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Perfectivity, telicity and Estonian verbs

Anne Tamm

This paper discusses telicity and perfectivity in Estonian. Neither of these categories corresponds exactly to the Estonian object case alternation, which is argued to reflect predicate or clause aspectual properties and not the NP-related properties of objects. The aim of this account is to accommodate the systematic compatibility of verb classes with certain clausal aspectual object case marking patterns. The paper proposes a way of understanding the interaction between verbal and clausal aspect in terms of boundedness and formalizes it in the framework of Lexical Functional Grammar (LFG). The features of verbs and case markers determine the clausal aspect from different constituents at the syntactic level of constituent structure. The information is unified at another syntactic level, functional structure.

Keywords accusative, Estonian, partitive, perfectivity, telicity

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1. INTRODUCTION

In several languages, case assignment is influenced by aspectual semantic restrictions on the predicate,[1] but few languages show a strong correlation. I argue that Estonian is a language where aspect and object case alternations are tightly related, but the basis of the alternation differs slightly from the traditional aspectual oppositions of telicity or perfectivity.

As in Finnish, there is a tight relationship in Estonian between accusative, telicity and perfectivity, on the one hand, and between partitive, atelicity and imperfectivity, on the other. However, while being historically related to the Finnish accusative, the following sections show that the Estonian accusative[2] or 'total object' case, does not exactly cover the conceptual ground of the Finnish accusative. As a consequence, the relationship between telicity and perfectivity also differs on the basis of the data about case marking. The Estonian partitive is historically related to the Finnish partitive and has developed from the case ending denoting 'separation from' or 'part of', the separative (elative-ablative) case.[3] As for the Estonian partitive plural, its morphological form diverges from Finnish and, in addition, partitive bare plural and mass NPs influence the aspectual interpretation differently from Finnish. Examples with consumption verbs, illustrating the separative use, as in (2), still stand out as the

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most salient examples of the Estonian object case alternation ((1), (2)). The examples discussed in the following sections show further developments.[4]

(1) Mari sõi (ühte) õunapirukat.[5]
M[NOM.S] eat.3s.PST one.PART apple-tart.PART
'Mary was eating an/the(/one) apple tart.'

(2) Mari sõi (ühe) õunapiruka (ära).[6]
M[NOM.S] eat.3S.PST one.TOT apple-tart.TOT up/PRT
'Mary ate an/the(/one) apple tart (up).'

Creation verbs as in (3) and (4) are also salient examples; more typically, they occur without the particle. The sentences with total object case (2) and (4) are perfective and telic according to the standard tests of temporal sequencing and temporal adverbials (demonstrated with (4)), while the sentences with partitive, (1) and (3), are imperfective and atelic (demonstrated with (3)); see the details of the tests in sections 3.1 and 3.2 below.

(3) Mari kirjutas (ühte) raamatut
M[NOM.S] write.3s.PST one.PART book.PART
aasta aega /#ja läks tööle.
year time.PART and went to work
'Mary was writing a/the(/one) book for a year
(anomalous with the alternative: and went to work).'

(4) Mari kirjutas (ühe) raamatu
M[NOM.S] write.3s.PST one.TOT book.TOT
ühe aastaga /ja läks tööle.
one.GEN year.COM and then went to work
'Mary wrote a(/one) book in one year / and then went to work.'

In Estonian, the partitive–total object case alternation has been observed to reflect either the aspectual oppositions of boundedness, resultativity, and perfectivity[7] or the NP-related oppositions of definiteness, knownness, and specificity.[8] In recent international literature, following Kiparsky (1998) and Ackerman & Moore (1999), the term '(a)telicity' has become dominant in descriptions of the Estonian verbs and object case alternation. Examples such as (1) and (3), with the partitive object, are referred to as non-bounded, irresultative, imperfective, and atelic. Examples (2) and (4), which contain a total object, are referred to as bounded, resultative, perfective, and telic.

The first question is how to fix the relation between telicity and perfectivity, which are understood as the phenomena behind the alternation of the object case of Estonian predicates. The second question is how to capture these data. The following sections show that while an aspectual analysis of the Estonian case alternation has advantages over several directly NP-related accounts (section 2), no clear correlation

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between case and the aspectual categories of either perfectivity or telicity can be established (section 3). Therefore, in the final proposal formulated as a Lexical Functional Grammar account, the terms telicity and perfectivity are avoided and the term boundedness is used instead (section 4). The final section proposes an aspectual analysis where the entries for verbs and case morphemes contribute complementary grammatical aspectual information.

2. WHY NOT AN NP-RELATED ANALYSIS?

This section provides the arguments for preferring predicate-related approaches to aspect and object case marking. The examples of the following subsections show that the aspectual oppositions and case-marking alternations are not directly related to the differences in the properties of the object NP. Examining the properties of case-marked NPs is, however, important, since the historical NP-relatedness has shaped the Modern Estonian aspectual system in a way that it does not exactly reflect the standard semantics of perfectivity and telicity, but a more abstract version of part–whole type of semantics that has spread over the aspect and mood categories in Estonian.

2.1 Part–whole correspondences

Several accounts studying compositional aspect and parallels between the verbal and nominal domains relate the variation in aspect to the quantificational properties of the object NP, such as the specified quantity feature in syntax (Verkuyl 1993) or quantization (Krifka 1992, 1998). From this perspective, examples (1)–(4) above show that the expected variation in the aspectual value of the sentence is not paralleled by the difference in the object NP properties. All examples contain quantized NPs (e.g., 'one apple tart', 'one book') regardless of their case marking.

Although examples (1)–(4) might suggest otherwise, the part–whole semantics that underlies the historical regular partitive–accusative oppositions has disappeared in Modern Estonian. In example (5), the referent of the partitive marked noun *võti* 'key' is not part of the key and in example (6), the referent of the partitive marked noun *Jüri* 'George' is not part of George.

(5) Leidsin võtit korduvalt.
find. 1S. PST *key.PART* *repeatedly*
'I found the key several times.'

(6) Mari ehmatas Jürit.
M[NOM.S] *frighten.3S.PST* *J.PART*
'Mary frightened George.'

