Acquisition of Differential Object Marking in Estonian

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1. Introduction[3]

The acquisition of transitive sentences has been investigated often from the perspective of cue competition. Argument relations are signalled in different ways across languages, but typically the linguistic devices used to mark argument structure involve case-marking and word order. This allows for considerable variability cross-linguistically, as the cues vary in availability, validity and reliability (MacWhinney 2004), as well as complexity, salience and redundancy, across languages. Some have claimed that children typically master the case systems of particular languages by age three (e.g. Smoczyńska 1985), but research also shows that acquisition of complex case systems is not rapid, but emergent and gradual (Aguado-Orea & Pine 2015, Räsänen et al. 2015).

Although the most frequent case paradigms may be mastered early, it is unclear how well children understand the functions of case-marking. Dittmar and colleagues showed that German children are not able to reliably use case as an isolated cue (i.e. in the absence of SVO word order, intonation and discourse context) before age seven, as German sentences typically carry redundant information from both case and word order, with both cues supporting the interpretation of a transitive sentence (Dittmar et al. 2008). German case may be difficult to acquire, as it is marked on determiners, is confounded with gender, and involves much homonomy. However, the findings were replicated in Polish, in which case is marked on the noun itself, by Krajewski & Lieven (2014).

Differential object marking, however, complicates the system further: typically, DOM languages differ in having an unmarked and a marked direct object, the choice determined by animacy and definiteness (Aissen 2003). In Estonian, like Finnish (Kiparsky 2001, Huumo 2013), DOM involves a choice between objects which are both case-marked, and crucially involves aspect, although definiteness, boundedness and other factors also play a role. Estonian is rich in inflectional morphology and has flexible word order, hence case-marking is an important cue for acquiring the transitive structure. Because of the complexity of both object-marking patterns and morphological paradigms which

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provide cues to grammatical role (see Argus 2009), it is unclear which cues will prove most useful for the child acquiring the system.

It has been shown in a naturalistic study (of the same corpus investigated here) that both the child's own production and child-directed speech (CDS) have high rates of ellipsis: over 34% of both subjects and objects in transitive clauses were omitted in the CDS (Vihman et al. 2015). Considering the complexity of object-marking, homonymy in some declension classes and high levels of omitted arguments, we may ask how children acquiring Estonian begin to piece together the system. Moreover, using the complexities of Estonian as a test case, we can ask whether children begin to acquire a complex morphosyntactic system primarily by basing their early utterances on the input they hear (see e.g. Ambridge et al. 2015), or do they learn to use certain relevant semantic and morphological cues early on to build up knowledge of the syntactic system?

In this study, we investigated a dense corpus of naturalistic speech between one child-caregiver dyad to examine how the child marks direct objects in the early stages of transitive clause production. Are the markers of direct objects lexically or contextually restricted, or generalised early (i.e. used across a range of contexts)? Does the child first choose one case to act as a generalised object marker, before the nuances of differential object marking are acquired? Which of the object cases are generalised? One object case (the partitive) has fewer constraints on use, is morphologically more salient and transparent, as well as more frequent — we might expect this to be used more in early production; yet the other case (genitive) marks more prototypical objects — hence this may be easier to acquire as an object-marking case. We begin with a brief overview of object case-marking in Estonian, followed by a description of the corpus data and the results of our analysis; we finish by discussing implications and pointing out directions for further research.

2. Object marking in Estonian

Direct objects are marked in Estonian with three different cases, depending on lexical, syntactic, and semantic considerations. Importantly, no single case can be given the label ACCUSATIVE, if accusative is taken to mean a default object-marking case. A two-way contrast guides the system, partially semantic in nature, but also involving binary syntactic categories such as negation. We follow the linguistic tradition in labelling the contrast as a distinction between TOTAL and PARTIAL OBJECTS (Erelt et al. 1993).

