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 (**??**), 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 Assigns GEN	Null Assigns GEN	Overt Assigns DAT
AGR	Null	Null	Person, #
Pronouns	1, 2, 3 persons M, F genders	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*	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.

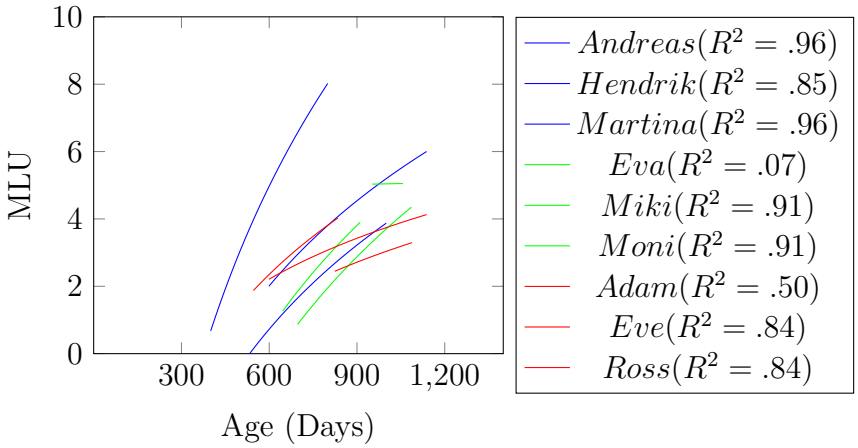

Figure 5.1: Combined MLU

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.

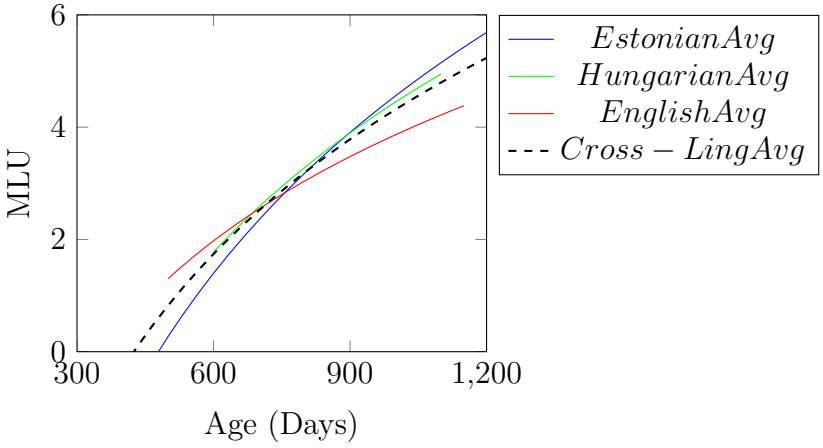

Figure 5.2: Average MLU

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.

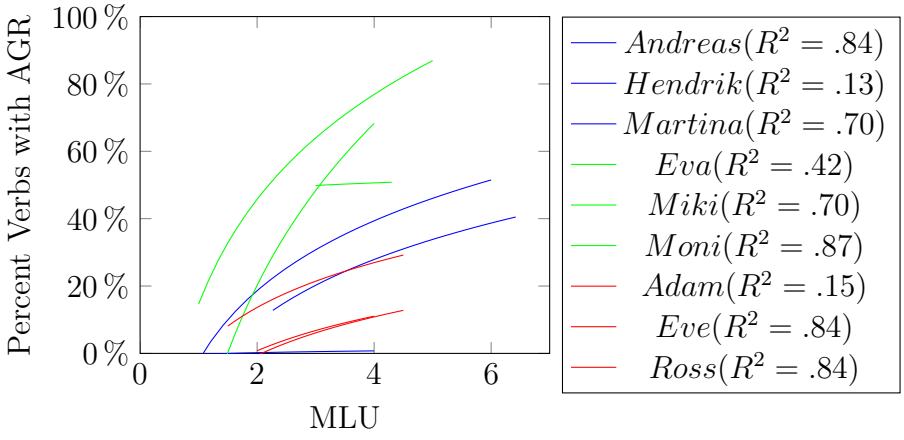

Figure 5.3: Cross-Linguistic Verbal Agreement Growth

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 (**??**).