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A more intriguing question for a possible quantificational analysis of the case-marked NPs concerns the correspondence between the total case and quantization. I argue that there is no clear correlation, even if a correct analysis of the total case needs more data than examined in previous sources and it is out of the scope of this paper to give a conclusive set of examples. In the account of Tamm (2004a), the total case is restricted to quantized NPs only; partitive lacks any restrictions on the quantization of the NP it marks. Examples (1)–(6), containing quantized NP objects and partitive marking, confirm the correctness of an analysis of the partitive without quantization restrictions. However, quantization is indeed a necessary restriction for plural total objects, which are morphologically nominative, as illustrated in (7).[9] For partitive plurals, on the other hand, there is no restriction on being either non-quantized, (8), or quantized, (9).[10]

(7) Mari sõi (kõik) õunad (ära).
M[NOM.S] *eat.3S.PST* *all* *apple*.NOM.PL *up*/PRT
'Mary ate (all) the apples (up).'

(8) Mari sõi ühekorraga mett ja õunu.
M[NOM.S] *eat.3S.PST* *simultaneously* *honey*.PART *and* *apple*.PART.PL
'Mary was eating honey and apples simultaneously.'

(9) Mari sõi (kõiki) õunu (ühekorraga).
M[NOM.S] *eat.3S.PST* *all*.PART.PL *apple*.PART.PL *simultaneously*
'Mary was eating (all) the apples (simultaneously).'

Contrary to the approach taken in Tamm (2004a), which associates a restriction about quantization with the total object case (as a constraint on the syntax–semantics mapping) regardless of the number, this article wishes to provide some challenging details about singular NPs. More specifically, it is problematic to assume a semantic quantity or specificity restriction on singular NPs. The following examples examine the case marking of Estonian concrete mass nouns, a topic that has not been dealt with in detail before.[11] Mass and bare plural nouns are typically partitive objects, but there are also examples with total case-marked mass nouns. However, even in case of the most typical examples of mass nouns as total objects, such as verbs of transportation, as in (10), it is difficult to establish whether it is pragmatics (implicature) or semantics (entailment) that determines that the transportee is of certain quantity by way of a mass–count shift, such as a shift from mass to standard serving. With a verb of consumption, (11), it is again an implicature that what is consumed is a quantity,

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such as a bottle of water or any other type of standard serving. However, the total case-marked NP in examples (10) and (11) can instantiate a focus and contain a kind-denoting NP. Since kind-denoting NPs are analyzed as quantized NPs, that is, '(one) kind of' ice cream or water, the total objects could be instances of a mass–count shift, that is, a coercion to quantized NPs. With the verb 'discover' in (12), the specified quantity of the object is less conspicuous, since what is discovered for the first time is simultaneously an instance and a kind of material. While there can be more alternative kinds of iron, the existence of a set of alternatives cannot form a restriction for total object-hood. Those mass nouns of which there are no alternative kinds (and no possibility of plural forming), such as 'ekasilicium' in (13), can be total objects. In addition, example (14) shows a total case marked mass noun that is disambiguated by an adjective that coerces the noun to be a concrete instance: gradually growing 'mold' is less likely to be a kind.

(10) Mari tõi jäätise.
M[NOM.S] *bring.3S.PST* *ice-cream.TOT*
'Mary brought ice-cream.'

(11) Jõin vee (ja lõpetasin lõunapausi).
drink.1S.PST *water.TOT* *and finished lunch break*
'I drank (the) water (and finished my lunch break).'

(12) Umbes 3400 e. Kr. avastasid inimesed
approximately *3400 BC* *discover.3PL.PST* *human.NOM.3PL*
Egiptuses raua.
Egypt.INE *iron.TOT*
'Approximately in 3400 BC, humans discovered iron in Egypt.'

(13) Winkler avastas 'ekasiliitsiumi' . . . haruldase
W[NOM.S] *discover.3S.PST* *ekasilicium.TOT* *rare.GEN*
mineraali analüüsil.
mineral.GEN *analysis.ADE*
'While analyzing a rare mineral, Winkler discovered ekasilicium.'

(14) Avastasin vannitoast jõudsalt kasvava hallituse.
discover.1S.PST *bathroom.ELA* *quickly* *growing.TOT* *mold.TOT*
'I discovered (some) quickly growing mold in the bathroom.'

In addition, example (15),[12] with a non-referential object NP, shows that the correspondence specified for quantity–total object fails in combinations with the aspectual particle *ära*.

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(15) Mind kutsuti reklaamipäevale klouni
I.PART *invite.PASS.PST* *advertising.day.ALL* *clown.PART*
mängima. Mängisin klouni ära
play.MA.INF *play.1S.PST* *clown.TOT* *PRT*
ja sain sada krooni.
and *get.1S.PST* *hundred[NOM.S]* *kroon.PART*
'I was invited to play a clown on the advertising day. So I played the clown and got 100 kroons.'

Example (15) also illustrates a case where the occurrence of a total object is not subject to the restriction of referentiality either. The infelicity of the continuation in (16) shows that *klouni* 'clown.TOT' in (15) does not introduce an entity that may subsequently be independently referred to in a definite context.

(16) ??Kloun oli kirjus riides.
clown[NOM.S] *be.3S.PST* *colorful.INE* *cloth.INE*
'The clown was wearing colorful clothing.'

Another option that is excluded by example (15) is that of the definiteness hypothesis, which could be worded as follows: the total case marks definite NPs, and partitive marks indefinite NPs. Total objects are more frequently definite NPs than not, but not vice versa; definite NPs can be partitive marked as objects, as in (6) above. I provide more examples of total objects that are not necessarily definite. Firstly, a large class of creation verbs with alternating case appears in sentences with typically indefinite or non-specific referents and with total case marking (cf. (4) above). Secondly, most of the atelic verbs have only partitive objects, and whether the noun phrase is definite does not influence object case (17).

(17) Mari vaatas oma raamatut/*raamatu.
M[NOM.S] *watch.3S.PST* *own.GEN* *book.PART/*TOT*
'Mary was looking at her book.'

Thirdly, there are no verbs that give rise to regular minimal pairs of opposite object case that would correspond to definiteness oppositions and confirm the definiteness hypothesis. Instead, verb classes based on case marking tend to be related to classes that resemble Vendler's aspectual classes. Namely, states and activities correlate with partitive objects and accomplishments, and achievements with total objects.

