessa have an additional suffix that agrees with their possessor in person and number. This section will first provide an analysis of the morphology of both possessive and subject agreement and then will discuss the syntax and morphology of possessed DPs.

The first notable fact is that the agreement seen on possessa is very similar to the agreement seen on verbs. The clausal analogy between CPs and DPs has been

helpful for a wide range of languages, but the agreement in Hungarian, discussed first in Szabolcsi (1983), was one of the first pieces of evidence used in developing the comparison. To understand this parallel, the facts of agreement on verbs and possessives will be described in turn. Table (3.1) shows the agreement morphemes for both verbal paradigms as well as the possessive paradigm.

Subjective		Objective		Possessive	
-ok	1SG	-om	DEF, 1SG	-om	POSS, 1SG
-sz	2SG	-od	DEF, 2SG	-od	POSS, 2SG
∅	3SG	-ja	DEF, 3SG	-ja	POSS, 3SG
-unk	1PL	-juk	DEF, 1PL	-unk	POSS, 1PL
-otok	2PL	-jatok	DEF, 2PL	-otok	POSS, 2PL
-enek	3PL	-jak	DEF, 3PL	-juk	POSS, 3PL

Table 3.1: Morphemes and Features for all three agreement paradigms
Singular possessive agreement (red) is identical to the objective paradigm;
1PL and 2PL POSS ARG (blue) identical to the subjective forms.
3PL POSS AGR is same as 1PL objective (green)

Verbal agreement in Hungarian is sensitive to the ϕ-features of the subject as well as definiteness of the object: the *Subjective* conjugation is used for intransitive verbs and verbs with indefinite objects, while the *Objective* conjugation is used with definite objects (Coppock and Wechsler, 2012). A minimal definite/indefinite pair and an intransitive sentence are shown in (14).

(14) a. én lát-om a madár-at
1SG.NOM see-1SG.DEF the bird-ACC
I see the bird.

b. én lát-ok egy madár-at
1SG.NOM see-1SG.INDEF a bird-ACC
I see a bird.

c. én esz-ek

1SG.NOM eat-1SG.INDEF

I eat.

It is important to note that Hungarian features extensive vowel harmony related to both the frontness and the roundedness of the vowels. To save space and simplify the current analysis, Hungarian examples will only be shown that involve back vowels.

Possessor agreement has morphemes in common with both verbal agreement paradigms. The agreement morphemes shown for the singular possessors with singular possessa are identical to the verbal agreement seen with the objective conjugation (shaded in blue in the table). Plural first and second person possessors with singular possessa have agreement morphology that is identical to the subjective conjugation (shaded in red). Complicating matters, third person plural possessor agreement, shaded in green in the able, shares a form with the objective 1PL form.

Possessed DPs trigger the objective conjugation when they are the objects of verbs. This suggests that the DEF feature and the POSS feature may in fact be the same feature, or that the POSS bundle contains a +DEF feature. This points toward an analysis where vocabulary insertion for agreement for plural possessors takes places after a +DEF feature is impoverished, explaining why plural possessive agreement uses the same vocabulary items as the subjective (indefinite) conjugation. This application of impoverishment is in line with Nevins (2011), which suggested impoverishment operations target morphologically marked feature combinations. Such a rule would take the form seen in (15):

(15) [+POSS, +DEF, +PL] → [+POSS, +PL]

This rule, however, would predict that the [3PL, POSS] combination should, like the other plurals, be identical to the subjective form for 3PL, which it is not. A more

specific vocabulary item for [3PL, +POSS] would allow insertion of *-juk* just in this case, which would only coincidentally share a form with [1PL, +DEF]. Alternatively, the suppletive form *-juk* shared between the [3PL, +POS] and [1PL, +DEF] could be a default agreement form, or some other impoverishment operation is active which affects [1PL, +DEF]. A detailed account of how vocabulary items are determined is required for a truly complete accounting of Hungarian morphology, though this will be left for another time. For present purposes, the current morphological analysis provides a sufficient description of the challenges facing the Hungarian learner.

Table (3.1) above only shows the agreement morphology in the case of singular possessa. When the possessum is plural, the suffixes on the possessum show their morphological composition more clearly, as can be seen in the right two columns in (3.2).

	Singular Possessum		Plural Possessum	
Person	Singular	Plural	Singular	Plural
1	-om	-unk	-ja-i-m	-ja-i-nk
2	-od	-otok	-ja-i-d	-ja-i-tok
3	-ja	-juk	-ja-i	-ja-i-k

Table 3.2: Head-Marking Suffixes for Possession

Each suffix is made of a possessive marker *ja*, followed by an *-i-* signifying the plurality of the possessum, and finally a person and number possessor agreement morpheme. The plural marker in Hungarian is generally *-k*, but plurality of the possessum is unique in being marked with an *-i-*, suggesting that vocabulary insertion of the [+PL] feature is context-dependent, as discussed in Embick (2010).

The examples in (16) illustrate agreement and plural morphemes for pronominal and lexical possessors in the nominative case[1].

[1] *Anti-agreement*, another morphosyntactic phenomenon at play here and to be discussed momentarily, results in some unexpected behavior in the 3PL examples.

(16) a. az én kalap-om
the 1SG.NOM hat-POSS.1SG
my hat

b. az én kalap-ja-i-m
the 1SG.NOM hat-POSS-PL-1SG
my hats

c. a te kalap-od
the 2SG.NOM hat-POSS.2SG
your hat

d. a te kalap-ja-i-d
the 2SG.NOM hat-POSS-PL-2SG
your hats

e. az ő kalap-ja
the 3SG.NOM hat-POSS.3SG
his/her hat

f. az ő kalap-ja-i-(∅)
the 3SG.NOM hat-POSS-PL-(3SG)
his/her hats

g. a mi kalap-unk
the 1PL.NOM hat-POSS.1PL
our hat

h. a mi kalap-ja-i-nk
the 1PL.NOM hat-POSS-PL-1PL
our hats

i. a ti kalap-otok.
the 2PL.NOM hat-POSS.2PL
y'alls hat

j. a ti kalap-ja-i-tok
the 2PL.NOM hat-POSS-PL-2PL
y'alls hats

k. az ő(*-k) kalap-juk
the 3SG.NOM(*-PL) hat-POSS.3PL
their hat

l. az ő(*-k) kalap-ja-i-k.
the 3SG.NOM(*-PL) hat-POSS-PL-PL
their hats

m. a fiú kalap-ja-i
the boy hat-POSS.3SG-(PL)
the boy's hat(s)

n. a fiú-*(k) kalap-ja-i-(*k)
the boy-*(PL) hat-POSS.3SG-PL-(*3PL)
the boys' hats

(16k), (16l) and (16n) display what is referred to as *anti-agreement*. With third person plural *internal*[2] possessors, the plurality of the possessor is represented only one time– on the possessor if it is lexical, and on the possessum if the possessor is pronominal. Complicating matters further still, this *anti-agreement* effect is subject to variability, especially in cases where the possessor is DP-external. There are several competing accounts seeking to explain this phenomenon (Dikken, 1999; Ortmann, 2011; Sutton, 2014), though it can be set aside for the time being.

Like English, there is also a distinct set of possessive pronominals used without a possessum, as seen in Table (3.3). These differ somewhat in their morphology compared to forms with an overt possessum, but their structure is similar and they provide more evidence for the syntactic structure to be proposed.

	Singular Possessum		Plural Possessum	
Person	Singular	Plural	Singular	Plural
1	enyém	mienk	enyéim	mieink
2	tied	tietek	tieid	tieitek
3	övé	övék	övéi	övéik
Lexical	baráté *friend's*	barátoké *friends'*	barátéi *friend's*	barátokéi *friends'*

Table 3.3: Possessive Pronouns in Hungarian- Forms with null possessa

Like the plural possessive DPs seen earlier, the morphological make-up of these constructions is relatively transparent– the structure of each is (roughly) Possessor-POSS-(Plural)-Person/number, as shown in (17):

[2]Possessors in Hungarian may be to the right or left of the determiner. *Internal* and *external* refers to their position relative to the DP. The unmarked form of possessed nouns is internal, between determiners and the possessa. External possessors, which may be either immediately before the determiner or even earlier in a sentence, are the result of pragmatic causes like focus or topic.

(17) en-je-i-m

1SG-POSS-PL-1SG

enyéim 'mine (PL)'

Anti-agreement is seen with the possessive pronominals with null possessa just as with other instances of possessor pronouns– plurality of the possessor is only shown in the word-final agreement marker, not as apart of the initial possessor morphology, which would otherwise be expected to be *ők*. Likewise, the lexical possessors with null possessa, shown in the last row of the table, exhibit simply the possessive suffix and *-é* and possibly the null-possessum plural *-i*, but plural agreement does not occur.

Third person forms have a subtle wrinkle. Throughout the rest of the paradigm, the Poss morpheme is either incorporated into the agreement markers (as with singular possesa, *viz. kalap-om* 'my hat'), or surfaces as *-ja*, most clearly exemplified in examples with plural possessa. In the third person possessive pronouns, the POSS morpheme is *-vé-*. Given that this only appears in this particular context where the possessive pronoun includes both the possessor and the rest of the possessive morphology in a single word, it is not hard to imagine that this is a highly specified allomorph. The sentences in (18) show the four possibilities for third person possessors with null possessa.

(18) a. az ö-vé lát egy madár-at

DEF 3SG-POSS see-3PL.INDEF a bird-ACC

His/Hers sees a bird

b. az ö-vé-i lát-nak egy madár-at

DEF 3SG-POSS-PL see-3PL.INDEF a bird-ACC

His/Hers see a bird

c. az ö-vé-k lát egy madár-at
DEF 3PL-POSS-PL see-3SG.INDEF a bird-ACC
Theirs sees a bird

d. az ö-vé-i-k lát-nak egy madár-at
DEF 3PL-POSS-PL-PL see-3PL.INDEF a bird-ACC
Theirs see a bird

The facts discussed so far show all the details of Hungarian possession in its simplest form, which is admittedly not very simply. The production data examined in Section (3.2) can largely be described with the level of detail presented so far- all relevant morphology and the basics of the syntax has been addressed. Nonetheless, the finer details of the structure and case-assignment must be discussed in order to both justify the clausal parallel itself and the similarities and differences between Hungarian and Estonian and English.

The structure of the DP and the position and case of the possessor are all closely related. Hungarian has very robust case morphology that appears on all DPs, though the case of the possessor is not terribly clear-cut. As was mentioned earlier, the possessor may appear in several positions relative to its DP, as illustrated in (19). When the possessor appears internally– that is, to the right of the determiner– it appears as nominative– without overt case morphology. If it appears to the left of the determiner, it appears with dative morphology- either *-nak* or *-nek*, depending on vowel harmony.

(19) a. a fiú kalap-ja
the boy.NOM hat-POSS.3SG
the boy's hat

b. fiú-nak a kalap-ja
boy.DAT the hat-POSS.3SG
the boy's hat

There are several approaches to explaining the case-alternation. Szabolcsi (1994) identifies the unmarked as being nominative and suggests the dative is assigned by D to a possessor in its specifier, though she also notes the same case-marker is used for other constructions not related to possession or other dative constructions. (For example, the suffix *-nak* is also the 3PL.INDEF verbal agreement marker.) Based on current assumptions, this analysis causes some problems. For this account to work, there must be two different types of Poss heads– one which assigns nominative case to the possessor after agreement and one which does not assign case at all. This latter type will only be licensed after a D which assigns dative to the possessor that has moved into its specifier. Alternatively, there is one Poss head which always assigns NOM to the possessor, but this possessor is obligatorily dropped when a co-referring DP is merged in SpecDP.

Another possibility, suggested by Dikken (1999), suggests both the possessor with overt dative morphology and the unmarked, nominative possessor are complements of a dative preposition, which may be either overt or null. Only the null variant may license the possessor to remain in situ. This explains the difference between the two case-varieties, though it severs the relationship between case-assignment and agreement, which is achieved via an independent Agr projection above the dative preposition.

Following Dikken's insight that both types of possessors are underlyingly dative, Sutton (2014) suggests an intermediate functional projection, *Poss* assigns dative, triggering agreement with the possessor in the process. This allows a unified account of case and agreement within the nominal and for subject-verb agreement. To account for the differences in case morphology, an Impoverishment rule was posited which removes the DAT feature within the DP included in (20), while another set related rules shown in (21b) lead to the anti-agreement effects.

(20) +DAT → ∅ / _ Poss

(21) a. [+PL, +3]→ ∅ / _ PossP

b. [+PL, +3]→ ∅ / DP _

The impoverishment, active before vocabulary insertion occurs, explains why the morphology is at odds with the syntax while still maintaining identical structures and meaning. This account posits a specific structure of the DP and the location of the possessor. Internally, it will be in SpecPoss post-agreement and case-assignment, though there are several possible positions for the external possessor to land. The Hungarian possessor may be extracted to the edge of the DP, as in (22b), or all the way to the start of a clause, as seen in (22c), neither of which trigger the impoverishment of the DAT feature.

(22) a. Janos lát-ta az-t a Mari barát-ja-t
Janos.NOM see-3SG.DEF.PAST DEM-ACC the Mari.NOM friend-POSS-ACC
Janos saw Mari's friend– Possessor in SpecPossP

b. Janos lát-ta Mari-nak (*az-t) a barát-ja-t
Janos.NOM see-3SG.DEF.PAST Mari.DAT *DEM-ACC the friend-POSS-ACC
Janos saw MARI's *friend*– Possessor in SpecDP

c. Mari-nak Janos lát-ta az-t a barát-ja-t
Mary-DAT Janos.NOM see-3SG.DEF.PAST *DEM-ACC the friend-POSS-ACC
It was MARI's *friend that Janos saw.*– Possessor in SpecTopP

This suggests that, unlike English, the possessor may land in SpecDP and beyond. There are several reasons to believe that possessors move to this position. As noted

originally by Szabolcsi and in line with the UTAH (Baker, 1997), the fact that both internal and external possessors have the same theta role suggests they have originating position. A null resumptive pronoun in the internal-possessor position co-indexed with the external possessor would be in keeping with the spirit of the UTAH and explain how agreement occurs. This would require a different explanation regarding anti-agreement: both agreeing and anti-agreeing forms would have same internal structure. This approach also does not explain how the external possessor receives case.

Another question concerns *why* the possessor should ever move from the internal position, and the likely answer involves a topic or focus feature. Topic is an important part of Hungarian syntax– Kiss (2002) suggests the basic form of all Hungarian sentences is Topic-Predicate. The availability of a [+TOP] or [+FOC] feature within the DP, as discussed in Aboh (2004), may explain why possessors may move to SpecDP or futher in Hungarian while they are restricted from doing so in other languages.

The position of the internal possessor is less immediately clear. It must appear before the possessum and its adjectives, and after quantifiers and demonstratives, demonstrated in (23).

(23) a. a Léda párizsi kalap-ja
the Leda Parisian hat-POSS
Leda's Parisian hat (Szövegtár, 2003)

b. minden én vetk-e-i-m-ből
every 1SG transgression-POSS-PL-1SG-ELA
From all my transgressions (Károly, 1840)

c. két János fi-a

two Janos son-POSS

John's two sons (Kiss, 2002)

These DPs suggests a basic structure as follows:

(24) [$_{DP}$ D [$_{QP}$ Q [$_{NumP}$ (Num) [$_{PossP}$ PSR [$_{nP}$[$_{AP}$ A][$_{nP}$ n]-Poss]-Num]-AGR]-CASE]

Following Kiss (2002), adjectives are adjoined to the nP, while quantifiers and demonstratives (which each may co-occur with determiners) are adjoined to DP. The root itself ultimately appears after whichever adjectives, demonstratives, and quantifiers are in the DP, with up to four morphemes adjoined to its right. Poss appears immediately to the right of the root, which means either Poss is the first head above nP or that Poss lowers to this position during morphological operations or that it takes an nP complement.

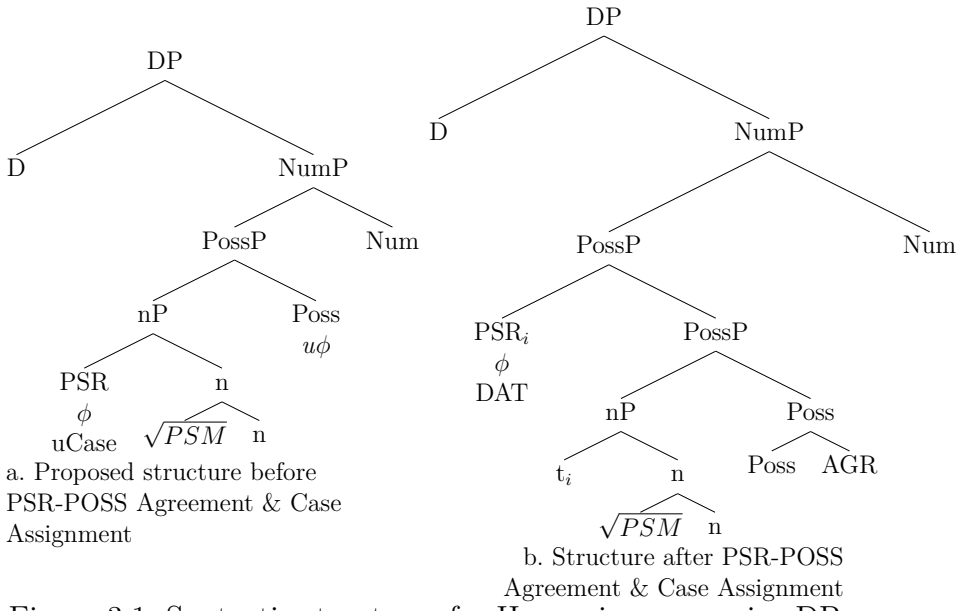
The first possibility would make a possessor in SpecPoss occur after quantifiers, which, as shown in (23b), is the case. Kiss, following Bartos (1997), suggests the possessor in base-generated in SpecPoss, moving up to an Agr projection. If the possessor is merged lower, at Spec$n$P and raises to SpecPoss following agreement and case-assignment, the correct order is found with respect to phrasal elements before the possessum. The realization of the suffixal morphology presents some problems still.

Recall that, as reflected by null-possessa forms like *enyém* 'mine' (see (17)), the possessa's basic shape is noun-POSS-NUM-AGR. The AGR node is inserted post-syntactically, but this would still predict the AGR node to be adjacent to POSS, rather than separated by the number morpheme. This can is achieved via local dislocation following linearization, as shown in (**??**):

(25) $\sqrt{root}^\frown$NUM$^\frown$Poss$^\frown$AGR $\rightarrow$ $\sqrt{root}\oplus$POSS$\oplus$NUM$\oplus$AGR

$\rightarrow$ kalap-ja-i-nk, hat-POSS-PL-1PL, 'our hats'

With these basic facts of the possessive spelled out, a description of the merging, agreeing, and movement of a possessed DP is possible. Though the ultimate form of possessives in Hungarian are very different, the underlying structure is essentially equivalent to that proposed for English and Estonian. The differences mainly come from the ability of Hungarian possessors to be extracted from the DP and the realization of agreement. Figure (3.1) below illustrates the proposed structure, assuming head-final linearization[3].



a. Proposed structure before PSR-POSS Agreement & Case Assignment

b. Structure after PSR-POSS Agreement & Case Assignment

Figure 3.1: Syntactic structures for Hungarian possessive DP

[3]Hungarian is usually considered a head-final language, though it is not exclusively so. Kiss (2002) notes that while PPs and many elements in nominal indicate head-finality, the VP and CP are head-first, and D also appears at the front of the DP. This is reminiscent of Biberauer et al. (2013), where the possibility of variable properties in a single language lead to the discussion of *mesoparameters* (See Section (1.3.1)).

The normal Agree procedure takes place within the DP, with Poss probing and finding ϕ-features on the possessor, assigning it dative case in return and moving it to SpecPossP. From here, the possessor may move to the specifier of the DP and beyond if it is merged with the relevant feature (topic or focus). As an "escape-hatch" position, possessors that have moved to SpecDP may move higher in the clause, as was shown in (22c). Szabolcsi (1994) notes that *wh-* possessors are dispreferred in DP-internal positions, suggesting that the same or similar feature normally responsible for *wh*-movement is also in play for possessor movement.

The syntactic structure is proposed to be identical for both nominative and dative possessors, with the dative morphology being impoverished when it remains in the DP (Sutton, 2014). The AGR node undergoes local dislocation, switching places with the *Num* head. A head-final linearization yields the surface order seen in (26):

(26) a. D PSR$_{[+DAT]}$ *n*-Poss-AGR-NUM

Initial Linear Order

b. D PSR ~~[+DAT]~~ *n*-Poss-NUM-AGR

Linear Order following Local Dislocation and Impoverishment

At this point, impoverishment rules may apply and vocabulary may be inserted. Typically, *Num* is realized as *-k*, though it must be context dependent and spell-out as *-i* in possessed environments.

Compared with English and Estonian, the Hungarian possessive DP is quite complicated, with many more features represented and optional movements. As such, it is expected that the Hungarian child will acquire all the elements of possession with greater difficulty than an English or Estonian child acquired the details of their language. Alternatively, because agreement appears on both nouns and verbs, a Hungarian child will be exposed more often to the agreement morphemes, which may give

them an advantage in acquiring them throughout the system. As will be shown and discussed in greater detail in Chapter (5), this latter possibility turns out to be the case.

3.2 Acquisition of Hungarian Morphosyntax

Having detailed the facts of Hungarian verbal and possesive agreement, the development of these categories in child language can be addressed. For the Hungarian children, special attention was paid to the presence of agreement morphology on verbs and nouns, case-marking on nouns, and the appearance of pronouns. MLU was calculated over time for each child[4]. The appearance of the various functional features was tracked and graphed according to both time and changing MLU to get a sense of how the children developed. Subsections (3.2.1) through (3.2.3) address each child in particular, concluding with a picture of how they compare to each other. Table (3.4) below summarized the available data analyzed for each child.

Corpus	**Speaker**	**Start**	**End**	**Sessions**	**Avg Utterances**	**Avg. MLU**
MacWhinney	Eva	2;07.12	2;10.27	7	290	4.1
Reger	Miki	1;11.02	2;11.26	30	284	2.6
MacWhinney	Moni	1;09.11	2;05.01	5	90.4	2.65

Table 3.4: CHILDES Corpora for Hungarian

3.2.1 Eva

Eva averaged 290 utterances/session, with 7 sessions recorded between 2;07.12 and 2;10.27. Eva's MLU trends upward throughout the course of her recordings; however

[4]Every child utterance was manually analyzed for each session, giving a morphosyntactic description of each. MLU was calculated by taking the average number of (overt) morphemes in the middle 100 utterances produced by the child. Theoretically present but non-overt morphology, such as third-person singular agreement or NOM case, is used in the description of the utterance but was not used to calculate MLU. A comparison of the MLUs across language groups is included in Chapter (5)

the first two sessions, just days apart, show a significantly higher MLU than a session months later, though there is still a positive trend over time. Though there is a large amount of data represented for Eva, the fact that it covers such a relatively small period of time means that little can be gleaned from the trajectory her developing grammar takes. Nonetheless, even this long-exposure snapshot can give us a sense of how the different elements of the grammar relate to each other, especially when compared to the other children.

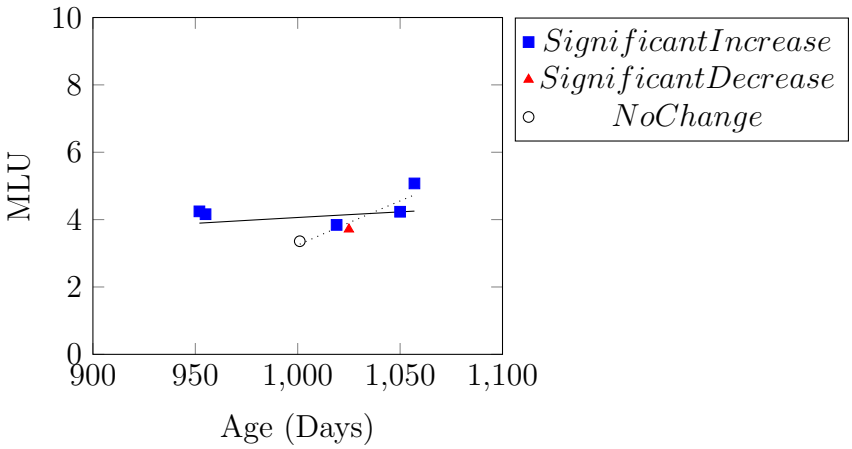


Figure 3.2: Eva MLU

Despite the abrupt change between 2;07 and 2;09, Eva still shows a general increase in MLU, though the linear regression has a very low R^2 value, suggesting the upward trend is not statistically powerful. The dashed line, which shows the trajectory of just the last four sessions, however, fits nicely to a regression. A closer examination of the data, however, does not suggest anything unusual about either of the first two sessions. The takeaway is, perhaps, that there is relatively little change across these few months with regard to the total complexity. It does not, however, mean that the grammar is unchanging in its entirety, as the analysis of the other factors will demonstrate.

Figure (3.3) charts the percentage of pronouns as all nouns, percentage of nouns which show overt case, percentage of nouns which show agreement morphology, and percentage of verbs with agreement morphology. Nouns with agreement morphology increase steadily, though remain low throughout. Overt case is relatively stable, while verbal agreement and pronouns actually decrease. This overall decrease is mostly the result of an unusual second session during which both agreement rate and pronoun use rates are the highest they ever are. Without these outliers, the overall slope is much flatter. Taken together with MLU, this data suggests that most functional elements do not change over this period. Nominal agreement is the only category which increases, however slightly.

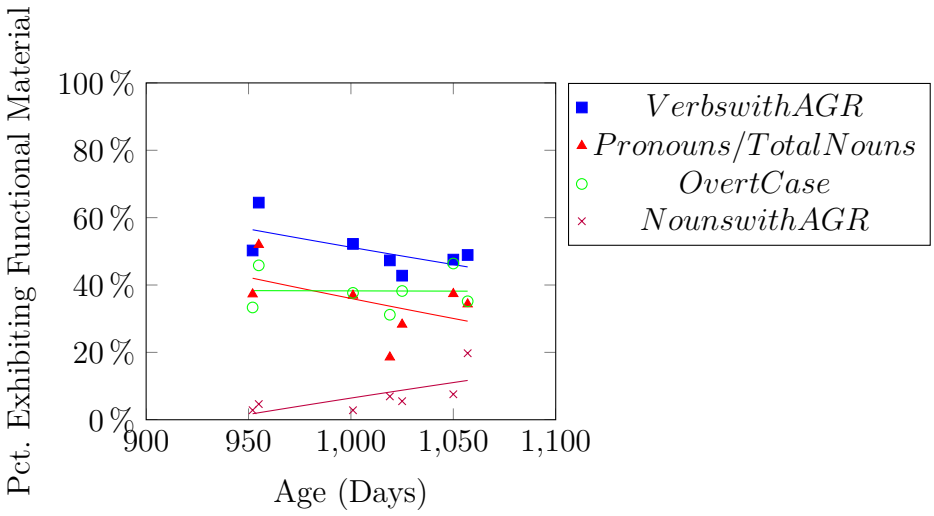


Figure 3.3: Eva Functional Heads Over Time

Table (3.5) shows the first time Eva uses a particular person/number combination, as well as the point at which there was evidence for the feature actually being acquired. An affix was considered acquired if it appeared on to two distinct roots or, in the case of pronouns, if it appeared in two distinct case-forms. The first session already contains evidence for full acquisition of many person and number combinations. What is most

interesting is the features that come later. Possessor agreement is always the last to be acquired. Additionally, second and third person plural are very rare. This can be attributed to either their featural complexity or low frequency– most conversations are between the child and her mother. Third person plural is more likely than second person to appear in a conversation, though it is still very rare.

P, #	Pronoun	2;07.12	2;07.15	2;09.19	2;09.25	2;10.20	2;10.25	2;10.27
1SG	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							
2SG	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							
3SG	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							
1PL	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							
2PL	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							
3PL	Pronoun							
	V-DEF							
	V- Indef							
	N Agr							

Table 3.5: Eva ϕ-feature Acquisition
First Use (light) and Partial Paradigm (dark)

If a generalization can be made, it must be very general. Definite agreement is the first to appear, followed by indefinite agreement and finally nominal agreement. This is somewhat surprising from a complexity standpoint. Definite agreement morphology

entails both the regular number and person features as well as definiteness, not to mention it is only a possibility for transitive verbs. Furthermore, the input frequency is strongly in favor of indefinite agreement- 64% of verbs show this agreement, compared to 25% definite with the remainder non-finite forms. Nonetheless, definite occurs before indefinite agreement in all cases where a difference can be discerned.

Figure (3.4) provides a clearer example of the state of Eva's grammar at the point where she first uttered relevant morphemes. These examples provide some context for the complexity of her grammar as the morphological milestones are met. Because she was relatively advanced when recordings begun, the very first session already has examples of a wide variety of feature combinations, and the utterances contain case, pronouns, negation and a variety of other functional elements.

What is interesting is that the features that appear later in the collection period often show up as a part of relatively short utterances. The average MLU throughout the period of the recordings is around 4; many of the later first appearances are part of utterances with only two or three morphemes. This points to some sort of processing limitation reminiscent of Hegarty– though Eva is capable of producing much longer utterances, when a new feature is called for, it does so in an environment that is otherwise uncomplicated. This tendency is repeated for the other children as well and seems to point toward an important factor in acquisition, as will be discussed in Section (5.3).