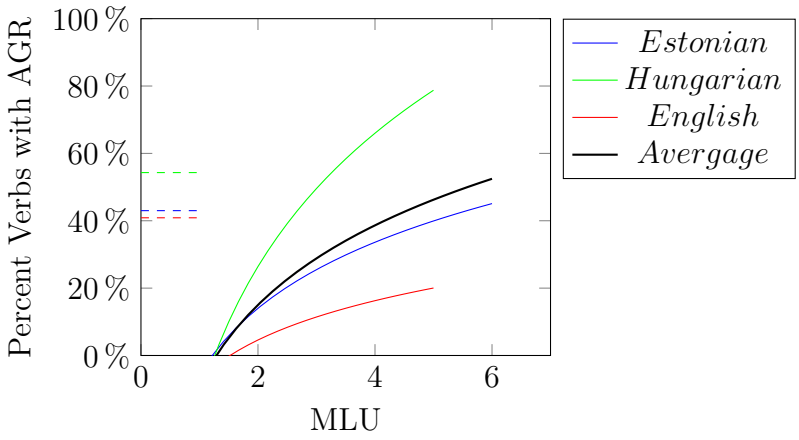

Figure 5.4: Cross-Linguistic Verbal Agreement Growth

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

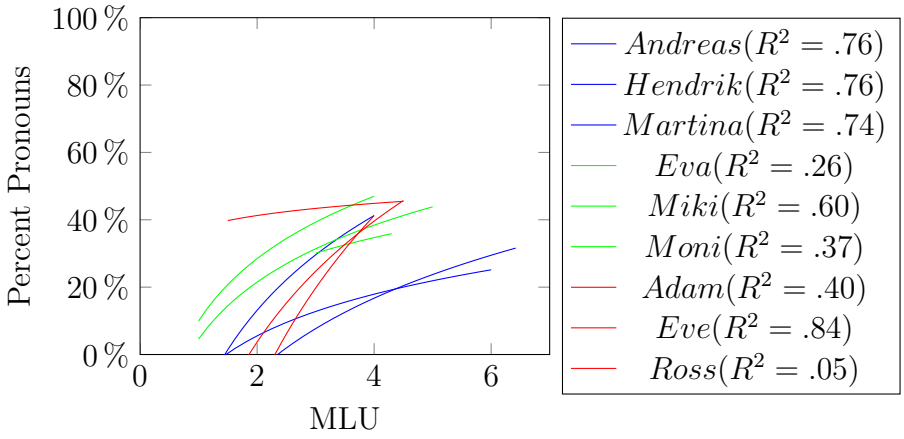

Figure 5.5: Cross-Linguistic Pronoun Comparison

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):

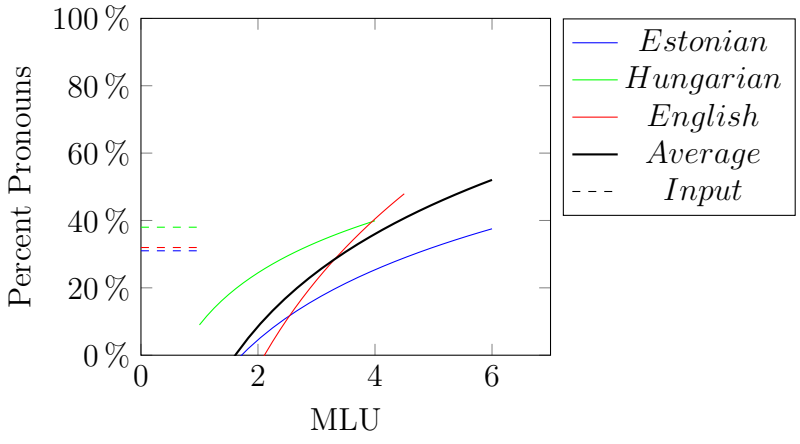

Figure 5.6: Cross-Linguistic Pronoun Averages

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.