While there are many issues concerning quantification and definiteness that need to be addressed before deciding whether the quantization restriction on total objects (Tamm 2004a) should be removed or not, the discussed data are still relevant to clarify the nature of aspectual composition. This section examined the specificity or definiteness restrictions and the possibility of analyzing sentences with total object as instantiating mass–count shifts. The latter are harder to pin down than the opposite, count–mass ones: the issue deserves further study. Despite many previously recorded intuitions and observations about the correlations between case and NP-properties,

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I conclude that case alternation cannot be strictly related to any NP-properties. The following section studies the exact relationship between case alternation and aspectual distinctions.

3. ASPECTUAL HYPOTHESES

This section presents the arguments for not assuming telicity and perfectivity as the exact categories that correspond to the Estonian case alternation. The section gives a brief overview of some verb classes and their aspectual interpretation with partitive objects. In a two-level approach to aspect such as Smith (1991), either perfectivity or telicity can be hypothesized to correlate with aspectual case alternations. One option is that case marking and viewpoint aspect are linked, while situation aspect depends on the presence of telic verbs, resultative complements and particles. The other option correlates situation aspect and case. On the one hand, the more specific viewpoint aspectual hypothesis about case could be formulated as follows: partitive case marking occurs in sentences that describe imperfective viewpoint aspect and total case marking occurs in sentences that describe perfective viewpoint aspect. On the other hand, a telicity hypothesis about case may have the following formulation: partitive case marking occurs in sentences that describe atelic events and total case marking occurs in sentences that describe telic events. Examples (3) and (4) above, as illustrated by the tests that are discussed in the following subsections, confirm both hypotheses.

3.1 The viewpoint aspectual hypothesis about case

There are some problems with the viewpoint aspectual hypothesis about case; namely, the sentences where partitive objects appear are not necessarily imperfective. The perfective readings of sentences with partitive objects are indicated by a standard test of temporal sequencing.[13] The test indicates if an event can be viewed from inside or outside, that is, if a sentence can be interpreted as imperfective or perfective. A perfective sentence co-occurs with the interpretation of temporal sequencing of the relevant events (event 1 happened AND THEN event 2 happened); an imperfective sentence allows an overlap (event 1 and event 2 happened simultaneously). Inserting 'and then' is infelicitous between the two sentences and the sequence is anomalous if no overlap is possible, for instance, if the sentence that is being tested is imperfective and the test sentence contains a punctual verb.

I discuss three main cases of partitive–perfective correspondences: creation verbs with partitive plural objects and transitive achievements including psych-verbs and degree achievements. Firstly, partitive objects of verbs that have case alternation (such as 'write') do not appear necessarily in sentences that are imperfective. The effect is illustrated by example (18), which contains a semantically restricted, partitive plural 'bare' NP. The partitive plural NP can be substituted by a partitive mass singular one for the same effect.

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(18) Mari kirjutas raamatuid.
M[NOM.S] *write.3S.PST* *book.PART.PL*
((Ja siis) Ta läks ülikooli tööle.)
and then she went at the university to work
'Mary wrote books/Mary did some book-writing. ((And then) She went to work at the university.)'

This sentence has a perfective reading according to the test, since the interpretation of temporal sequencing of the described event of book-writing is temporally sequenced before the working event.[14]

Secondly, partitive objects of several event verbs that have no case alternation, such as *alustama*, *algama* 'start, begin', *solvama* 'offend', *võitma* 'win', *rikkuma* 'ruin', *ehmatama* 'frighten' (see (19)), *üllatama* 'surprise', are not imperfective either, according to the test. Note that, in contrast to example (18), the object NP is not semantically restricted in (19).

(19) Mari ehmatas Jürit/ #Jüri.
M[NOM.S] *frighten.3.PST* *J.PART/ #TOT*
((Ja siis) Ta läks tööle.)
and then she went to work.)
'(First,) Mary frigtened George (and then left to go to work).'

The sequencing effect occurs in a narration; that is, Mary first frightened George and then left for work. In addition, imperfectivity does not necessarily arise with degree achievement verbs with partitive objects either, (20), although the effect is weaker. The object may be semantically unrestricted in the case of degree achievements as well.

(20) Firma laiendas teed.
firm[NOM.S] *widen.3S.PST* *road.PART*
((Ja siis) Algas töö.)
and then started the work
'The firm widened the road. ((And then) the work started.)'

Total objects are also possible with degree achievements, as in (21), and the perfectivity of the sentences where they occur is proved by the felicitous temporal sequencing effect of the event before the test event. The event in (21) cannot be continued, while the events in (19) and (20) can be optionally continued. The tests that contrast (24)–(28) with (29) show the difference between the interpretations (see next section).

(21) Firma laiendas tee.
firm[NOM.S] *widen.3S.PST* *road.TOT*
((Ja siis) Algas töö.)
and then started the work
'The firm widened the road, (and then) the work started.'

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In sum, case alternation cannot be related to the distinction perfective–imperfective aspect, since partitive objects of verbs with object case alternation do not appear necessarily in sentences that are imperfective.[15]

3.2 The telicity hypothesis about case

A telicity hypothesis hypothesizes a link between the telicity of the event and the object case. Telic sentences are hypothesized to have total objects and atelic ones are hypothesized to have partitive objects. However, Kiparsky (2005) discusses many instances of Finnish, where partitive objects appear in telic VPs. Estonian is similar in this respect. The following examples illustrate partitive objects in Estonian telic VPs that represent events with definite endpoints. As in Finnish, telic sentences with measure phrases may have partitive objects, as in (22) and (23).

(22) Takso sõidutas Peetrit ühe kilomeetri.
taxi[NOM.S] drive.3S.PST P.PART one.TOT kilometer.TOT
'The taxi drove Peeter one kilometer.'

(23) Mari kirjutas raamatut terve aasta.
M[NOM.S] write.3S.PST book.PART whole.TOT year.TOT
'Mary was writing a/the book for a whole year.'

The relationship between object case and telicity is dependent on the exact definition of telicity. These examples prove that there is no relation between object case and the notion of telicity that is understood with reference to endpoints. While the events that are described in these sentences have endpoints, the endpoints are not the inherent endpoints of the events of writing a book or taking Peeter somewhere. Depraetere (1995) shows that, in terms of endpoints, there are two types of endpoint-related telicity: telicity proper and boundedness. Telicity is related to the endpoint that is determined by the verb and its arguments, while boundedness is related to other linguistic means for providing a boundary to the event, such as measure adjuncts. Total case marking of objects and measure adjuncts in Estonian indicates the similarities between them.[16] The distinction is relevant for understanding the type of 'boundedness' that is useful in the discussion of object case in Estonian.