Unlike the situation with ϕ-feature acquisition, the limited window with Eva does seem to show some interesting trends with regard to case. Table (3.6) shows the first appearance and full acquisition for various cases, divided by pronouns and full nominals. The most striking thing is the difference between the two– full nominals appear in nine different case forms. The only cases where full acquisition for pronouns occurs is the three grammatical cases: nominative, accusative, and dative. There are

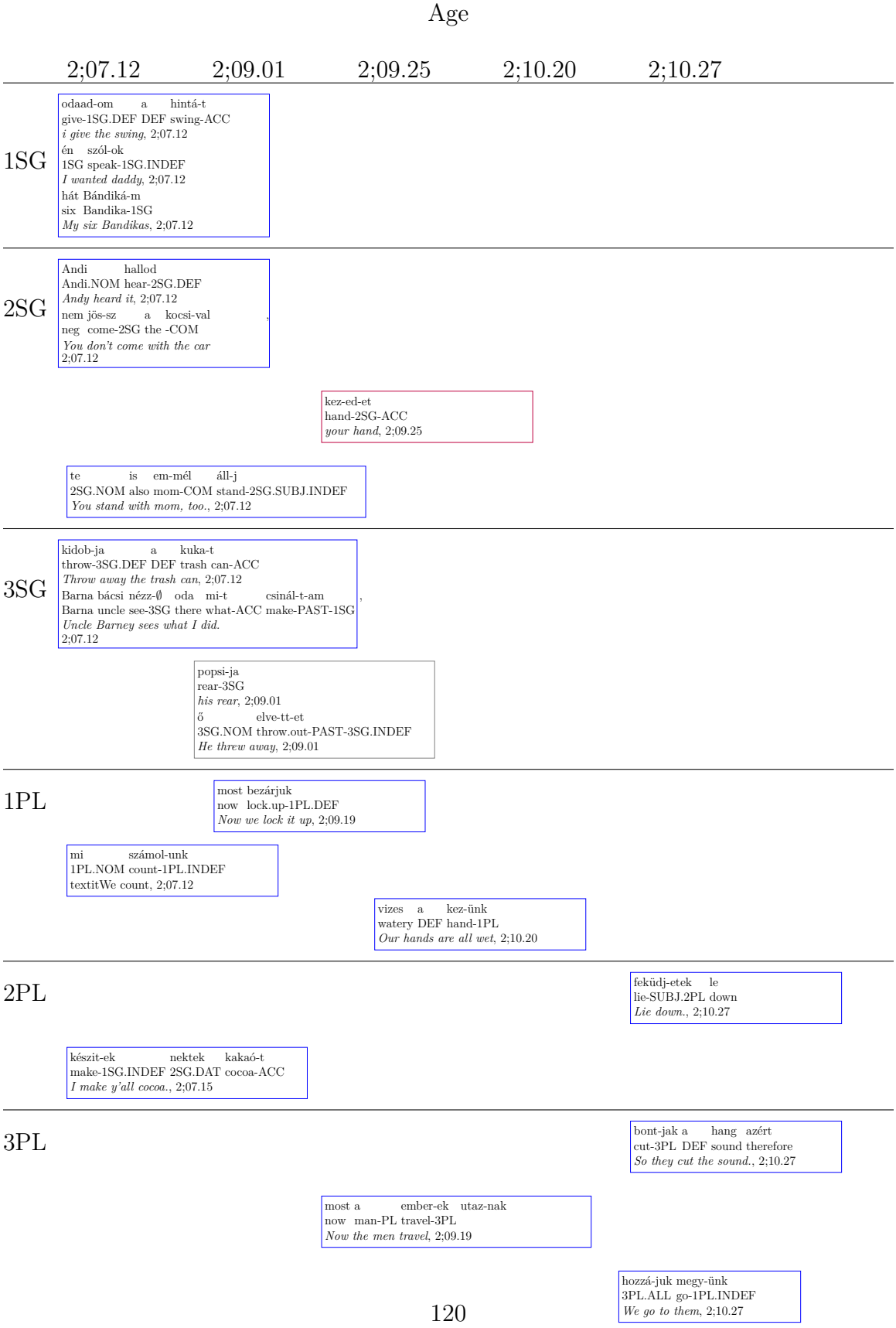


Figure 3.4: Eva Example Utterances
Utterances which contain multiple target feature combinations are included only once

Case	Type	2;07.12	2;07.15	2;09.01	2;09.19	2;09.25	2;10.20	2;10.27
NOM	Pro	Dem						
	Nom							
ACC	Pro	Dem						
	Nom							
DAT	Pro						Dem	
	Nom							
ILL	Pro		Dem					
	Nom							
INE	Pro							
	Nom							
ELA	Pro							
	Nom							
ABL	Pro							
	Nom							
SUB	Pro			Dem				
	Nom							
COM	Pro	Dem						
	Nom							

Table 3.6: Eva Case Acquisition
First Use (light) and Partial Paradigm (dark)
First mention of Demonstrative indicated with *Dem*
TER/TEM/TRA/SUP/ALL/CAU/ADE/DEL do not appear in the data.

no cases that appear only with pronominals, and pronouns nearly always appear either later than or at the same time as lexical nominals in a particular form. The two exceptions are comitative and ablative.

A grammatical explanation for this difference could relate to the complexity of combining two functional items on a single head, D. Another possibility is that full nominals are much more common in the input in the different case forms. Table (3.7) shows this distribution. While full nominals do appear in the semantic cases at twice the rate of pronouns, the pronouns still do appear quite a bit in the input in the different forms. A close look at the input reveals a few case forms attested in Eva's production (DAT, ADE, CAU) are actually more common on pronouns in the input than on nominals. This suggests that frequency is not the only factor and that a grammatical explanation is more appropriate.

	Pronouns	Substantives	Total
Nominative	63.8%	72.7%	70.7%
Accusative	17.6%	14.1%	14.6%
Dative	12.0%	1.4%	5.6%
Semantic	6.6%	11.8%	9.1%

Table 3.7: Eva: Percentage of Cases in Input

The next question to examine for Eva is whether there is any relationship between subjects and possessors. Figure (3.5) shows the change of possessors (in blue) and subjects (in red) as percentages of all nouns. The graph indicates a very modest growth in possessors over time, which corresponds to an actually large *decrease* in subjects. We've seen that nominal agreement slowly increases over time, but that verbal agreement, which goes hand-in-hand with subjects, actually decreases slightly in the same time period. This slight decrease might be simply noise in the data, reflecting an actually stable grammar during the short period in question, or it could reflect an addition of non-agreeing verb forms in the data. Likewise, subject growth will be

seemingly diminished by the addition of nouns generally– such as verbal arguments and possessors/adjunct nominals.

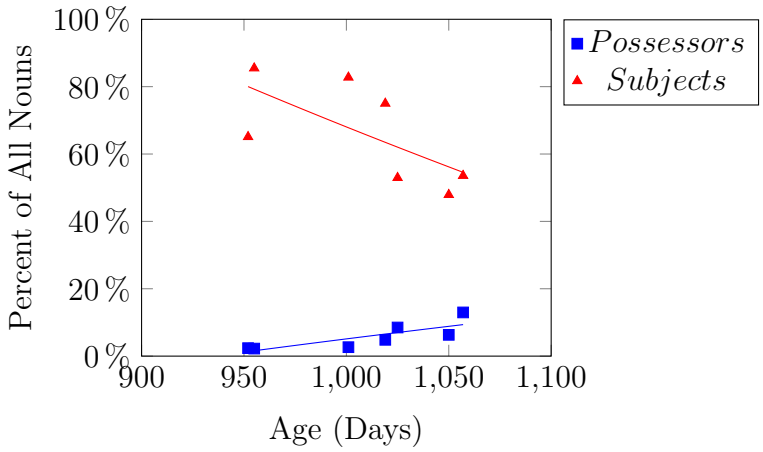
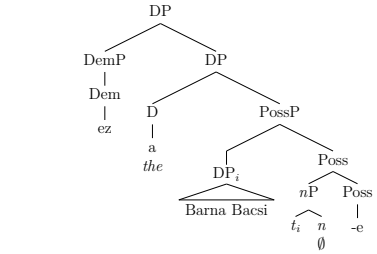


Figure 3.5: Eva Subjects and Possessors Over Time

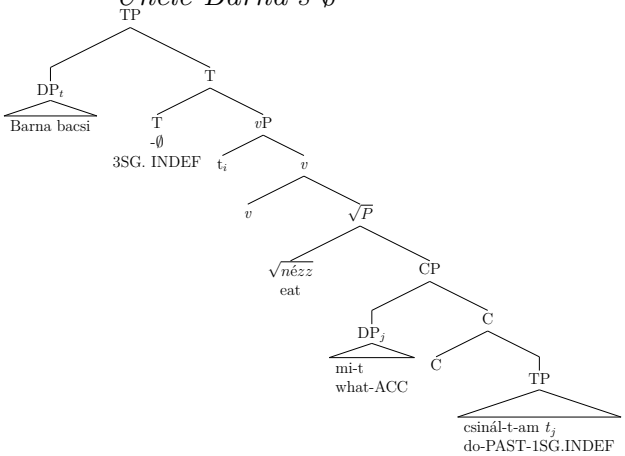
Finally, the relationship between the structural development of the CP and the DP can be addressed. Though until now the focus has primarily been on either morphological realizations or semantic/syntactic development in the case of possessors and subjects, development of syntactic structure will be covered next. Table (3.8) shows the largest nominal and verbal phrases produced during the sessions in which the first evidence for different aspects of the nominal and verbal extended projections appeared.

Again, due to the later stage of Eva's development, there is no pattern or trend to be found– the first session contained the highest syntactic projection under investigation for both DPs and CPs. Nonetheless, there may be an interesting result in the lack of a pattern. If the CP and DP were not developing in parallel, it would be possible to have a fully developed CP with all the required projections necessary for conveying a wide variety of meaning while still having a low-complexity DP.

2;07.12
First D
First C



ez a Barna bácsié
Uncle Barna's ∅



Barna bácsi nézz mit csináltam .
Uncle Barna sees what I did.

Table 3.8: Eva Structure Development

Alternatively, because CPs necessarily contain DPs, the CP could reasonably lag behind DP development. Neither of these options are seen: complexity, understood in terms of functional structure though not necessarily length, is matched in the development of each. In fact, the most complex DP itself contains another DP (the possessor), and the most complex CP contains another CP. Though it is only a single data point, it confirms the expected result.

Summarizing Eva's results over the three and a half months, there are no clear answers regarding the initial research questions. Verbal agreement for both conjugations far precedes nominal agreement, and subjects and possessors do not seem to develop with any relationship to each other. The piece of evidence most supportive of the idea that the theoretical parallels guide acquisition is the fact that overall complexity of the DP and the CP are similar. All that said, the very small and late window into Eva's development are may obscure trends that might otherwise be discovered. The other Hungarian children will provide a more detailed picture.

3.2.2 Miki

Miki was recorded for 30 sessions between 1;11.02 and 2;11.26. Unlike Eva, all the data for Miki suggests a clear upward trajectory for all factors considered, likely helped by the wide range of ages covered and the very large number of sessions. MLU, shown in Figure (3.6), increases regularly over time, with high R^2 values indicating the trends accurately map the growth of the child's grammar. The blue dots in the graph indicate sessions with significantly higher MLU ($p>.05$); the preponderance of blue dots shows a very steady and regular increase in complexity across the sessions.

Given that the utterances are growing steadily in complexity, we expect to also see a growth in funnctional material. This expectation is borne out: the presence of functional material, shown in Figure (3.7), also increases steadily throughout the

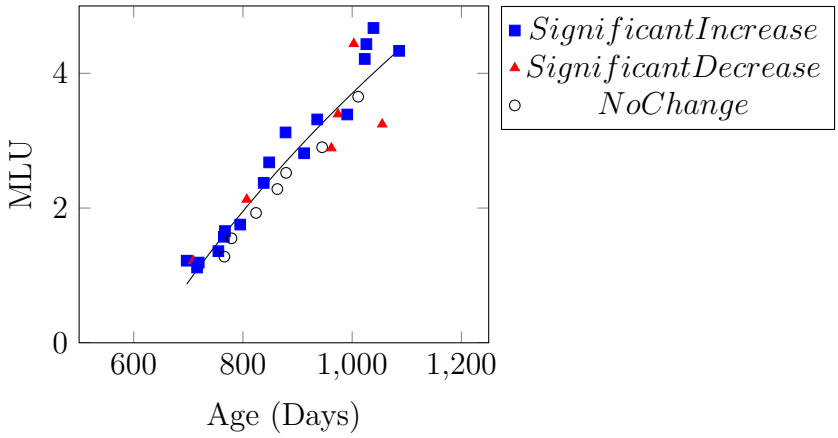


Figure 3.6: Miki MLU

period of recordings. Verbal agreement in particular moves to more than 70% by the end of the sessions. Growth in pronominaland overt case percentage shows that the growth is not limited to aspects of the verbal domain. Agreement on nouns is low throughout, though it does exhibit some growth. This is to be expected due to low overall instances of possession.

The initial results from these two tables show a grammar that is developing quickly and in both the relevant domains. For a closer look, Table (3.9) shows the development of different person and number combinations seen in the various functional heads on which they appear. Typically, a feature combination appears first as a pronoun, indicated in blue. Like Eva, there is a tendency for definite agreement to appear before indefinite agreement, with nominal agreement the last way for a feature combination to be manifested.

With regards to the order in which different combinations show up, they are largely in line with the predictions made by Harley and Ritter. First person features appear first, followed by third. Somewhat surprisingly, first person plural appears

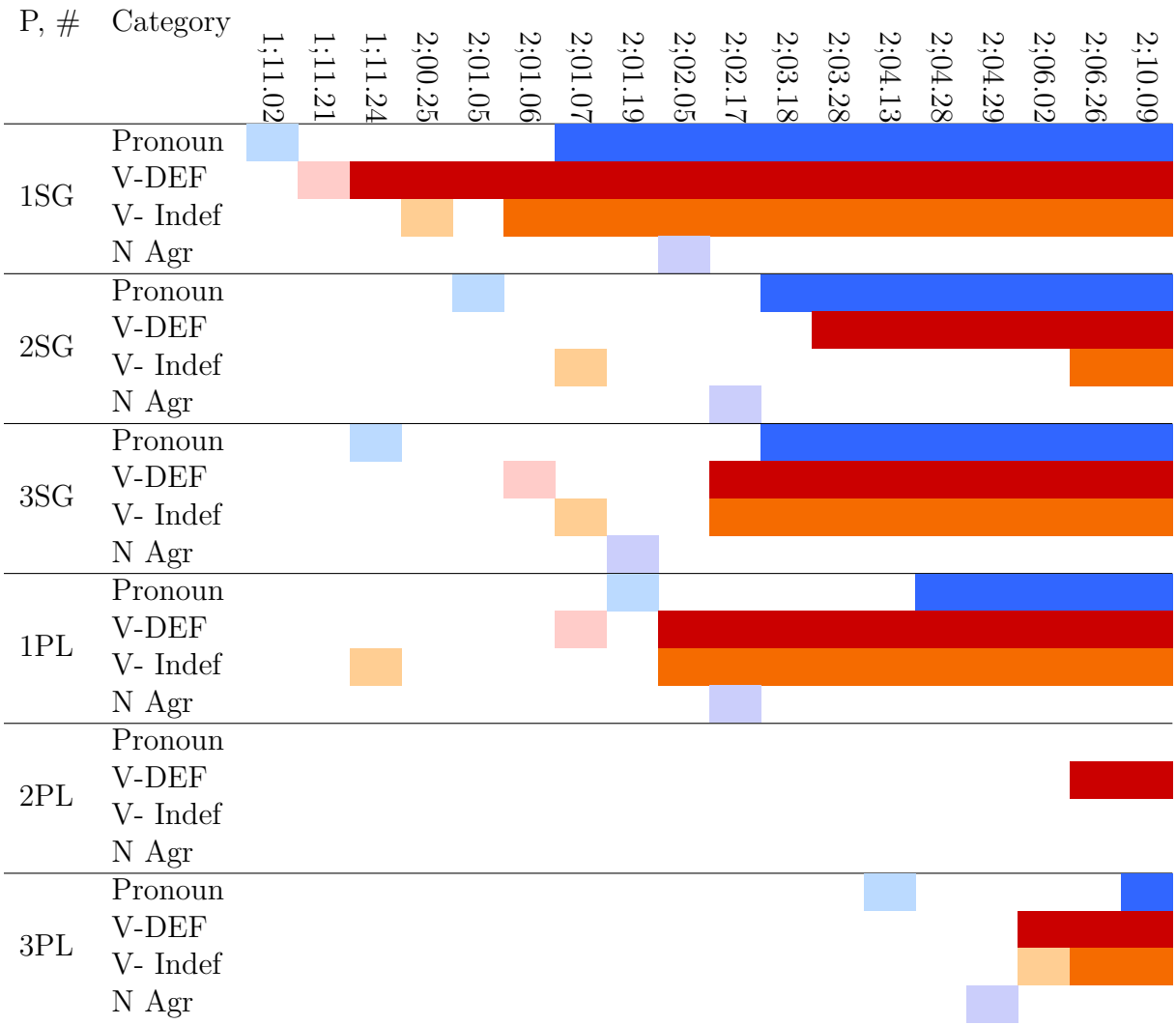


Table 3.9: Miki ϕ-feature Acquisition
First Use (light) and Partial Paradigm (dark)

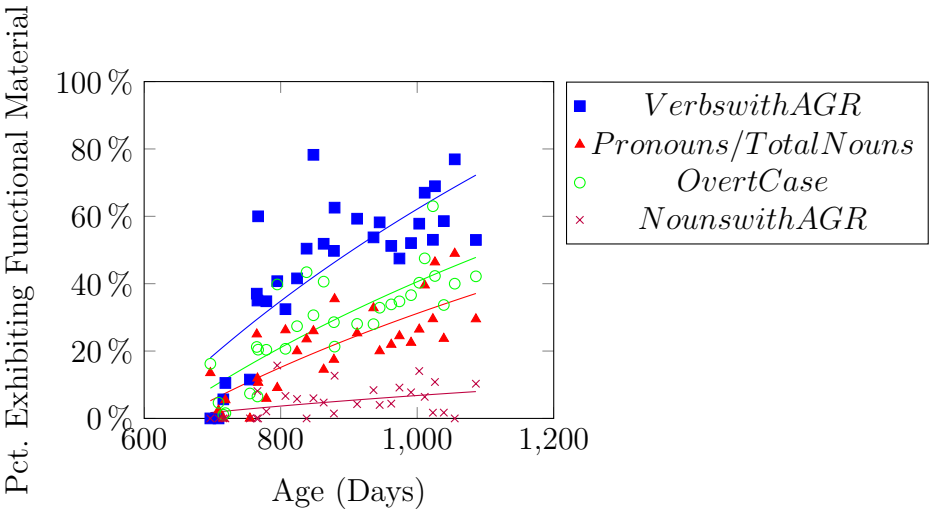


Figure 3.7: Miki Functional Heads Over Time (Percentage)

before second person singular. The other plural forms appear much later in all case forms, with second person plural being nearly absent from the data except for definite agreement, which appears at the second-to-last session. Regarding DP/CP symmetries, we get somewhat conflicting information. Feature combinations first appear as D, then later as agreement, and only finally as nominally-internal agreement.

Figure (3.8) provides a clearer example of the state of Miki's grammar at the point where she first uttered relevant morphemes. These examples provide some context for the complexity of her grammar as the morphological milestones are met.

The utterances highlight the growing complexity as new features are introduced, just as was seen with Eva. First instances of a feature often occur in utterances with lower than the average MLU at that period of time, as if Miki were using extra effort to produce the new morphemes, consistent with the idea that the number of distinct

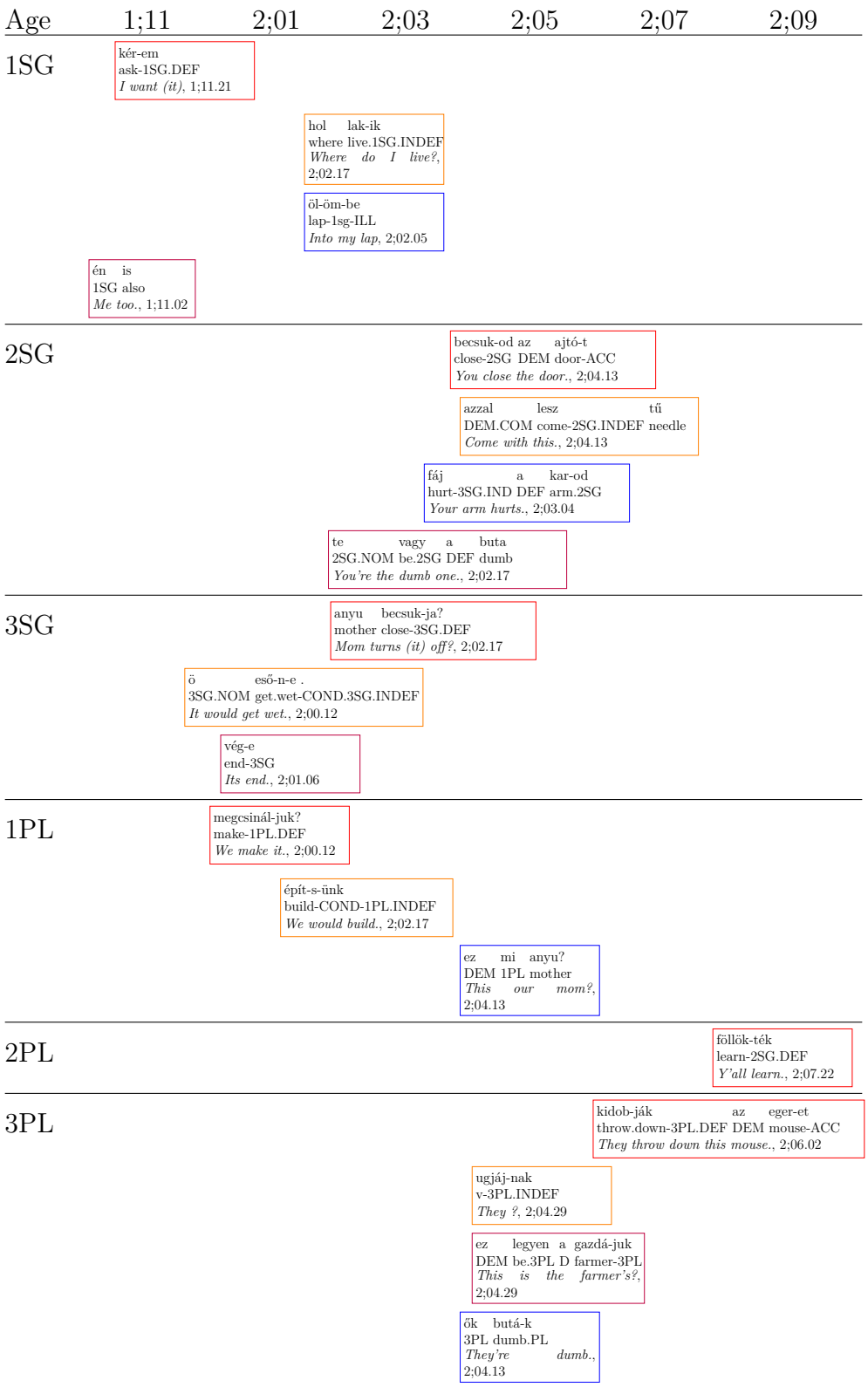


Figure 3.8: Miki Example Utterances
Utterances which contain multiple target feature combinations are included only once

feature and syntactic complexity of words and utterances influence the children as their grammar develops.

Case acquisition, depicted in Table (3.10) is broadly similar to Eva, though with a more dramatic difference between pronouns and full nominals. Acquisition of a paradigm is only evidenced for the grammatical cases on pronouns, and in every instance the semantic cases appear on a full noun before they appear on a pronoun.

Case	Name	1;11.02	1;11.14	1;11.21	1;11.24	2;01.06	2;01.19	2;02.05	2;02.17	2;03.04	2;03.18	2;04.28	2;06.02	2;06.26	2;07.05	2;07.22	2;10.09	2;10.25	2;11.26
NOM	Pro		*d*																
	Nom																		
ACC	Pro	*d*																	
	Nom																		
DAT	Pro													*d*					
	Nom																		
ILL	Pro		*d*																
	Nom																		
INE	Pro											*d*							
	Nom																		
ELA	Pro										*d*								
	Nom																		
ABL	Pro																		
	Nom																		
SUB	Pro																		
	Nom																		
COM	Pro										*d*								
	Nom																		
CAU	Pro														*d*				
	Nom																		
DEL	Pro																		
	Nom																		
ADE	Pro																		
	Nom																		

Table 3.10: Miki Case Acquisition
First Appearance (light), Paradigm (dark). *d* signifies first appearance of demonstratives

The grammatical explanation for the difference in the development of case on pronouns versus nominals might involve the difficulty in combining two functional features at once, compared to the relative ease of combining a lexical noun with a single, functional case morpheme.

Looking at the breakdown of the case forms attested in the input in Table (3.11), it can be seen that there are a wide variety of pronouns in all case forms in the input. Not surprisingly, the portion of dative pronouns is quite high compared to dative nominals. This large difference might be reflected in the relatively early appearance of dative pronouns in Miki's production. On the other hand, accusative is very similar on nouns and pronouns, yet it is late in the production data, again suggesting a grammatical development issue independent from input concerns.

	Pronouns	Substantives	Total
Nominative	60.3%	68.0%	66.0%
Accusative	21.9%	18.0%	18.9%
Dative	6.3%	1.6%	3.1%
Semantic	11.6%	12.5%	12.0%

Table 3.11: Miki: Percentage of Cases in Input

Demonstratives appear mostly prior to personal pronouns, a result seen in the Estonians as well as Eva. Though they are grammatically similar to pronouns and certainly are functional items, demonstratives appear with a wide variety of cases and often very early in the data, more similar to lexical nouns. This suggests a difference in the way they are represented in Miki's grammar. Recall that, unlike English and Estonian, Hungarian demonstratives may appear along with determiners, and they may appear by themselves, characteristics shared with nominals.

Moving beyond the morphological realizations on nominals, the semantic/syntactic evidence for possessors and subjects is examined in Figure (3.9). Though the data does not show consistent upward growth like the morphological development, there

is still some growth shown in both. Subject rate, indicated in red, grows more consistently and rapidly. Though a developing grammar will allow more and more room for adjuncts and other arguments as well as null-subjects, which all could conceivably actually lower the portion of subjects, growth in subjects does in fact increase. For possessors, on the other hand, evidence for growth is much less clear.

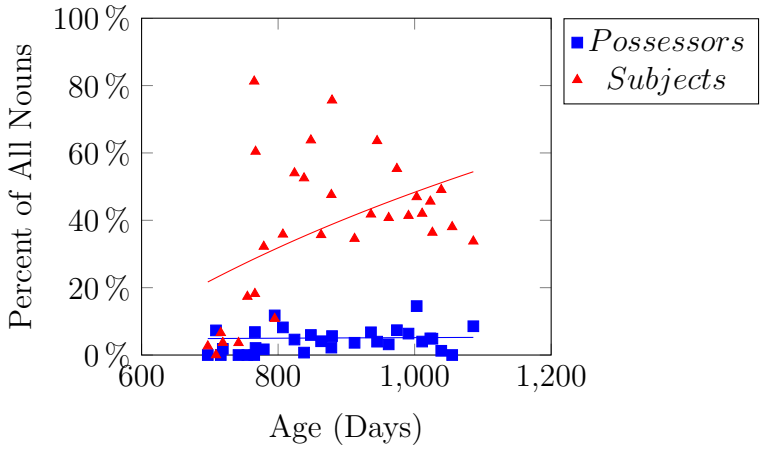


Figure 3.9: Miki Subjects and Possessors Over Time

By itself, this type of growth refutes the possessor/subject parallel argued earlier, though a brief look at the development of Miki's syntactic development of nominal and verbal phrases in Table (3.12) supports it. These trees were simplified to show relevant structures only– missing projections include NumP within the noun, as well as a complex verb *elmegy*, which is made of two morphemes, *el-* 'from' and *megy* 'go'. Nonetheless, they provide a good picture of the type of structure represented in Miki's utterances at the various points.

These trees actually show a very close correlation between the types of structures available to the child at any point. The first session only has very simple nouns outside of a larger syntactic structure beyond the $\sqrt{P}$; and the most elaborate verbal phrase was simply negation and a verb. A few weeks later, however, the most complicated

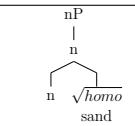
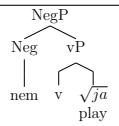
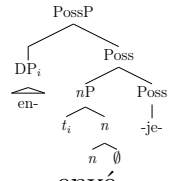
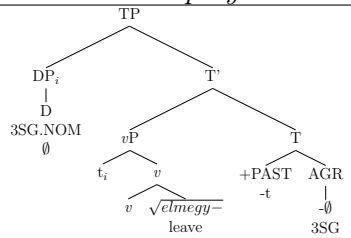
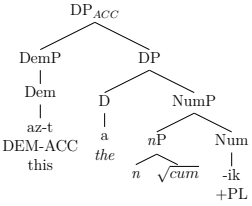
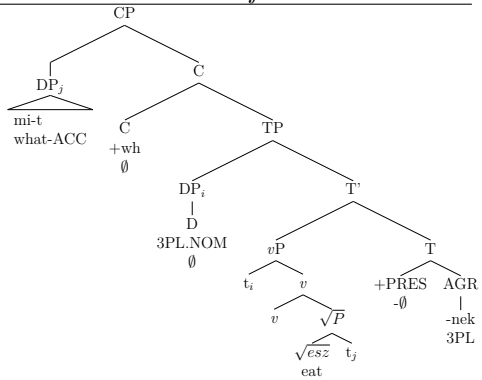
	Largest Nominal Projection	Largest Verbal Projection
1;11.02 First N First V	 homo(k) *sand*	 nem ja *don't play*
1;11.14 First Poss First T	 enyé *mine*	 elment *He left.*
2;01.07 First D First C	 azt a cumikát *these pacifiers*	 mit esznek? *What do they eat?*

Table 3.12: Miki Structure Development

nominal and the most complicated verbal projections each contained an additional functional projection above the root. Most interesting about this session is that the TP has a null subject while the nominal has a null possessum. Both contain morphological evidence of the intermediate head (*-t* and *ye*, respectively). Agreement is, appropriately, null on the verb, however the obligatory agreement on the noun is not produced, showing that while the syntax is adult-like, the morphology is not.

Finally, two months later there is data for both full DPs and full CPs, evidenced by a DP including both a demonstrative and the definite determiner and [+WH, +Q] CP. Agreement appears in the CP and while this particular DP does not have a possessor and so does not require agreement, there are examples of case-concord on the noun and demonstrative. Despite the unclear examples from the morphology data examined above, the maximal syntactic complexity for the two domains does seem to develop in striking parallel.

3.2.3 Moni

Moni was recorded for six sessions between 1;09.11 and 2;06.01, with an average of just 120 utterances per session. Nonetheless, her data shows a steady trajectory for all categories tracked. Figure (3.10) shows a steady increase of MLU across the sessions, with a strong positive correlation between age and length of utterance.

Moni's functional vocabulary also increases steadily across time. Most notably, the percentage of verbs that appear with agreement morphology increases regularly, especially at two years old, at which point there is a big increase. There is also a notable increase in nouns with overt case at this point, suggesting Moni has successfully posited functional heads that were not a part of her grammar before and developed the morphological-merger required to form these complex heads (Matushansky, 2006).

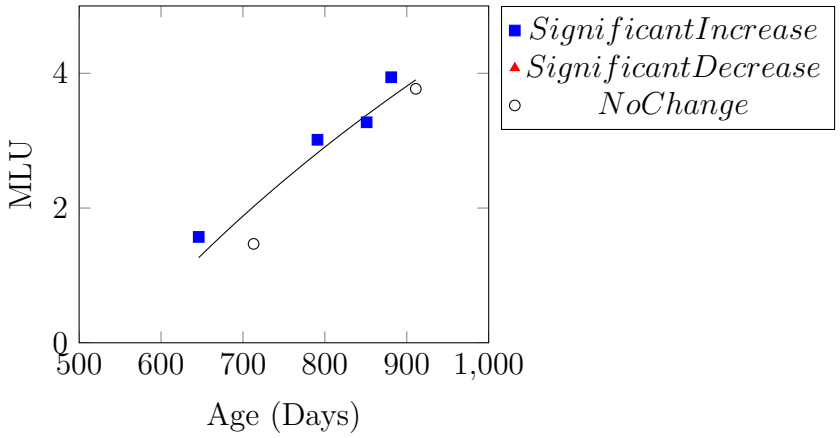


Figure 3.10: Moni MLU

Percentage of pronouns also increases steadily over time. Nominal agreement shows an increase as well, with another spurt happening around 2 years, though not as dramatic as that seen in the other categories. These are reflected in Figure (3.11).

The appearance of features corresponds to what is seen in the other children, with first-person singular being the first to show up. Table (3.13) shows the point at which various feature combinations were first attested on different morphemes. Interestingly, there is no evidence for productive acquisition of these features until after 2 years, after which a wide variety of features appear all at once. Another surprise is that first person plural appears before any other plural morphology, including plural nouns, and second person appears before any third-person features.