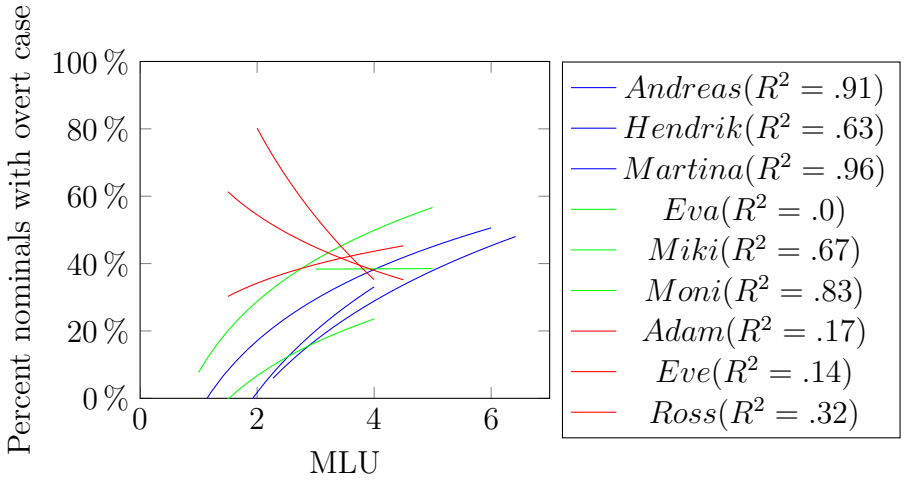

Figure 5.7: Cross-Linguistic Child Case Percentage Comparison

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 (**??**). 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.

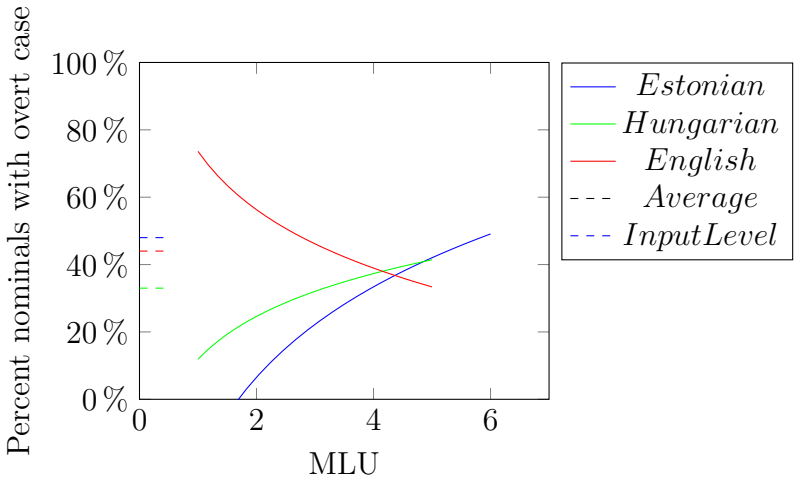

Figure 5.8: Cross-Linguistic Average Case Percentage Comparison

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 **??** 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 (**??**):

- 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.