On the basis of (22) and (23) above, only telicity in its strict sense (verb and its arguments) could be hypothesized to be the category behind object case alternations. However, examples (24)–(28) do not confirm the stricter form of telicity-object case hypthesis either. Degree achievement verbs have either partitive or total objects and are marginally compatible with telicity tests in sentences with partitive objects such as (24). The miscellaneous group of achievements consisting of mainly psych-verbs that appear in sentences that are perfective according to tests turns out to be also telic in telicity tests, (25). Also, the verbs that are perfective with partitive plural objects are telic ((26)–(28)). Each of these examples describes

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an event that is an event in its own right. However, comparing the telicity and perfectivity tests with the verbs in sentences (24)–(28), telicity tests give a more marginal result than the perfectivity tests. The intuition about marginality can be related to the possibility of adding 'more' of the event of the same type in each example.

(24) Firma laiendas kahe tunniga teed
firm[NOM.S] *widen.3S.PST* *in two hours* *road.PART*
ja järgmise tunniga
and *next.GEN* *hour.COMIT*
laiendas ta seda veelgi.
widen.3S.PST *s/he[NOM.S]* *it.PART.PL* *more=DISTR*
'The firm widened the road (in two hours), and in the following hour, they widened it even more.'

(25) Mari üllatas Jürit ühe hetkega
M[NOM.S] *surprise.3S.PST* *J.PART* *in a moment*
ja järgmise hetkega
and *next.GEN* *moment.COMIT*
üllatas ta teda veelgi.
surprise.3S.PST *s/he[NOM.S]* *it.PL.PART* *more=DISTR*
'Mary surprised George in a moment and in the next moment, she surprised him even more.'

(26) Mari leidis ühe hetkega raamatuid
M[NOM.S] *find.3S.PST* *in a moment* *book.PART.PL*
ja järgmise hetkega
and *next.GEN* *moment.COMIT*
leidis ta neid veelgi.
find.3S.PST *she[NOM.S]* *they.PL.PART* *more=DISTR*
'Mary found some books in a moment and in the next moment, she found even more (of them).'

(27) Mari kirjutas aastaga raamatuid
M[NOM.S] *write.3S.PST* *in a year* *book.PART.PL*
ja järgmise aastaga
and *next.GEN* *year.COMIT*
kirjutas ta neid veelgi.
find.3S.PST she[NOM.S] they.PL.PART *more=DISTR*
'Mary wrote some books in a year/Mary did some book-writing in a year and in the next year, she wrote even more (of them).'

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(28) Mari sõi lühikese ajaga õunu
M[NOM.S] eat.3S.PST in a short time apple.PART.PL
ja järgmise hetkega
and next.GEN moment.comit
sõi ta neid veelgi.
eat.3S.PST she*[NOM.S] they.PL.PART more=DISTR*
'Mary ate some apples in a short time, and in the next moment, she ate even more of them.'

The addition test indicates that these verbs can be described as weakly telic. Linguistically, they differ from sentences with total objects, which are anomalous with the addition test (29).

(29) ??Mari leidis ühe hetkega raamatu
M[NOM.S] find.3S.PST in a moment book.TOT
ja järgmise hetkega
and next.GEN moment.COMIT
leidis ta neid veelgi.
find.3S.PST she[NOM.S] they.PL.PART more=DISTR
'Mary found a book in a moment and in the next moment she found even more of them.'

These examples are non-divisive and what I call optionally cumulative.[17]

3.3 Summary and discussion

While the consumption and creation verbs with incremental themes are the most salient examples, there are many other telic verb classes that display aspectual object case alternation in Estonian. Perfectivity and telicity, as identified by the standard tests, do not form the natural aspectual categories behind case marking. In particular, the examples with achievements, and, as Kiparsky (2005) has established for Finnish, sentences with measure adverbials, degree achievements, and bare partitive plural objects form the largest groups of exceptions.

Case marking based on the quantization of the object is by now replaced by case marking that reflects aspect. Importantly, however, the semantic structure of the Estonian aspectual category in the verbal predicate domain has taken the shape borrowed from the nominal domain. However, it has not taken the exact shape of mass versus count that is functionally carried over to homogeneous versus quantized events or predicates. Observationally, the following division has developed: a) homogeneous (quantized and non-divisive), b) 'portioned,' corresponding to optionally cumulative and non-divisive and c) quantized proper (non-cumulative and non-divisive). Instead of an opposition between two poles of perfectivity–imperfectivity or telicity–atelicity, I propose that the Estonian aspectual system conceptualizes aspect as a scale of which

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events can be realized in different degrees. Verbs set the conditions on the type of the scale and the case marking specifies the exact degree on the scale.

The salient consumption and creation verbs serve as a good example. Partitive marking on a singular or plural object, such as 'apple tart' or 'book', yields the interpretation of the predicate as homogeneous. The scale is open. In case of partitive plurals, the interpretation of the predicate is 'portioned'; the event resembles a portion of apple-tart eating of undefined quantity. The eating event is over, but the quantity that is eaten is not specified. The scale is bounded at the lower end only. Total case marking on 'apple tart' yields the interpretation of the predicate as quantized. The scale is closed at the upper end. On the other hand, verbs such as 'look' or 'watch' impose homogeneity; they specify a scale that is open-ended. The verbs such as 'surprise' or 'frighten' impose the interpretation of the predicate as 'portioned' and specify a scale that is bounded at the lower end. The lexicalized 'frightening' or 'surprising' event has clear temporal boundaries as verified by the perfectivity test. However, in contrast with the lexicalized 'eating' or 'writing' event, it is not lexically conceptualized as having any maximal final point related to the effect on the one frightened or surprised. Verbs differ lexically in the properties of the scale they specify.

A problem with earlier formal approaches and the Estonian data was the lack of insight about how the verb, the NP and the case actually interact. Data that help to solve this problem have been addressed in the previous sections. The following section tries to formalize the interaction. The goal is to achieve an intuitive division of labor between the elements and to reflect this particular grammaticalization pattern in Lexical Functional Grammar (LFG).