In contrast to Miki, Moni tends to use the indefinite agreement first, followed by definite, then pronouns and finally nominal agreement. The indefinite agreement markers represent the fewest amount of features and are seen on intransitive verbs, which is consistent with theory that suggests a more complicated vocabulary item

P, #	Category	1;09.11	1;11.18	2;02.01	2;04.01	2;05.01	2;06.01
1SG	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						
2SG	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						
3SG	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						
1PL	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						
2PL	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						
3PL	Pronoun						
	V-DEF						
	V- Indef						
	N Agr						

Table 3.13: Moni ϕ-feature Acquisition
First Use (light) and Partial Paradigm (dark)

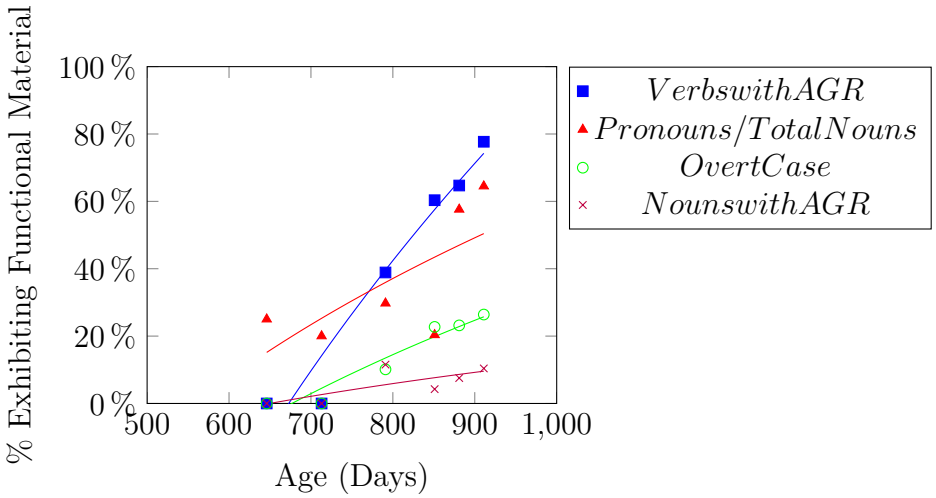


Figure 3.11: Moni Functional Heads Over Time (Percentage)

will be more difficult to acquire. That definite agreement comes second, however, is surprising on this count.

Figure (3.12) provides a clearer example of the state of Moni's grammar at the point where she first uttered relevant morphemes, so the relationship between the morphology and the broader syntactic environment can be appreciated.

From these, we see that, as is often the case for the others, new features appear in below-average MLU utterances. The pronouns and nominal agreement, in fact, often appear by themselves, not in a larger structure.

The case data shown in Table (3.14) is also consistent with what was seen in the other children, though much fewer total forms are attested. Nonetheless, the distinction between the semantic cases and the grammatical cases is strong. Personal pronouns are largely confined to the grammatical cases (though missing accusative),

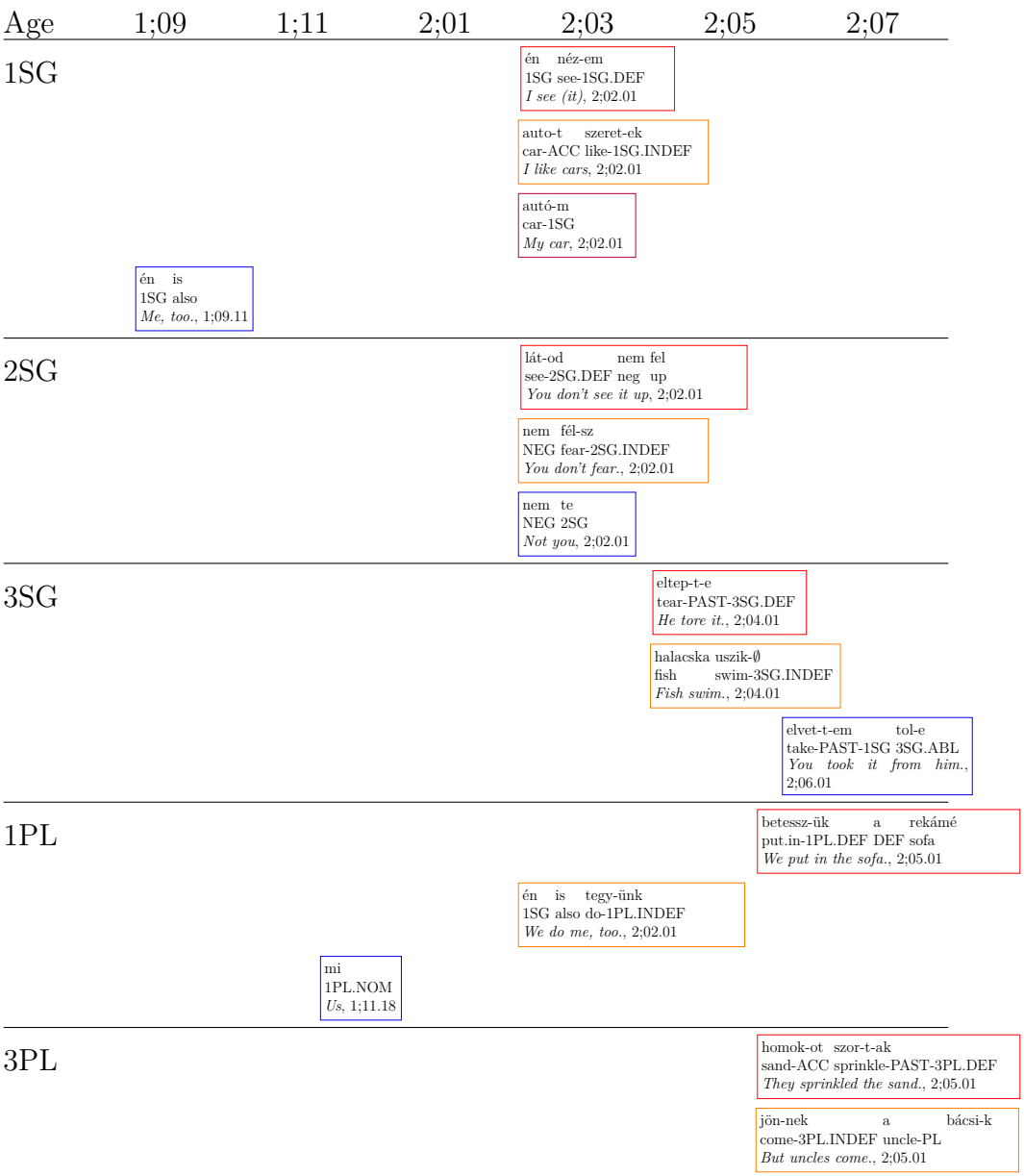


Figure 3.12: Moni Example Utterances
2PL were never present in Moni's utterances

with only ablative appearing on pronouns. Lexical nouns appear with a wide variety of cases. Demonstratives are rare, though with both grammatical cases present.

CASE	Name	1;09.11	1;11.18	2;02.01	2;04.01	2;05.01	2;06.01
NOM	Pro				*d*		
	Nom						
ACC	Pro				*d*		
	Nom						
DAT	Pro						
	Nom						
ILL	Pro						
	Nom						
INE	Pro						
	Nom						
ELA	Pro						
	Nom						
ABL	Pro						
	Nom						
SUB	Pro						
	Nom						
COM	Pro					*d*	
	Nom						
DEL	Pro						
	Nom						
SUP	Pro						
	Nom						

Table 3.14: Moni Case Acquisition
First Appearance (light), Paradigm (dark)

Because very little of Moni's input was included in CHILDES, it's difficult to get a sense of what sorts of patterns may have been present in her caretakers' speech. As such, including percentages of different case forms would be potentially misleading, so raw counts were included instead in Table (3.15). Little can be said, ultimately, though even with the miniscule amount of data, there still appeared accusative pronouns, which were never produced.

	Pronouns	Substantives	Total
Nominative	2	7	9
Accusative	4	0	4
Dative	0	0	0
Semantic	1	1	2

Table 3.15: Moni: Percentage of Cases in Input

The relationship between the growth of subjects and possessors is depicted in Figure (3.13). We see subjects rising steadily throughout. There is no dip in subjects like that seen in the other children, though this may just be because the data ends before adjuncts and other nouns begin appearing. Possessors remain low, as usual, but there is a significant rise throughout.

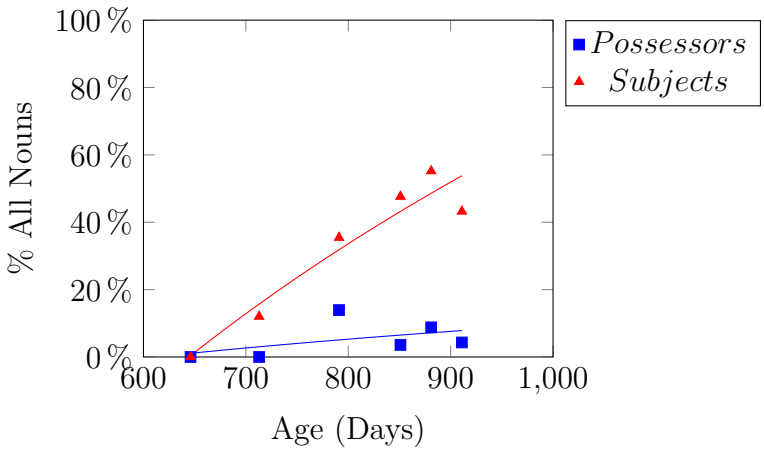


Figure 3.13: Moni Subjects and Possessors Over Time

The steady growth of both possessors and subjects indicates that T and Poss are both represented, providing a structural place to host them. More evidence for this growth can be seen in Table (3.16), which represents the largest syntactic structures produced at the point when the nominal and verbal functional elements are first uttered.

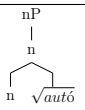
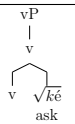
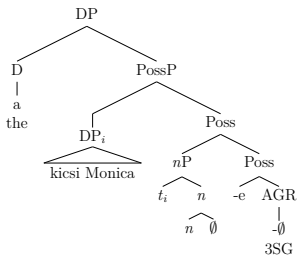
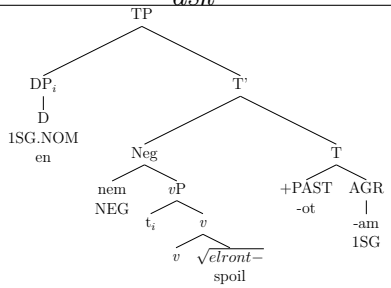
	Largest Nominal Projection	Largest Verbal Projection
1;09.11 First N First V	 autó *car*	 ké(r) *ask*
2;01.01 First Poss, First D First T, First C	 a kicsi Monikáé *Little Monica's (one)*	 én nem elrontottam *I didn't mess up*

Table 3.16: Moni Structure Development

These trees show, once again, a very consistent and parallel growth. At the first session, the most complicated nominal projection is simply a noun, and the most complex verb is simply a verb. Two sessions later, all the target categories are present, complete with agreement, providing another piece of evidence for the parallel development of CP and DP in the syntax. The next section will summarize all the data from the Hungarian learners, draw conclusions about the relationship between DP and CP acquisition in Hungarian.

3.3 Comparison and Summary

In many respects, the three Hungarian children are similar. Despite the differences in age when the data was collected for each child and what sort of production was recorded, they have similar trajectories. Figure (3.14) plots all the MLUs for the children on the same graph against time. Though Moni has longer utterances at an

earlier date, at no time does there appear to be a large gap between any of them. If one imagines the trajectory for Moni and Miki to continue, as shown in the dashed line in the chart, it would seem that Eva is slightly more advanced than the other two at similar ages, but not so much so that a comparison cannot be drawn. To ensure maximum compatibility of the comparisons, comparisons in this chapter will be made in terms of MLU rather than age.

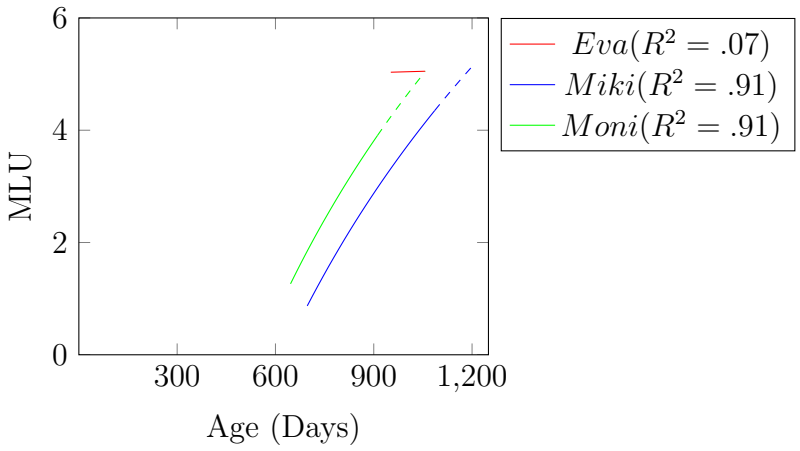


Figure 3.14: Hungarian Children MLU Comparison

Table 3.17 highlights the MLU and order in which the basic syntactic points of the CP and DP were acquired. This table confirms the steady and similar growth of syntactic categories. The children all seem to build structure from the bottom up, with the intermediate projections being produced between when the lowest and highest heads in the respective extended projections appear, as expected.

	N/V		Poss/T		C/D	
	Age	MLU	Age	MLU	Age	MLU
Eva	2;07.12	2.9	2;07.12	2.9	2;07.12	2.9
Miki	1;11.02	.9	1;11.24 (Poss) 1;11.21 (T)	1.16 1.11	2;01.07	1.43
Moni	1;09.11	1.6	2;02.01	2.46	2;05.01	3.0

Table 3.17: Summary of Acquisition Points for Parallel Structural Positions: Hungarian

The first comparison to be made is how verbal agreement compares across the three children. Figure (3.15) shows the percentage of verbs exhibiting verbal agreement compared across MLUs. The children for whom there is reliable growth information show increasing use of verbal agreement; though Miki uses agreement at nearly twice the level as Moni initially, their rates nearly converge as MLU reaches toward five. Eva, in contrast, shows a significant decrease over this period, a decrease that is paralleled in several other categories, as will be seen soon. This is likely a result of the small sample size over a short period of time; a more detailed examination of morphemes does show a developing grammatical capacity.

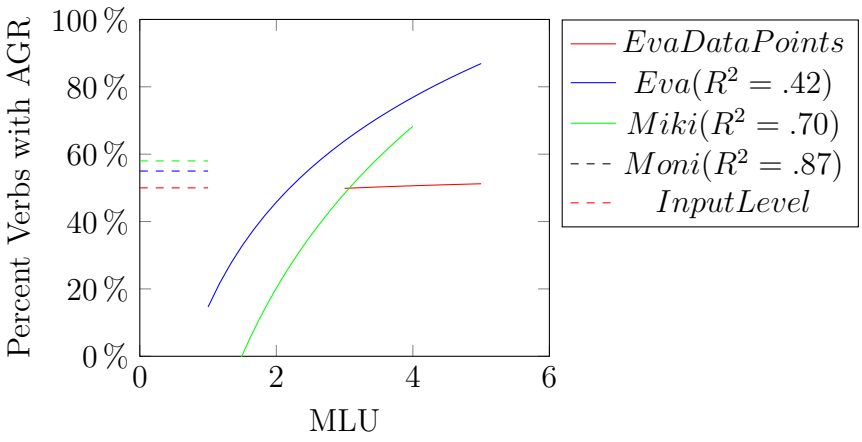


Figure 3.15: Hungarian Children Verbal Agr Comparison

Input agreement levels for the children are all very close to each other, ranging from 50-55%, showing that input is not meaningfully different between them. This graph does show that all the children have a functional agreement system. Eva, who is the oldest of the three during he period of her transcripts, has the most stable percentage of agreeing verbs, hovering right around the adult level. The other two children have verbal agreement rates that climb quickly, going much beyond their input. The discrepancy between Miki and Moni will be seen in other areas as well,

the result of their data showing real growth while Eva's grammar seems altogether more stable.

Eva's lower overall agreement rate is likely the result of more verbs in non-agreeing but nonetheless adult-like forms such as infinitives. Another interesting point can be seen when you compare Eva's agreement rate in terms of MLU from the agreement rate over time (see Figure (3.3)). There, Eva's agreement appears to fall somewhat over time, while it is steady in terms of MLU. Though this would be difficult to explain in terms of grammar, a closer look at her data in terms of age reveals that her second session has a very high verbal agreement rate of 65%; followed by the steady rate in subsequent sessions around 48%, it gives the appearance of a dip when viewed over time.

Having seen some evidence of the functional development in the verbal domain, the same can be studied within nominals. The percentages of pronouns as a percent of all nouns are compared in Figure (3.16). It shows nearly identical paths for all three learners, though Moni's data fit the correlation plotted less well. Each child's data is close to input levels by the end of the sessions. Reflecting the relative maturity of her grammar, Eva shows the least growth, though her production is close to adult-like throughout.

The examples in (27) include the utterances for each child at an MLU of 4 using pronouns. These are all subject pronouns, and they all correctly appear along with their corresponding agreement morphology.

(27) a. én is akar-ok ide jön-ni
1SG.NOM also want-1SG there come.INF
I want to come there, too. (Eva, 2;07.12)

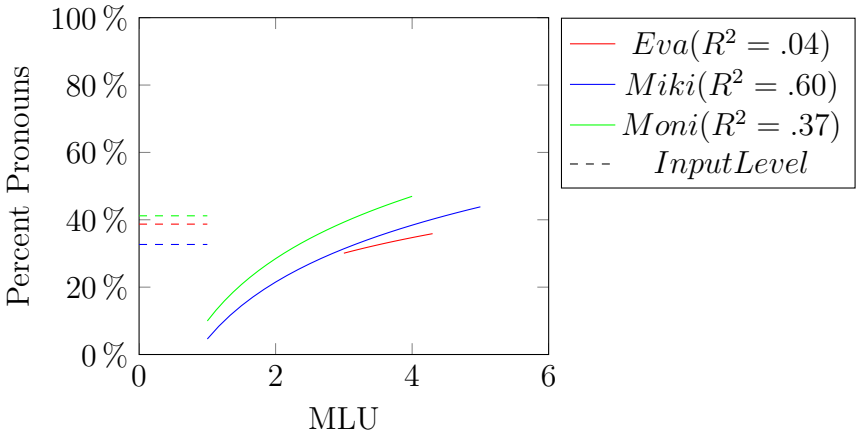


Figure 3.16: Hungarian Children Pronoun Comparison

b. én nem akar-ok betakajóz-ni
1SG.NOM NEG want-1SG cover-INF
I don't want to cover (Miki, 2;09.03)

c. én nagy vagyok
1SG.NOM big be-1SG
I'm big. (Moni, 2;05.01)

Having seen the development of pronouns, we can turn to the other evidence used for acquisition of the DP: case. Eva again consistently uses of case across her data range, which makes sense given her high and steady MLU, while both Miki and Moni increasingly make use of overt case, consistent with their individual growth. This development is graphed in Figure (3.17).

This figure and the two before it all show complexity increasing rather steadily in both the verbal and nominal domains for the two children who show growth, and

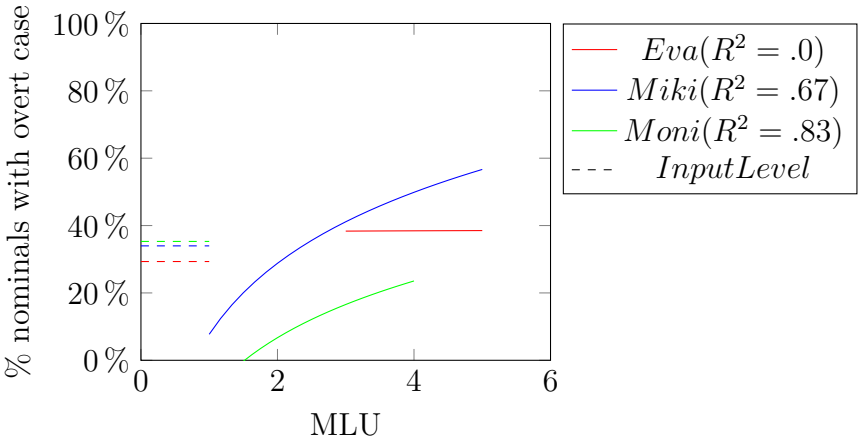


Figure 3.17: Hungarian Children Case Comparison

a steady, more adult-like usage for the mature learner, Eva. The types of case used and the different development paths the children take can show us more about how the functional material is spread between the different syntactic environments. Figure (3.18) shows the MLU the children had when they acquired the various case forms. The dotted lines indicate pronouns, while solid lines indicate case on nominals, with all the semantic cases considered together.

Because Eva had so much morphology in her first session, little can be gleaned here, though it is reassuring at least that all forms do appear as would expected of someone with an advanced MLU. The other two mirror each other fairly well, however. For pronouns, nominative precedes accusative, which precedes dative, with semantic cases showing up late or not at all. This order might reflect the case-assigner acquisition, and T, v, and Poss develop in that order. It was shown in the section for each child, however, that Poss and T seem to appear at once. The simplest answer is

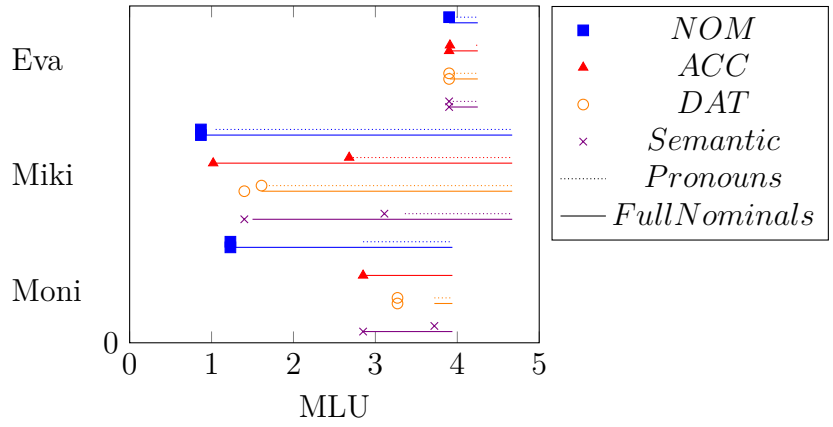


Figure 3.18: Hungarian Case Acquisition Timeline
Symbols indicate first appearance of particular case form; line segments indicate point at which case form was considered *acquired*, which was determined by its appearance on multiple nouns/pronouns.

that this pattern copies frequency in the input, where NOM, ACC, and DAT are the most common case forms for pronouns.

Lexical nouns are similar with regard to grammatical case, though semantic case shows up on them frequently and often early. The difference between case on pronouns and lexical nouns shows that the merge and spell-out of different combinations of functional and lexical items are more or less difficult. The merge of one functional item (a pronoun) with another (a case marker) is more difficult than combining two items with meaningful semantics (lexical items and semantic cases) or one lexical item with grammatical case. One reason for this is the unpredictability: for example, a [3SG] feature may eventually be spelled out as *ő* or *neki*, depending on whether it is combined with [NOM] or [DAT] features. Lexical items (or roots) will be much more stable in their phonological form. This does not explain why semantic case is relatively late on pronouns, despite also involving the spell-out of functional features.

Their late arrival in pronouns might reflect simple differences in the type of nouns that are used as adjuncts or arguments.

The final element of nominal morphology to analyze is the growth of agreement within the DP, graphed in Figure (3.19). Though these are rare constructions, barely hitting 10% for any child, they do all grow over the time period. That they approach 10% but do not exceed it is not surprising given the data for adults, who also produce agreeing nouns at approximately that rate (indicated by the dotted lines on the vertical axis). The steady growth is again clearest for Miki and Moni, though Eva shows the clearest growth here of all the morphology tracked.

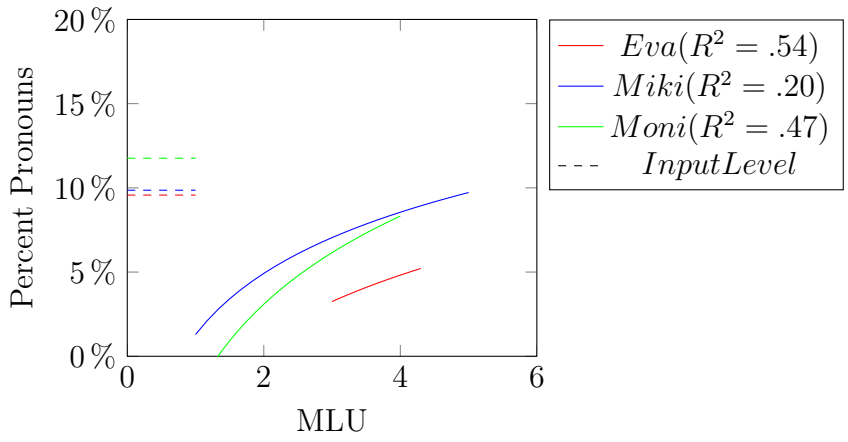


Figure 3.19: Hungarian Children Possessor Agr Comparison
Note that the scale only goes to 20%, unlike the other graphs, in order to better illustrate the change.

This figure shows growth of the morphology related to possessors; earlier, growth of verbal agreement was also shown. The individual child sections showed how the syntactic developments related to nouns and verbs paralleled each other. The next aspect to look at is how possessors and subject inclusion changed over time. Figure (3.20) shows two different growth rates. The solid lines indicate the portion of nouns

which are the grammatical subjects, while the dotted lines show the portion of *utterances* which contain subjects.

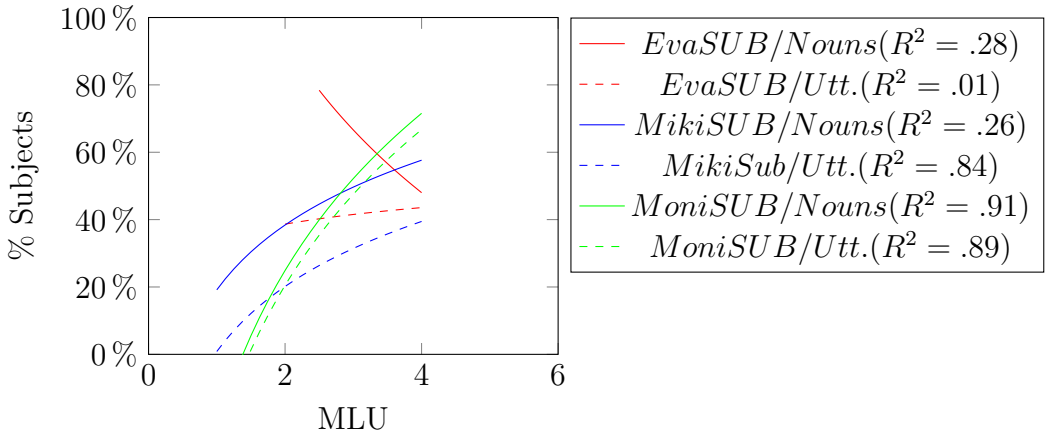


Figure 3.20: Hungarian Children Subject Rate

The reason for including both sets is that as the grammar develops, we expect additional argument and adjunct nominals to appear in utterances. This could explain the downward trajectory of Eva as her MLU increases, though it does not seem to apply to the other children. The dotted lines show increases for Miki and Moni– a very similar increases as well. For this calculation, Eva's trajectory is mostly flat, suggesting this aspect of her grammar is not changing in the window analyzed.

When we examine possessors, as in Figure (3.21), it is unnecessary to make such a comparison, as there is no expectation that utterances will be more likely to have possessors. Still, the percentage of all nouns that do contain a possessor increases clearly for all the children. Recalling Figure (3.19), which showed the number of nouns exhibiting agreement morphology topping out around 10%, this is very similar to the number of possessors. The only discrepancies should be due to the morphological system not being entirely figured out yet, resulting in possessors that do not trigger the appropriate agreement. Eva also shows dramatic growth here, relative to the other

variables, suggesting this is a part of her grammar that actually is developing during the time period analyzed.

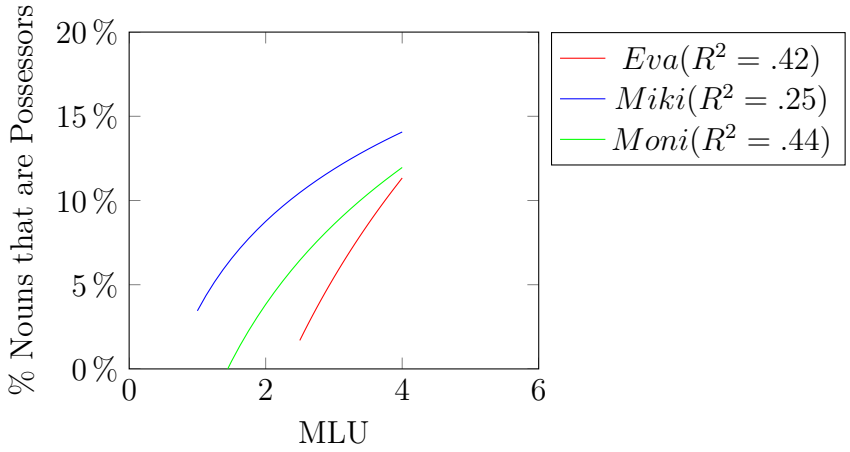


Figure 3.21: Hungarian Possessor Percentage

Evidence from the nominal and verbal morphology, syntax, and semantics has been discussed so far, and has shown that all three children have at least comparable growth rates and that various morphological indicators in the verbal and nominal domains increase over time. The next few analyses will focus more directly on the research questions presented earlier and attempt to show whether the DP/CP similarities are evident in the data.

The next graph examines the relationship between case-marking and agreement in the two domains, following the idea that case and agreement go hand in hand and are associated with the acquisition of the appropriate functional heads. To do this, Figure (3.22) repeats the basic structure of Figure (3.18)– with the very first appearance of a case-form indicated with a shape and the lines indicating the period during which acquisition had been acquired. Unlike the previous figure, only nominative and dative are shown– the cases associated with T and Poss. Between these, the first subject, possessor, verbal agreement, and nominal agreement are shown.

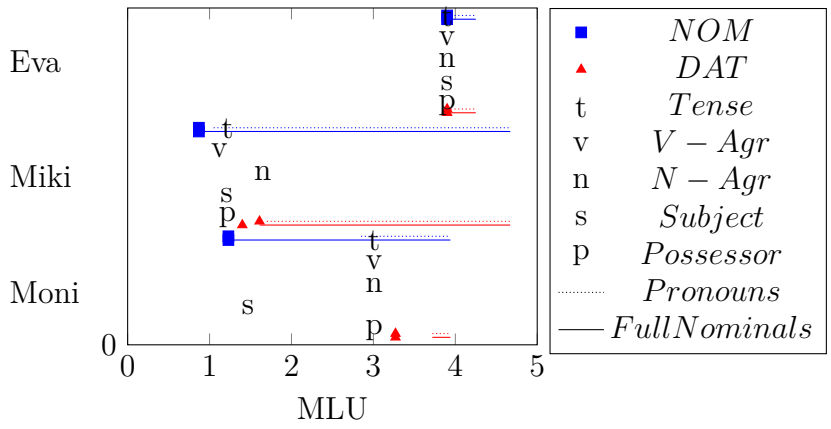


Figure 3.22: Hungarian Case Compared to AGR, PSR, SUBJECT Acquisition

Relationships between the functional heads and the agreement/case associated with them can be seen by the timing similarities between when a feature is manifested and when case-marking occurs. The strongest support for the CP-DP parallel would show a close relationship between the points that NOM/DAT, V-AGR/N-AGR, and Subject/Possessor pairs were acquired. Less strong support would entail relationships between any one of those pairs individually. What is seen is not strong support at all.

It is important to discuss the variation in possessor case marking and how that may affect these results. In Section (3.1), it was shown that possessors may either be nominative, dative, or null, depending on context and the syntax of the particular DP, though it was argued by both Dikken (1999) and Sutton (2014) that all possessors are underlyingly dative. When one looks at the types of possessors seen in early child data, the majority of possessors surface without overt case. This is not surprising, as a feature of early language is the absence of case morphology generally. Once case has been acquired, dative and null possessa begin to be seen, though nominative possessors continue to appear in greater numbers, with approximately half to two-

third of the possessors being nominative, the rest split between null and dative. This is similar to what is seen in the input. Importantly, the first dative possessors appear in the earliest sessions where dative has been acquired, indicating the children do correctly associate this case form with possession, in addition to its other functions.