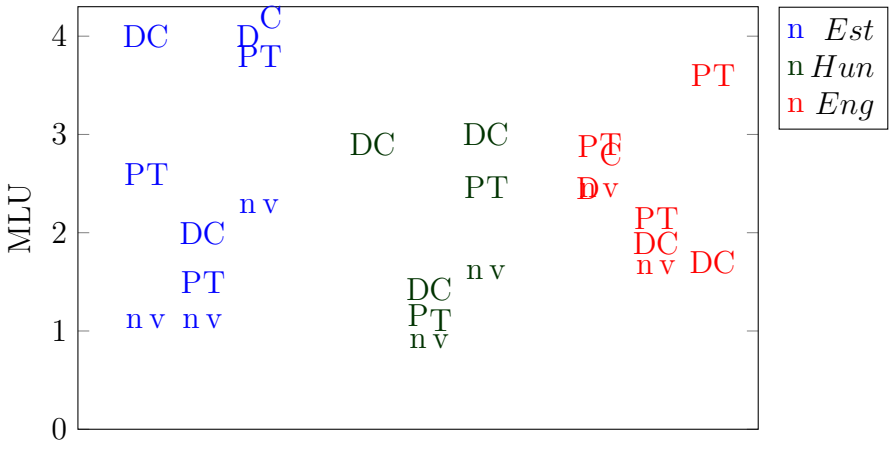

Figure 5.9: Cross-Linguistic Functional Structure Acquisition Points

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.

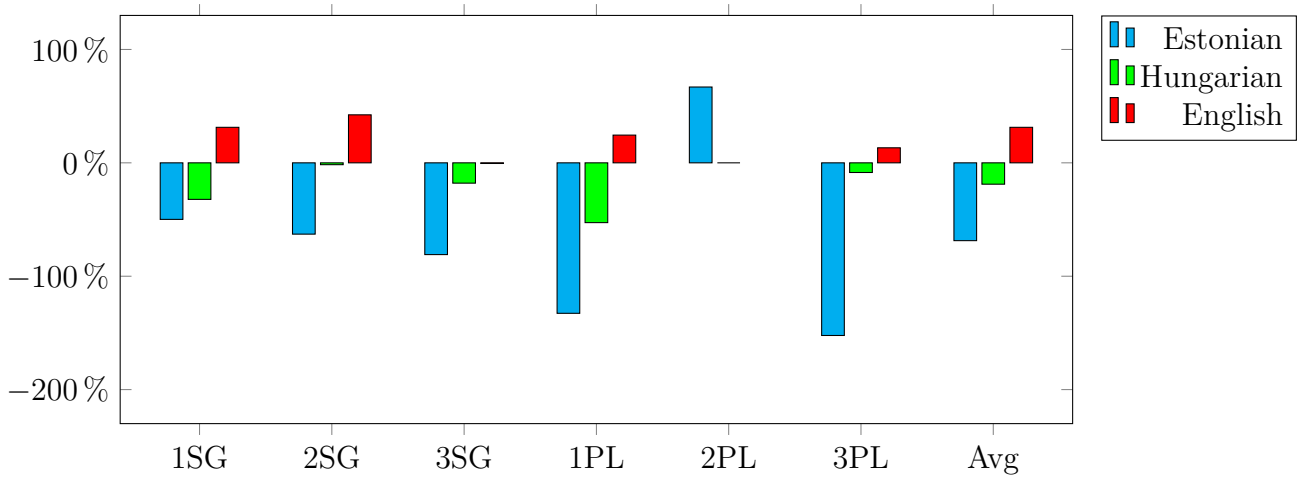

Figure 5.10: Nominal / Verbal Feature Preference
Positive numbers indicate pronoun preference; negative numbers indicate agreement preference

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 (**??**). 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.

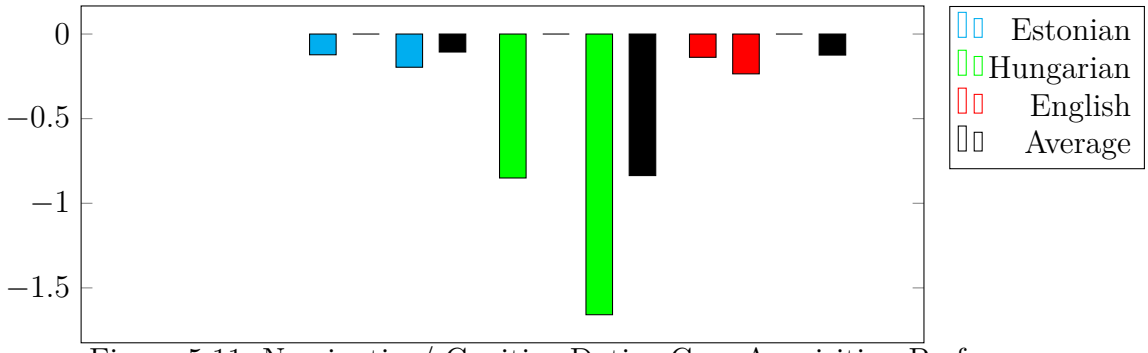

Figure 5.11: Nominative/ Genitive-Dative Case Acquisition Preference
Positive numbers indicate GEN/DAT preference; negative numbers indicate NOM preference