4. TOWARDS AN ACCOUNT

4.1 The possibilities in LFG

The proposal is to formalize the observation that both verbs and case encode grammatically relevant aspectual features in this account. In LFG, there are two syntactic levels, functional structure (f-structure) and constituent structure (c-structure); see Bresnan (2001) or Dalrymple (2001) for an introduction to LFG. Grammaticalization in the category of aspect concerns the lexicon (containing words and morphemes), f-structure (containing functional features such as tense, mood, number or gender) and semantics, since the mapping between syntax and semantics is between the f-structure and the semantic structure in LFG (Butt, Dalrymple & Frank 1997). The functional features differ from the functional categories and features of other generative syntactic accounts in that they capture generalizations that are not established formally by means of tests that are only structural, syntactic in their nature but also functionally. The functional bias makes studies of grammaticalization

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interesting for the syntactic studies in LFG. Therefore, the following subsections propose an account that might be closer to typology than previous generative accounts on Finnic case and more formal than previous functional and cognitive semantic accounts.

Importantly for this account, the LFG framework allows locating pieces of aspectual information and information about grammatical relations in many, possibly discontinuous constituents that may appear in several configurations in surface constituent structure syntax. Simultaneously, it allows locating them at one place at the other syntactic level – functional structure. The aspectual composition is achieved by means of constraints that pertain to relations between the levels of representation. I apply an analysis where the constructive case model is used to account for encoding sentential aspect on dependents. Recent sources contain many elements that have been useful for formalizing the interaction between the Estonian aspectual cases and verbs, such as Nordlinger & Sadler (2004) on constructive case in LFG, Lee (1999), Butt & King (2005), Butt (2006) on semantic case as well as approaches where the aspectual feature composition is carried out at the level of f-structure (Toivonen 2001). The following sections concentrate on the lexical entries and the functional structure.

4.2 Boundability and boundedness

The goal of this subsection is to provide an account of how the information from lexical entries of verbs that appear in bounded, that is, perfective and (weakly) telic, sentences specifies structures of syntactic representation. The proposal is that lexical entries provide partial but basic information about clausal aspect at the f-structural level of syntactic description.

On the one hand, some verbs, such as the verbs *kirjutama* 'write' and *sööma* 'eat', regularly vary in their aspectual behavior. Tests have shown a three-way interpretation of these verbs (or rather, sentences with these verbs). They are perfective and telic if they appear with total objects, perfective and weakly telic if they appear with partitive plural objects, and imperfective and atelic if they appear with partitive singular or plural objects. In this article, the aspectual terminology of perfectivity and telicity is not used further and the term 'boundedness' is applied to capture the three possibilities. Boundedness is a syntactic feature at the f-structure; semantics will not be examined further. Sentences that are perfective and telic are referred to as maximally bounded, sentences that are perfective and weakly telic are referred to as minimally bounded, and sentences that are imperfective and atelic are referred to as nonbounded.

Whether the clause is unbounded, maximally bounded or minimally bounded depends on verbs and case marking. On the one hand, there is no one-to-one correspondence between verbs and sentence aspect. The three types of case marking

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depend on the interaction of verb class and case marking. As an instance of the interaction, there are three different aspectual possibilities of the verb *kirjutama* 'write': fully, maximally bounded (total objects), not bounded (partitive objects), and indefinitely, minimally bounded (semantically restricted partitive objects). A class of event verbs such as the psych-verb *ehmatama* 'frighten' above appear in minimally bounded sentences with partitive objects.

In view of the observations about the objects, instead of the quantification of the object NP, another fact related to the object NP is decisive for boundedness, namely, the object case. The object case alternates between partitive as in an unbounded sentence, and the total, as in a maximally bounded sentence. The semantically restricted partitive appears in a minimally bounded sentence.

An optimal formalization of the interaction must, therefore, reflect the match between verbs, aspect, and case in a flexible way to accommodate the verb's aspectual possibilities with different types of case, on the one hand, and, on the other hand, to fix the sensitivity of case to verb classification.

I propose to represent the verbs that appear in bounded sentences with a boundedness attribute (B) that is either valueless or with the value (MINimal). Lexical entries encode boundability or boundedness, respectively. Boundedness is also the term for the aspectual features in the f-structure feature matrix, where the B attribute can have the value of MINimal or MAXimal. I suggest treating Estonian aspect in terms of boundedness and verbal boundability, based on the intuition that transitive verbs are either boundable or not; see (30).

(30) Boundable verbs: *kirjutama* 'write', *sööma* 'eat', *jooma* 'drink';
Bounded verbs: *ehmatama* 'frighten', *üllatama* 'surprise', *alustama* 'begin'

Sentences or clauses are bounded in two different ways: some verbs are bounded lexically and others compositionally, by case-marked objects. Some verbs may have an aspectual feature in their entry; other verbs specify the attribute only, but the value must be provided by another element in the clause. In that way, verbs provide partial aspectual specification in a clause. The maximal boundedness value, MAX, can be specified only compositionally for these verbs, by means of unification. Once an attribute is provided with a value lexically, it cannot be changed or further specified by another element in syntax. Elements in syntax can add information but not change attribute–value pairs. Combinations of attributes and values associated with verbs yield distinct verb classes.

4.3 Constraints for verbs

In my classification, if a verb is referred to as bounded, then its boundedness feature is specified. Indications about the boundedness of the verb belong to the functional specifications in the verb entries and in the respective terminal node of the c-structure.

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These specifications have the form of defining equations, as in the verb entry of *ehmatama* 'frighten' in (31). A defining equation, mapped from the c-structure node to the f-structure, adds an aspectual constraint on the f-structure, the aspectual feature B MIN, as in (32).

(31) **ehmatama**, *V*: (↑PRED)= 'FRIGHTEN <(↑SUBJ), (↑OBJ)>'
(↑B)=MIN

(32) $\begin{bmatrix} \text{PRED} & \text{'FRIGHTEN <SUBJ, OBJ>'} \\ \text{B} & \text{MIN} \end{bmatrix}$

In the case of *ehmatama* 'frighten', boundedness is specified in the lexical entry of the verb and clausal aspect is determined by the verb. As a result of the mapping from c-structure to f-structure, the f-structure is constrained to contain the specified boundedness feature, that is, an attribute with a 'fixed' value, (32). Having a fully specified feature in the form of a defining equation, such as (↑B) = MIN, as part of its lexical entry means for the verb that its boundedness is lexicalized; it is an inherently perfective, bounded verb. Since clausal aspect is modeled in terms of the unification of boundedness features in the f-structure, the failure in unification explains the restrictions on case marking patterns in the model where case contributes different values. This means that these verbs are not boundable any more and the range of aspectual case marking possibilities is restricted.