Keeping this in mind, the comparison can continue. Because Eva's grammar is so advanced at the initial stage, any possible relationships are obscured by the fact that everything has been acquired. With Miki, there is no relationship between features associated with the nominal extended projection– (possessors, dative case, and nominal agreement) and their verbal counterparts. However, nominative case appears quite early, quickly followed by tense, verbal agreement, and the subject, all features associated with the same intermediate head. Likewise, dative case and possessor agreement appear close to one another. This suggests that, rather than a parallel development, Miki is learning all the important elements of T and after this feature bundle is developed, then puts together the elements of Poss.

Moni's data is less revealing, with nearly all morphology coming online at the same session, though well after the first nominative case and well before the first dative possessors. Taken together, this all suggests that, contrary to the expectation, there is not a relationship between when case and agreement are acquired within the verbal domain and when they are acquired within the nominal domain. That said, there are additional ways to look at the data. One such way is to examine how person-number feature combinations occur across their different morphological manifestations.

For Hungarian, there are four meaningful ways these acquisition points can be compared: pronouns to verbal agreement, verbal agreement to nominal agreement, pronouns to nominal agreement, and the nominal agreement to verbal agreement with specific attention paid to the morphological form. These four graphs present the differences by comparing the MLU at the point of acquisition. To take into account

the fact that the children's MLUs are slightly different at the different acquisition points, numbers are presented as percentages

In Figure (3.23), the first time a feature combination appears in the form of a pronoun is compared to the first time it appears as an agreement morpheme. Because verbal agreement always appears before nominal agreement, and pronouns always appear before their nominal agreement counterparts, this graph will indicate whether there is a preference toward interpretable/nominal appearance (indicated by positive numbers) or uninterpretable/verbal appearance (indicated with negative numbers).

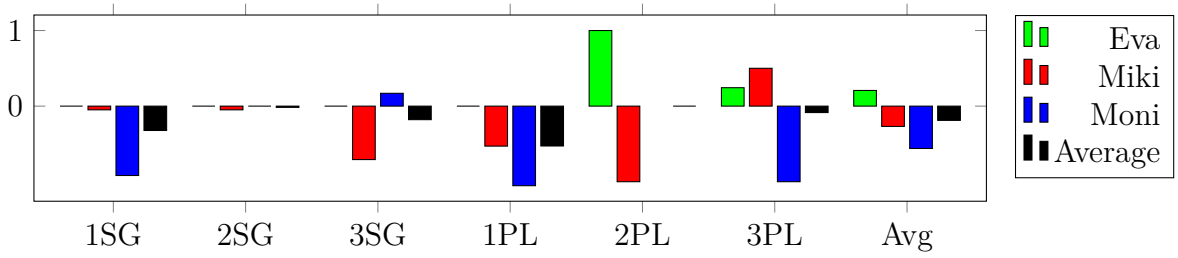


Figure 3.23: Nominal / Verbal Feature Preference
Positive numbers indicate nominal/interpretable pronoun preference;
Negative numbers indicate verbal/uninterpretable agreement preference

The figure shows a slight preference for features to appear as agreement prior to appearing as pronouns, though the difference in MLU at the point of acquisition is often less than one. The 2PL features show the widest discrepancy, both between the children and when compared to the other forms. Perhaps importantly, this is also the least common feature combination. In some sense, however, this graph compares apples and oranges– agreement morphemes and pronouns are not the same thing and do not serve the same function, but they do represent the existence of the same underlying features in the grammar. Figure (3.24) shows the same type of data, however this time the features being compared are possessor agreement and subject agreement, with subject agreement preference being indicated with negative numbers.

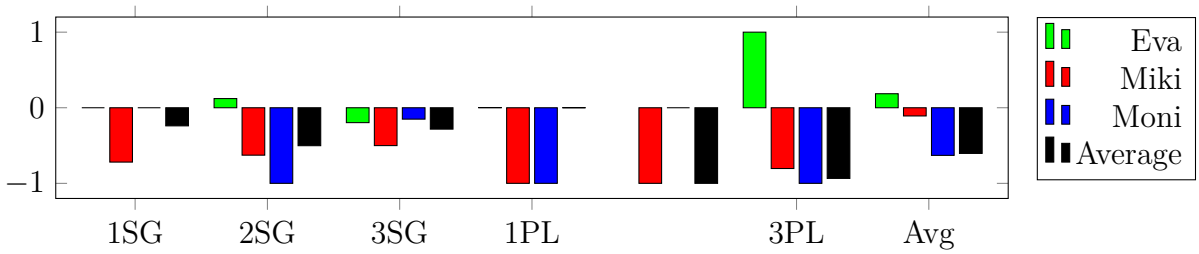


Figure 3.24: Verbal AGR / Nominal AGR Feature Preference
Positive numbers indicate possessor agreement preference; negative numbers indicate verbal agreement

For this comparison, we see a distinct preference for agreement appearing first on verbs. Eva has the smallest preference and is the only child who uses a nominal agreement morpheme at a lower MLU than the corresponding verbal agreement (2SG). Eva also is the most advanced learner as well– most morphemes appear at the same session at the very beginning of data collection. These results are not surprising, given the much higher frequency verbal agreement as compared to nominal agreement- nearly every utterance has an example of verbal agreement, while nominal agreement is only found on approximately 10% of nouns. For the sake of completeness, the difference in MLU at the acquisition point for pronouns and nominal agreement is shown in Figure (3.25). Though this does not shed light on similarities and differences between nominal and verbal development, it is interesting just to compare the same sorts of features within the nominals.

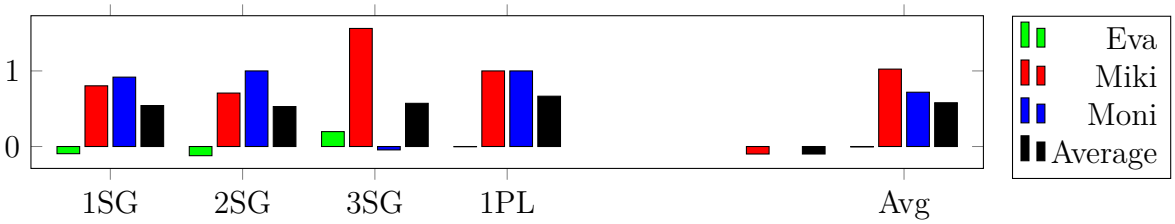


Figure 3.25: Pronouns versus Nominal AGR Feature Preference
Positive numbers indicate preference for pronouns

This graph shows a strong preference for pronouns before nominal agreement, with only a handful of feature combinations appearing as nominal agreement for any of the children. Taken together, the trend suggests that verbal agreement comes before pronouns, which come before nominal agreement– all of which is in line with frequency.

One final approach to the acquisition of this morphology is to consider the effects of the allomorphic suppletion addressed in Section (3.1). Recall that the possessive singular agreement morphemes were identical to the objective verbal agreement morphemes, the 1PL and 2PL possessive forms were identical to the subjective forms, and, oddly, the possessive 3PL was the same as the objective 1PL. The previous graphs were all undertaken with the assumption that the underlying functional features would be related. A distinct possibility is that the children are simply learning particular morphological forms and using them when appropriate. To discover this, Figure shows the MLU difference at the first utterance of each morpheme. If these numbers are closer to zero, it suggests that the forms are most important, while positive indicates a preference for verbal agreement and negative for possessive agreement.

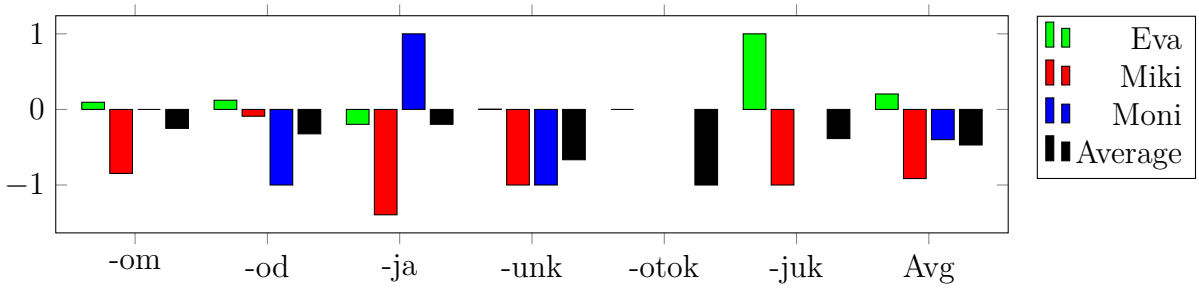


Figure 3.26: Verbal or Nominal Agreement- Suppletive Forms
Positive numbers indicate preference for verbal agreement; negative numbers indicate nominal preference

As can be seen, there is a general preference for morpheme to show up as verbal agreement much earlier than nominal agreement. This suggests that it is not a matter

of the morpheme being acquired– these are the exact same phonological form– but the underlying features must be acquired. Eva's data is different- she shows a slight preference for the nominal agreement in 1SG, 2SG, and 3PL forms– the difference is particularly large for 3PL. Two details must be noted. First, Eva's differences are the smallest overall, with nominal agreement appearing 20% earlier than verbal forms, compared to 40% and 90% for Miki and Moni, respectively. That, combined with Eva's rather stable MLU over the period, suggests not so much a different direction but that the forms had already been acquired at the onset with Eva. Had the window started earlier, it is likely that a different pattern would arise.

What can be made of this from the point of view of the parallel acquisition approach? This part of the discussion was meant as an answer to the second research question suggested in the first chapter– whether the appearance of a particular feature or structural position in one domain predicts its appearance in another domain. Recall, the closer to zero any of the MLU differences shown in the previous three charts, the more closely aligned the acquisition of the features were. While there is a strong preference for verbal agreement over nominal agreement, and an even stronger preference for pronouns over nominal agreement, Figure (3.23), representing verbal agreement and pronouns, actually shows the closest relationship between the acquisition of the features across domains. Pronouns are learned quickly after their corresponding agreement morphemes. While this is not unassailable data in support of the parallel being relevant for acquisition, if the strongest relationships were DP internal (pronoun acquisition corresponding to nominal agreement), it would certainly suggest a distinct process was at work.

Why this acquisition order should be the case is an open question. One possible explanation involves the nature of spell-out. The first utterances contain vocabulary items that are simply a root and a functional head, which requires no complicated

morphological process. The next items that are produced are roots along with a single, additional functional feature, which are finally followed by items that are purely functional features and, eventually, bundles of functional features.

It was shown for all three children that the syntax in nominals and verbs seems to grow at the same pace. Differences in morphological production follow the steps suggested above. This is also reflected in the types of case morphology shown. Lexical items appear with a wide variety of cases (which mean a single root plus a case feature) before pronouns appear with case (which involves multiple functional features). This suggests an acquisition process where the syntax builds up gradually, but separate morphological word-building processes come online more slowly. This hypothesis will be addressed again in the final chapter, when the acquisition of Hungarian is compared with the acquisition of Estonian and English.

Chapter 4

English

This chapter explores the structure and acquisition of the English DP. Like previous chapters, the discussion first examines the morphosyntax of possession in English, with the goal of providing a detailed analysis of the relevant phenomena, supporting the DP-CP parallels discussed in Chapter 1, and showing the subtle but substantial similarities between English and the other target languages. After this theoretical discussion, the second section of the chapter discusses the acquisition of the relevant parts of the DP and CP, focusing on whether the theoretical parallels are reflected in the acquisition process. It is shown that while there is evidence for parallel acquisition of syntax in both domains, the morphological and semantic picture is rather blurry.

4.1 Overview of English

The key issues that must be settled for English possession are the case of the possessor, the particular morphemes or features present in the possessor, and the structure of the possessed DP. This section will discuss the possessor's forms and suggest a few possible ways of analyzing them. Each possibility leads to a different analysis of the syntax and morphology of the possessor. The evidence supports an analysis that entails genitive case-assignment by a distinct (and morphophonologically overt) Poss projection within the DP.

As Table 4.1 shows, the important factors in determining the form a possessor may take must include person, number, gender, and animacy features, as well as the

	Overt Possessum		Null-/Post- Possessum	
Person	Singular	Plural	Singular	Plural
1	my	our	mine	ours
2	your	your	yours	yours
3	his her its the boy's	their the boys'	his hers its the boy's	theirs the boys'

Table 4.1: Possessive forms for English

overtness of the possessum[1]. Any syntactic and morphological analysis must be able to reference these features. As shown in the rightmost columns of Table 4.1, possessors have an additional consonant when the possessum is not overt or when the possessor is post-possessum, followed by *of*. This consonant is *-s* in all cases but first person singular, where it is *-n*.

[1]The examples in (i) below show the relationship between the form of the possessor and whether it is immediately followed by the possessum. Possessors may appear both before or after the possessum– if they appear after, they must be preceded by *of*.

(i) a. My *(hat) is on the dresser

b. The hat of mine is on the dresser

c. *The hat of my is on the dresser

d. Mine (*hat) is on the dresser

The choice of construction is affected by numerous factors, including at least animacy, information structure, and phonological weight, and has been widely studied (Rosenbach, 2005: and references therein). The post-nominal construction is an important part of the English possession puzzle, but both because it is so complicated and because it is so rare in child language, a full analysis of it will not be pursued in this dissertation. The basic facts of the post-nominal possessor will be used for the purpose of supporting a bi-morphemic analysis of the genitive pronouns.

Deciding on the appropriate syntax for the entire possessed DP involves not only the location of the possessor with respect to the possessum, but also the status of this *-s, -n*. The starting assumption will be that the consonant seen after the pronouns is identical in source and function as the *-s* seen after lexical possessors. Possibilities for this consonant include it being a determiner, an element of the genitive case allomorph (overt on lexical possessors), the realization of a distinct possessive head within the DP, or even an agreement marker[2]. Each of these issues will be discussed in turn below.

Rosenbach (2004) suggests that the *-s* seen in English is not a case-marker but a determiner. If *-s* is D (representing, perhaps, a [+POSS] feature on the determiner feature bundle), the only possible position for the possessor is the specifier of DP. With this situation, the pronouns forms do not reflect case morphology– contextual allomorphy determines the correct form of the pronoun and there is no agreement. Abney (1987) also suggests the *-s* is a determiner and that this D head assigns genitive case to the possessor in its specifier. This D head may also be null, as with pronominal possessors, and it would be sensitive to whether its noun complement was overt or not.

A problem with the SpecDP account is that assumptions regarding the assignment of case require more than the simple Spec-Head relationship Abney attributed to assigning case(Chomsky, 1999). To rescue this, D would have to agree with the possessor in a lower position and move it to its specifier. This D would be unique among determiners in assigning case and having an EPP. Also, specifiers are "escape-hatch"

[2]Historically, the *-s* was the main English genitive case marker (Van Gelderen, 2006). First and second person genitives alternated between *my/mine* or *thy/thine* depending on whether the possessum began with a consonant or vowel, respectively (*cf.* "This above all: to thine own self be true" (Shakespeare, 1904:1.3. 78)). This alternation is reminiscent of *a/an* and can easily be dealt with in purely phonological terms. Despite the clear diachronic history, the synchronic data cannot be accounted for so easily.

positions– a possessor in this position is expected to be able to be extracted. This is not the case in English[3], though we saw it is the case in Hungarian. These facts suggest that ruling out both SpecDP as being the position of the possessor as well as the identification of *-s* as a determiner is possible, especially if another solution presents itself[4]. Another possibility is that possessor is not in SpecDP but adjoins to the *-s* D, though this requires that Spec-to-head be a licit movement.

Another alternative is that this *-s* is related to a genitive case allomorph, though this genitive-marked DP must not be SpecDP but lower. Treating the *-s* as a case marker is plausible, however possibly undesirable. Most pronominals with null possessa are also marked with *-s* (*eg. hers, ours*). If the *-s* seen on lexical possessors is the same *-s* seen on these pronouns, one of two things must be true. Either genitive pronouns must have two forms, depending on their environment– e.g. *her* or *hers* depending on the overtness of the possessa. The other option is that genitive pronouns are sometimes doubly marked for case: *her* being [3SG, +FEM, +GEN] and *hers* with an additional GEN feature represented by *-s*, giving [3SG, +FEM, +GEN, +GEN]. It would also entail that lexical possessors show [+GEN] case overtly as well with this *-s*, making genitive unique in this regard among English cases. Doubly GEN-marked nouns appear in many languages (see Plank (1995) and references therein), though this is usually considered a result of case concord in addition to case-agreement, not doubly-marked case from the same source.

[3]The possibility of an extracted possessor might be represented in examples such as "Look me in the eyes," though these construction appear limited to body parts (#grab me the book (as in *grab my book*; *grab the book for me* is the felicitous interpretation))

[4]Eliminating *-s* as a determiner raises the question of what the determiner might be. One option would be to suggest that the determiner in possessives is null, an analysis that could easily unite them with proper names, which also lack determiners and are inherently definite. The alternative is that there simply is no D projection, though this approach would create more problems than it solves.

The next part of the discussion explores the idea that the *-s* is not a determiner or case marker, but is a realization of a distinct syntactic head within the DP. As discussed in Section 1.2, the morphological possessor may be base-generated in any number of specifier positions in the elaborated DP structure. Assuming that the genitive case is a structural case assigned to the possessor, it will be this syntactic head that assigns genitive case and establishes an Agree relationship with a lower DP.

The first of two possibilities for this *-s, -n* is that it is a realization of agreement between the possessor and this functional head. Agreement would be context sensitive– only being realized on lexical items or when the possessum is non-overt. It would only have a unique form for first-person singular, where it surfaces as *-n*. Though the facts could be plausibly captured in such a system, it seems undesirable to posit such an agreement system when English agreement is otherwise overt on verbs with third-person singular subjects and auxiliaries (not to mention number concord on demonstratives).

A similar proposal, which does rely on Agreement and will be ultimately adopted, is that *-s* is the realization of the Poss head. Figure 4.1 gives a structure of the possessed DP consistent with the facts discussed above. A possessor is first merged at Spec*n*P, per UTAH. A Poss head agrees with and assigns genitive case to the possessor, while an EPP feature on this head causes the possessor to move to SpecPossP. (Recall that because *-s, -n* cannot be a determiner, the possessor cannot be in SpecDP.)

More support for the bimorphemic analysis of the possessive pronouns comes from nouns with morphological possessors that fulfill a variety of semantic roles. Consider the sets of sentences below:

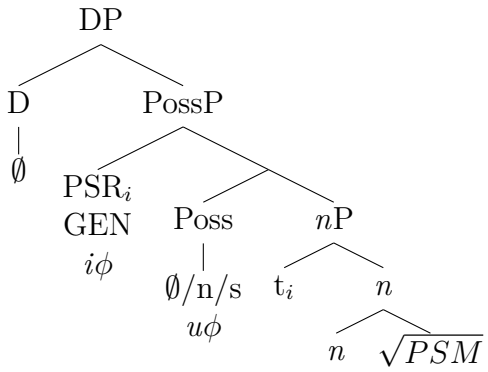


Figure 4.1: Proposed structure of English Possessive DP

(28) a. (My, Her, John's) portrait is hanging in the living room. *(=Possessor, Agent, Theme)*

b. A portrait of (mine, hers, John's) is hanging in the living room. *(=Possessor, Agent only)*

The first sentence is ambiguous with respect to whether the morphological possessor is a semantic possessor, agent, or theme, while in the second sentence, only possessor or agent is an available reading. Because the *-s* on the lexical possessor and the *-n* on the 1SG pronoun in these examples have the same effect (eliminating the theme interpretation and forcing the agent/possessor one in 28b), they presumably have the same syntactic locus. Assuming lexical DPs do not overtly manifest case means that this morpheme is not a case marker, so both must be realizations of Poss.

What the possessor and agent have in common, to the exclusion of the complement, is that, in line with the UTAH as discussed in 1.2, these arguments are both merged above the head noun. Following Kayne (1994)'s analysis of *of*-constructions like these, the head NP is moved leftward to SpecDP, followed by *of*-insertion. An argument originally merged as a complement to *n*P, rather than above it, could not be

moved above its antedecent. A thorough discussion of the syntax of *of*- constructions would take us too far afield, though see Kayne (1994); Den Dikken (1998); Alexiadou and Wilder (1998) for more discussion.

With the syntactic structure thus described, the morphology and the spell-out of the syntactic structure outlined above can be addressed. Table 4.2 shows a specification of vocabulary items for pronouns, following Harley and Ritter (2002), using the feature set [±Author, ±Participant, ±Plural][5], as well as specifications for the Poss head, which sensitive to the pronominal status of the possessor DP (assuming that pronouns are DPs (Abney, 1987) specified for [±pron feature] (Chomsky, 1981b; McCloskey and Hendrick, 1990)) and the overtness of the possessa.

		-Pl		+Pl	
+Auth, -Part, [GEN]		→	my	→	our
-Auth, +Part, [GEN]		→	your	→	your
	+Masc	→	his		
-Auth, -Part, [GEN]	+Fem	→	her	→	their

Poss
- → n / $DP_{[+Pron,+Auth,+Part,-PL]}$ _ ∅
- → ∅ / $DP_{[+Pron]}$ _ X_{overt}
- → s / Elsewhere

Table 4.2: Vocabulary Items for Genitive Pronouns and POSS

These tables assume that the forms of the possessor can be morphosyntactically decomposed both as a genitive pronoun and a context-dependent Poss head. This head shows up as *-n* between the first person singular pronoun *my* and a null possessum. Poss is null when it is spelled out between pronouns and overt possessa, and

[5]This vocabulary specification predicts a form *his's* for null possessa with the third-person masculine possessor. Following Stemberger (1981)'s explanation for the interaction between plural *-s* and with the possessive *-s*, it is assumed there is a phonological explanation for the haplology.

it is *-s* elsewhere[6]. This last step gives the possessive pronouns giving *yours, hers, ours, theirs* with non-overt possessa. Lexical possessors receive the *-s* allomorph in all contexts. This analysis shows Poss to be affected by the ϕ-features of the possessor, and superficially looks like agreement, though it seems more apt to just call it contextual allomorphy. It is important to note that these spell-out conditions are limited by what is accessible in the current phase, assuming that D is a phase head that triggers spell-out. In Figure (4.2), we see the proposed structure for the DP.

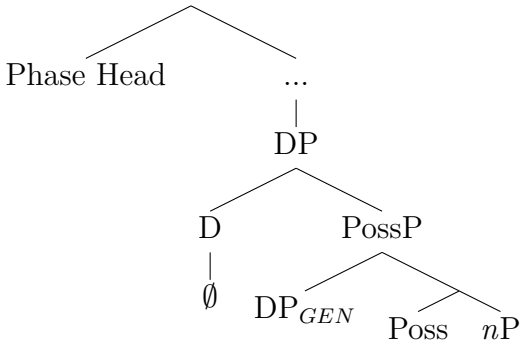


Figure 4.2: Syntatic structure of English Possessive DP

Assuming that D is a phase head, the merging of the next immediate phase head triggers spell out of everything to its right. This leads to the vocabulary items shown in Table (4.3), each of which represents a possibility described in (4.2).

A PP or CP in *That book of mine [$_{PP}$on the shelf] [$_{CP}$that you borrowed]* or the TP in*[$_{DP}$Mine][$_{TP}$ is on the shelf]* will not be present in the workspace while the vocabulary items in the DP are being inserted: only items in the complement of the possessum's D will be relevant for Vocabulary Insertion (Bošković, 2014).

[6]This specification suggests that the inanimate pronoun *it* would appear without the possessive marker when the possessum is overt. This is not the case. One possibility is that this specification also must include a [+Animate] feature, but this would introduce the complexity that a plural, inanimate pronoun is identical to the animate: *their(s)*. Another possible solution is that *it*, despite being like the personal pronouns in many respects, is not actually specified as being [+Pron].

DP_{GEN}	Poss	nP		
my	-n	$\emptyset$	$\rightarrow$	*mine*
my	$\emptyset$	puppy	$\rightarrow$	*my puppy*
her	$\emptyset$	puppy	$\rightarrow$	*my puppy*
her	-s	$\emptyset$	$\rightarrow$	*hers*
The dog	-s	puppy	$\rightarrow$	*The dog's puppy*

Table 4.3: Possible linearized structures and vocabulary items

Because this project seeks to understand the relationship between verbal and nominal aspects of language acquisition, it is important to understand the aspects of the CP in English as well. Syntactically, English is similar to Estonian and Hungarian: T assigns nominative case to and agrees with the subject (Chomsky, 1980). Agreement is overt on main verbs in the present tense for all third-person singular subjects; other person-number combinations exhibit agreement only with auxiliaries, as shown in Table 4.4:

Feature Combination	NOM Form	Verb AGR	BE-AGR	HAVE-AGR
1SG	I	$\emptyset$	am, was	have
2SG	you	$\emptyset$	are, were	have
3SG	he she it	-s	is, was	has
1PL	NP we	$\emptyset$	are, were	have
2PL	you	$\emptyset$	are, were	have
3PL	they NP-PL	$\emptyset$	are, were	have

Table 4.4: English NOM case and Agreeing Verbal Forms

Compared to the other target languages, English morphosyntax seems to provide fewer challenges to the learner. Verbal agreement is sparse, nominal agreement is non-existent. There are only three case-forms to acquire. The syntax of all three languages,

on the other hand, is rather similar, though English allows less flexibility with respect to movement than the others. Before examining the actual data, it might be expected that English learners would master the relevant morphology more quickly though develop the syntactic structures in a similar manner. That said, it might be that the extensive morphology available in Estonian and especially Hungarian help the child identify relevant structures more quickly and allow a quicker acquisition. The next section of the chapter continues to the analysis of *how* the three target children acquire the components of English, while the next chapter will provide a comparison of all three sets.

4.2 Acquisition of English Morphosyntax

An analysis of three English-speaking children represented in the CHILDES database (MacWhinney, 2000) was carried out to understand how the morphosyntactic phenomena described in the previous section are acquired. These three children are quite well-known from a number of other studies, such as Brown (1973); Vainikka (1993) and Radford (1998), among others. They were chosen because their age range and number of sessions were most similar to those examined in previous chapters. The particular CHILDES corpus, start and end ages, number of sessions, and average number of utterances and MLU for each child is summarized in Table 4.5. Adam has the largest number of sessions and they are the longest in length, though they range over a shorter time period. Ross has the widest range of data, starting just after his first birthday and continuing for two years; he also has the highest MLU average. Eve's average utterances, MLU, and age range is between that represented by the others.

Corpus	Speaker	Start	End	Sessions	Avg Utterances	Avg. MLU
Brown	Adam	2;03.04	2;11.28	19	557	2.89
Brown	Eve	1;06.01	2;03.15	11	335	3.02
MacWhinney	Ross	1;01.11	3;01.05	10	141	3.49

Table 4.5: CHILDES Corpora for English

To make the analysis of the English speakers as compatible as possible with the analysis of the learners of the other languages, the same types of analyses were carried out for all groups. This presents something of a challenge– English does not have the wide range of case-morphology or agreement exhibited by the other languages. Nonetheless, MLUs for learners during this early period were quite similar. Additionally, the syntactic analysis of the languages show that, despite surface morphological differences, the underlying syntax is quite similar within the DP, in accordance to Minimalist thinking.

For each of the three children, the following variables were tracked and analyzed. First, the rate of verbal agreement was calculated, which includes all third-person-agreeing verbs, as well as *be* and *have* forms, which show person and number-specific forms. The overall rate will be much lower than those languages with obligatory agreement across all verbs, however differences over time and between the children and their input targets will still give a sense of the growth.

Pronouns represent the same person and number distinctions, with the additional feature of gender being represented. Like the other languages, the growth of pronouns usage was tracked as it increased toward adult-like levels. The largest difference between English and the others is the lack of case-morphology on lexical nouns and the minimal amount of case even on pronouns. To get some sense of case on the DP, the use of *of* was also tracked. Assuming *of* is inserted post-syntactically, its presence

should be a good indicator of the functional DP structure (Chomsky, 1993). These results will be discussed for each child, though ultimately it did not appear to offer any interesting insights into the development of case on nominals.

A comparison of children's MLU at the point of acquiring verbal agreement morphemes to their MLU when they acquired the interpretable, pronominal counterparts was not carried out as it was for the other languages. This was due to the lack of person/number unique agreeing forms, though it was possible to compare the differences in possessor- and subject-related syntax and morphology. Overall syntactic growth of DPs and CPs were straightforwardly compatible as well, and these developmental milestones were tracked in the same manner as the other target languages.

Having described the general outline of the type of variables analyzed for the English-speakers, the discussion can now turn to the specifics of their learning paths.

4.2.1 Adam

Adam's production was tracked for 19 sessions between the ages of 2;03.04 and 2;11.28, providing a relatively brief window into a somewhat later stage of his development. Despite the size, there is significant increase in his average MLU, as shown in Figure 4.3.

As mentioned in the section introduction, verbal agreement on main verbs was tracked, as well as the percentage of verbs that were functional– either *be* forms or auxiliary *have*. For nouns, the pronoun-use rate as a percentage of total nominals was tracked, as was done for the other languages, and the number of nouns preceded by *of* were also tracked. Figure 4.4 shows the growth for all these categories.

This graphs shows a steady growth of functional elements in his production data, as evidenced by his use of pronouns and verbal agreement/auxiliary verbs. The steadiest and sharpest growth comes from his inclusion of pronouns, which approach 50% of

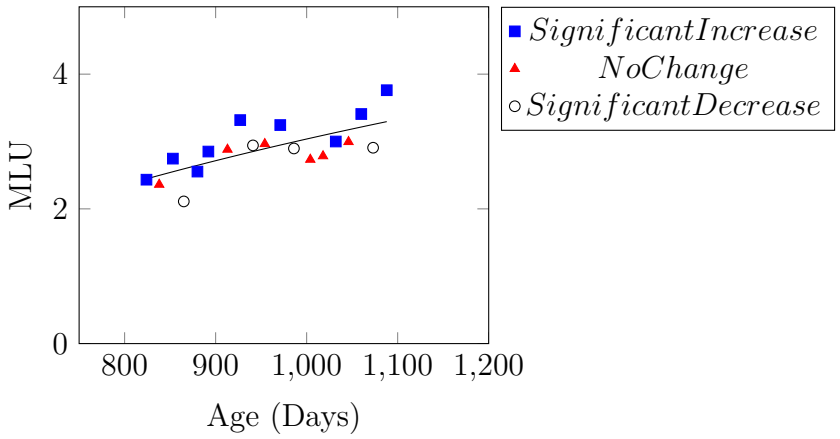


Figure 4.3: Adam MLU

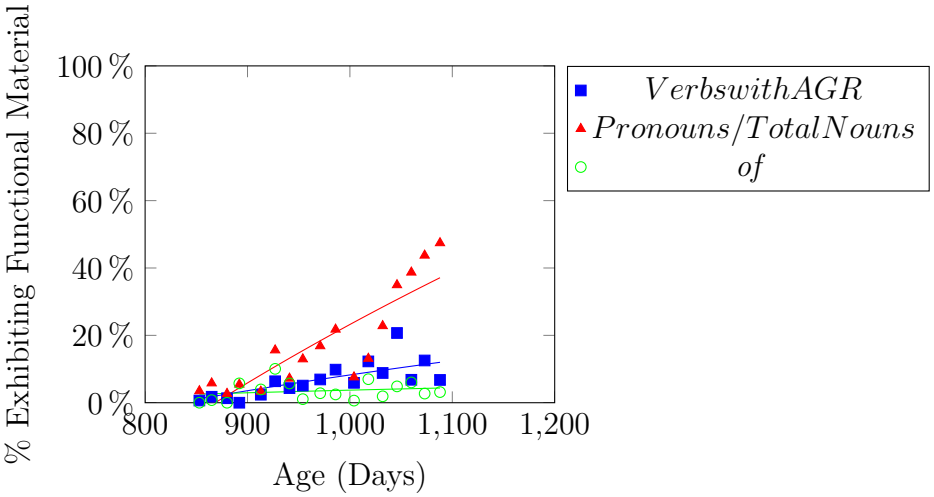


Figure 4.4: Adam Functional Heads Over Time

all nominals by the end of the session. For comparison's sake, his input used pronominals 27% of the time, suggesting his use actually surpassed his input. The use of *of*, which is purely functional and indicates the presence of a DP complement, starts and remains low, suggesting that, contrary to the hypothesis, it is not as interesting an indicator of growing functional representation as hoped.