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

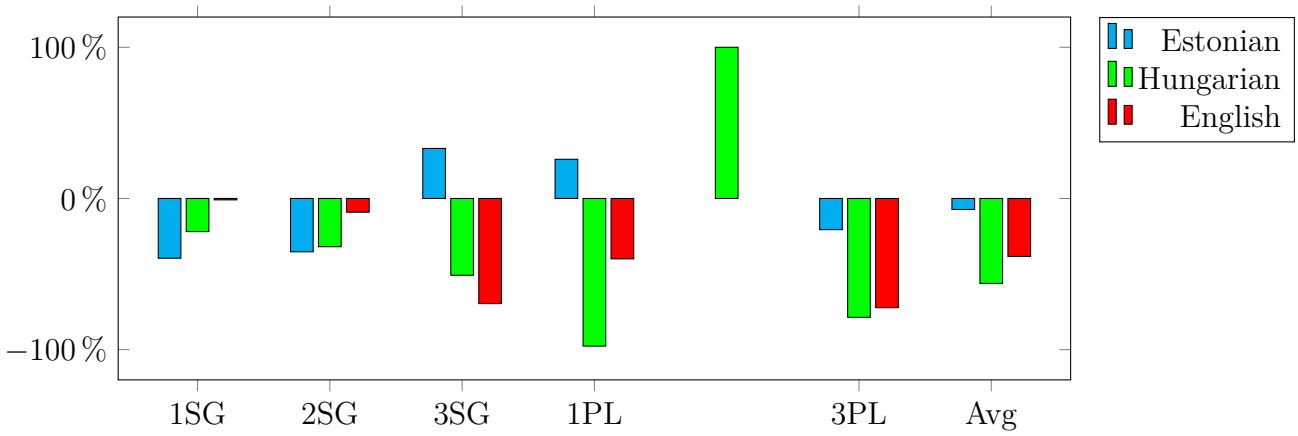

Figure 5.12: Subject versus Possessor Case Acquisition Order
Positive numbers indicate Poss/GEN/DAT preference; negative numbers indicate T/NOM preference

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.

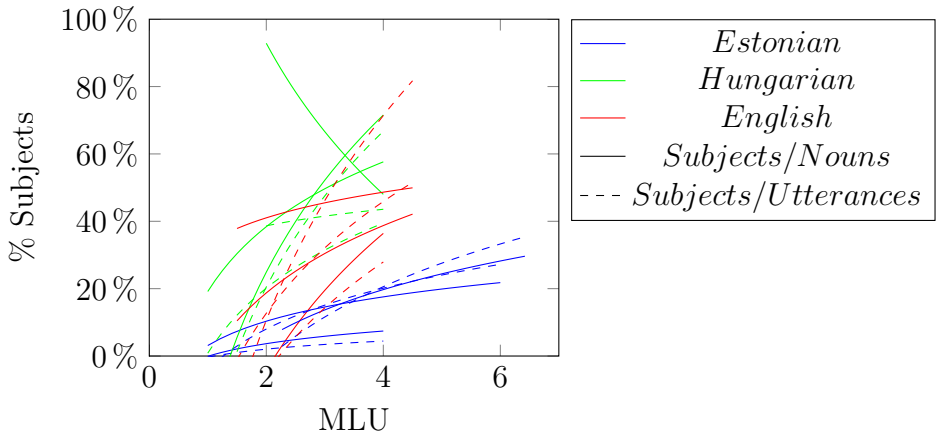

Figure 5.13: Cross-Linguistic Children Subject Rate

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).