If verbs are boundable, their boundedness feature is underspecified. They can be bounded, and the range of case marking possibilities is open. Indications about the boundability of the verb also belong to the functional specifications in the verb entry and are present at the terminal verb node of the c-structure. These specifications have the form of existential constraints in LFG, as shown in (33).

(33) **kirjutama**, *V*: (↑PRED)= 'WRITE <(↑SUBJ), (↑OBJ)>'
(↑B)

In this case, clausal boundedness is not determined by the verb (i.e., by the lexical entry of the verb) but only as the result of aspectual composition, modeled as the unification of features in the clausal f-structure, (34). As a result of the mapping from constituent structure to f-structure, the f-structure is constrained to contain only the attribute part of the boundedness feature, that is, an attribute without any value.

(34) $\begin{bmatrix} \text{PRED} & \text{'WRITE <SUBJ, OBJ>'} \\ \text{B} & \end{bmatrix}$

Having an existential constraint (↑B) means that the attribute B must be present in the f-structure feature matrix that corresponds to the verb in c-structure. As clausal aspect is modeled in terms of the unification of boundedness features in the functional structure, the possibility of the unification with features with different values explains

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the wider range of case marking patterns. In my model, the 'underspecified' features become fully specified by the features of case-marked objects.

The next question is: given the incomplete f-structure, how will the values be obtained? Before discussing the verb's contribution to the sentence and the interaction with case-marked objects, I present the features associated with the three types of case markers.

4.4 Inside-out constraints for features associated with case-marked objects

Total case is the case that encodes maximal boundedness; it appears in sentences that denote an event with clear boundaries and that cannot be continued. If my data on total objects may be understood as conceptualizing or grammaticalizing a category, then total objects have conceptualized or grammaticalized the naïve semantics of quantization (a condition of count nouns, cf. Krifka 1991) at the Estonian predicate and NP level. In the area of the NP quantization, the Estonian quantization semantics is – up to details such as mass to count shifts of the standard serving or kind type – surprisingly close to but not absolutely identical to count and quantized semantics proposed by authors such as Krifka (1991). The total case may be understood as an instance of 'Universal Packager', however, in a tight, yet flexible symbiosis with transitive verbs. Bearing in mind the slight discrepancy between morphosyntax and semantics, I prefer the less semantically loaded term 'boundedness' (Jackendoff 1991, 1996) for the NP category as well. LFG allows for two major types of solutions for the mismatch. The mismatch can be dealt with either in a more formal way, capturing the strictly formal relationships in language, or in a more functional way, taking grammaticalization into account. In the first case (more formal), the constraints are between morphology (the case of total objects) and semantics (the 'ideal' quantization). In the second case (more functional), the goal of the constraints is also to explain grammaticalization. The relevant interface constraints are then located between morphosyntax, in the form of the functional feature of boundedness, which corresponds to the naïve conceptualization of QUAntization in Estonian, and semantics. The entry for the total case is presented in (35). The feature (↑B) = QUA in the entry (35) reflects the constraint on the object.

The lexical entry of the total case contains another defining equation, an inside-out constraint for the maximal boundedness feature, (B↑) = MAX. This constraint ensures the constraint on the clausal aspect. A total case-marked nominal specifies the f-structure information in (36).

(35) TOT: (↑CASE) = TOT
(OBJ↑)
((OBJ↑) B) = MAX
(↑B) = QUA

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(36) $\begin{bmatrix} B & MAX \\ OBJ & \begin{bmatrix} CASE & TOT \\ B & QUA \end{bmatrix} \end{bmatrix}$

The indication (OBJ↑) stands for the inside-out function application. The information associated with the total case 'constructs' the f-structure of a higher f-structure. The higher f-structure contains an object to which the immediate f-structure containing the case-marked nominal belongs. The association between the nominal and its grammatical function is established by virtue of the case marker attached to it. I leave the semantic constraints that constrain the mapping between the f-structure and s(emantic)-structure aside.

Partitive encodes only the constraint that the sentence is not maximally bounded (37).[18] The constraint on the f-structures (37) contains only the information that the aspectual partitive cannot appear in sentences that are maximally bounded. Sentences where partitive occurs and where no other rule applies are unbounded (see Tamm to appear) by a default rule.

(37) $PART_1$:

$(\uparrow CASE) = PART$

$((OBJ \uparrow) B) \neq MAX$

Partitive NPs as objects specify the information in the f-structure feature matrix as in (38). If the f-structure matrix contains a B attribute with a MAX value, the structure is ill-formed. No restrictions apply to the quantization of the NP.

(38) $\begin{bmatrix} OBJ & \\ & [CASE \quad PART] \end{bmatrix}$

Singular mass noun and plural count noun partitive objects are specified as in (39) (leaving out the semantic restrictions), and they specify the information in the f-structure feature matrix as in (40).

(39) $PART_2$:

$(\uparrow CASE) = PART$

$((OBJ\uparrow)B) = MIN$

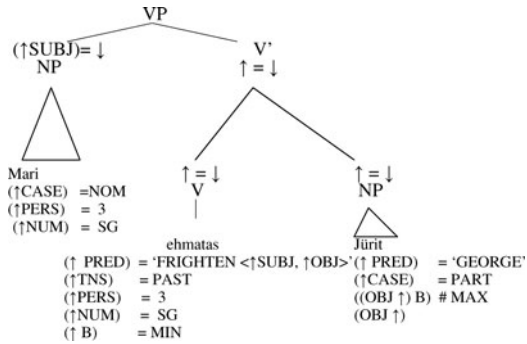
(40) $\begin{bmatrix} B & MIN \\ OBJ & [CASE \quad PART] \end{bmatrix}$

The general well-formedness conditions of LFG secure the sensitivity of aspectual case to verb classification and vice versa. For instance, the sentence with *ehmatama* 'frighten' and a total object, in (19) above, is ruled out by these principles. The sentence is ill-formed as a result of a feature clash between the features specified by the total case, $(B\uparrow) = MAX$, and the verb *ehmatama* 'frighten', $(\uparrow B) = MIN$.