Semantically, Total Objects correspond to Hopper & Thompson's (1980) notion of prototypical object, marking transitive patients which are maximally distinct from the agent and 'totally affected' by the action. For a clause to take a Total Object, certain conditions must be met: an aspectual verb must be used, the predicate must be bounded and affirmative, and the patient must be definite and delimited. Total Objects may be marked with GENITIVE or NOMINATIVE case. Most singular Total Objects are genitive, as in (1), but in certain contexts, nominative is used. These include subjectless clauses like imperatives, as in (2), and impersonal voice constructions. Plural total objects are also nominative, as

in (3). If these conditions are not met, the object is a Partial Object and takes PARTITIVE case, as in (4).

(1) ma lõikan **ühe tükikese** sulle siit
I cut.1SG.PRS one.GEN piece.DIM.GEN you.ALL here.ABL
'I [will] cut you a little piece from here.' (CHI, 3;1.13)

(2) söö ilusti **suu** tühjaks
eat.IMP nicely mouth.NOM empty.TRANSL
'Eat up everything nicely.' (lit. 'Eat your mouth empty') (MOT, 2;0.16)

(3) piim teeb **luud ja kondid** tugevaks
milk.NOM make.3SG.PRS [small-&-large]bone.NOM.PL strong.TRANSL
'Milk makes (your) bones strong.' (MOT, 3;0.16)

(4) ei saa **sokki** jalga panna
NEG can sock.PAR.SG foot.INE put.INF
'[I] can't put the sock on [my] foot' (CHI, 2;1.6)

Additionally, not all verbs allow both object cases. A sizable class of PARTITIVE VERBS, consisting mostly of cognition and psychological predicates, takes only partial objects, while only a limited number of verbs take only genitive; note that even these will have partitive objects under negation, hence the restrictions on use of Total and Partial Objects are asymmetrical.

Whereas the genitive Total Object corresponds most clearly to the prototypical transitive object, it is the Partial Object which could be argued to represent a default case: strict conditions govern the use of Total Object cases, while the Partial Object applies elsewhere. Table 1 summarises these distinctions, and each object-marking case is discussed below, with examples from the corpus used in this study.

Table 1. Factors affecting object case-marking in Estonian

	TOTAL OBJECT	PARTIAL OBJECT
SEMANTICS	Affected, definite Patient; Perfective aspect	Unaffected or partially affected Patient; Indeterminate quantity; or Imperfective aspect
SYNTAX	Affirmative clause	Affirmative or Negative
CASE-MARKING	**Singular:** Declarative, Active > GEN. Imperative > NOM. Impersonal Voice > NOM. **Plural:** NOM.	**Singular, Plural:** PARTITIVE

3.1 Partial Objects

Partitive case is used to mark Partial Objects in a range of contexts. Partitive verbs include mental verb categories such as perception, emotion, and cognition predicates (*nägema* 'to see', *armastama* 'to love', *oletama* 'to assume') as well as atelic activities or states such as *aeglustama* 'to slow sth. down', *omama* 'to own' (Vaiss 2004). Additionally, negation formally requires a partitive object, as shown in (5). This overrides any other condition which might support Total Object case-marking. Partitive is the only case marking Partial Objects, and hence alternates with either genitive or nominative case, depending on the context: negative imperative predicates take partitive objects, as do verbs which would normally always take total objects, such as *leidma* 'to find', in negated clauses.

(5) ø ei anna **kalapulka** kiisule .
NEG give-ø fish-stick.PAR cat-ALL
'[I] won't give the cat a fish finger.' (CHI, 2;0.15)

(6) sööveel **putru** .
eat.IMP more porridge.PAR.SG
'Eat [some] more porridge.' (MOT, 3;1.6)

Semantically, if the event is incomplete, atelic, or ongoing, the object takes partitive case; likewise if the patient is indefinite or of unbounded quantity (as in 6). The partitive could be called a default object marker, as it applies in all cases in which the conditions on Total Objects are not met.

3.2 Total Objects

Both genitive and nominative case are used to mark Total Objects. These occur in specific, semantically and syntactically defined contexts. In order to allow Total Object case-marking, the predicate must be bounded, telic, completed and affirmative; the object must be affected and definite. Genitive is the most frequent case for marking Total Objects: singular nouns in active, affirmative clauses occurring as the Total Object with a perfective predicate are marked with genitive case (as in ex. 7). These are also prototypical semantic patients, following Hopper & Thompson (1980).