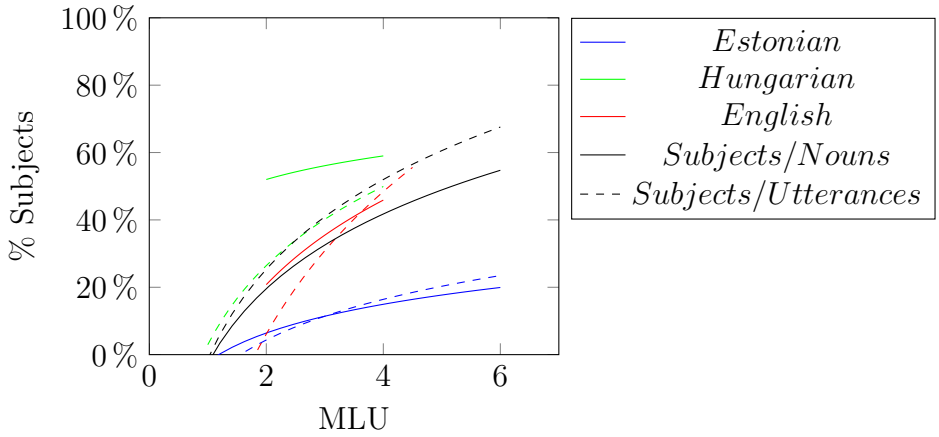

Figure 5.14: Cross-Linguistic Children Subject Rate

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 (**??**) in Chapter (**??**)).

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.

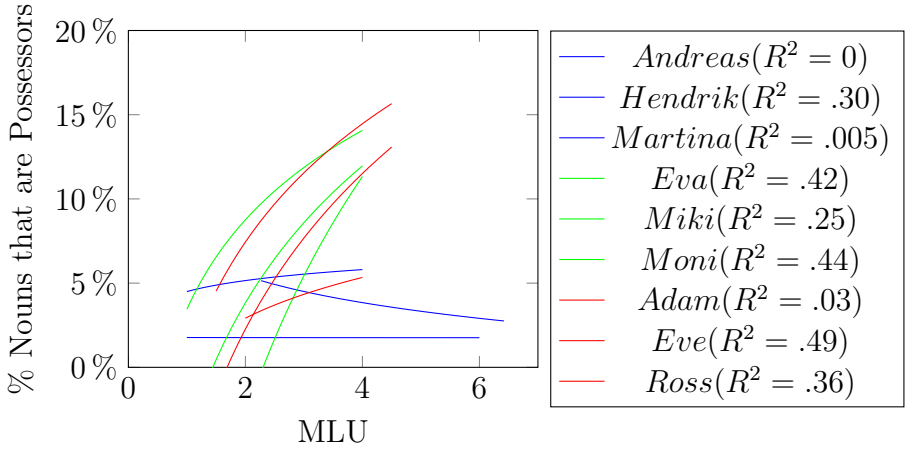

Figure 5.15: Cross-Linguistic Possessor Percentage

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.

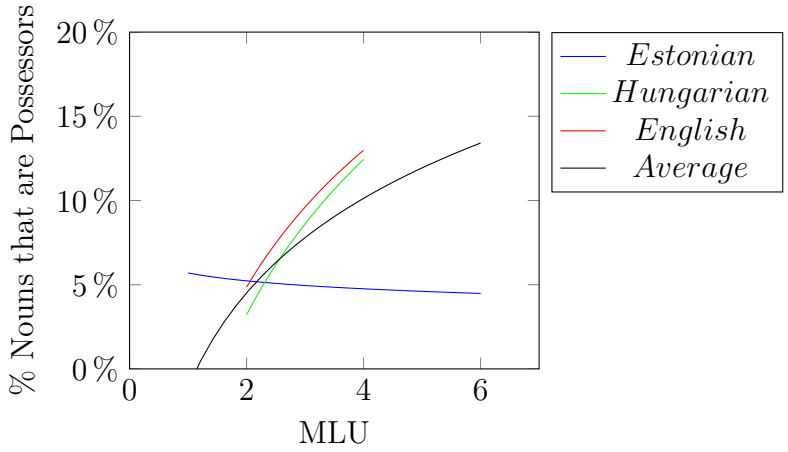

Figure 5.16: Cross-Linguistic Possessor Percentage Averages

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.