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Partitive 1 and partitive 2 marked objects and the minimally bounded verb form well-formed minimally bounded sentences, since the verb entry constrains the f-structures to have a 'minimally bounded' feature. The semantically restricted partitive 2 constrains f-structures in an exactly identical way with a minimally bounded feature; therefore, the features are unifiable. The entry for partitive 1 fixes that the structure should not contain a 'maximally bounded' feature, which it does not; therefore, again, the features are unifiable. Example (41) illustrates the c-structure representation of a sentence with the verb and a partitive object and example (42) shows the f-structure of the relevant elements.

(41)



(42)

$$\begin{bmatrix} \text{PRED} & \text{'FRIGHTEN <SUBJ, OBJ>'} \\ \text{B} & \text{MIN} \\ \text{TNS} & \text{PAST} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARI'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'GEORGE'} \\ \text{CASE} & \text{PART} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}$$

The two types of bounded sentences formed by the verb *kirjutama* 'write', which has an entry with an existential constraint, are also explained. The 'minimal' and 'maximal' values of the attribute are provided by the case-marked objects, partitive plural and total, respectively. The f-structure of the maximally bounded sentence, (4) above, with the creation verb and a total object is illustrated in (43).

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(43)
$$\begin{bmatrix} \text{PRED} & \text{'WRITE } \langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{B} & \text{MAX} \\ \text{TNS} & \text{PAST} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARI'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'BOOK'} \\ \text{CASE} & \text{TOT} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{B} & \text{QUA} \end{bmatrix} \end{bmatrix}$$

The f-structure of the minimally bounded sentence with the creation verb and a semantically restricted partitive object (18) is illustrated in (44) (see the entry for the semantically restricted partitive in (39) above).

(44)
$$\begin{bmatrix} \text{PRED} & \text{'WRITE } \langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{B} & \text{MIN} \\ \text{TNS} & \text{PAST} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARI'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'BOOK'} \\ \text{CASE} & \text{PART} \\ \text{NUM} & \text{PL} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}$$

The f-structure of a non-bounded sentence with the creation verb and a semantically unrestricted partitive object contains a feature that represents an unbounded scale. Depending on the verbs, the partitive case is ambiguous between the interpretations of minimally bounded scales (scales bounded at a lower point on

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the scale) and unbounded scales. In case of creation verbs, partitive plural objects appear in aspectually ambiguous sentences. While example (44) illustrates the f-structure of a minimally bounded sentence with a partitive plural object, example (45) illustrates the f-structure of an unbounded sentence with a partitive plural object (books) and example (46) presents the f-structure of an unbounded sentence with a partitive singular object (a book), as in (3) above. See (37) above for the entry of the semantically unrestricted partitive, and (39) for the semantically restricted partitive.

(45)
$$\begin{bmatrix} \text{PRED} & \text{'WRITE } \langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{B} & - \\ \text{TNS} & \text{PAST} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARI'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'BOOK'} \\ \text{CASE} & \text{PART} \\ \text{NUM} & \text{PL} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}$$

(46)
$$\begin{bmatrix} \text{PRED} & \text{'WRITE } \langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{B} & - \\ \text{TNS} & \text{PAST} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARI'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'BOOK'} \\ \text{CASE} & \text{PART} \\ \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}$$

The relevant verbal lexical entries are illustrated in (47) and (48).

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(47) kirjutas, V:
(↑PRED) = 'write<(↑SUBJ),(↑OBJ)>'
(↑TNS) = PAST
(↑PERS) = 3
(↑NUM) = SG
(↑B)

(48) ehmatas, V:
(↑PRED) = 'frighten<(↑SUBJ),(↑OBJ)>'
(↑TNS) = PAST
(↑PERS) = 3
(↑NUM) = SG
(↑B) = MIN

The relevant object entries are illustrated in (49)–(54).

(49) raamatu, N:
(↑PRED) = 'BOOK'
(↑CASE) = TOT
(↑NUM) = SG
(↑B) = QUA
((OBJ↑)B) = MAX

(50) raamatut, N:
(↑PRED) = 'BOOK'
(↑CASE) = PART
(↑NUM) = SG
(OBJ↑)B) ≠ MAX

(51) raamatuid, N:
(↑PRED) = 'BOOK'
(↑CASE) = PART
(↑NUM) = PL
(OBJ↑)B) = MIN

(52) raamatuid, N:
(↑PRED) = 'BOOK'
(↑CASE) = PART
(↑NUM) = PL
(OBJ↑)B) ≠ MAX

(53) raamatut, N:
(↑ PRED) = 'BOOK'
(↑CASE) = PART
(↑NUM) = SG
(OBJ↑)B) ≠ MAX

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(54) Jürit, N:
(↑PRED) = 'George'
(↑CASE) = PART
(↑NUM) = SG
(OBJ↑)B) ≠ MAX

In sum, clauses are aspectually bounded or not bounded. Clauses are bounded in two different ways, maximally and minimally. Verbs are restricted in their possibilities for aspectual interpretation; they may be lexically unbounded only ('watch'), boundable (variable in their aspect, as 'eat', 'write'), or minimally bounded only ('frighten'). Maximally bounded sentences have total objects; not bounded and minimally bounded sentences have partitive objects. Semantically restricted partitive objects can appear in minimally, but not maximally bounded sentences.

5. CONCLUSION

I have argued in this paper that Estonian is a language where aspect and object case alternations are tightly related, but the basis of the alternation differs slightly from the traditional aspectual oppositions of telicity and perfectivity. Instead of an opposition between two poles of perfectivity–imperfectivity or telicity–atelicity, I propose that the Estonian aspectual system conceptualizes aspect as a scale of which events can be realized in different degrees. This paper discusses telicity and perfectivity as the phenomena appear in Estonian and proposes a way of understanding the interaction between verbal and clausal aspect in terms of boundedness.

I describe my model for Estonian aspect as a 'scattered aspectual model': the features of verbs and case markers determine the clausal aspect from different constituents at the syntactic level of constituent structure. The information is unified at another syntactic level, the functional structure. The account of the interaction is meant to accommodate the systematic compatibility of verb classes with certain clausal aspectual object case marking patterns. The methodology of LFG is applied here. The analysis of the empirical material contains only the Estonian 'aspect' verbs, that is, verbs that are either aspectually 'fixed as bounded' or 'free'. These verbs are regarded as inherently bounded ('perfective' e.g., 'frighten') or boundable ('telicizable', e.g., 'eat' or 'write'), respectively. The lexical entries for the bounded transitive verbs are provided with fully specified aspectual features, and the lexical entries of the boundable verbs are provided with deficiently specified (underspecified) boundedness features in the LFG lexicon.