(7) mina toon **uue** **köharohu** mängult .
I.NOM bring.1SG.PRS new.GEN cough-med.GEN play.ELA
'I'll pretend to bring a new cough medicine.' (CHI, 3;01.1)

(8) kas konn sööb **minu** ära või?
Q frog.NOM eat.3SG.PRS 1SG.GEN PRT or
'Is the frog going to eat me up?' (MOT, 2;01.8)

Finally, genitive case is limited in its direct object function to singular nouns. Plural Total Objects are in nominative case (as in 9); likewise, a number of syntactic contexts involve nominative Total Objects, regardless of number. These include subjectless constructions such as imperatives (Siska 2013), example 10, and impersonal voice constructions (Vija et al. 2009), example 11.

(9) issi pani **silmad** kinni .
daddy.NOM put.3SG.PST eyes.NOM.PL closed
'Daddy closed his eyes.' (MOT, 3;1.13):

(10) pane nüüd **see** **propeller** (.) siia kiivri sisse .
put.IMP now this propeller.NOM here.ILL helmet.GEN into
'Now put the propeller here into the helmet' (3;0.4, CHI)

(11) kas siis tehakse **uus** **süst** vä ?
Q then do.IMPERS.PRS new.NOM.SG shot.NOM.SG or
'Do they then give [you] a new shot?' (CHI, 3;1.1)

These constructions only have nominative objects when they fulfill the more general conditions for Total Objects, as detailed above. In the analysis, we looked at the use of each object case in the CDS and the child's production.

4. Data and Method

The data analysed here is based on utterances containing transitive verbs extracted from a dense database of one child acquiring Estonian. The corpus is available on the CHILDES Databank in the Estonian repository under Vija (MacWhinney 2000). This corpus includes naturalistic recordings of one child and his caregivers from the child's age of 1;7 to 3;1, with dense data collected for six weeks (5 hours per week) at age two (2;0.01–2;1.12, MLU in words 1.99–2.94) and age three (3;0.0-3;1.13, MLU in words 3.9–5.4).

Four datasets were compiled from the mother's and child's utterances in the Vija database: mother's (MOT) utterances at age 2;0 and 3;0, and child's (CHI) utterances at age 2;0 and 3;0 (i.e. the 30 recordings over six weeks at both ages). We extracted all utterances which had finite forms of the most frequent transitive verbs occurring in the child's speech at age two, excluding those lexemes which are not used at all in any one of the other datasets, as well as some verbs which tended not to occur with objects, but were used more as discourse particles ('see', 'look', 'wait'). The final list included 18 verbs (see below for list of verbs).

The sets of utterances were randomly sampled to be matched in size across all four datasets, *at each verb,* meaning that the number of utterances containing each verb included in the analysis were the same in each of the datasets, in order to ensure that differences between usage across the datasets could not be related to differences in use of a verb, as some verbs are biased toward the use of one case or the other. This resulted in 1,551 utterances for each dataset, and varied from 9 to 355 utterances per verb, as can be seen in the list below, amounting to

6,204 utterances. All utterances were manually coded and analysed according to the various factors deemed to be relevant to object choice and transitive utterance structure. The list of transitive verbs included in the study is as follows, with glosses and the number of utterances per dataset (one dataset representing one speaker at one age).

1. *tee* 'make/do' (355 utterances)
2. *pane* 'put' (314)
3. *taha* 'want' (230)
4. *võta* 'take' (118)
5. *söö* 'eat' (116)
6. *too* 'bring' (68)
7. *kirjuta* 'write' (60)
8. *joonista* 'draw' (50)
9. *anna* 'give' (47)
10. *aita* 'help' (37)
11. *loe* 'read/count' (29)
12. *hoia* 'hold' (28)
13. *näe* 'see' (28)
14. *kuula* 'listen' (23)
15. *joo* 'drink' (15)
16. *lõika* 'cut' (13)
17. *leia* 'find' (11)
18. *keera* 'turn' (9)