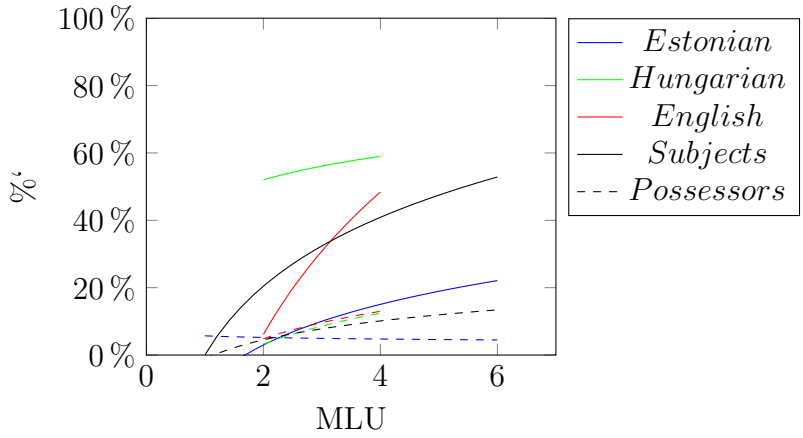

Figure 5.17: Cross-Linguistic Subjects and Possessor Percentage Averages

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.

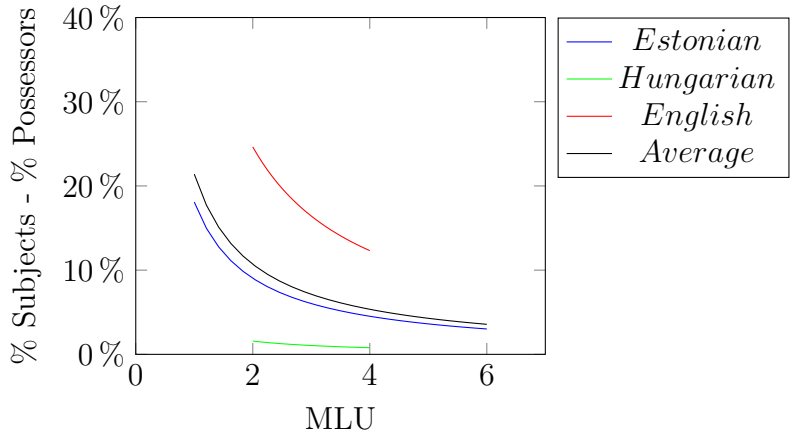

Figure 5.18: Cross-Linguistic Subjects and Possessor Growth Rate Differences

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 (**??**) 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 (**??**) 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 (**??**), 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 (**??**), (**??**), and (**??**). For the Hungarians, see (**??**), (**??**), and (**??**).

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 (1) are typical of this stage where no functional material is present.

(1) 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 (2b), or verbs with agreement or tense as in (2a), but there are no pronouns with case morphology nor verbs with both tense and agreement. Example (2c) 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.

(2) 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 (3), 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 (3b) 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 (3c) is representative of a featurally-complex bundle, reminiscent of Hegarty's developing structures.

(3) 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 (4) 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 (4b). Again, English morphology is not as clear on this point, though the combination of the first person singular pronoun with the modal suffix in (4c) is in effect a functionally complex head.

(4) 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 (1). 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 (2) show. Next, functional items increase in complexity, with bundles representing multiple features, like overt case on pronouns, such as in the examples in (3). Finally, both roots and functional heads with complex morphology will be produced, like the examples in (4).

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 (**??**) 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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