In addition to the aspectual information encoded in the lexical entries of transitive verbs, the functional specifications at the lexical entries for aspectual object case markers also include aspectual boundedness features. The aspectual cases are called

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'total' and 'partitive' and their features encode information that is relevant for the semantic interpretation.

Clausal aspect is specified in terms of syntactic boundedness features at the level of the functional structure. In sum, this paper has studied the aspect-related attributes and values that transitive verbs and case contribute to the functional structure in LFG. More specifically, the focus is on bounded sentences.

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NOTES

1. See Butt & King (2005) for examples of Urdu-Hindi, where the case of the subjects is dependent on transitive verbs if the predicate is perfective. One of those languages more distant from Estonian is Scottish Gaelic (Ramchand 1997).
2. Accusative is another term for what is used and glossed here as 'total case'. The term 'accusative' is used in comparisons with other languages, especially in typological literature (Hiietam 2003). Differently from Finnish, there is no morphological accusative in Estonian. The article uses the 'total object' shorthand to refer to NPs that bear one of the morphological case forms (genitive or nominative) on NPs that appear as objects in sentences that have, as discussed in this paper, distinct semantic properties.
3. Kiparsky (1998) writes about the origins of the Finnish partitive, showing a similar construction in Mordvin. Rätsep (1977) and Laanest (1975) mention that the Estonian partitive has the same origin. See Rätsep (1979:24–29) on the development of the partitive form–meaning relationships in Estonian, Larjavaara (1991) for an account of how the aspectual object case developed in Finnish and Kangasmaa-Minn (1993) for parallels in Finno-Ugric aspect.
4. The glosses follow the Leipzig glossing rules, available at <http://www.eva.mpg.de/lingua/files/morpheme.html>. Additional abbreviations: ADE = adessive, ALL = allative, ELA = elative, ILL = illative, INE = inessive, MA_INF = m-stem illative infinitive (the 'ma-infinitive'), PART = partitive, PRT = particle, TOT = total.
5. A typical partitive singular form ends with /-t/ or /-d/. The form of partitive may but needn't differ from that of total (morphologically, genitive) in its long vowel quantity (in *õuna* 'apple.TOT/GEN' and *klouni* 'clown.TOT/GEN', the diphthong is pronounced with a short 'u', in *õuna* 'apple.PART' and *klouni* 'clown.PART', the diphthong is pronounced with a long 'u'). In other cases, the partitive stem ends with a vowel with or without stem alternation or without stem quantity lengthening (*tüübi* 'type.GEN', *tüüpi* 'type.PART') or /-t/, /-d/ (*võtme*

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'key.GEN', *võtit* 'key.PART', *maa* 'land.GEN', *maad* 'land.PART'). See Rätsep (1977, 1979) or Laanest (1975) for further details and the history of the morphological development.

6. The presence of the resultative particle (*ära* 'away, up, completely') and the specificity of the object are related (Tamm 2004a). The specificity of the object varies without the particle. For a different perspective, see Ackerman & Moore (2001), who discuss Estonian as an example of a language that is undergoing regular grammaticalization process, where the category of aspect tends to be morphologically marked on verbs by means of the particle.
7. Some examples of aspectual approaches that contain either Finnish or Estonian: Kont (1963), Rätsep (1978), Tauli (1968), Heinämäki (1984), Erelt et al. (1993), Verkuyl (1993), Tenny (1994), Kiparsky (1998), Nelson (1998), Ackerman & Moore (2001), Metslang (2001).
8. Rajandi & Metslang (1979), Hiietam (2003), cf. also Belletti (1988) and van Hout (2000) on Finnish.
9. The nominative case may be historically related to a restriction on (explicit) quantization. In addition to the universal quantifier, the numeral heads and some other types of quantizing heads of total objects are marked with the morphological nominative. See Lees (2004, 2005) for historical studies on the topic and Rätsep (1977, 1979) for details of the morphological development.
10. The partitive plural morphology differs considerably in Finnish and Estonian: it is heavily reduced in the latter. Also, the example has a non-progressive reading that is discussed further in section 3.
11. See some of the tests (failure with numerals, plurals or measure phrases, combination with count determiners with *mitu* 'many') for the Estonian distinction of mass and count in Paldre (1997) and Tamm (2004b). For an analysis of abstract nouns and their morpho-syntactic properties in Estonian I refer the reader to Tamm (2004b) and for further discussion of the issue of the relationship between the morphosyntax and semantics of indefiniteness, case, quantization, and issues of kind semantics in Estonian, I refer the reader to Tamm (to appear). Carlson (1980), Link (1983), Krifka (1991), Gillon (1992), and Chierchia (1998) provide several semantic criteria for determining the count and mass nature of a noun and issues on reference to kind in semantics.
12. The example reports colloquial usage and is from Metslang (2001:463).
13. I apply the tests that are used by approaches that keep telicity and perfectivity apart, e.g., Smith (1991). See Tamm (2007b:490–495) for more data on these verb classes and a discussion of the aspectual tests.
14. However, an interpretation of overlap is also possible with an atelic test sentence, correctly indicating two interpretations for the verb with the partitive object: perfective and imperfective.
15. This category may have similarities with some aspectual distinctions noticed in other languages. Singh (1998) describes Hindi, which has a neutral perfective, in Koenig & Muansuwan (2000) Thai has a semi-perfective, and a category of Squamish perfective is discussed in Bar-el, Davis & Matthewson (2005).
16. Tamm (2007a) analyzes the total case marking on objects and adjuncts in a uniform way and contains more details about the relationship between the two types of telicity and the patterns of case marking.
17. Further details and data on testing Estonian predicates for their divisive and cumulative properties can be found in Tamm (2003).
18. Some verbs (e.g., *poolitama* 'divide, cut in two', *jagama* 'divide') have total objects in their stative readings – an indication that total case is not exactly related to telicity or

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perfectivity – and partitive objects in their activity readings; see Tamm (2004a:99–102) for a discussion and more examples. The boundedness restriction seems to be due to a lexical constraint associated with the verb; further study is needed to establish the exact relationship between the stative and activity uses of these verbs.

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