

# Word-based declensions in Estonian\*

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## 1. INTRODUCTION

The declensional system of modern Estonian exhibits a highly uniform word-based structure. The system is essentially tripartite, comprising a set of singular grammatical cases, a set of plural grammatical cases and a set of semantic cases. The subsystem of singular grammatical cases consists of isolable stems and theme vowels. Yet it is particular stem-vowel combinations that are distinctive, as neither stems nor vowels can be assigned case properties in isolation. The plural grammatical cases are in turn ‘parasitic’ formations (Matthews 1972), based purely on the form of the singular cases. The semantic cases are then based on the form of the corresponding genitive. Within each subsystem, case and other grammatical properties are associated with whole word forms, but these word-level properties cannot be apportioned to smaller units.

This paper suggests that a traditional word and paradigm (WP) model offers an illuminating perspective on the organization of this system. Recognizing words as ‘minimal meaningful units’ directly captures the fact that case is consistently associated with words, but not with sub-word units. The traditional view that words ‘are not wholes composed of simple parts but are themselves the parts within a complex whole’ (Matthews 1991:204) likewise brings out the implicational structure of declensions. This structure includes the patterns of stem syncretism in Figure 1, along with interdependencies between grammatical cases, such as the general predictability of the nominative singular from the partitive or genitive singular. The network of relations between the forms of a noun define a paradigmatic context for the interpretation of individual forms that supplies information that is not represented in their syntagmatic structure.

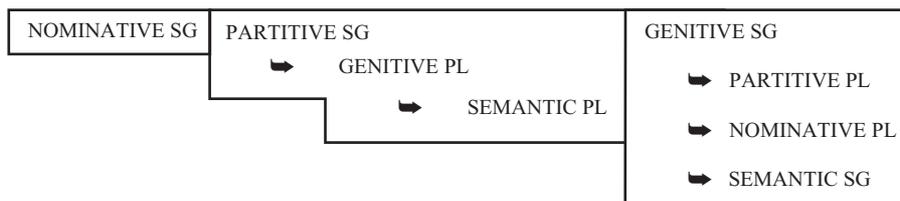


Figure 1. General patterns of parasitic stem syncretism in Estonian declensions

A WP analysis of Estonian declensions also clarifies the challenge that word-based patterns present for post-Bloomfieldian models that assume a bi-unique correspondence between units of content (‘morphemes’) and units of form (‘morphs’). Following Matthews (1972), much of the WP literature has

focussed on cases of ‘cumulative exponence’, in which there are more units of content than units of form, and on cases of ‘extended exponence’, in which there are more units of form than units of content. The emphasis on missing and extra units has fostered the idea that property-form mismatches are the main challenge posed by word-based patterns. However, an examination of the Estonian declensional system shows that a shortfall or excess of units is merely a symptom of a more general problem of morphological ‘overextraction’, in which a property-form relation is extended to units that do not function as Saussurean ‘signs’. In particular cases, notably in flexional languages, overextraction leads to an apparent mismatch between ‘units of form’ and ‘units of content’. Yet, as Estonian shows, overextraction may also characterise analyses in which there is no shortage of form units or content units. Recurrent units of form can be identified at every level in Estonian, from the singular grammatical cases through to the semantic cases. But sub-word units cannot be brought into correspondence with grammatical properties because stems, theme vowels and parasitic bases bear no consistent meaning in isolation. Imposing a morpheme-based description onto such a word-based system simply ‘creates gratuitous problems of analysis and gratuitous problems of explanation’ (Matthews 1991:174).

### 1.1. Morphomic stem syncretism

Noun paradigms that exhibit productive ‘weakening’ gradation (Erelt et al. 2000:255, Viitso 2003a:27) offer a striking illustration of the challenge posed by word-based patterns of exponence. In the partial paradigms of HEKK ‘hedge’ and KOOL ‘school’ in Table 1, the nominative singulars *hekk* and *kool*, and the partitive singulars *hekki* and *kooli* are strong, based on the ‘overlong’ or ‘Q3’ (*kolmas vâlde* ‘third quantity’) stems *hekk-* and *kool-*. The corresponding genitive singulars *heki* and *kooli* are weak, based on the non-overlong stems *hek-* and *kool-*.<sup>1</sup> There are thus three grade-alternating cases in Table 1: nominative, partitive and genitive singular. These cases are realised by means of three distinct formatives: the strong stems *hekk-* and *kool-*, the weak stems *hek-* and *kool-*, and the theme vowel *-i*. There is no ‘mismatch’ between units of form and content, because there are exactly as many case values as exponents. But instead of a biunique correspondence, these elements exhibit the overlapping pattern in Table 1.