These past graphs indicate that over the period of time examined, functional material related to both verbs and nouns is steadily increasing. The questions specifically about the relationship between the development of morphology in these extended projections can now be addressed. The first place to look is the development of the syntax related to the DP and the CP.

Because Adam's data collection starts relatively late, he already has a complete selection of DP- and CP-related syntactic positions and morphology acquired. His first session, at 2;03.04, contains possessors, tense, determiners, and adult-like questions. Example utterances are depicted in 4.6:

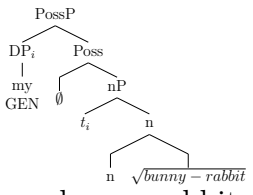
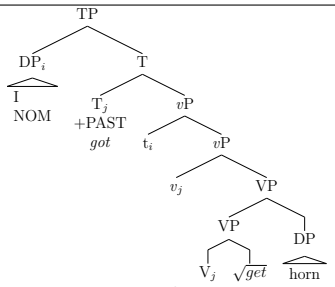
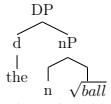
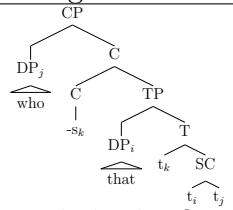
	Largest Nominal Projection	Largest Verbal Projection
2;03.04 First Poss First T	 my bunny rabbit	 I got horn
2;03.04 First D First C	 the ball	 who's that?

Table 4.6: Adam's Structure Development

Though little can be seen from a developmental point of view, the results are still of interest. From this early age, all the elements required by the syntax are present in Adam's grammar. If there was a difference in how the syntax developed across domains, it would have had to have occurred before Adam's first session at 2;04.03. From what has been shown for the other study languages, it is expected that the syntax would develop along these lines.

Seeing that syntax of nominal and verbal constructions do seem to grow in parallel, it is worth asking whether this pattern is seen again when looking specifically at the number of subjects and possessors in the data. Figure 4.5 shows the percentages of all nouns that are possessors or subjects in the data, as well as the percentage of utterances which contain a subject.

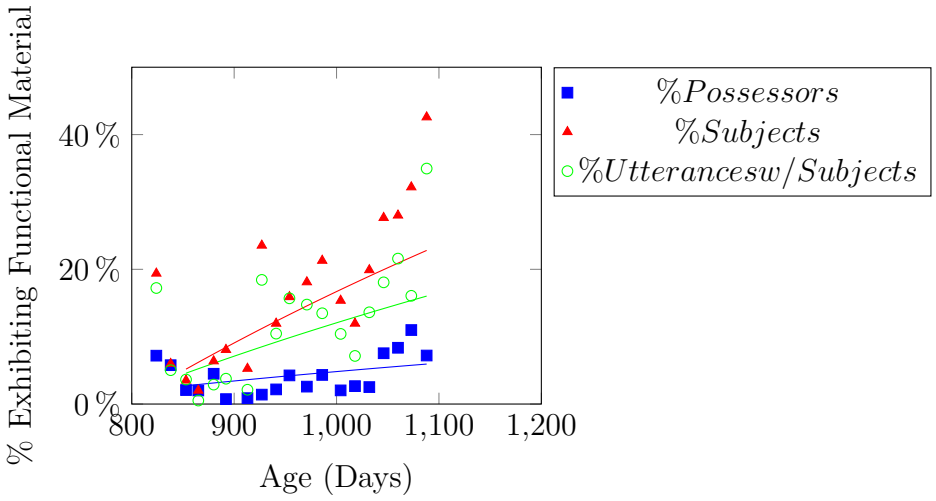


Figure 4.5: Adam Possessors & Subjects Over Time

The graph shows steady growth over time for subjects, based on either their percentage relative to other nouns (red) or the proportion of all utterances which contain a subject (green). There are two things to keep in mind when looking at this graph. Given that subjects are obligatory in sentences and possessors are optional, we would expect subject rates to always be high and possessor rates to always be low. Any

increases seen represent an increase in the capability of a child to represent enough syntactic structure to host both possessors and subjects. An important question is whether and how these rates increase.

For possessors, the graph shows an overall increase which ends at a rate of 7.2%– rather close to the adult possessor rate of 7.9%. The initial two sessions, where MLU is around 2.4, actually has relatively high possessor percentages, which then drops a couple sessions later, followed by a steady increase throughout the rest of the sessions. This is consistent with a growing ability to support a possessor position that eventually reaches a target-like ceiling. Inclusion of subjects also proceeds as expected, at higher rates and more quickly then possessors, consistent with their obligatory nature.

The next place to look is the morphology, whose growth is displayed in Table 4.7. This table shows the age at which a feature was first uttered in a lighter shade and the point at which there was sufficient evidence to consider a feature acquired in a darker shade. Evidence for acquisition was appearing in multiple, different contexts. For example, as shown in (29), the first person singular pronoun was considered to be fully acquired at the first session for the NOM and GEN forms, while ACC and GEN+Poss forms were not acquired until a few sessions later, when each form appeared in different contexts.

(29) a. *NOM:* I get horn; I wash hand (2;03.04)

b. *GEN:* my shadow; my screwdriver (2;03.04)

c. *GEN+Poss:* mine (2;03.04); that mine (2;04.30)

d. *ACC:* give me screwdriver (2;03.04); next to me (2;04.03)

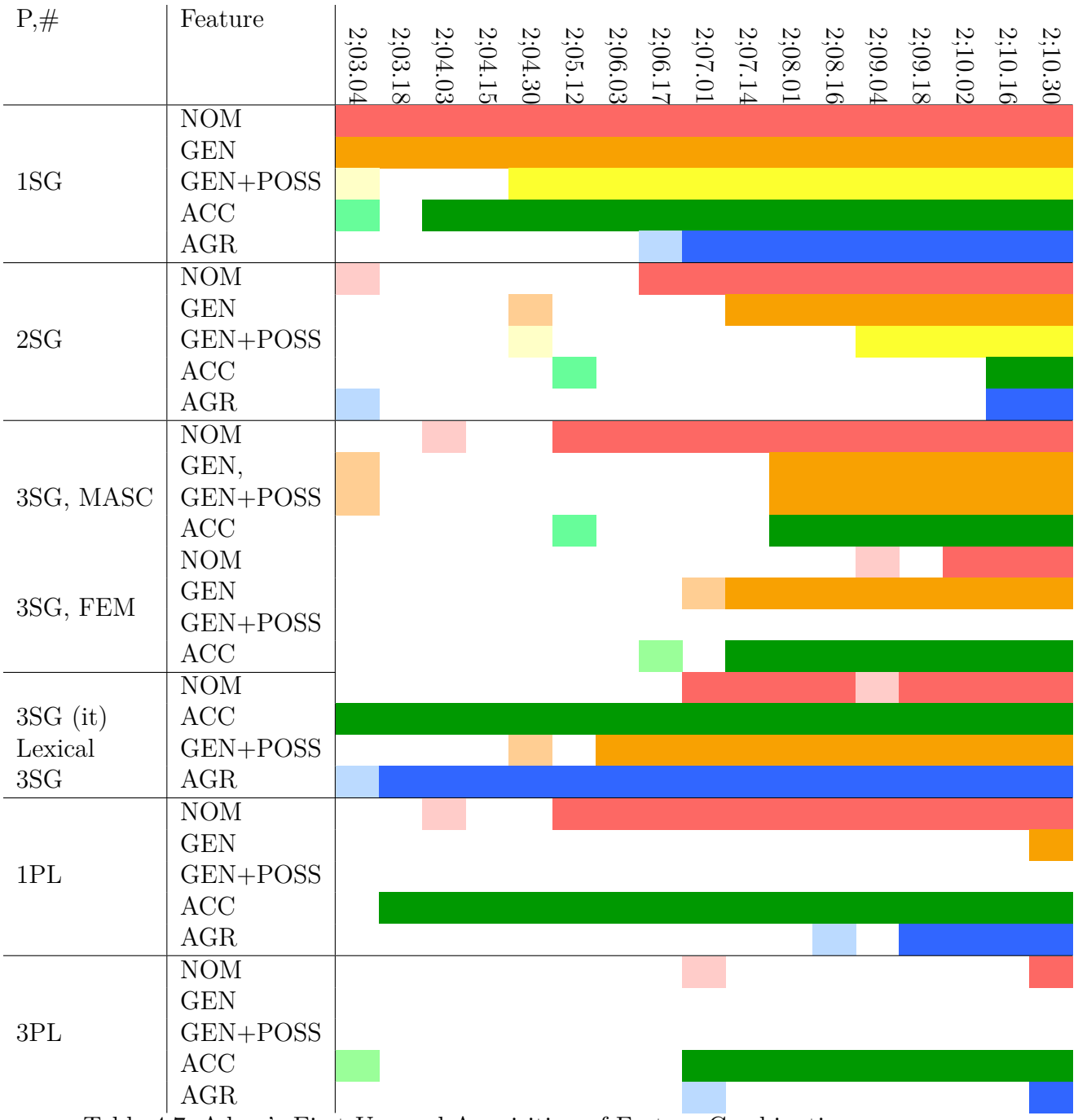


Table 4.7: Adam's First Use and Acquisition of Feature Combinations

Defining when GEN+Poss was fully acquired is a challenge, as they occur in the same context. A conservative view was taken here, as it occurs several times as a standalone utterance in the first few sessions, though not until two months into the recordings does it appear in a truly different utterance "that mine". It could alternatively have been considered to have been acquired by the very first session, where Adam uses *my* with a wide variety of possessa, uses *mine* as a standalone utterance multiple times, and finally utters *my XXX mine*, where "XXX" is unintelligible. This utterance shows that Adam correctly produces *mine* when it is not followed by an NP, though it's similar enough to his previous utterances of just "mine" that it's unclear whether it should count as acquired. That said, the environment required for producing *mine* (being $\text{DP}_{GEN,PRO}$ _ $\emptyset$) is rare enough, occurring with only about 6% of adult possessive pronouns, that it's impressive the child does get it right this early. There are no examples of Adam pronouncing Poss inappropriately.

This data can be discussed from a variety of perspectives. With respect to ϕ-features, the order seen is consistent with Harley and Ritter's predictions. First person singular forms appear before all others and are all present at the initial sessions, suggesting a [+Author] feature was the first to be added to pronominal feature bundles. Gendered pronouns were not fully acquired until after the others, though third-person agreement and possessive marking were acquired, again consistent with a view that puts these features rather far from the hierarchical root.

Plural forms come after singular forms in all cases, consistent with an acquisition process that can handle simpler feature bundles (those not specified +PL) before more complicated ones. Third-person plural forms were among the rarest: well after first person plural and third-person singular were acquired, these forms were nearly unaccounted for. This is somewhat difficult to account for given a morphological complexity account, as these forms do not include animacy, gender, nor

Author/Participant features. Second-person plural was not analyzed for Adam, as is not possible to distinguish it from the singular, and given that Adam primarily interacted with one person during his sessions, it was assumed that all uses of *you* have a singular referent.

Agreement was defined by either the third-person *-s* which appeared very early, or through the use of *be* or *have* for the other person/number combinations. Notably, the third person forms came very early, and the next form to appear was *am*, which, unlike the other, later-appearing auxiliary forms, is not syncretic, representing only the first-person singular feature combination.

Differences in case acquisition can also be examined via this table. Looking at each person/number/gender combination on its own, no pattern holds entirely. Nominative appears at the same time as or before genitive in every case except for 3SG, feminine. Accusative occurs latest for the singular pronouns, but first for the plural pronoun. These results are surprising given that the syntactic positions associated with nominative and genitive case appear at the same time.

Looking specifically at the genitive case compared to the genitive combined with the Poss heads *-s, -n*, we see that the combined form is quite rare. This is not entirely surprising, given the analysis in the previous section which suggested that these are not simply allomorphs but two distinct heads in the syntax. The combined form actually does not even appear except 1SG, 2SG, and lexical possessors, for which they are always required: *hers*, *ours*, and *theirs* are all absent from the data.

(30) a. 2SG GEN: your hat (2;07.14)

b. 2SG GEN+Poss: Put it. Yours. (2;09.04)

The GEN+POSS forms for lexical nouns appear rather early, being acquired before the third person pronouns. One place they do not appear, however, is with proper

names: Adam consistently produces utterances like the ones below, well after he is using the possessive *-s* for lexical nouns:

(31) a. Adam tow-truck, *2;07.14*

b. Robin home, *2;09.18*

c. That's Perro honey, *2;11.28*

This is months after he first makes use of the *-s* for other lexical nouns; Adam seems to have learned the rule for when to omit the Poss head associated with pronouns and extended it to proper names. Though this is not the rule in the target language, Adam is correct insofar as proper names do behave like pronouns with respect to other properties: they do not allow adjectival modification nor prepositions, they are referential, definite, and (in English) may not take determiners (Longobardi, 1994). There is little here that suggests a relationship between the two case forms. It is, however, another example where underlying syntactic similarity is at odds with the morphological results.

Before moving on to the analysis of Eve's data, a brief summary of what Adam has showed us about the DP/CP parallels is in order. Adam's grammar develops significantly over the period he is tracked, with every functional feature or projection that was tracked steadily increasing. Both his DPs and his CPs exhibit the same, high level of complexity from the first session, but the morphological reflexes of the relevant features develop differently. Nominative pronouns appear before genitive in all cases. The syntactic/semantic notions of possessor and subject do not follow each other, either: while both appear at the earliest session, subjects rise greatly over the period, and possessor growth, while slower and peaking lower, does gradually approach adult-like levels. Taken together, this suggests that the DP-CP parallels may manifest in

the acquisition of syntactic phenomena but not in the morphology. The patterns seen in the following two children yield further evidence of this pattern.

4.2.2 Eve

Eve was recorded for 20 sessions, starting at 1;06.01 and continuing until 2;03.15, with an average of 335 utterances per session and an average MLU of 3.02. Figure 4.6 shows her MLU across the sessions, showing a steady increase across the duration of the data-intake.

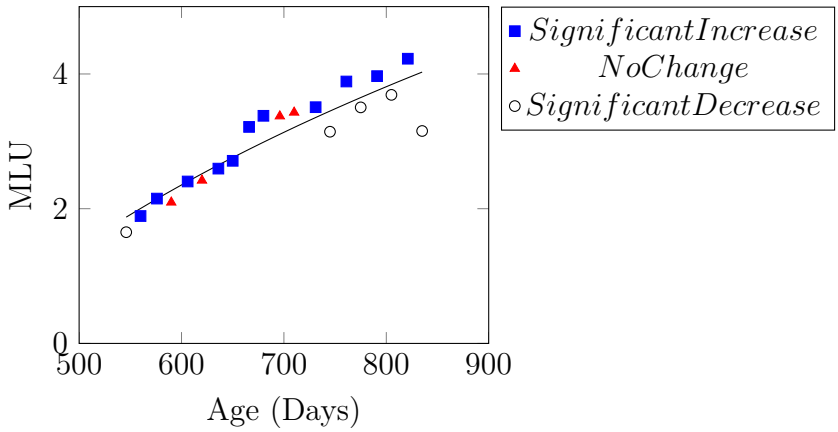


Figure 4.6: Eve MLU

As mentioned previously, to get a sense of the development of Eve's grammar, auxiliary and agreeing verbs were tracked, as well as the ratio of pronouns used, and the number of nouns preceded by *of*. The first two variables track the availability of T as a syntactic position, while the second two are related to functional material in the DP. Figure 4.7 shows the growth rate of all three of these variables. The most striking increase is for pronouns, which are initially very low but approach 50% by the end of the session. Evidence for T and agreement also starts low and stays low for quite awhile, however at approximately 2 years it begins a steady increase. "*Of*" starts and

stays low, again suggesting it is not actually a meaningful measure of grammatical development.

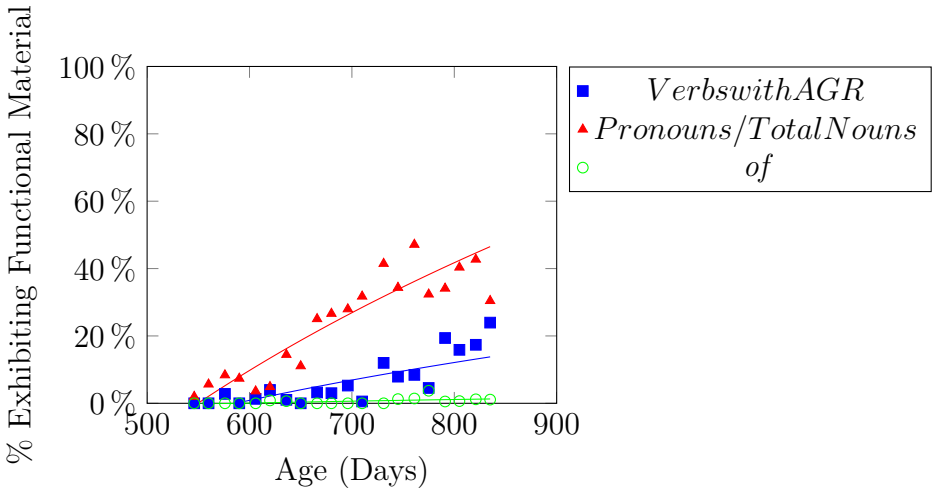


Figure 4.7: Eve Functional Heads Over Time

Like Adam, Eve showed evidence for all the functional categories and morphology from the first session. Unlike Adam, the data for Eve starts rather early, at just 18 months, making the wide variety of structures less expected. Table 4.8 shows the most complex structures in her production data from this first session. Though there is evidence for T from the past tense form, agreeing forms are not present in the data at the earliest session. Nonetheless, even if T only represents tense itself and assigns nominative case, it is still present syntactically.

The first evidence for agreement comes a month after the first session, at 1;07.01, where third-person singular *is* appears (shown in 32); it is not until 1;10;01 that agreement is seen on a main verb and that an agreeing form appears for a non-third person form (shown in 33):

(32) The dog is stuck, *1;07.01*

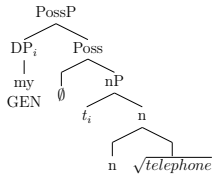
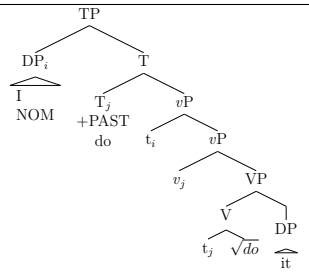
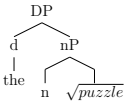
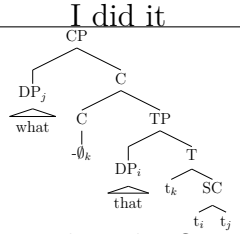
	Largest Nominal Projection	Largest Verbal Projection
1;06.01 First Poss First T	 my telephone	 I did it
1;06.01 First D First C	 the puzzle	 what that?

Table 4.8: Eve's Structure Development

(33) When Cromer comes.

Where are you?, *1;10.01*

These examples show that while the syntactic position is available from the earliest age, the morphology takes a little bit to catch up– just as was seen for Adam. Another look at the morphology is provided in Table 4.9, which charts the first use and acquisition of the various cases and agreement. Though all the target syntactic positions were evidenced from the start, the morphology shows a much wider spread, allowing a better sense of Eve's acquisition path.

Regarding person-number combinations and the acquisition of the range of morphology, another preference for 1SG forms is seen, followed by the variety of third person forms for both genders. This is followed a concentration of 2SG forms appearing at 1;11.01. Third person plural forms are seen last. Agreement is earliest for third person singular, appearing first on the copula as *is*, followed by *has* and finally main

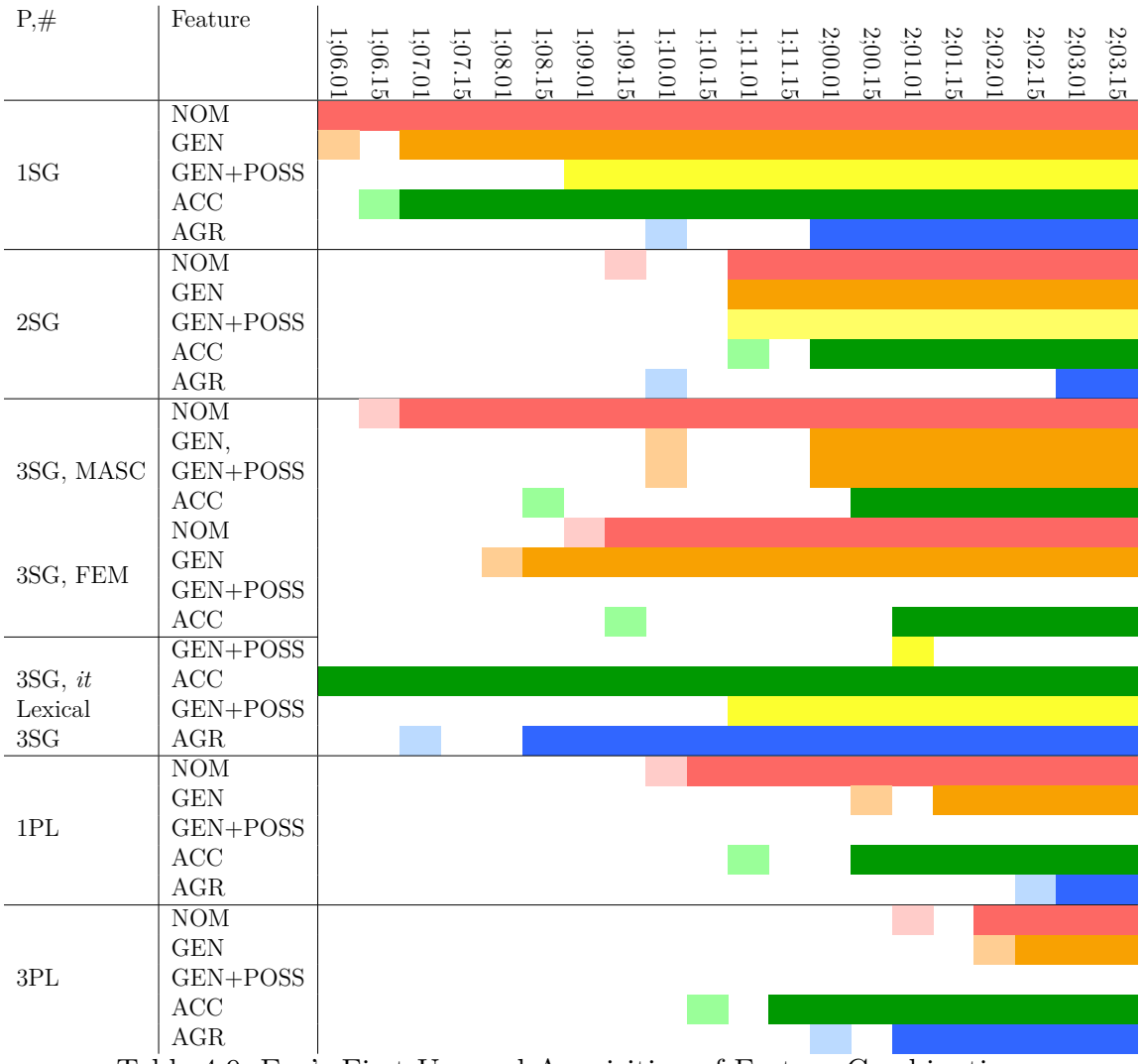


Table 4.9: Eve's First Use and Acquisition of Feature Combinations

verb agreement at 1;10.15. Auxiliaries for the other forms appear later than the 3SG-agreeing auxiliaries, but only at 1;10.01– just one session prior to 3SG main verb agreement.

The relationship between the appearance of nominative case and genitive case is as with Adam– NOM consistently appears either before or at the same time as GEN. The one exception is for the 3SG feminine pronouns, where genitive enjoys a slight advantage. It is also unclear whether these differences in timing– often just a matter of weeks between the appearance of nominative and genitive– are significant and how much they are related to frequency in the input, a question which will be addressed in the section comparing the three English-learners.

The final point to be made about this data is the relationship between form expressing only the genitive and forms with the genitive plus the possessive suffix. For the items where these forms are different, the affix-less form appears earlier or at the same time as the form with the affix. There are no cases where the genitive is learned first as the longer form, showing that Eve is successfully finding an adult-like representation.

The next step is to examine how syntactic and semantic aspects of the DP/CP parallel are reflected in acquisition by looking at rates of subjects and possessors. Syntactically, the required position for subjects and possesors was available at the very earliest session, yet the rate of usage for subjects and possessors was very different across data sessions, as seen in Figure 4.8.

As is often the case, possessors started and stayed much lower than subjects, achieving their highest rate of 16% right in the middle of the recording session, with an average of around 7&. Notably, the first few sessions all had very low possessor percentages, which increased dramatically around the sixth session and then stayed

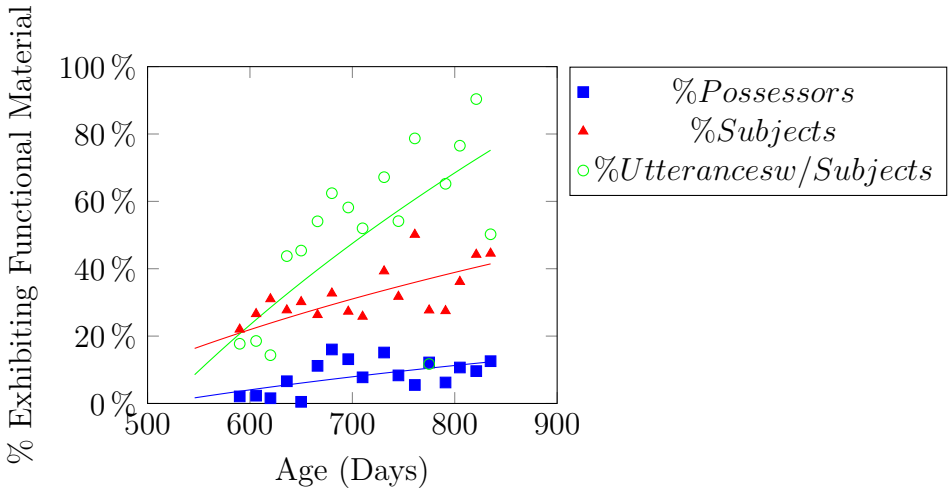


Figure 4.8: Eve Possessors & Subjects Over Time

at this level. The portion of possessors in the input was around 9%, indicating that the child actually did achieve a target-like possessor rate during this period.

Subject use, based on percent of nouns that were subjects and percent of utterances which contained subjects, grew rapidly, with 80% of all utterances containing subjects. Though there will always be some portion of utterances with no subjects, due to fragments, imperatives, and other structures smaller than TP, Eve's use of subjects indicates a grammar that contains substantial functional structure most of the time. That possessors do not follow this dramatic growth rate reflects another difference between the acquisition of the DP and CP and a difference in the role and requirements related to possessors and subjects in language generally, though the jump and then leveling out of possessor levels indicates that once the structure was firmly acquired, there were no problems producing possessors like an adult.

The pattern seen with Eve matches what was seen with Adam, across nearly every variable. MLU steadily increases as do the prevalence of pronouns, and agreement.

Syntactically, all the structure for both subjects and possessors are available at the earliest stage, and indeed subjects and possessors appear at the onset, though nominative case marking precedes genitive for every options. Subject inclusion increases steadily, though possessors do not. This again points to a result where the parallels are reflected in the syntax, not the morphology nor semantics. Whether the same pattern holds for Ross will be addressed in the next section.

4.2.3 Ross

The last English learner to examine is Ross, whose 10 recordings cover a span of approximately 2 years, from 1;01.11 until 3;01.05. Each session produced an average of 141 utterances, with an average MLU of 3.5.

MLU did increase over the entire span, however the irregular timing between the sessions clouds the picture somewhat; 10 months passed between the third and fourth sessions, during which time MLU increased by more than 50%. Though there are not the regular intervals between sessions like Eve nor the steady growth seen in either of the previous two children, there is still a significant increase across the span, as shown in Figure 4.9.

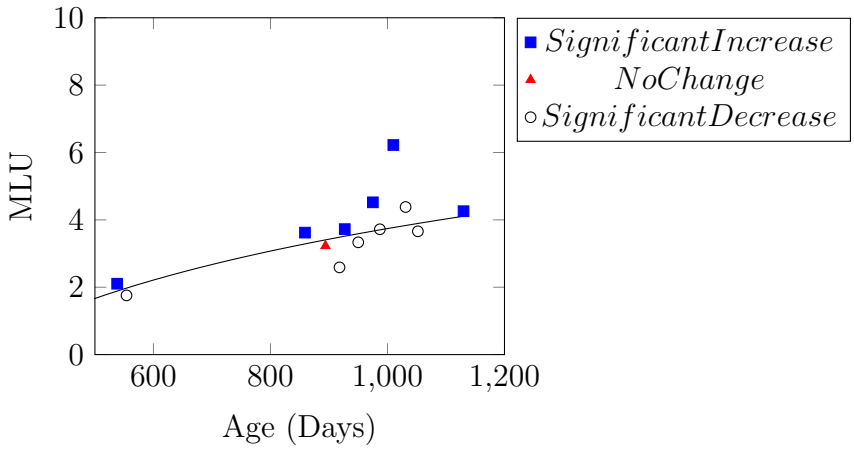


Figure 4.9: Ross MLU

Figure 4.10 shows the percentage of agreeing verb forms (blue), percentage of pronouns (red), and percentage of nouns preceded by *of* (green). Agreeing verb forms increase the most, though they start relatively high, with the initial sessions clustering around 10-15%. By later sessions there is a big increase, however. Pronouns represent around 40% of nominals at the start, rising only to around 50% by the end of the session. Finally, *of* appears rarely throughout his data. As the third child that shows very little use of this indicator of Case, it seems that this is not in fact an interesting indicator of grammatical development.

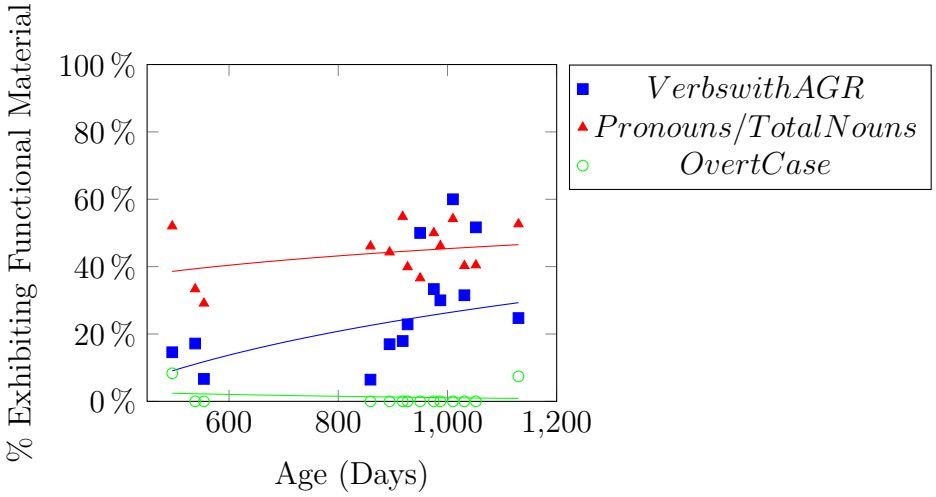


Figure 4.10: Ross Functional Heads Over Time

One issue with the lack of a growth trajectory is that it is possible that the important growth actually happened before the sessions began. This seems unlikely at first, given the early date of the recordings, but Ross was an early learner; his early utterances were in fact quite complex, as shown in Table 4.10. His longest overall utterance (*Can I have some of that?*) contains a modal in C, which represents not just functional structure but movement, and the object DP itself contains a recursive DP within it *[$_{DP}$some [$_{DP}$of that]]*. That also qualifies as his largest DP in his first session.