5. Results

The data were first pooled to compare use of each case across datasets. Figure 1 shows the proportion of object tokens in the child's speech and child-directed speech at each age appearing in each case (GEN, NOM, PAR).[4]

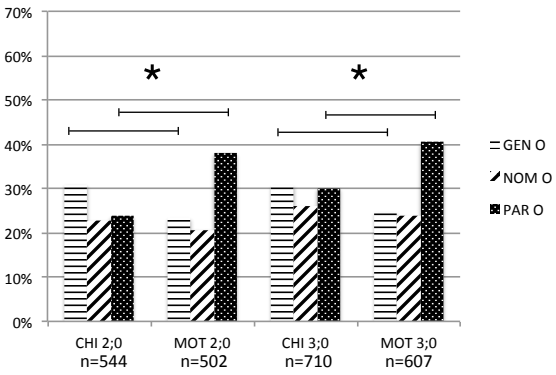

Figure 1. Proportion of overt objects in each object case, across datasets.

[4] One drawback of the corpus is that it has not yet been morphologically parsed. Additionally, neither automatic not manual parsing can resolve the issue of those morphological declension paradigms in which the orthography of some nouns is ambiguous between partitive and genitive case, although the distinction is auditorily available: the difference is a quantity distinction between long and overlong segments, e.g. piim (NOM), piima (GEN), 'piima (PAR). Hence, a group of object nouns had to be excluded from the data in the present study, though they were available in the input to the child. These will be examined in future studies.

As shown in Figure 1, we found significant differences between the child's production and mother's speech at ages 2;0 and 3;0, for both genitive and partitive case ($p < 0.01$). Interestingly, the child uses proportionally much less partitive case-marking for direct objects in transitive utterances than the mother (24% vs 38% at age 2;0). Conversely, the child uses proportionally more genitive objects (31% vs 23% at age 2;0). By age 3;0, the difference in partitive case usage has been reduced but is still statistically significant, with a 10% difference (30% in CHI vs 40% in CDS); the difference in genitive objects remains the same.

It is noteworthy that the child, even at age 2;0, is producing objects in all three cases. These initial results lead us to ask: How can the differences between the child's production and the CDS be accounted for? Are they differences in type of utterance, syntactic and semantic contexts for the transitive objects; or do they mark differences in how the child is using the case system?

Is the child making haphazard errors, "randomly" allocating the three case forms, or can we detect differences in constructions or contexts of usage which would serve to explain the differences between CHI and MOT and uncover principled patterns of case use in the child's data? In the next sections, we look more closely at how to account for the differences, first mapping the word order of the clauses, then the specific contexts of use for each case.

5.1 Word order

In section 3, we discussed the conditions on object case selection in grammars of Estonian. Spoken data, however, often shows exceptions to rules, and a few particular exceptions may be at the root of some of the results discussed so far. Word order is a likely factor in case selection, due to (a) differences in clause types affecting the case marking of objects and reflected in word order; (b) a possible tendency to mark sentence-initial objects as nominative; and (c) the prevalence in utterance-initial position of the often invariant interrogative pronoun *mis* 'what'.

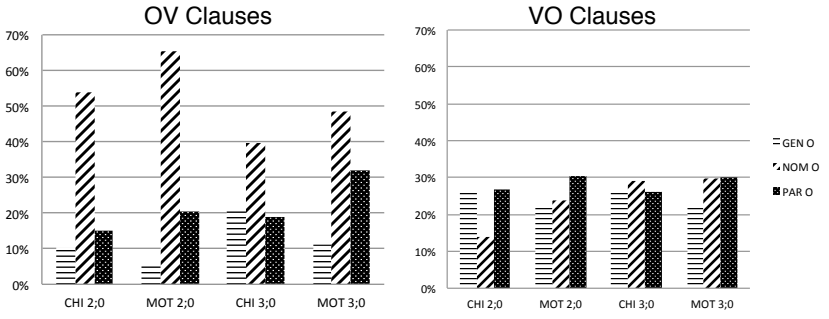

Figure 2. Word order and object case selection. Left-hand graph: clauses with preverbal object position (27% of clauses with overt objects); Right-hand graph: clauses with postverbal objects (73%).