Table 1. Overlapping exponence in weakening declensions

| Case          | Form         | Stem         | Exponent      |
|---------------|--------------|--------------|---------------|
| Nominative Sg | <i>hekk</i>  | <i>kool</i>  | <u>STRONG</u> |
| Partitive Sg  | <i>hekki</i> | <i>kooli</i> | <u>THEME</u>  |
| Genitive Sg   | <i>heki</i>  | <i>kooli</i> | <u>VOWEL</u>  |

There is no element that functions as a case marker in this subsystem. There is, in particular, no sub-word formative in Table 1 that signals partitive singular case. The stem of the partitive singular, *ˈhekk-* or *ˈkool-*, also realises the nominative singular. The theme vowel *-i*, which distinguishes the partitive and nominative singular, also marks the genitive singular. In short, ‘partitive singular’ is a word-level property that cannot be associated with any sub-word unit. The weak stem likewise does not signal genitive case in isolation, but only in contrast to a strong partitive, as many nouns are weak through their full paradigm. Moreover, it is precisely the lack of a theme vowel or case exponent that unambiguously identifies *ˈhekk* as a nominative singular. A noun that ends in *-k* can only be nominative singular, because every **other** case form in Estonian ends in a vowel or a case exponent. The interpretation of *ˈhekk* cannot be established by isolating any syntagmatic ‘part’, but only by contrasting *ˈhekk* with the set of alternative case forms.

Weakening declensions are remarkably efficient, yet in ways that defy description in agglutinative terms. The subsystem in Table 1 maximises the case contrasts that can be expressed by means of a strong stem, a weak stem and a theme vowel. From the elements *ˈhekk*, *hek-* and *-i* or *ˈkool-*, *kool-* and *-i*, one can define the forms *ˈhekk*, *ˈhekki*, *heki* and *hek*, and *ˈkool*, *ˈkooli*, *kooli* and *kool*. The first three elements of these series are acceptable words, which realize nominative, partitive and genitive singular in Table 1. But a weak stem in isolation, *hek* or *kool*, is not acceptable, because words are minimally bimoraic in Estonian, and only ‘Q3’ monosyllables contain two moras (cf. Prince 1980 and section 2.2). So the three distinct case forms in Table 1 represent the maximum that can be defined from the formatives in Table 1. The paradigms of *HEKK* and *KOOL* thus exploit efficient combinations, which is orthogonal to property-form biuniqueness.

Unlike cases of cumulative or extended exponence that might be described in terms of the ‘empty’ or ‘portmanteau’ morphs in Hockett (1947), the descriptive challenge illustrated in Table 1 is not that particular formatives realize ‘too few’ or ‘too many’ properties. The problem is that the sole function of individual formatives is to distinguish the word forms that realise case values. A morpheme-based analysis of the pattern in Table 1 is confronted with the fact that none of the individual formatives function as case morphemes. Case properties are realised by the word forms in Table 1, and words are characterised by distinctive **combinations** of formatives. But that is as far as one can extend a property-form relation without creating gratuitous problems of analysis.

Apportioning case properties to individual formatives in Table 1 not only misidentifies the locus of the property-form correspondence, but also applies the wrong logic to the analysis of this subsystem. The post-Bloomfieldian model does not seek minimal elements purely for their own sake, but because it assumes that their properties can be ‘summed’ to give the properties of other forms that are composed of the same elements. This analytic technique is based on the

assumption that recurrent elements will make a consistent contribution to the forms that they underlie. But this assumption is patently false in Estonian. One can identify contrastive properties and recurrent formatives in Table 1. However, individual formatives cannot be assigned a grammatical meaning from which the meanings of word forms can be determined. This is, of course, typical of theme vowels. What distinguishes Estonian is that stems are ‘sub-meaningful’ in much the same way, so that a stem ‘can be defined . . . in terms of which forms are built on it, which is to say in terms of its place in the morphological system of the language’ (Aronoff 1994:167).

This ‘morphomic’ pattern is propagated through a system of stems based ultimately on the formatives in Table 1. The chart in Table 2 exhibits the stem syncretism in weakening declensions though, as will become clear below, many of these patterns apply more generally within Estonian.