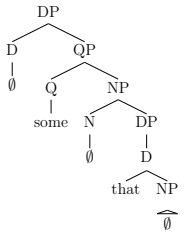
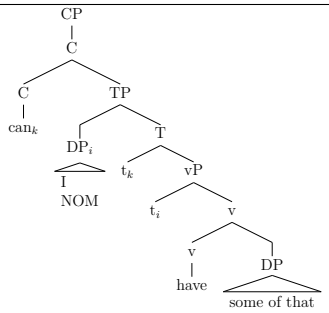
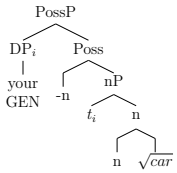
	Largest Nominal Projection	Largest Verbal Projection
1;04.01 First N,D First C, T, V	 some of that	 Can I have some of that?
1;05.23 First Poss	 your car	

Table 4.10: Ross's Structure Development

The earliest sessions include possessors, determiners, tense, and complementizers. Though there is not evidence of how Ross developed to this point, that all this functional material appears at the same time is important. The inclusion of *of* in the CP also clearly indicates that Ross's grammar includes case in its representations.

Table 4.10 shows structures that demonstrate Ross's syntactic and morphological capabilities. As was seen with the other children, Ross exhibits the entire range of functional projections at the very start. The only possible exception is the appearance of the possessor. Though at the first session (1;04.01), Ross utters *mine*, no other possessive forms appear, suggesting that this is unlikely a fully-formed, complex DP. At the next session (1;05.23), however, Ross produces *Is that your car?* If the early example is not a true possessive construction but an unanalyzed chunk, there is much better evidence that the structure is a part of Ross's grammar a month later.

Though the complex syntax combined with the rather stable use of other functional elements suggests that there was not significant growth in his grammar during the period of recordings, tracking pronominal morphology does show development over time, shown in Table 4.11.

Unlike Adam and Eve, there are not large differences between the different person-number combinations, though case forms and agreement for plurals do come much later than their singular counterparts. Nominative appears before genitive for all pronouns, while accusative forms appear earlier for some and later for others. A notable exception is for the feminine pronouns, which appears first for accusative, months later as a genitive, and not in the nominative form until nearing the end of the sessions.

The last item to look at is the use of subjects and possessors in Ross's speech. Like other items discussed, there is relatively little change from the start to the finish for either of these. Possessors rise a slight amount from the very first sessions to the later sessions. The portion of nouns that are subjects does not increase from the earliest to the latest, though the amount of utterances with subjects does increase. By the end, individual utterances are more likely to have subjects than not, suggesting the functional structure is becoming obligatory.

All together, there is nothing about Ross's data that distinguishes him from the other children. Unfortunately, there is relatively little change in any of the variables, so determining what Ross can tell us about the DP-CP parallels in acquisition is difficult. The little change over time that he does display is limited to the morphology, though these differences mostly conform to the NOM before GEN pattern seen with most other children. The next section will directly compare all children and discuss what the overall results from the English learners can show us.

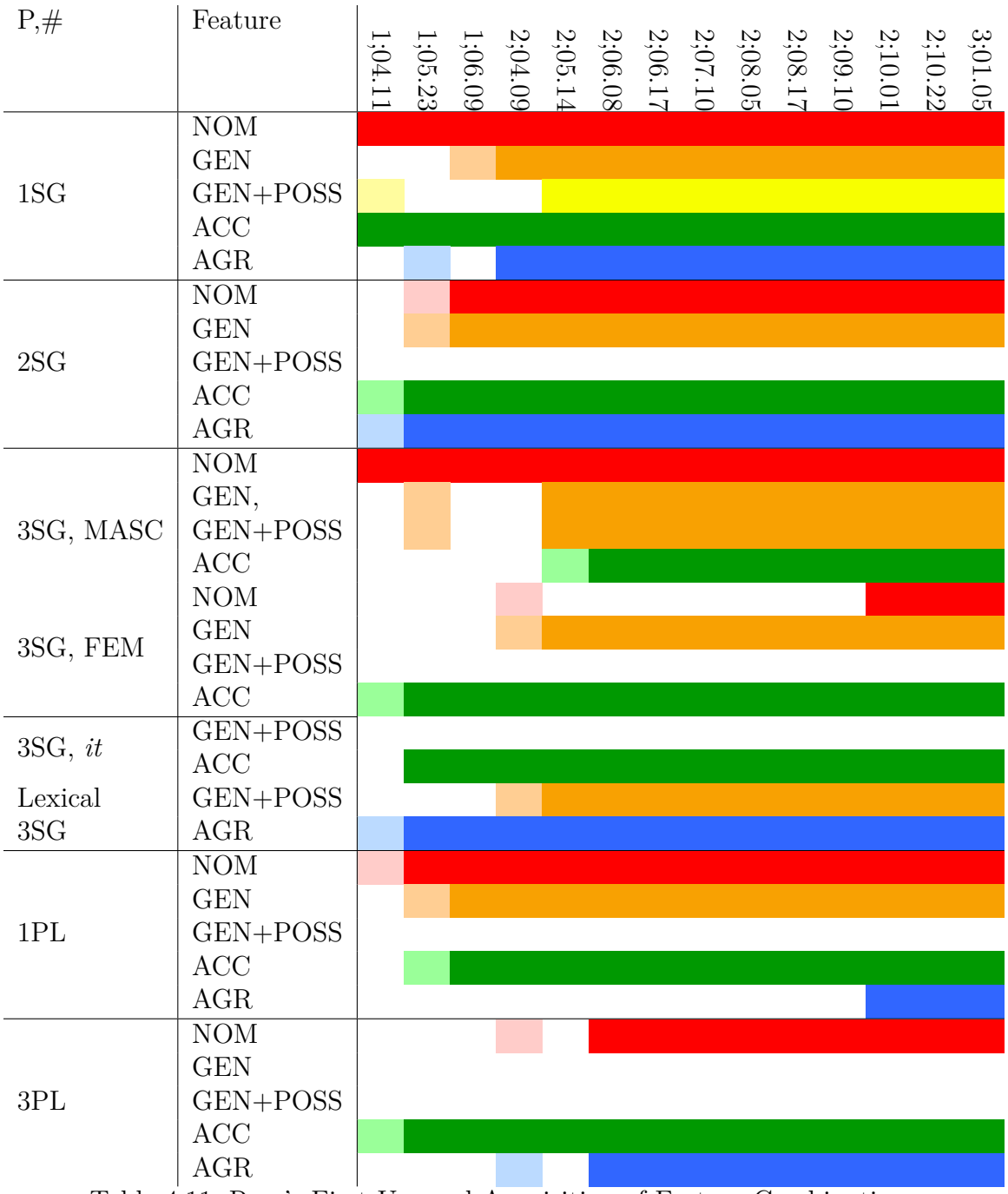


Table 4.11: Ross's First Use and Acquisition of Feature Combinations

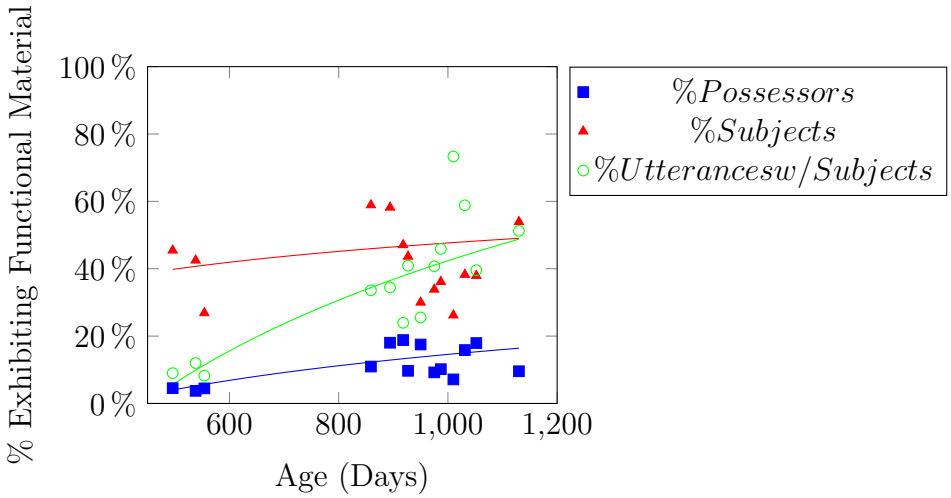


Figure 4.11: Ross Possessors & Subjects Over Time

4.3 Comparison and Summary

The last step in the discussion of the English acquisition of DP and CP is to compare the results from the three children so far. First, the basic facts of each individual's development will be discussed to ensure their acquisition was similar. Next, the specific details of their acquisition will be analyzed to see what overall trends can be found.

The first variable to analyze is MLU growth. Though the actual ages of the children during their recording was different, they actually had quite similar MLU trajectories, as shown in Figure 4.12

This result is somewhat surprising, especially since Eve and Adam's ages do not overlap at all. Nonetheless, they all have MLUs of just over two at their initial sessions and move steadily– up to around four for Eve and Ross and to just above three for

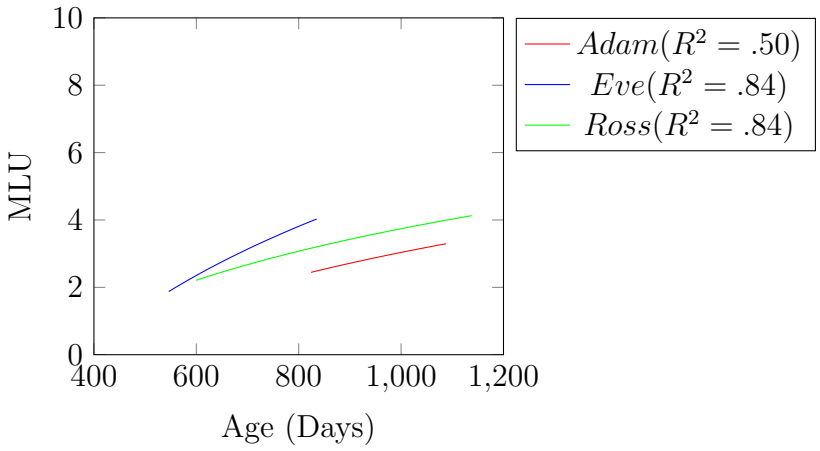


Figure 4.12: Combined MLU

Adam. This provides some confidence that the complexity of their grammars and linguistic capability are comparable on a broad level.

	N/V		Poss/T		C/D	
	Age	MLU	Age	MLU	Age	MLU
Adam	2;03.04	2.36	2;06.03	2.88	2;03.18 (D) 2;05.12 (C)	2.36 2.85
Eve	1;06.01	1.65	1;07.01	2.15	1;06.15	1.9
Ross	1;04.11	1.71	2;04.09	3.6	1;04.11	1.7

Table 4.12: Summary of Acquisition Points for Parallel Structural Positions: English

A closer look at the details of their production reveals that the similarities don't end at the length of their utterances. Table 4.13 shows the percentage of their verbs which either show agreement or are auxiliaries– each of which is evidence of a T projection in their syntax. As MLU increases, evidence for T also increases for all the children, though Ross shows the most movement and the highest portion of his verbs contain morphology that requires T. This data suggests that not only the general

complexity of their utterances is the same, as shown in the last graph, but that relevant functional material is also similar.

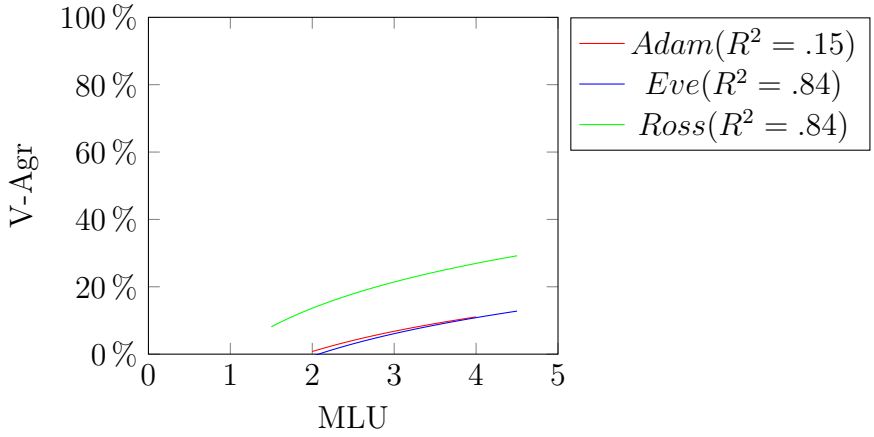


Figure 4.13: Combined V-Agr

Table 4.14 attempts to understand the growth of functional elements in the DP by graphing the growth of pronouns as a portion of all nouns. Again, Adam and Eve's growth, represented by the red and blue lines, respectively, are nearly identical. Ross, on the other hand, has a consistently high percentage of pronoun usage. As MLU approaches four, however, all three children appear to hit the same ratio. Though both of these are imperfect measures of the functional representations of the children's grammars, they tell us that both overall complexity is increasing as well as the usage of functional elements in the extended verbal and nominal projections.

So far it has been shown that the children's grammars are all growing at a similar rate and that the CP and DP are growing in complexity as well. The next step is to specifically address the research questions and look at the syntactic, morphological, and semantic aspects of CPs and DPs to see how they compare and what can be learned. In the previous sections, the most complex DPs and CPs for each child demonstrated that the potential for syntactic complexity was quite high from the

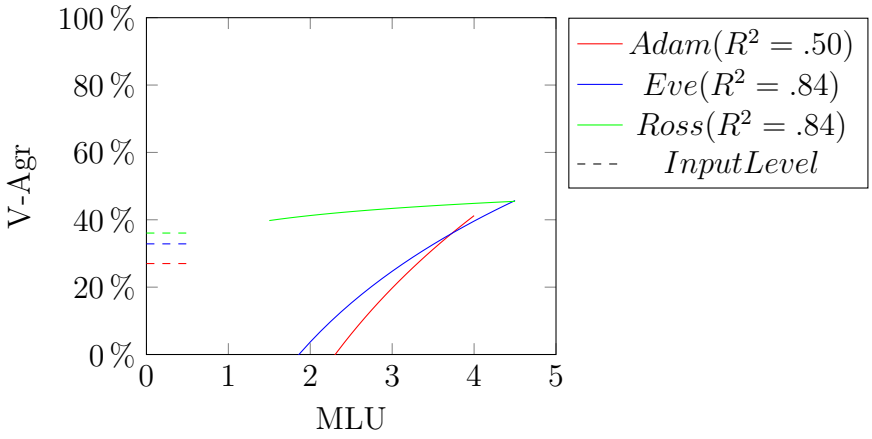


Figure 4.14: Combined Pronoun Pct

start and that each of the theoretically parallel structures were present at the same time. Table 4.13 reviews these largest structures for each child.

These trees show not just a high degree of complexity, but a high degree of similarity between the children. Also notable is that both past-tense forms (for Adam and Eve) are irregular forms– a single vocabulary item is expressing both the root and the tense. Ross, on the other hand, makes use of a modal in this utterance, which similarly avoids using a bimorphemic word.

This fact might be related to the over-regularization of past tense forms seen in children (Marcus et al., 1992). At an early stage, irregular forms are produced correctly, later treated as regular *-ed* verbs, until finally being pronounced in a target-like way. This phenomenon suggests that once the *-ed* rule is learned, it is over-applied. It related to the data in that the children seem to avoid situations where the rule *might* apply, instead choosing monomorphemic words. Alternatively, these results could simply be because irregular verbs, though in a minority by *type* are actually the

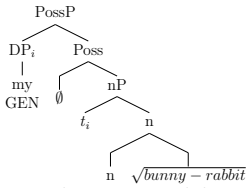
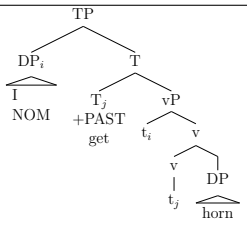
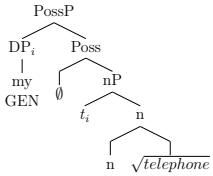
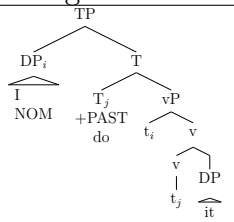
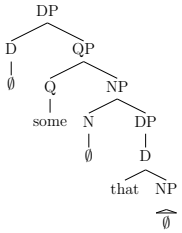
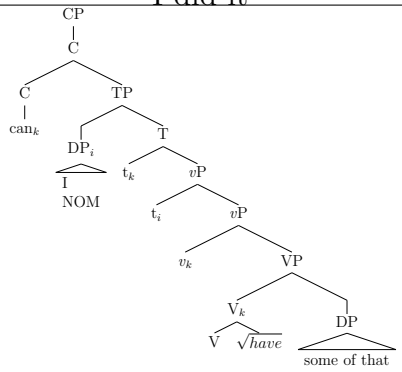
	Largest Nominal Projection	Largest Verbal Projection
Adam 2;03.04 MLU: 2.43	 my bunny rabbit	 I got horn
Eve 1;06.01 MLU: 1.65	 my telephone	 I did it
Ross 1;04.01 MLU: 1.71	 some of that.	 Can I have some of that?

Table 4.13: English Structure Development- Largest Trees

majority when considered by *token* (Francis and Kucera, 1967), giving the children much more opportunity to learn them.

Given that the syntax is equally complex for each child and for each domain, the assumption is that nominative and genitive case-marking should also have been similarly acquired. Table 4.15 shows the MLU for each child when they first produced and then acquired different case forms. Adam and Ross' production suggests simultaneous acquisition of all forms, which confirms this assumption. Eve, on the other hand, shows a much wider spread: the first utterances including the different case forms are close together, but actual acquisition evidence in the form of a more fully formed paradigm proceeds in a NOM, GEN, ACC order, with great differences between them.

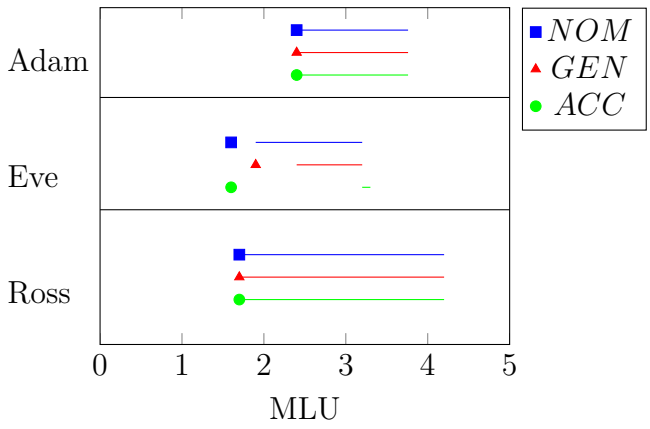


Figure 4.15: English Pronoun Case Acquisition Timeline
Symbols indicate first appearance of pronoun in specified case; lines show period during which form was acquired

Though initial analysis looked merely at when a form was first acquired, subsequent work was done to determine to what extent the children were acquiring the pronouns correctly, as was found by (Radford, 1996:503) and discussed in the first chapter. Though there were errors made by all three children, there were in fact very rare. No child ever incorrectly uses the nominative form of any pronoun. On one

occasion, Adam incorrectly used a genitive where a nominative was called for, as does Ross. Eve makes more errors in total, with six attested throughout her corpora, but these amount to less than a half a percentage of total pronouns. Eve's errors are different, too– she uses accusative forms where nominative is called for 5 times and once uses genitive when nominative is called for. Despite these occasional errors, it does not seem that any are frequent enough to warrant a reanalysis of the basic acquisition patterns seen.

The data summarized in the previous table is shown in greater details, looking at each person number combination on its own. Table 4.16 shows the difference between MLUs for each child at the point where NOM and GEN was acquired for each child for each pronoun. If each case is acquired at the same time, the difference should be zero– the further from zero it is, the larger the difference there is between the two. In this graph, positive numbers indicate a preference for DP-internal case-marking.

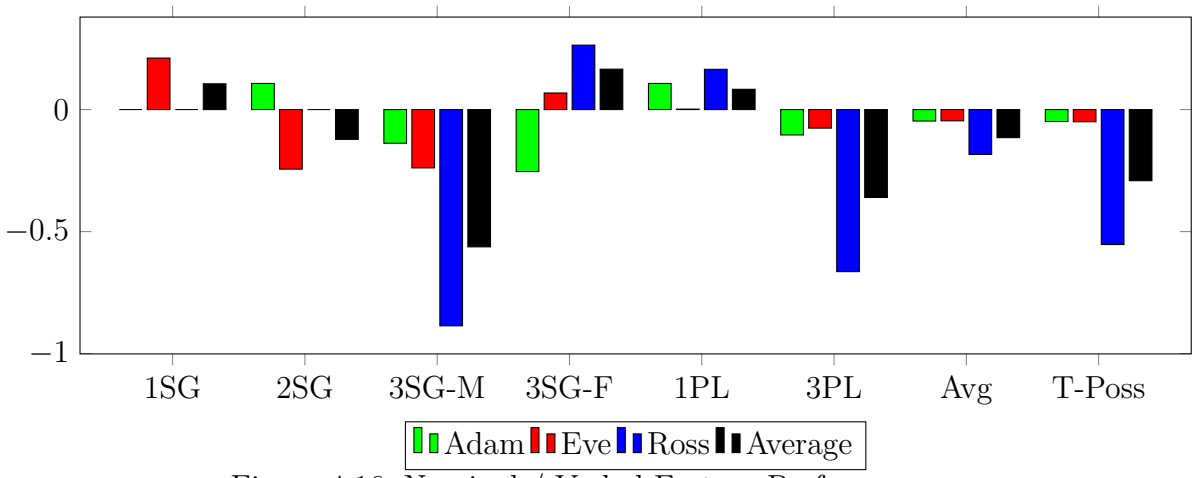


Figure 4.16: Nominal / Verbal Feature Preference
Positive numbers indicate GEN/Poss preference;
negative numbers indicate NOM/T preference

From table 4.16, we see that MLU is on average 11% smaller when NOM is acquired compared to GEN. Looking more closely at individual pronouns, we see that this overall average appears to be driven by significant preferences for 3SG-Masculine

and 3PL pronouns in Ross's data– other pronouns and learners are actually much more evenly divided. Despite these large preferences for genitive for Ross, he still does acquire genitive forms earlier for some of the pronouns. The eventual averages for the three children is 4.7%, 4.6% and 18% for Adam, Eve, and Ross, respectively. To compare, MLU changes on average 2.6% ±12%, and 2.8% ±28% across all their sessions. Ross's seemingly large preference for nominative is smaller than the standard deviation for MLU. Looking at these trends along with the data for MLU averages suggests that the case morphemes are acquired at the same time.

Another way to understand development of nominal and verbal functional material is to look at morphological evidence for the intermediate functional heads of T and Poss. Though there is not always a requirement that there be overt material in this head, looking at the first appearance of these elements can at least show when they were available to the children. The last column from Figure 4.16 depicts the MLU difference between when Poss was first evidenced and when T was first evidenced. It shows a very small preference for T over Poss, with Ross's results the most lopsided of the three, though again within a standard deviation of MLU average.

The next place to compare the children is their use of subjects. Figure 4.17 shows the growth rate of subjects, analyzed two different ways. The solid line indicates the portion of all nouns that are subjects, and the portion of all utterances which contain subjects is indicated by the dashed lines.

In all cases and in both measures, there is an increase in the amount of subjects included in the child's speech. The higher R^2 values for the per-utterance analysis suggests that these growth trajectories are more representative of the child's actual growth. For Eve, who has the highest rate of subject-inclusion, her utterances are complex enough to include a subject nearly 80% of the time by the end of her sessions. There is clearly representational growth occurring for the verbal extended projection.

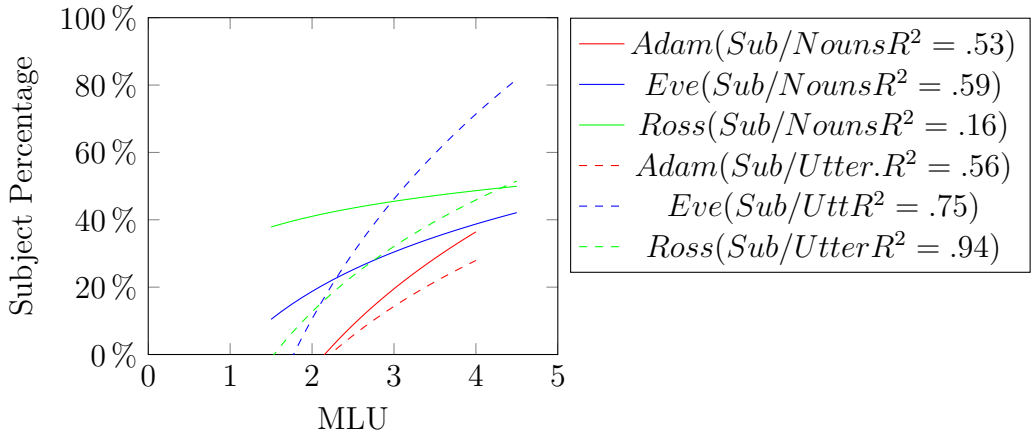


Figure 4.17: English Learners Subject Development
Solid lines indicate % of nouns that are subjects;
dashed lines indicate % of utterances with subject

To see within the nominal extended projection, growth of possessors can be analyzed, as seen in Figure 4.18:

The rates for possessor use increase as well, but not as quickly as subjects and not to as high a level. Though this at first seems evidence against the parallel structure being relevant for acquisition, it is actually suggestive of the opposite. Taking the genitive and nominative case acquisition patterns seen in Figure 4.16 into account, we see that genitive is acquired much earlier than would be expected given the differences in subjects and possessors. Since subjects are so much more common, it would be expected that nominative case would be acquired much earlier. Instead, we see both case-forms acquired in a similar time frame, despite the relative rarity of possessors in the child's production. Possessors are at most 15% of nouns, and much lower for Adam, and their growth is slow. Nonetheless, the morphological aspects of possession appear nearly in line with those associated with T.

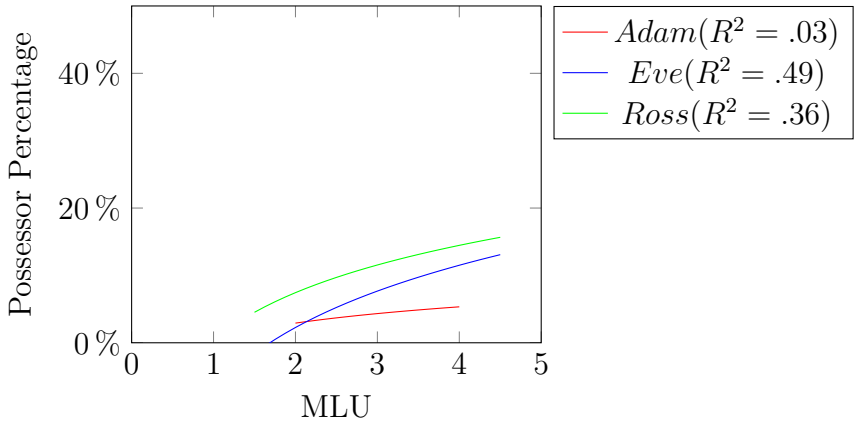


Figure 4.18: Combined Possessor Pct

Results for the three children were mostly the same. For all three, the syntactic structures of DPs and CPs were all present from the first sessions. While earlier data could have refuted or confirmed parallel syntactic development, the fact that the initial DP and CP complexity were roughly equal is more suggestive of confirmation. This is especially true given that the low MLUs of all the children indicate that all three were barely producing two-word utterances at this point.

There is more evidence for morphological development over this period. Case-marking of subjects with nominative comes slightly before genitive case-marking, though only slightly so. There is no DP-internal agreement to serve as a comparison, but other elements associated with T likewise come before elements associated with Poss– specifically the *-s, -n* possessive suffixes. Though we do see changes in the appearance of this morphology over time, it appears the vocabulary items for both heads are acquired at essentially the same time.

Finally, subjects grow rapidly both in terms of proportion of nouns and utterances with subjects, as do possessors, though their overall rate remains much lower than

subjects, likely due to the low rate of possessors used in the target language. To answer the research questions explicitly, it can be said that structural positions related to DP and CP syntax are related, verbal agreement and pronominal features in CP and DP are not related, and there is some evidence that case-marking between the two domains is related. The following chapter will combine these results found for English and the results found for Estonian and Hungarian to determine what can be said about child language overall when it comes to these inter-domain parallels.

Chapter 5

The Cross-Linguistic Comparison

The first chapter of this dissertation described the theoretical parallels between DPs and CPs and suggested using these parallels to analyze child language acquisition. The previous three chapters described the acquisition of Estonian, Hungarian, and English by three sets of children, evaluating along the way to what extent the theoretical parallels were reflected in the acquisition process. This final chapter will compare and contrast these languages and their acquisition. The first section will review the facts of the three languages and compare the results of the acquisition analysis. The next section will discuss the relationship between DP and CP in early language and what this relationship shows about how acquisition proceeds. The final section summarizes these results and makes suggestions for future projects.

5.1 Review & Comparison

This first section will present a brief review of the three target languages, then summarize the acquisition paths of the different sets of children. The goal here is to acknowledge the differences between the languages and to determine the extent to which their acquisitions may be compared. Table (5.1), repeated from Chapter (1), summarized the main similarities and differences between the languages.

These differences are mainly reflected in their morphology. As was shown in the initial sections of the previous three chapters, the syntactic structures were quite similar for the languages, with similar sets of functional categories doing similar syntactic

	English	Estonian	Hungarian
DP			
Poss	Overt	Null	Overt
	Assigns GEN	Assigns GEN	Assigns DAT
AGR	Null	Null	Person, #
Pronouns	1, 2, 3 persons	1, 2, 3 persons	1, 2, 3 persons
	M, F genders		
D	def, indef, null	n/a	def, indef, null
Demonstratives	singular, plural		
	distal, proximal	proximal	distal, proximal
Extraction of Possessors	Disallowed	Disallowed	Allowed
Promotion of non-Possessors to Poss	Allowed	Allowed	Allowed
Concord	Demonstratives (Number)	Demonstratives (Number, Case) Adjectives (Number, Case)	Demonstratives (Number, Case)
CP			
T	Overt	Overt	Overt
	Assigns NOM,	Assigns NOM	Assigns NOM
AGR	1, 2, 3 Person on *be*	1, 2, 3 Person	1, 2, 3 Person Definiteness
Extraction of Subjects	Allowed	Allowed	Allowed
Promotion of non-Agents to T	Allowed	Allowed	Allowed

Table 5.1: Nominal and Verbal Extended Projection Acquisition
Shaded cells indicate features with most direct parallels across domains

work: agreeing, moving, and assigning case. Given these similarities and differences, the first question that can be asked is how the acquisition processes can be compared at the most basic level. To understand this, Figure (5.1) graphs the developing MLUs of all nine children, color-coded for language.