As shown in Figure 2, clauses with OV order show a preference for nominative objects, and account for a sizable proportion of nominative objects, particularly at age 2;0. The mother's utterances at both ages contain more partitive objects, even when split by object position, but the child's data contain a more even number of genitive and partitive objects in the VO clauses. Is this difference due to clause type? Clause type has an effect on both word order and object case marking. Figure 3 shows the distribution of clause types across the datasets. The greatest differences between the CDS and the child's production is the larger proportion of interrogatives at both 2;0 and 3;0 in the input relative to the child's usage, with more declaratives in the child's utterances. In the next section we look at the factors affecting the selection of each case.

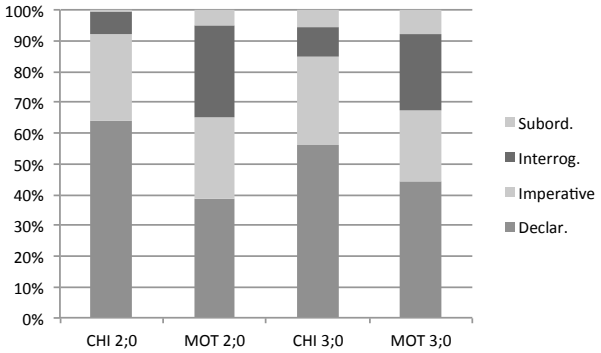

Figure 3. Distribution of clause type in the four datasets

5.2. Functional difference between object cases

This section narrows in on the conditions in which each case is used. As shown in Figure 4, nominative case is highly constrained by its syntactic context. Across all four datasets, imperatives and interrogatives are responsible for at least 77% of nominative objects (and nearly 90% in some).

Imperatives syntactically select nominative case for Total Objects, and as shown in Figure 3, imperatives constitute roughly a quarter of all utterances. In the case of interrogatives, the great proportion of nominative objects are accounted for by the interrogative/relative pronoun *mis* 'what', as shown in 12.

(12) a. **mis** sa tahaksid ?
what.NOM you.NOM want.CND.2SG
'What would you like?' (MOT, 3;0.0)

b. **mis** ma kirjutan sinna ?
what.NOM 1SG.NOM write.1SG there.ILL
'What [will] I write there?' (MOT, 3;0.0)

In spoken language, this pronoun is most frequently used in an invariant nominative case, particularly in utterance-initial position in interrogatives.

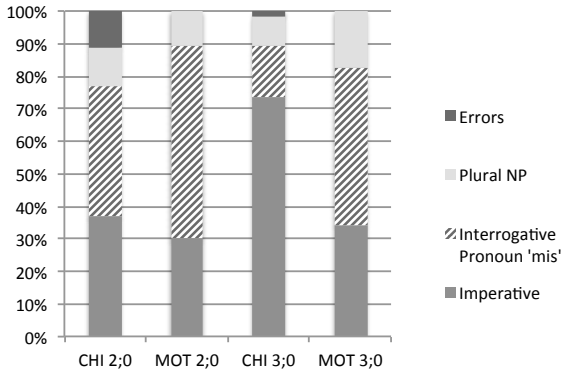

Figure 4. Nominative objects: contexts of use

Figure 4 demonstrates that nominative objects are mostly used in accordance with the conditions on grammatical use, and that the child's usage varies with age (due to the great increase in imperatives at age 3;0), but at age 2;0, 11% of nominative objects are erroneous.

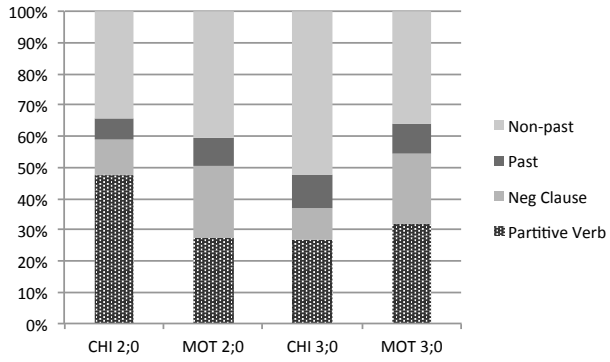

Figure 5. Partitive objects: contexts of use

As can be seen in Figures 5 and 6, neither genitive nor partitive case are as tightly connected to use in particular constructions as nominative objects are, although roughly 50% of partitive objects in the input can be accounted for by particular constructions — partitive verbs and negated clauses. The child makes use of this statistical information, and at age 2;0 nearly half of partitive objects