Table 2. Stem syncretism in weakening declensions

|      | Singular Grammatical Cases |       |        | ‘Fusional’ Cases |          | Plural Grammatical Cases |          |           |
|------|----------------------------|-------|--------|------------------|----------|--------------------------|----------|-----------|
|      | Nom                        | Gen   | Part   | Illa2 Sg         | Part2 Pl | Nom                      | Gen      | Part      |
| Form | `hekk                      | heki  | `hekki | `hekki           | `hekke   | hekid                    | `hekkide | `hekkisid |
|      | `kool                      | kooli | `kooli | `kooli           | `koole   | koolid                   | `koolide | `koolisid |
| Stem | Strong                     | Weak  | Strong | Part Sg          | Part Sg  | Gen Sg                   | Part Sg  | Part Sg   |

As in Table 1, the nominative and partitive singular are based on the strong stem, and the genitive singular is based on the weak stem. Nouns with vowel-final partitives usually have two additional forms based on the partitive singular, designated ‘ILLA2’ and ‘PART2’ in Table 2. The first is a ‘short’ illative singular, which is identical to the partitive singular in the case of *`hekki* and *`kooli*. The second is a ‘stem’ partitive plural, which preserves the stem of the partitive singular but ends in a different—and generally predictable—thematic vowel, *-e* in the case of *`hekke* and *`koole*.

The singular case forms also provide bases for the plural grammatical cases. The partitive singulars *`hekki* and *`kooli* underlie the partitive plurals *`hekkisid* and *`koolisid*, as well as the **genitive** plurals *`hekkide* and *`koolide*. The genitive singulars *heki* and *kooli* likewise underlie the nominative plurals *hekid* and *koolid*. In general, both the case and number properties of a base: genitive singular *heki/kooli* or partitive singular *`hekki/`kooli*, may differ from the properties of a form that it underlies: nominative plural *hekid/koolid* or genitive plural *`hekkide/`koolide*. These patterns are strikingly ‘parasitic’ or ‘Priscianic’, in the sense of Matthews (1972), in that the plural grammatical cases are based on the **form**, not the **entry**, of a singular grammatical case.

This Priscianic pattern is propagated through the system of 11 ‘semantic’ cases. Each semantic case form is marked by a number-neutral case exponent.

Yet the base of a semantic case form is a morphomic stem, corresponding to the genitive form. The singular semantic cases in Table 3 are based on the genitive singulars *heki* and *kooli*, and the plural semantic cases are based on the genitive plurals *hekkide* and *koolide*. The allative plural [[[*hekk*]*i*]*de*]*sse* thus contains three levels of morphomic stems. The basic stem *hekk* realises nominative singular in isolation and underlies a second stem, *hekki*. The stem *hekki* realises partitive singular in isolation, and underlies a third stem, *hekkide*. The stem *hekkide* realises genitive plural in isolation and underlies the plural semantic cases. The entire stem system is morphomic, from the simple components of singular grammatical cases in Table 1 through to the complex bases of the semantic cases in Table 3.

Table 3. Parasitic semantic case forms

|             | Sing    | Plur       | Sing     | Plur       | Suf  |
|-------------|---------|------------|----------|------------|------|
| Genitive    | heki    | hekkide    | kooli    | koolide    |      |
| Illative    | hekisse | hekkidesse | koolisse | koolidesse | -sse |
| Inessive    | heki    | hekkides   | koolis   | koolides   | -s   |
| Elative     | hekist  | hekkidest  | koolist  | koolidest  | -st  |
| Allative    | hekile  | hekkidele  | koolile  | koolidele  | -le  |
| Adessive    | hekil   | hekkidel   | koolil   | koolidel   | -l   |
| Ablative    | hekilt  | hekkidelt  | koolilt  | koolidelt  | -lt  |
| Translative | hekiks  | hekkideks  | kooliks  | koolideks  | -ks  |
| Terminative | hekini  | hekkideni  | koolini  | koolideni  | -ni  |
| Essive      | hekina  | hekkidena  | koolina  | koolidena  | -na  |
| Abessive    | hekita  | hekkideta  | koolita  | koolideta  | -ta  |
| Comitative  | hekiga  | hekkidega  | kooliga  | koolidega  | -ga  |
|             |         | 'hedge'    |          | 'school'   |      |

### 1.2. Morphological implication

The declensional system of Estonian conforms to the post-Bloomfieldian model in forming meaningful units from sub-meaningful elements. However, the sub-meaningful elements are formatives and stems, not phonemes, and the meaningful units are words, not morphemes. One cannot assign a determinate morphosyntactic value to the formatives in Table 1 or to the stems in Tables 2 and 3 because the meanings of these elements are context dependent. In Estonian, as in many morphological systems, words function as lexical **constructions**, in the sense that this term has come to be understood in other domains of grammar.<sup>2</sup> A morphological analysis cannot merely assemble discrete chunks of information associated with individual elements, but must recognise the contribution made by distinctive **combinations** of elements. As with other types of constructions, the whole guides—and may even determine—the selection of its parts, but the properties of the whole are more than the sum of the properties of its parts.