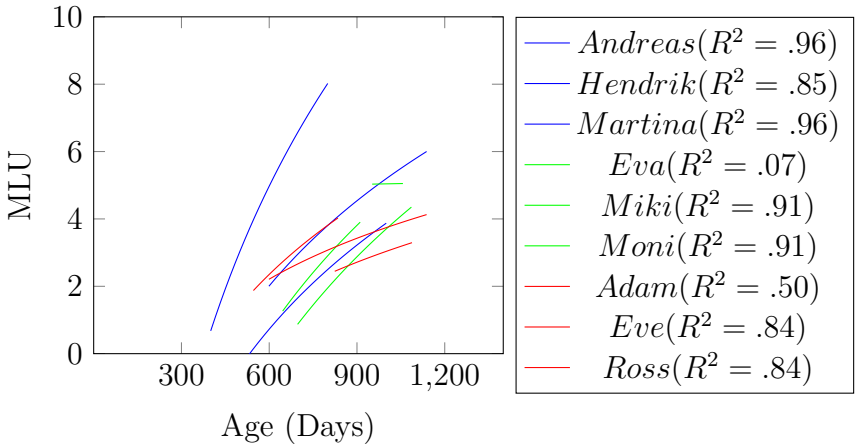


Figure 5.1: Combined MLU

This figure shows that, despite the different languages being learned, all have similar MLU changes. There are some important exceptions. The furthest curve to the left, far apart from the others, represents Martina, the exceptional Estonian learner. An average MLU growth plot excluding Martina is shown in Figure (5.2), in black, along with averages for each language.

This graph again confirms that these children are all developing at a similar rate and suggests that comparing the development in terms of MLU will allow accurate inter-language and inter-child comparisons. This is not entirely unexpected. Though Hungarian and Estonian words may contain more morphemes, at the early stages of child language, there is not a lot of derivational morphology nor otherwise complex words. The main differences that separate Estonian and Hungarian from English are case-morphology and agreement. Agreement development will be compared first.

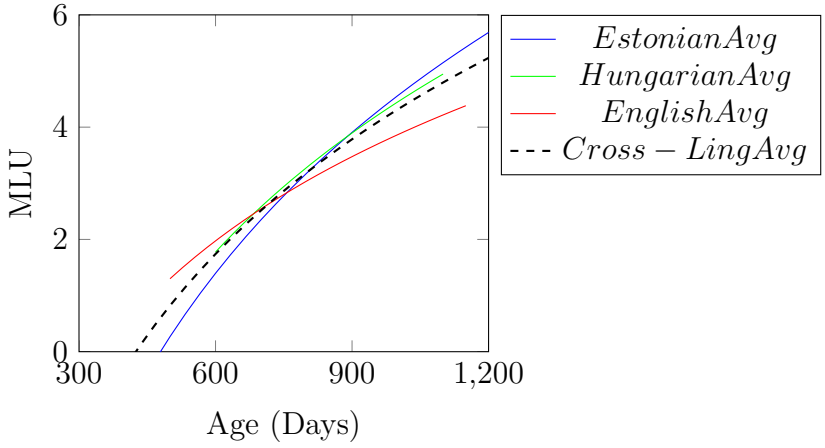


Figure 5.2: Average MLU

Agreement for Estonian and Hungarian is complete for person and number, though Estonian alone has overt agreement for 3SG. Agreement in English was calculated based on either the presence of 3SG agreement on main verbs or an agreeing auxiliary. Figure (5.3) compares this element between the three languages.

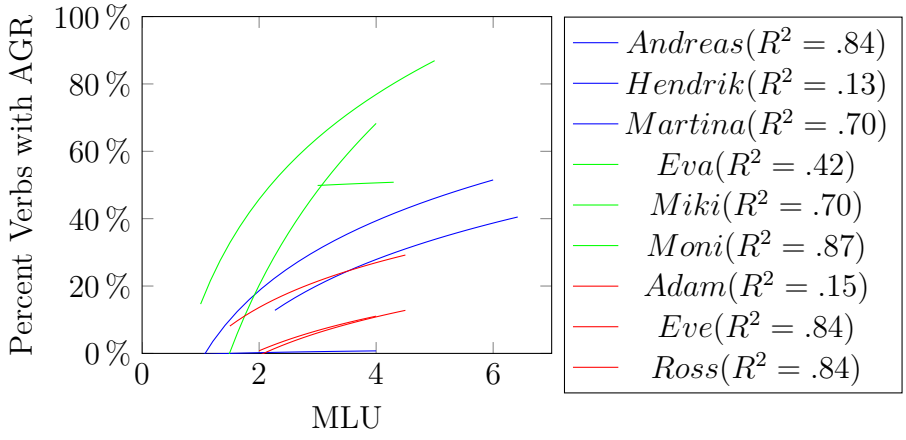


Figure 5.3: Cross-Linguistic Verbal Agreement Growth

In this graph, we see some differences emerge that merit discussion. The Hungarian learners are much more likely to include verbal agreement: all the green lines are much higher than any other lines– even Eva, whose agreement usage seems to drop over the period. The English learners, as expected, show the lowest percentage, if you exclude the Estonian child Hendrik, who recall never seemed to master verbal agreement. Figure (5.4) shows average values for the languages, which excludes Hendrik for the Estonians, as well as the Hungarian learner Eva, whose low R^2 value and lack of growth was discussed in Section (3.2.1).

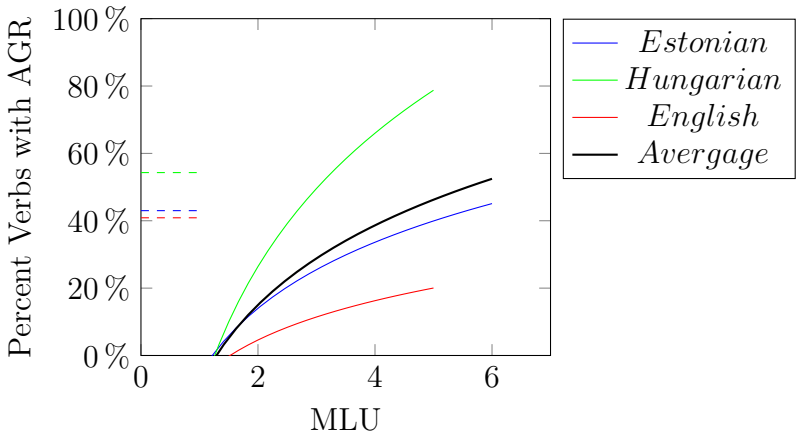


Figure 5.4: Cross-Linguistic Verbal Agreement Growth

Seeing the lines here, it is clear that the average of the Hungarian children's production is much higher. The main difference between the languages is that Hungarian has two different agreement paradigms with a total of eleven different forms (six for the definite conjugation and five for the indefinite, with the indefinite 3SG being null). This compares to six for Estonian and between one and five for English, depending on how you count[1].

[1]English agreement forms would total one if only the 3SG *-s* was included. Adding the unique forms of *be* (am, are, were), which are included as agreeing forms in the calculation yields four

The short dashed lines on the side of Figure (5.4) represent the percentage of verbs in the input that show agreement. Hungarian input contains the most agreeing forms, which is somewhat surprising given that any verb that shows agreement in Hungarian would be expected to show agreement in Estonian as well. In fact, the Estonian input contains just a slightly higher percentage of agreeing forms than English. If input alone were responsible for agreement growth rate, it would be expected that Estonian and English would be quite similar. This is not the case– English agreement inclusion stays quite low. The growth rate is more closely related to the number of agreeing forms: the many forms of Hungarian agreement aid the child in acquiring the relevant paradigms, the smaller number of forms in Estonian are reflected in a slightly slower rate, and English's lowest number is reflected in the lowest growth rate by its learners.

Case-morphology and use of pronouns were tracked to obtain a measure of DP complexity similar to agreement in the CP. Given what was just shown for agreement, two things can be expected. The first is that the pronoun development should be rather similar cross-linguistically, given that all three languages use the same feature distinctions in their pronoun inventory. One caveat is that the possibility of pro-drop in Hungarian and Estonian might depress the percentages seen in the children, even allowing for an early English null-subject stage (Sano and Hyams, 1994). Figure (5.5) shows the development of pronouns as a percentage of all nouns for all nine children.

Compared to verbal agreement, the pronoun rates are all rather similar, especially if you exclude the flat trajectory of Ross, whose trends fit their models rather poorly. The other two Hungarian children are quite similar to the English learners. One Estonian, Andreas, is also quite close to them. The other two Estonians show much lower growth rate. Though standard English has no dedicated second person plural pronoun, which makes its paradigm slightly smaller than the others, this form is

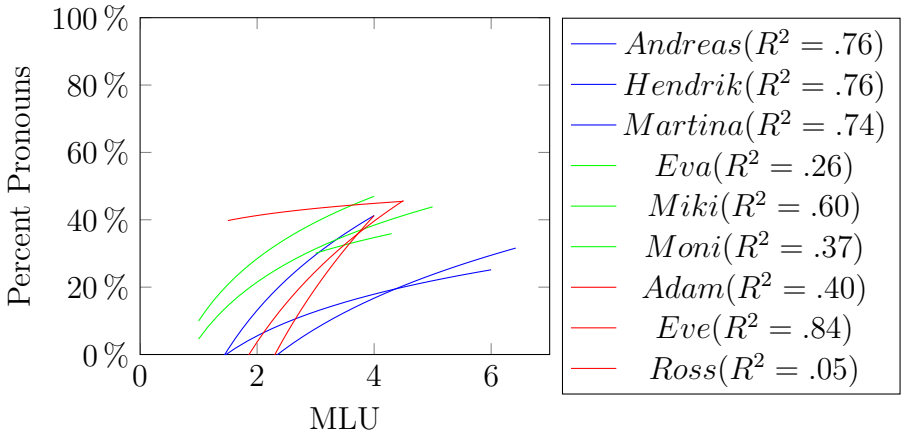


Figure 5.5: Cross-Linguistic Pronoun Comparison

nearly absent from the input in all the languages. Given this similarity between the paradigms, it might be expected this is an input-related trend rather than grammar. To see if this is the case, the averages for each language group as well as input are graphed in Figure (5.6):

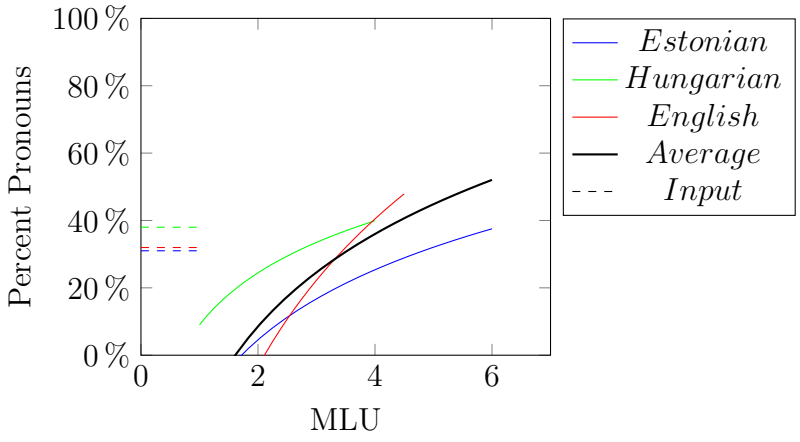


Figure 5.6: Cross-Linguistic Pronoun Averages

The first thing to notice is that despite the availability of pro-drop for both Hungarian and Estonian, the pronoun percentage in the input is strikingly similar, coming

in at 31 % for Estonian, 38% for Hungarian, and 32% for English. The higher rate in Hungarian is reflected in the higher rate in the children. Estonian shows the slowest rate, but why this should be the case is unclear.

The other proxy for DP development was the presence of overt case on nominals, which signal the presence of a complete DP. Case was a central aspect of the morphology for Estonian and Hungarian, and the wide variety of cases present a particular challenge to the children. English, on the other hand, has a much more restricted environment for overt case to manifest, namely the pronouns. Still, the comparison seems to be valid given that non-nominative case on English pronouns appears in all the same environments overt case appears in the other languages. The data represented in Figure (5.7), however, disputes this suggestion.

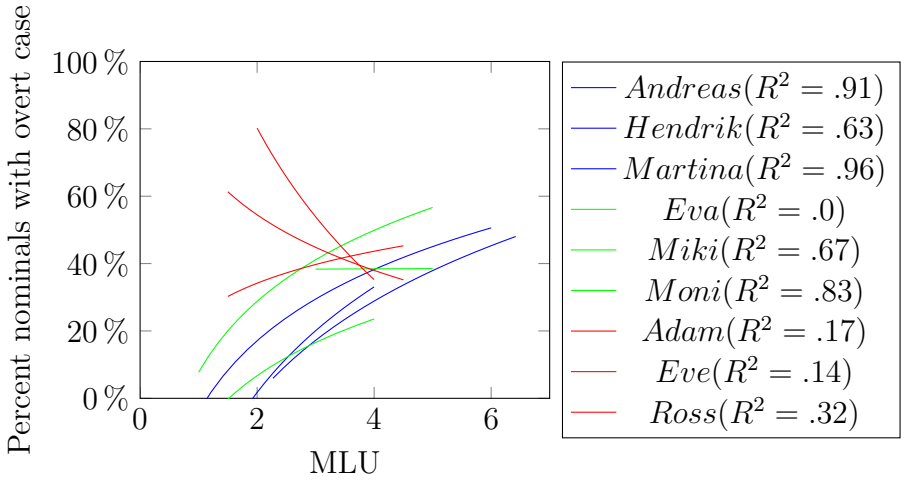


Figure 5.7: Cross-Linguistic Child Case Percentage Comparison

The data shows that while Hungarian and Estonian have very similar trajectories of case acquisition, English is quite different. Non-nominative, overt case steadily increases for all the Estonian and Hungarian children. The English children, in contrast, show more erratic percentages over time, as indicated by the low R^2 values, which grow slowly or actually decline. The reason for this is likely the incorrect use

of non-nominative forms in early stages of acquisition, as discussed in Section (1.3.3). In fact, Vainikka (1993) notes this pattern in Adam's data, as did Pensalfini (1995) for Eve.

Figure (5.8) shows the averages as well as the input levels. All three inputs are quite close to one another, which is not surprising. Estonian and Hungarian very steadily approach the level seen in the input, an expected result where objects and adjuncts are increasing as the overall linguistic capacity increases.

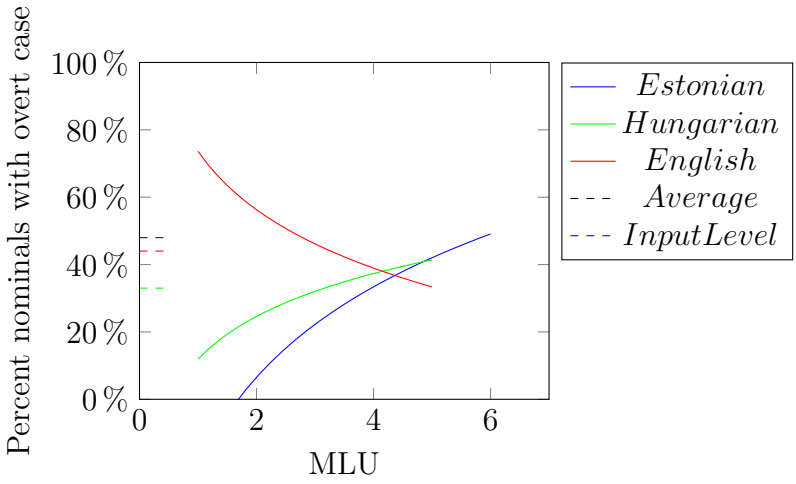


Figure 5.8: Cross-Linguistic Average Case Percentage Comparison

That the English average goes down can be attributed to several things. It was shown with Hungarian agreement that the many different forms actually seemed to aid rather than hinder the children's development. In Estonian and Hungarian, there are a wide variety of case markers which may be having the same effect. In addition, overt case is only manifested on pronouns. While there is overwhelming evidence that case is important to pronouns, it is actually relatively rare for nominals generally. The closest thing lexical nouns have to case markers if the preposition *of*, which was shown in Chapter 4 to also be quite rare. Acquiring case requires also acquiring pronouns;

data for the other languages shows that case consistently appears on lexical items first, underlining the difficulty of acquiring case.

Considering the portion of all nominals which show overt case in English, the input level is actually closer to 14% as opposed to the 40% of all pronouns. This makes overt case rather rare and explains why the children's path toward case-acquisition is not as smooth or successful as Hungarian and Estonian children.

So far, this discussion has shown the extent to which the languages are comparable on the relevant dimensions. It was shown that MLU is very similar across all three groups during the time period in questions. Likewise, pronoun use also is relatively similar across the groups, both in terms of the type of input they were receiving and the paths of the children's acquisition. After this, the different languages seemed to diverge based on the details of their grammars. Hungarian and Estonian overt case percentages are very similar, which is not surprising given the relatively similar role of case in their grammar. Case in English is, as expected, much lower overall and slower to develop. The biggest differences between the languages was seen in verbal agreement, where three distinct trajectories were shown.

5.2 The DP/CP Parallel in Acquisition: Answering the Questions

In the previous section, the basic growth patterns in the children's grammars were tracked, highlighting some of the broad similarities and differences between them all. In this section, the original research questions will be answered in terms the cross-linguistic trends evidenced. To review, here are the original research questions posed in Chapter (1):

- Does the appearance of a particular feature or structural position in one domain predict its appearance in another domain?

- Does child language acquisition data provide evidence for a relationship between case assignment and agreement both within the clause and those phenomena within the noun phrase?

The first question is primarily a syntactic question. The extended projections of the noun and the verb were theorized to have parallel syntactic positions; *n* and *v* selected the roots, T and Poss agreed with and assigned case to lower nominals, and C and D related the linguistic expression to the discourse.

To see how the acquisition proceeded for the children, consider the data in Figure (5.9). Here the MLU for each child is charted at the points where the various functional projections were first evidenced. The important projections, in order of required complexity are *n*,*v*, Poss/T, and D/C. Though the limitations of the available data prevents a complete picture from being seen in the cases where a child's initial sessions already showed evidence of higher functional projections, there is still a clear relationship between the different domains.

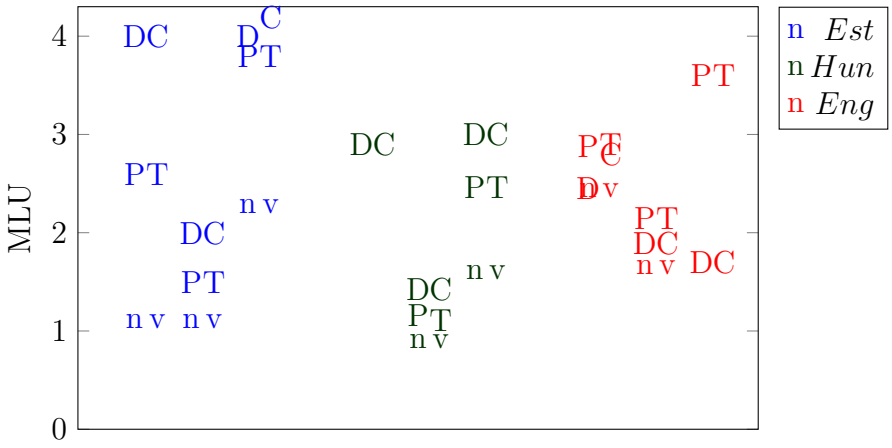


Figure 5.9: Cross-Linguistic Functional Structure Acquisition Points

This chart shows that in nearly every case, every time evidence for a particular functional projection was seen, there was also evidence for its parallel projection in the

same session. Across the languages and across the children, the first noun appeared along with the first verb, the first possessor along with the first marking of tense, and the first complementizers with the first determiners. This is positive evidence for the reality of the DP-CP parallel in acquisition.

Though each projection was acquired at the same time as its parallel projection, the overall order was not identical between languages. Estonian and Hungarian both neatly parallel the developing structure from the bottom up, while English learners all produced the highest level projections, C and D, before the intermediate T and Poss. This is likely the result of ambiguous and confusing evidence for these positions in English. Agreement is inconsistent and often absent in English and abundant in the other two. Though Estonian has no possessor agreement, ample evidence for T might be extended to a child's analysis of nominals. Additionally, case-concord will also help set possessors aside within the DP.

Admittedly, some aspect of this might be trivial. After all, the first sessions did show both nouns and verbs, but had the earliest session been even earlier, it is possible there was a point when only nouns or only verbs were spoken. Importantly though, in these early sessions nouns and verbs both appear within a larger context that suggests truly syntactic nouns and verbs, not just acategorical pronounced roots. For example, verbs appeared along with negation (e.g. Andreas's *ei taha* 'not want', 1;07.24) and nouns with adjectives (Hendrik's *tita uus* 'baby new', 1;08.13) .

Seeing that structural positions seem to parallel each other across domains, the other part of the research question involves the appearance of *features*. Person and number features may be represented in the different domains in two types of contexts: agreement morphology in the verbal domain and pronouns in the nominal domain.

Figure (5.10) shows the difference between average MLU at the point where a particular feature combination was acquired. To take into account individual differences

in MLU, the numbers expressed are percentages: for example, if the 1SG pronoun is produced at MLU of 3 and the corresponding agreement morpheme at an MLU of 2, then there is a -50% preference for agreement.

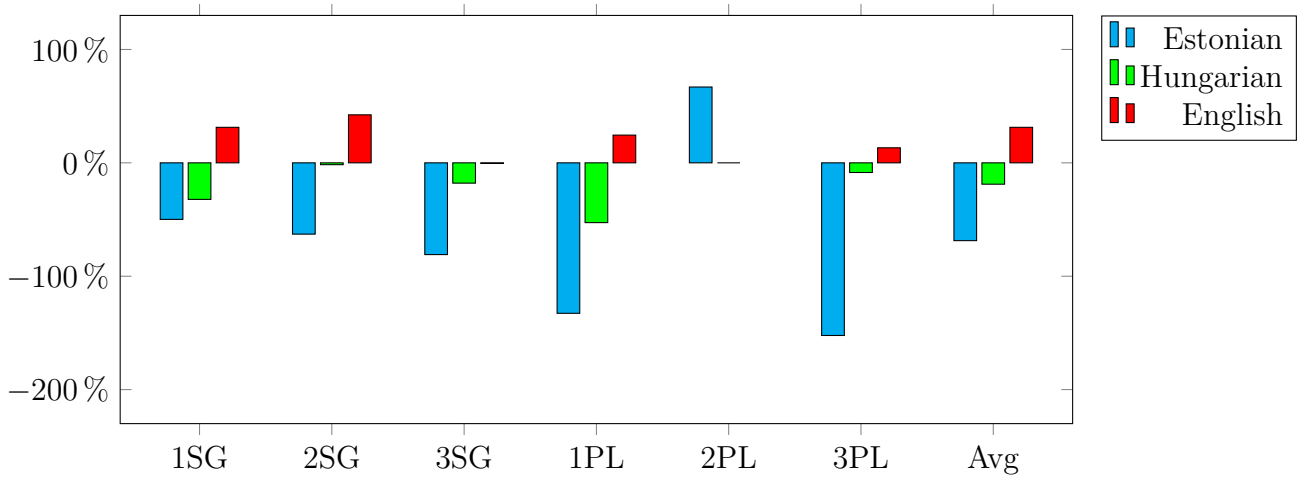


Figure 5.10: Nominal / Verbal Feature Preference
Positive numbers indicate pronoun preference; negative numbers indicate agreement preference

It is seen in Figure 5.10 that both Estonian and Hungarian have preferences for agreement in nearly all cases. The exceptions are the lack of preference for Hungarian in both second-person pronouns, and Estonians' pronominal preference for second person plural. Notably, these are both rather rare forms in the production.

That English shows a consistent preference for pronouns over agreement is not surprising. Recall that agreeing forms only include copulas, auxiliaries, and 3SG present verbs. Though they are common in the input, they are not as common as inflected main verbs are in the other languages– see Figure 5.3. It is also worth recalling that the total amount and speed at which agreement morphology is acquired is more closely related to the amount of agreement in the grammar as opposed to frequency in the input.

All together, the data show that the DP-CP parallels are not reflected in the acquisition of person and number features. Instead, the development of each are independent and related to a combination of the specific details of the grammar as well input frequency. Comparing pronouns with agreement combines the syntactic and morphological, in the sense that the pronoun feature bundles are a part of the syntactic derivation from the start, while agreement morphology is only inserted post-syntactically. That both agreement and pronominal preferences exist shows that neither origin (syntactic/post-syntactic) is necessarily more challenging. This contrasts with the data seen regarding particular functional projections, where there was parallel development in the different extended projections.

The next research question concerned the development of agreement and case-asignment parallels between DPs and CPs. Hungarian differs from the other languages in that it features the clearest example of feature-parallels with both nominal and verbal agreement. The patterns seen within Hungarian were discussed in Chapter (3). Though parallel agreement cannot be addressed in this comparison since Estonian and English do not feature it, parallels in case-marking can. All three languages use nominative case-marking for subjects. Estonian and English use genitive case-marking for possessors, while Hungarian uses dative and nominative. Similar to what was done for the agreement-pronoun comparison earlier, the MLUs at the point that NOM case was acquired was compared to the MLU when the possessor case acquired, giving a percentage preference for one or the other.

The data is presented two ways– in Figure (5.11), the average preference for each child overall is presented, along with overall averages. It shows an across-the-board preference for subject cases over possessor case, though one child in each group showed no preference. The preference was strongest for Hungarian– not a surprising result given that the DP-internal possessor surfaces without overt case, like a nominative.

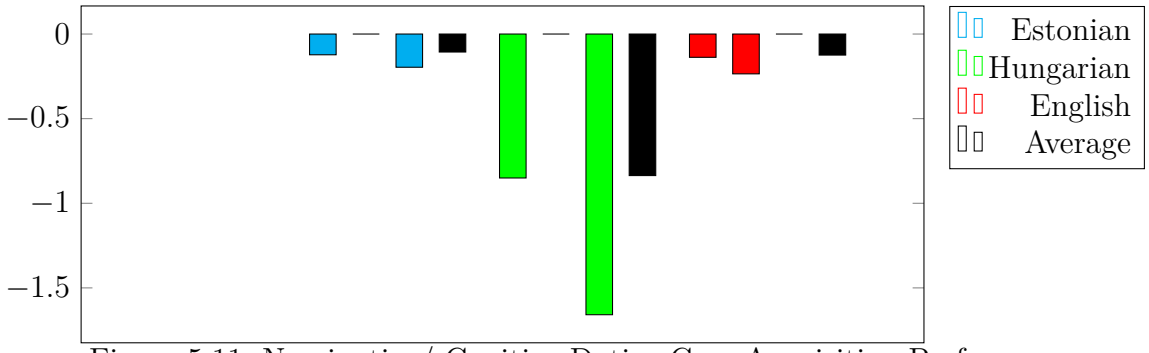


Figure 5.11: Nominative/ Genitive-Dative Case Acquisition Preference
Positive numbers indicate GEN/DAT preference; negative numbers indicate NOM preference

Examining case-acquisition across person/number combinations averaged per language group reveals a different look at the data, shown in Figure (5.12). This reflects the same trend as seen in the previous figure, though seeing the averages for the pronouns helps show the differences. The rarest person/number combination, second-person plural, is actually absent for Estonian and not calculated for English. For Hungarian, however, this rare form actually shows a great preference for the dative case. In all other combinations, Hungarian had strong nominative preference– most often the strongest, in fact. It also shows that Estonian, despite a modest overall tendency for nominative to appear earliest, genitive is earlier for two of the five combinations where there is data.

It is unclear what can be made of this data. The overall number show a nominative preference, but a closer look shows more ambiguity. As the original research question puts it, is there a relationship between the acquisition of case-marking within the DP and within the CP? These figures suggest that, at least in terms of acquiring and producing the morphology, there does not seem to be a relationship. That said, the fact that the data is so different for the different children and forms, the path

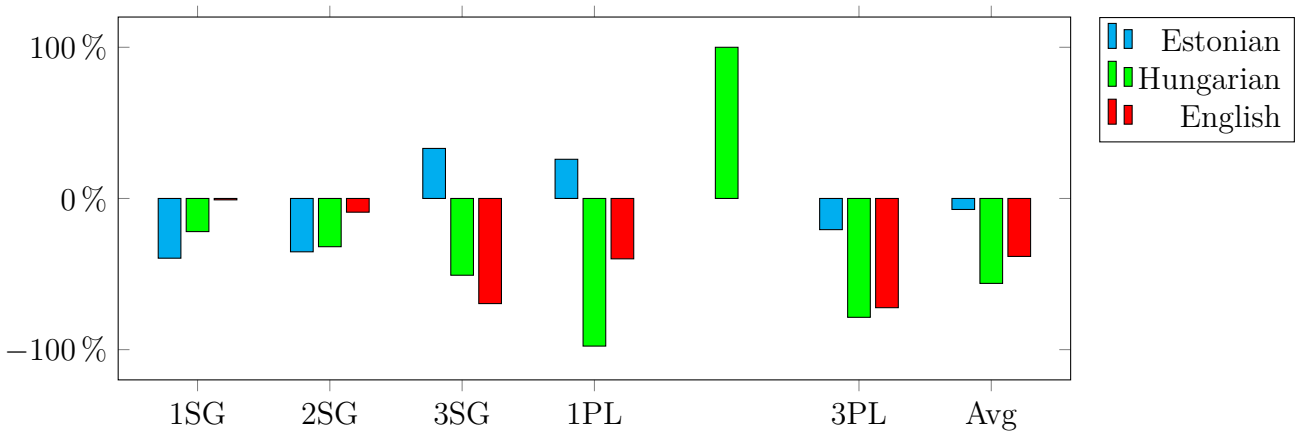


Figure 5.12: Subject versus Possessor Case Acquisition Order
Positive numbers indicate Poss/GEN/DAT preference; negative numbers indicate T/NOM preference

also seems unrelated to frequency (where nominative is always significantly more common), which suggests other, unknown factors guide the process.

Exploring possible relationships between CP and DP acquisition has so far included comparing syntactic projections, person/number feature production, and structural case-assignment. The next step will compare the syntactic/semantic notion of subjects with possessors. The first part will examine the growth rate of subjects and possessors in the language groups. As has been mentioned previously, eventually all full CPs will contain a subject, though not all DPs will have a possessor. This places a much different limit on their eventual levels. That said, the trajectories may still shed light on how the two are related, especially in the earliest stages.

Figure (5.13) shows the growth of subjects in two different ways. The solid lines indicate what portion of all nouns are subjects, while the dashed line indicates how many utterances contain subjects. These two different depictions were done to high-

light subject-growth while also taking into account that more complex utterances were also more likely to contain adjuncts and objects.

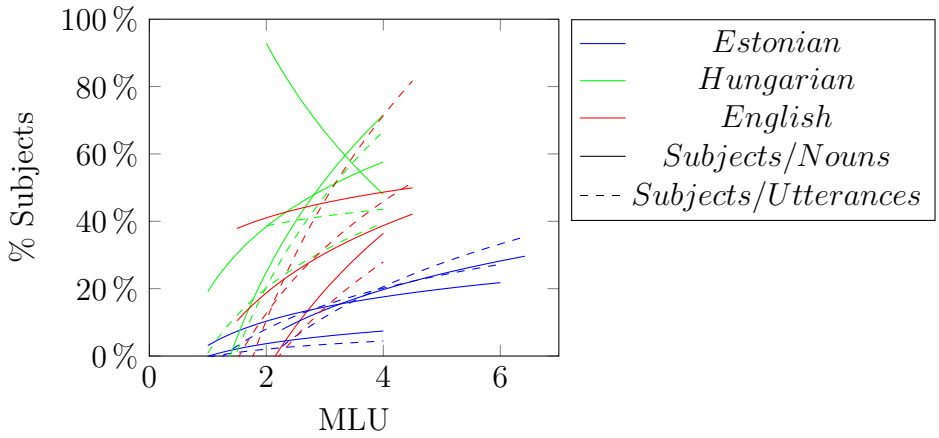


Figure 5.13: Cross-Linguistic Children Subject Rate

The figure shows rising rates for all the children but the Hungarian child Eva, who has been an outlier in many measures. Each language group's paths are rather close to each other, with Hungarian showing the steepest growth, and Estonian the slowest. The average path is shown in Figure (5.14).