in his production occur with partitive verbs, with another 10% occurring in negative clauses. At age 3;0, these two conditions amount to less than a third of all partitive objects. For the rest, past-tense clauses account for only a small proportion of utterances, which is to be expected, as partitive objects often encode ongoing, progressive aspect along with other factors.

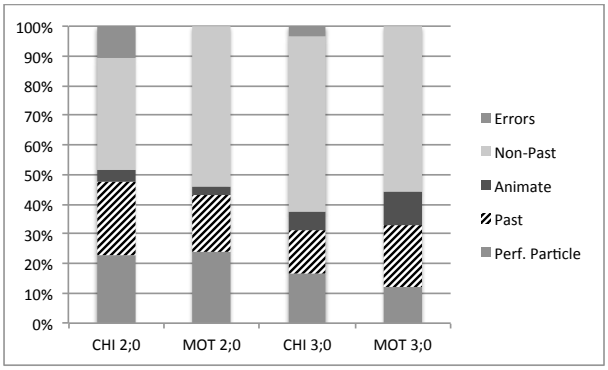

Figure 6. Genitive objects: contexts of use. 'Non-past' and 'errors' include those which do not refer to animates or co-occur with perfective particles.

Genitive objects are the least defined by particular constructions, which may go some way in explaining why the child goes beyond the input specifically in using the genitive. Perfective particles (like *ära* 'up' in example 8, above) are the clearest indicator of perfective clauses and usually select genitive objects. Figure 6 shows that both the CDS and the child make greater use of perfective particles indicating genitive objects at age 2;0 than age 3;0. At age 2;0, past tense is also used as an anchor for genitive case. These two factors together amount to nearly 50% of the child's production at age 2;0, but all other datasets use the genitive less in these specific conditions. Errors account for 11% of the child's use of genitive at age 2;0 and 4% at age 3;0.

One cautionary note must be made regarding coding of these utterances. It would seem, based on Figures 4-6, that the partitive is used accurately (vanishingly few errors), whereas the genitive and nominative are used in both grammatical and overgeneralised contexts. However, this asymmetry may be due in part to the fact that the contexts of use for genitive and nominative objects are so clearly defined: erroneous usage is clear and easy to detect and mark. Partitive objects may be used where adults would use a different case, but as the 'elsewhere' case, it is less clearly ungrammatical, and hence its divergence from the standard may not be marked as ungrammatical.

6. Discussion and conclusions

The study reported here is a preliminary look at object case-marking in the acquisition of Estonian. We asked whether children begin to acquire complex

morphosyntax by basing their early utterances on frequencies in the input, or whether they quickly learn some (semantic, morphological) cues to scaffold their early utterances. The data analysed here show that the child is not simply imitating the mother's production. The results are indicative of an emerging system, in which particular constructions or conditions of use (such as the partitive case with partitive verbs and genitive case with perfective particles) are learned at age 2;0. Our results show that the child uses differential marking early rather than generalising any one case to act as an object marker, but differs from the input in proportionally greater use of genitive case.

We also asked whether the direct objects in the child's transitive productions are lexically/ constructionally restricted. Overall, we may say that each of the object noun cases is restricted to particular contexts of use. The partitive case is used with partitive verbs and negation; genitive is used more with perfective particles and past tense verbs; and nominative objects are associated with particular constructions, especially with the interrogative pronoun *mis*.

Finally, we asked whether any single object case is generalised to act as an all-purpose object marker before the system is fully acquired. One object case (partitive) has fewer constraints on use, is morphologically more salient and transparent, as well as more frequent — we might expect this to be used more in early production; yet genitive case marks more prototypical objects — hence this may be more salient as an object-marking case. Based on this corpus study, we cannot say that any of the object cases is used as a generalised object marker. Genitive and nominative case are used in overgeneralised contexts, but the child does not use any case more than in one third of his utterances, unlike his mother, whose utterances contain more partitive objects than the other two cases. Since the mother uses considerably more partitive case, we may ask why this case is comparatively underrepresented in the child's speech, despite both its more generalised function and its prevalence in the CDS.

The child's more frequent and generalised use of genitive than partitive case, despite its lower frequency in the input, may lead us to ask whether these data lend support to the analysis of genitive case as an accusative case, which might be more rapidly acquired because of structural factors. Genitive has been taken to realise an abstract accusative case by some generative linguists (e.g. Caha 2009, Norris 2014), partially inspired by the related language Finnish, which has distinct accusative marking on personal pronouns for pronominal objects.

Estonian, however, does not retain any nouns or pronouns with distinct accusative marking which would lend support for the descriptive utility of 'accusative' (see 8, with a genitive pronominal direct object), and the label is problematic. In some sense, calling the genitive an accusative case resolves one issue but brings a host of others to resolve, and glosses over some of the more interesting distinctions and generalisations which children acquiring the language must learn, such as the overt indicators often co-occurring with Total Objects, or the alternation in object case which pervades the system. In addition, genitive case is also used in its more familiar function, that of marking possessive relationships. Cann & Miljan (2012) provide a unified analysis in which genitive case itself is underspecified, marking only a dependency relation;

in this way the use of genitive in both possessor phrases and predicates with Total Objects can be explained.

Are there alternative explanations, in which the overextension of genitive case might be more directly related to the input rather than a privileged structural position? First, note that genitive objects may be easier to acquire, but we do not have the relevant data which might tell us whether this is because they are structurally assigned syntactic objects, or because they are prototypical transitive patients. Further research is needed to test and compare predictions from semantics and syntax.

Secondly, despite the fact that partitive objects are more frequently attested in the input sample we have analysed here, it must be noted that the overall frequency of genitive nouns across corpora is significantly higher than that of partitive nouns. Genitive is not limited to direct objects, but also marks possessors, prepositional complements, and other dependent relations. A search run over a 270-million-word corpus[5] turned up genitive and partitive nouns in a relation of 0.55 to 0.41. The higher proportion of genitives in the child's production may be related to this higher overall frequency of genitive case in the input.

Finally, the proportion of case-ambiguous nouns in the child's data is 5 to 10% higher than in the CDS; this may be coincidental, and related to the lexemes used rather than any strategy of avoidance. Nevertheless, it serves to remind us that we should take these results with caution and investigate their validity with larger, parsed and carefully disambiguated datasets, experimental evidence, and computational analysis.

The current study brings new data to our attention with regard to differential object marking, in a system quite unlike the differential marking in Spanish, for instance. We found that the child uses three different object case markers, with a fair amount of systematicity, at age 2;0, and that he does not begin by generalising any single case as an object marker, but rather by using particular constructions with particular forms. We have shown evidence for constructional anchoring in the early stages of acquisition of object case. We have not discussed the morphological complexity of the cases involved, but in order to achieve a full picture, this must be considered alongside the syntactic and semantic subtleties involved in the system.

Frequency in the input has an effect, though whether this works on a lexical level or a more global level needs further investigation. The complexities of Estonian case acquisition beg further study with regard to factors such as the lexical diversity of noun phrases used in the caregiver's and the child's speech, the morphological transparency and productivity of case forms, referential form and the role played by semantics. Ongoing research by the authors will examine these factors in more detail.

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[5] etTenTen, part of the SketchEngine language corpora family, and available at www2.keeleveeb.ee/dict/corpus/ettenten

Abbreviations

1/2/3SG	first, second, third person singular
ABL	ablative
ALL	allative
CND	conditional
DIM	diminutive
ELA	elative
ILL	illative
INE	inessive
INF	infinitive
GEN	genitive
IMP	imperative
IMPERS	impersonal
NEG	negative
NOM	nominative
PAR	partitive
PL	plural
PRS	present
PRT	perfective particle
PST	past
Q	question marker
SG	singular
TRANSL	translative

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