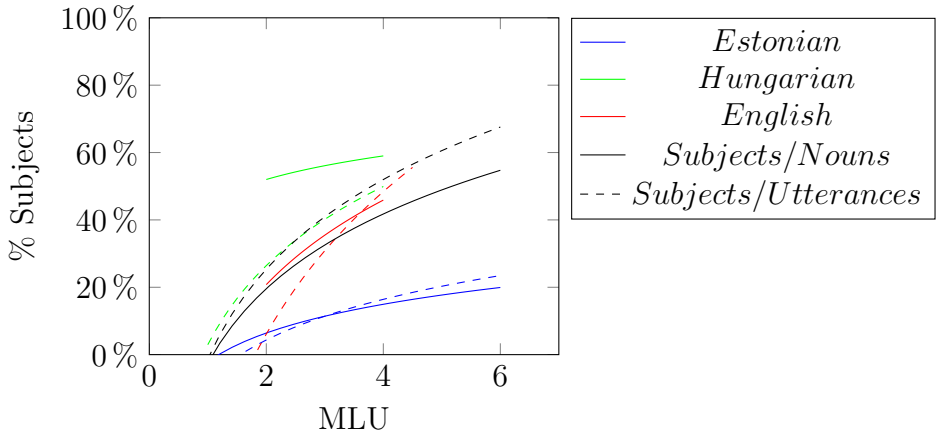


Figure 5.14: Cross-Linguistic Children Subject Rate

This simplified figure shows that English children seem to use subjects at a rate somewhat between the other two language groups. There is no reason to believe there

is a difference in how these languages use subjects, so there is no clear reason as to why there should be such different paths in the languages, especially given that the two with the most in common actually differ the most. The difference between the portion of utterances with subjects and nouns that are subjects are also large when comparing between languages. For Estonian, the difference between them is quite small, indicating an overall lack of non-subjects in the utterances. The Estonian numbers are also quite low– even at long MLUs, the portion of utterances that have a subject is less than 40%, even lower for Hendrik (see Figure (2.22) in Chapter (2)).

These questions are interesting in themselves, but they do not get to the comparison, which requires analyzing possessor rates as well. Figure (5.15) depicts the changing number of possessors for all three children, here only shown as percentage of total nouns.

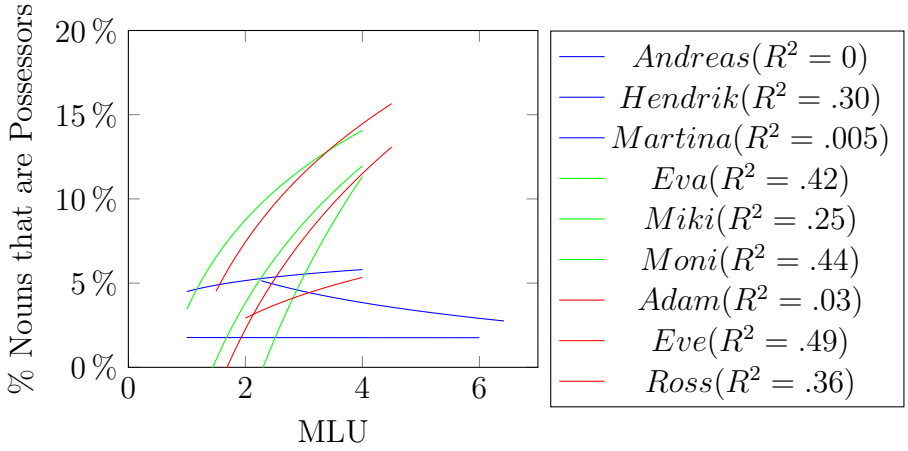


Figure 5.15: Cross-Linguistic Possessor Percentage

Because of the low numbers of possessors in the data and the flat growth rate, the R^2 numbers for many of the children are quite low. Again, there is a large divide between Estonian on the one hand and Hungarian and English on the other. In this case, there is not a large difference between the latter two, except for the very low

use of possessors across one English learner. Simplifying the picture is Figure (5.16), which shows average values for the children as well as an overall average rate.

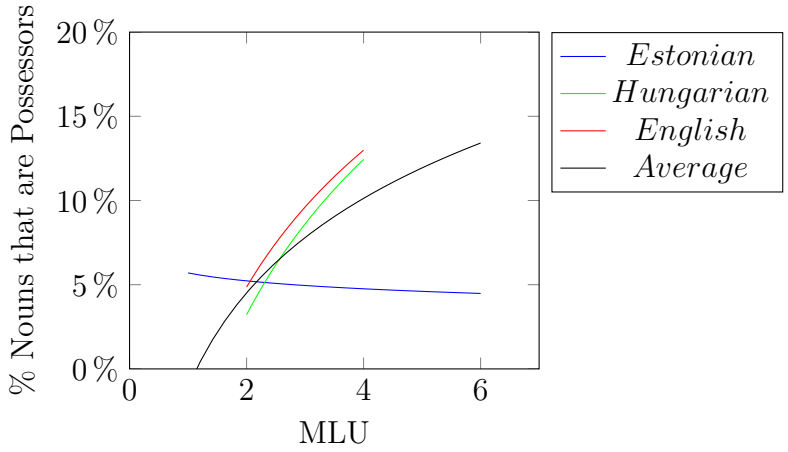


Figure 5.16: Cross-Linguistic Possessor Percentage Averages

The simplified graph emphasizes the similarity between possessor growth in Hungarian and English– their average rates are nearly identical to each other. Estonian, on the other hand, does not grow much at all, hovering right around 5% of all nouns, even as MLU triples. There is clearly a capacity for representing subjects when the MLU is above six. One possible explanation for the difference involves the particulars of morphology for the languages. English and Hungarian have morphology that is particular to possession. The Poss head itself is actually realized in these languages, albeit not always. Additionally, English genitive pronouns are used exclusively for possessors, and Hungarian has possessor agreement. Any of these factors might make acquiring the Poss head and its features easier. Estonian, in comparison, never has a phonetically realized Poss. Additionally, the possessor case is used as the base for all the semantic cases and is suppletive with the accusative. That Poss has no unique characteristics might be reflected in this slow growth.

The four preceding graphs illustrate the differences between subject and possessor growth. To more easily see what relationship there is, Figure (5.17) shows the subject and possessor growth rates grouped together, allowing immediate comparison between them. This time, though, subjects are not shown in terms of all nouns but in terms of utterances. In this way, the comparison is between how many utterances have subjects and how many DPs have possessors.

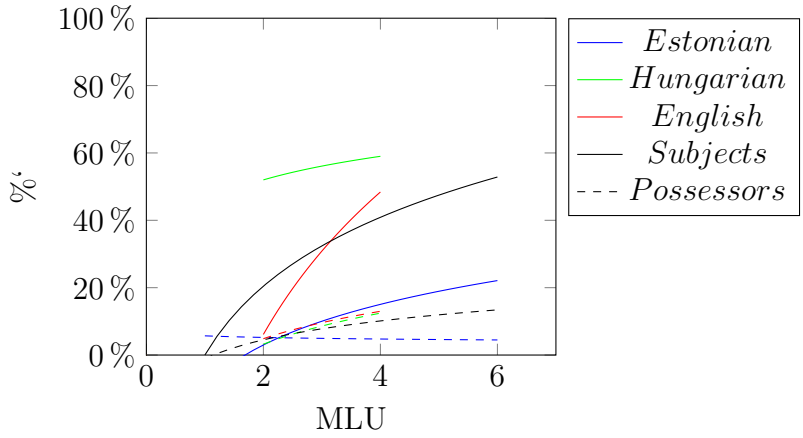


Figure 5.17: Cross-Linguistic Subjects and Possessor Percentage Averages

The figure seems to show the basic lack of a relationship between possessors and subjects, but it is possible there is more to look at than simply percentage growth. In Hungarian, where possessors and subjects have the most in common, there is a very wide difference in rates and the overall change. Nonetheless, the figure does show that over the period where subjects in Hungarian go from around 30% to around 60% and possessors from 5 to 15%. Though the total percentage changed is much different for the measures, the ratio might be meaningfully similar.

Following this line of thought, Figure (5.18) shows the difference between the subject growth rate and the possessor growth rate. If both are changing at the same rate, then this will be zero; higher numbers indicate subjects are growing faster. This is an attempt to understand how possessors and subjects develop in the grammars

while taking into consideration their much lower absolute numbers and presence in the child production.

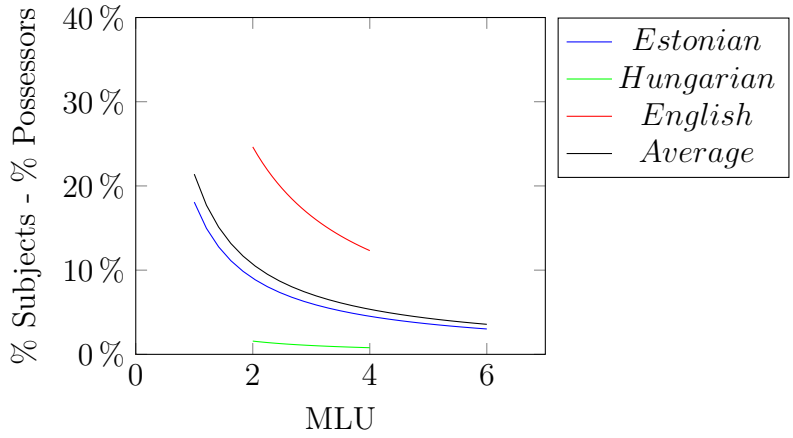


Figure 5.18: Cross-Linguistic Subjects and Possessor Growth Rate Differences

It can be seen in the Figure 5.18 that for English and Estonian, as total MLU increases, the difference between the subject growth rates and possessor growth rates gets smaller and smaller, but subjects are always most common and earliest to be included in production. For Hungarian, on the other hand, the difference between growth rates is quite small and stays small. This shows that despite the overall difference in frequency, children are adding possessors to their production at the same rate. This great difference can surely be attributed to the similarities between subjects and possessors in both their morphology and syntax. The extra evidence for the Poss position in the DP seems to be an advantage for the Hungariann learners, allowing them to posit the position in their grammar earlier.

This section of the chapter has addressed the research questions specifically, and the answers are somewhat mixed. Regarding structural positions, it was shown that there does seem to be a relationship in the development of the CP and the DP: the successive steps away from the root in the nominal and verbal extended projections were

acquired in concert. Particular features, on the other hand, did not develop in parallel: the languages with more agreement morphemes acquired those morphemes first, whereas person and numbers features appear on pronouns first in English. Though this result does not support the parallel approach, it is interesting in itself and will be discussed further in the following section.

The second question concerned the morphological reflexes of syntactic operations: agreement and case-assignment. Though only Hungarian had agreement that could be compared across the domains, case-marking provided an opportunity to compare across groups. Here there was also little evidence seen in support of a parallel development. Estonian's results were moderately supportive of this relationship, with DP-internal case-marking being acquired prior to nominative in some instances, though even Estonian on average showed a preference for NOM, as did Hungarian and English.

Finally, stepping back from strictly morphological realizations, subjects and possessors themselves were analyzed. Once again, it was shown that subjects were earlier and grew faster. The nearly consistent fact that the CP-related elements were acquired earlier across particular manifestations suggests rather than a parallel, there is in fact a preference for these elements in the verbal extended projection. Hungarian was different from the other languages, where though overall subject rates were higher, the rate growth of possessors and subjects were similar. Though the evidence does not unambiguously support the motivating idea of this project, there were still many interesting results with implications for research into language acquisition and theoretical morphosyntax. These and other ideas for future research will be addressed in the final section.

5.3 Summary & Future Directions

The final section of this chapter reviews some of the findings of the project in a wider context than outlined in the research questions. First, the results will be used to explore the DP-CP parallel from a theoretical point of view. The data from the three languages indicate a significant parallel in the development of syntactic categories, contrasted with morphological development that varies in language-specific ways and is not reflective of any similarities between nominal and verbal development. The second section analyzes these results in terms how they can inform acquisition generally. The final section concludes with some possible future research directions suggested and inspired by the project.

5.3.1 The DP-CP Parallel, Reviewed

Section (1.2) discussed the basic facts and motivation for the DP-CP parallel and mentioned some arguments against it. This section will briefly review the arguments and show what the results from the nine children analyzed here *can* tell us about these parallels. Though the results discussed thus far did not support a strong one-to-one relationship between elements and processes across DP and CP, there are other ways in which the data did support the parallels.

The first aspect involves the framing of the parallel in general. A neutral take on the parallel would place it in terms of the nominal and verbal extended projections: there are nominalizing or verbalizing heads N and V, and functional projections extend from them, though the syntax of the verbal extended projection does not directly relate to that of the nominal extended projection. In this sort of approach, there would be no need to be explicit about what corresponded to what and no need to

address every part of the functional structures, like quantifiers, demonstratives, and number or force, polarity, aspect, *et cetera*.

This study, though, did explicitly posit which functional heads were parallel to each other. N and V combine with acategorical semantic roots to form a minimal syntactic object. Poss and T do the same sort of grammatical/functional work: they both assign case to agree with a lower DP and have similar semantics between nominal/verbal roots. Finally, C and D both connect their complements to the discourse, by signaling semantic force or picking out referents.

From here, the situation is a little less clear. Poss and T were chosen as the next pair of complementary heads, though it is possible, however, that a different pair of categories is more appropriate. For example, Ritter (1991) suggested that DP takes a NumP complement rather than NP, with possessors being in SpecNumP. If this is the first functional projection above N, perhaps this is the best comparison to the acquisition of T.

A quick look at the data in Table (5.2) shows the first acquisition point of T compared to Num and Poss. It was shown earlier that there is a closer relationship between Poss and T, which was taken as evidence for one aspect of the parallel. This table calculated the difference in MLU at the point T and Poss were acquired compared to when T and Num were acquired. Positive numbers indicate that Poss was acquired more closely to T.

As the Table 5.2 shows, in no case was there a closer relationship between Num and T than there was between Poss and T, though for Adam, all three of the relevant structures were evident at the same session. The biggest differences come from Estonian, while the smallest are shown in Hungarian. This data confirms that there is something special about the Poss/T comparison; it is not just a matter of additional structural complexity.

Language	Child	T	Poss	Num	Percent Different
Estonian	Andreas	1.82	3.91	1.82	114.8%
	Hendrik	1.62	2.66	1.33	46.3%
	Martina	2.27	3.86	2.27	70.0%
Hungarian	Eva	3.02	2.5	3.02	17.2%
	Miki	1.1	1.43	1.18	22.7%
	Moni	2.46	2.56	2.46	4.1%
English	Adam	2.43	2.43	2.43	0.0%
	Eve	1.65	2.09	1.65	26.7%
	Ross	2.1	3.6	2.1	71.4%

Table 5.2: Difference between acquisition of Poss and Num compared to T
Positive percentages indicate Poss was acquired more closely to T than Num was

Though there are numerous intermediate projections in both types of projections, it is not worth comparing every possible pair. That said, one more pair should suffice. As mentioned earlier, some (e.g. Lamontagne and Travis (1987); Bittner and Hale (1996)) consider the highest nominal projection to be K(ase)P rather than DP. To explore this idea, the first realizations of case were compared to the first determiners and complementizers in the same manner as T was compared to Poss and Num. These results are shown in Table (5.3).

The results are different from the previous set but are quite interesting. In six out of the nine children, case and determiners are produced at the same session. In the other instances, D is more closely related twice, and only in one– Eve– is case more closely associated with complementizers than determiners. Rather than suggesting that a KP is the appropriate equivalent of the CP, they actually confirm that the DP is the more appropriate analog of CP. Additionally, these results reiterate the close relationship between case and DP-hood.

Language	Child	Comp	Case	D	Percent Different
Estonian	Andreas	2.92	1.82	1.82	0.0%
	Hendrik	1.2	2.23	1.47	63.3%
	Martina	6.37	3.86	3.86	0.0%
Hungarian	Eva	3.02	3.02	3.02	0.0%
	Miki	1.16	1.19	1.19	0.0%
	Moni	2.46	2.46	2.46	0.0%
English	Adam	2.43	2.43	2.43	0.0%
	Eve	1.89	1.89	1.65	-12.7%
	Ross	2.1	1.7	2.1	19.0%

Table 5.3: Difference between acquisition of D and Case compared to C
Positive percentages indicate D was acquired more closely to C than Case was

None of this is to suggest there are not good reasons for analyzing nominals in terms of KP, and the NumP projection is critical for analyzing nominal structure, especially in Hungarian. What these tables do suggest though is that there is something real about these specific projections and how they develop in acquisition. Though none of the specific arguments against the DP-hypothesis of Bruening (2009), mentioned in Chapter (1.2) can be refuted by what has been shown, in the aggregate they do support the overall structural and functional similarities between the DP and the CP.

5.3.2 Formal Approaches to Acquisition, Reviewed

In Section (1.3.2), three broad styles of formal approaches to language acqusisition were discussed, showing some of the differnt ways to view functional development in child grammars. These were called the Strong Continuity, Weak Continuity, and Maturational approaches. This section will review the basics of these assumptions

about grammatical development and see how the results from the study comport with them.

The Strong Continuity approach holds that the principles and functional structure of the child grammar are in identical to that of the adult, although the child may not have learned all the details, such as morphology or movement, in a precisely adult-like manner. Evidence to support this often involved finding evidence for complex functional structure at early stages of acquisition. Poeppel and Wexler (1993), for example, analyzes the speech of a German child at 2;1, finding a wide range of morphosyntactic data consistent with a developed C- and I-system. Similar results were not found in the children studied here.

By the age of 2;1, five of the nine children showed evidence of a C-system, but four did not. Even for the ones that did, when the data goes back far enough, there is certainly a stage where there is not evidence for any sort of functional structure. Poeppel and Wexler also suggest that the reason for occasional null-agreement allomorphs is due to confusion with grammatical null allomorphs in spoken German: the null version is in competition with an overt version and the child had not yet figured out the specifics of when to use which. This can be contrasted with the data in Estonian, where there is no agreeing null allomorph. The young Estonians continually omit agreement after they have first produced it. This shows that there is actually a missing morpheme, not confusion about the appropriateness of a null version.

Looking at the longitudinal data, there are many examples of grammatical elements that are not present at one stage and then present later. The examples of agreement found between 1;07 and 1;09 that Félix-Brasdefer (2006) used to support the early availability of functional features is contrasted in the study here. Only Martina had acquired agreement at a comparable age (1;05, in fact) but agreement

for others was seen as late as 2;02 for Moni and Hendrik, and Hendrik only barely produced agreement by the end of his sessions.

This brief look suggests that there are large differences between the early grammar and the adult grammar and that a strict interpretation of Strong Continuity does not describe the data well. It is not clear that the Maturational view, like Radford (1996) is a more accurate description of the process. This view holds that an initial, lexical-thematic grammar rather suddenly attains a functional, non-thematic status.

The data from the children with the earliest sessions does seem to support an analysis of an early lexical-thematic stage. All the children who start with MLUs under 2 produced utterances that were most often just a single verb, a single noun, or a verb and a noun– either a subject or an object. The functional material came out gradually. The question is whether the subsequent development was continuous or step-wise. The maturational view holds that once the child reaches a certain point, the grammar will develop all manner of functional material. C- and I-, and D- and Poss-related will all be accessible to the child once this stage is reached.

The Strong Continuity approach held that all these categories should be available from the start, which was shown to be inaccurate. Similarly, the data does not support the maturational analysis. The subsequent development of the grammar once nouns and verbs begin appearing with functional material is much more gradual. To show this, the point when T was acquired was compared to when there was evidence that C was acquired, with the results indicated in Table (5.4).

In four of the nine cases, both categories are evidenced at the same time. Of the remaining five, four support an earlier acquisition of T and one the earlier acquisition of C. At first glance, it appears that this data supports the Maturational account, though a closer look indicates some problems with it. Nearly all the children that seem to acquire C and T at once have an MLU above two, suggesting that there is

Language	Child	First T	First C	Result
Estonian	Andreas	1.82	2.92	T is first
	Hendrik	1.62	1.2	C is first
	Martina	2.27	6.37	T is first
Hungarian	Eva	3.02	3.02	Same Time
	Miki	1.1	1.16	T is first
	Moni	2.46	2.46	Same Time
English	Adam	2.43	2.43	Same Time
	Eve	1.65	1.89	T is first
	Ross	2.1	2.1	Same Time

Table 5.4: C- and T- Acquisition Comparison

not so much a simultaneous acquisition but that the data is missing a crucial stage. Though the average utterances are low, even at early stages there are individual utterances long enough to provide the correct environments. All the children that have earlier data available show that T comes first, followed by C. The exception to this is Hendrik, whose data starts very early but also acquired C much earlier. Though this is difficult to account for, it does not support a maturational view.

In the maturational view, case-marking and agreement are also supposed to become active once this functional-grammatical stage is reached, but it has been shown that neither case nor agreement develop in the grammar at once. Nominative always precedes possessor cases, indicating that frequency plays a large role in the acquisition timeline– no grammatical switch-flipping results in a sudden widespread appearance of case. Frequency too, it was shown, is stronger than whatever structural parallels there are that might also contribute to a step-wise acquisition of functional material. This pattern was reiterated with person and number features in agreement–

they were acquired in a piecemeal fashion and in varying orders, certainly not in a manner consistent with some grammatical operation becoming sufficiently mature.

Having seen that neither the Strong Continuity nor the Maturational view seems to capture the facts uncovered in the research project, it only remains to compare the results to the Weak Continuity predictions. Vainikka (1993) suggested that children go through distinct stages where first VPs appeared alone, followed by TPs, and finally CPs. Vainikka studied two of the same corpora used here, so it is not surprising that there would be similar results. What is more interesting, however, is that the results were also found in the other language groups.

Vainikka did not address development in the DP, only paying attention to how case developed in relation to the verbal categories, though similar stages were shown in nominal development. The particulars of case acquisition are worth mentioning. Estonian and Hungarian children did not have the same trouble with case as English learners have. This is likely related to case being more transparent and consistent in these languages and not limited to pronominal forms.

The Hungarian and Estonian children showed case acquisition patterns that were reminiscent of this gradual structure building. Nominative case came first in both groups. This differs from English and seems in contrast to the NOM from T hypothesis inherent to Vainikka's approach. Estonian and Hungarian nominative case forms can be said to be unmarked in a way that is not true for English, so these early forms may be unspecified for case. In Hungarian, nominative was followed by accusative and dative and in Estonian by genitive and accusative. Each of these subsequent cases are associated with a syntactically higher head[2].

[2]To review the development of case in the individual Estonians, refer to Figures (2.7), (2.11), and (2.15). For the Hungarians, see (3.6), (3.10), and (3.14).

The other Weak Continuity approach discussed earlier was Hegarty's 2005. His theory suggested that processing limitations in children caused them to create functional heads with feature-bundles that differed from the target bundles. While the current study's analysis could not be readily adapted to evaluate this point of view, the children's grammatical development was strongly affected by the feature composition of the utterances. This effect is consistent with Hegarty's outline, though it does not entail the positing of unique syntactic heads by children.

To review the findings at a high level, it was shown that the syntactic development of the children proceeded continuously, with the overall complexity steadily increasing. This fact was shown by the ever increasing MLU of the children, as well as the syntactic analyses of the data that showed development of functional categories. Refer to the figures in Section (5.1) to review this development.

Morphological development, in contrast, proceeded in a different manner. The first items that a child may spell out are those that consist of roots only. This is unsurprising and corresponds to the earliest stages where the MLU is less than two and the language children produce predominantly consists of nouns and verbs. The utterances of (34) are typical of this stage where no functional material is present.

(34) a. kass siti
box bug
Bug in the box- Andreas, 1;07.24, MLU: 1.1

b. anu gyeje
mom come
Mom is coming- Miki 1;11.02, MLU: 1.2

c. car come

Eve 1;06.01, MLU 1.65

The next items to be spelled out are those that represent a root along with one grammatical feature or one free morpheme that represents just one feature. Examples of this are nouns with case like (35b), or verbs with agreement or tense as in (35a), but there are no pronouns with case morphology nor verbs with both tense and agreement. Example (35c) is more complex than the other two utterances, with both a root with a feature (a noun with case) and a free morpheme (a determiner), but no individual words of greater complexity. This point requires a longer MLU sufficient to produce the complicated utterance. Despite this limitation, there are long utterances, showing there is a strong capacity for language but a limited capacity for morphological complexity.

(35) a. lenda-s ära

fly-PAST away

It flew away, Andreas 1;10.22, MLU: 1.8

b. kacsoj-ad be a magnó-t

turn-2SG off DEF TV-ACC

Turn off the TV, Miki 2;03.04, MLU 1.8

c. You read

Eve 1;06.01, MLU 1.9

In the next stage, represented by the utterances in (36), roots continue to appear along with functional features, though now purely functional feature bundles that represent more than a single feature are produced. The dative third-person pronoun

in (36b) is an example of this. Though English morphology does not allow as many opportunities for these functionally complex bundles, the negative auxiliary *don't* in (36c) is representative of a featurally-complex bundle, reminiscent of Hegarty's developing structures.

(36) a. Atsu hoia-b tool-ist kinni
Andreas hold-3SG chair-ELA up
Andreas holds onto the chair, Andreas 2;01.12, MLU: 2.92

b. és mi-t mond a maj-om neki
and what-ACC say DEF monkey-1SG 3SG.DAT
And what does my monkey say to him?- Miki 2;09.11, MLU: 2.8

c. i do-n't wear my sweatshirt
1SG.NOM AUX-NEG wear 1SG.GEN sweatshirt
Eve 2;01.15, MLU 3.1

Finally, the utterances in (37) show a wide range of functional material present on roots. Feature-heavy free morphemes appear, such as past tense auxiliaries, pronouns with non-nominative case, or morphologically complex words representing significant syntactic structure, such as in (37b). Again, English morphology is not as clear on this point, though the combination of the first person singular pronoun with the modal suffix in (37c) is in effect a functionally complex head.

(37) a. ma taha-n seda
1SG.NOM want-1SG DEM.PRT
I want that, Andreas 2;4.13, MLU: 3.9

b. ad-t-unk neki enni-való-t
give-PAST-1PL 3SG.DAT eat-NMNL-ACC
We gave him edibles, Miki 1;11.29, MLU 3.5

c. I-ll be mov-ing the stool
1SG-MOD BE move-PROG DEF stool
Eve 2;01.15, MLU 3.1

This progression can be summarized as follows: First, roots appear alone/with their categorizing heads[3] with no functional features, as in (34). Then, functional items first appear in the grammar, either as free morphemes (auxiliaries or pronouns) or bound to a root as agreement or tense, as the examples in (35) show. Next, functional items increase in complexity, with bundles representing multiple features, like overt case on pronouns, such as in the examples in (36). Finally, both roots and functional heads with complex morphology will be produced, like the examples in (37).

This morphological development shows acquisition to be best described by the Weak Continuity approaches. Syntactic development begins from the roots up, with functional categories increasing steadily. At the same time, morphological complexity also increases steadily, with the ability to represent functional features– both on roots and alone– gradually increasing. Initial grammars only represent structure and features step by step, but the progress is steady.

5.3.3 Future Directions

The project has answered some questions regarding the nature of the DP-CP parallel and provided interesting results applicable to language acquisition and morphosyntax

[3]See Section (1.4) for discussion

generally. These results, and especially their limitations, offer several interesting paths for future research.

The biggest opportunity involves an expansion of the target languages. One unfortunate limitation of the study was that only Hungarian had overt possessor agreement. Though the structure of the DPs across all three languages was shown to be basically similar, the relationship between agreement in the nominal and verbal domains was only possible to study in the context of one language. Though this offered an interesting contrast, a comparison between languages with similar morphology in addition to similar syntax would make great comparisons.

Many such languages do exist: for example, Finnish, Turkish, Welsh, and Inuit all have possessor agreement and a range of other grammatical characteristics that would make them good sources of comparison (Nichols and Bickel, 2013). Welsh and Turkish have the additional advantage of having readily available data in CHILDES. (The length of time and resources required for longitudinal studies would make embarking on a study of the other languages rather difficult.) Coming at the issue from a different angle, languages with substantially less morphology would provide another interesting contrast for exploring how nouns and verbs develop when they share even less in common. Whereas the development of DP and CP might be expected to track each other in a language like Hungarian where there is so much morphology in common, contexts where the similarities were less obvious would shed light on how much morphology matters compared to the underlying syntactic structure.

Another opportunity is to push the parallels even further. Previously, it was shown that other syntactic projections like KP and NumP did not correspond any closer to potential counterparts than DP and PossP. It is possible that there are other pairs that are worth exploring. One that comes to mind is the head responsible for assigning accusative case, Voice. Being a syntactic head between V and T, it seems like a possible

complement to Num. On the other hand, it assigns case like T and Poss. This unique set of properties, combined with the fact that there is not always a morphological realization of Voice itself, would make it an interesting locus of study.

Other elements in the extended projection might also be worth exploring, as well as the development of adjectives and adverbs. Adpositions provide another functional head that would be an interesting comparison. A language like Welsh that has morphological agreement present in prepositions would be a great place to start to compare syntactic and morphological development over time.

It may be that the DP-CP parallel itself does not play any specific role in acquisition in any languages. Even if that were the case, taking a close look at the acquisition process through the development of similar types of structures cannot help but add worthwhile knowledge about the representations children develop and how those change as the children successfully attain their target grammars.

With this discussion of the DP-CP parallels and how they relate to acquisition concluded, it is worthwhile to consider what the study suggests about language and acquisition generally. The biggest takeaway from the comparative study was that there was a great similarity in syntactic development and great differences in morphological development. This should be both unsurprising and galvanizing for proponents of Minimalism who have long claimed that the syntax is the same cross-linguistically and only morphology differs.

The results also offer some suggestions as to the important role that morphology plays in the acquisition process. In early chapters, it was supposed that complex morphology might either hinder a child from learning by overwhelming them with details, or it might help them by giving them a wide range of evidence for how their language works. As it turns out, far from being something that prevents or inhibits learning, the data from shows how morphology actually encourages learning.

Hungarian presents the most complicated system, yet Hungarian-learners mastered it earliest. The appearance of morphology in the data might help the children identify the structure of the language, using it to help identify the branches of the underlying trees and as a scaffolding to hang the lexical information.

Understanding functional elements as *frequent frames* (Mintz, 2003) from which children might be able to identify nouns and verbs and learn lexical items has been a fruitful approach over the last decade or more. Just as children might use these frames to identify syntactic category, they can also understand the frames themselves as a guide to the grammar.

Another interesting discovery involves the role of features in the grammar. It was not seen that any particular features were learned independently from the morphemes on which they were attached. Person features were learned as either pronouns or agreement, not as the abstract features. This related to the large conversation as to whether there is a universal inventory of features that a child selects from. This seems to indicate that there is not such a strongly pre-defined set, rather than the child has to create them from inducing them in the input. If there were a set and a child were looking for evidence for a particular subset, this would suggest once second-person were selected, the child would have access to both types of representations. Instead, the child seems to learn particular forms and then abstracts from these forms to create the features. Rather than pruning a structural tree, the child is discovering it.

Finally, this work reinforces the importance of applying detailed morphosyntactic analyses to acquisition problems. Though only the most complicated nouns bare a straightforward resemblance to clauses, the theoretical work that uncovered this basic parallel made this study possible. There are surely other topics of great interest to theoreticians that would yield interesting insights when applied to child language data. Likewise, adopting a specific morphological model is important for understanding and

describing the limitations of a developing data. Having a clear morphosyntactic framework not only helps identify places to look, but it is also crucial for understanding what is seen.

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