A model that insists on assigning meanings to minimal elements in Estonian declensions will not only create self-inflicted problems of analysis, but also fail to capture the organising principles of this system. An agglutinative analysis is particularly insensitive to the role that morphomic stems play in the **implicational** structure of a paradigm. The paradigm of an Estonian noun is not merely ‘the complete set of surface word forms that can be projected from the members of its stem set’ (Anderson 1992:134). Instead, Estonian declensions comprise networks of word forms which are connected by implicational rather than derivational relations. Each of the declensional types is organised around a set of **principal parts** from which one can predict the other forms of a paradigm. Traditional descriptions tend to list the three singular grammatical case forms: the nominative, genitive and partitive singular. However, in weakening declensions, the partitive singular functions as a ‘leading form’ or **kennform**, which reliably identifies the class of an open-class noun and, moreover, predicts the full paradigm of a noun. The implicational relations between the fusional case forms of HEKK and KOOL are set out in Table 4.

Table 4. Implicational structure of fusional grammatical cases

|          | Kennform         | Nom Sg         | Gen Sg        | Illa2 Sg         | Part2 Pl         |
|----------|------------------|----------------|---------------|------------------|------------------|
| Form     | `hekki<br>`kooli | `hekk<br>`kool | heki<br>kooli | `hekki<br>`kooli | `hekke<br>`koole |
| Relation |                  | truncation     | weakening     | identity         | exchange         |

A strong vowel-final partitive singular, *`hekki* or *`kooli*, implies a weak genitive singular, *heki* or *kooli*, as no open-class declension contains both a strong vowel-final partitive and a strong genitive singular. A strong vowel-final partitive singular also implies a ‘truncated’ nominative singular, *`hekk* or *`kool*, which lacks the theme vowel of the partitive. A vowel-final partitive singular also implies the ‘short’ illatives and stem partitives in Tables 2 and 4. Short illative singulars are minimally **trimoraic**. A strong partitive is already trimoraic, as the Q3 strong stem contributes two moras and the final syllable adds a further mora. Hence a strong partitive, *`hekki* or *`kooli*, implies an identical short illative singular. The stem partitive plural is likewise an ‘exchange variant’ of the partitive singular (cf. Mürk 1997:16). If the partitive singular ends in *-i*, the partitive plural ends in *-e*, and conversely. Thus *`hekki* and *`kooli* imply *`hekke* and *`koole*.

A vowel-final partitive singular also implies a genitive plural in *-de* and a ‘long’ partitive plural in *-sid*. Both genitive forms are predictable from the partitive singular, and these genitives in turn identify the base of semantic case forms. So the full paradigm of HEKK and KOOL is implied by the single kennformen *`hekki* and *`kooli*. Other noun types are based on other principal parts, which are described in section 2.1, but the implicational patterns are similar. Many of these implications are, moreover, ‘reversible’. The kennformen *`hekki* and *`kooli*

are identified by the genitive plurals *`hekkide* and *`koolide*, as well as by plural semantic case forms based on the genitive.

These patterns of mutual implication hold the key to the stem syncretism in Tables 2 and 3. The ultimate explanation for many of these patterns is plainly diachronic (Grünthal 2003:51, Viitso 2003b:162–168). But the synchronic function of these stems also cannot be understood in terms of their morphosyntactic ‘content’ alone, and must take into account their role within a system of implications that operates over paradigms, not single forms. It is because patterns at this level are inaccessible to methods of segmentation and classification that the ‘signal’ of a word-based system comes out as the ‘noise’ of non-biunique exponence in a post-Bloomfieldian model.

As this overview of patterns in weakening declensions suggests, property-form ‘mismatches’ are symptoms of a deeper problem. The challenge in Estonian is not that there are incomparable numbers of form and content units, but rather that no correspondence can be established between these units. The lack of a correspondence reflects the fact that the properties of an inflected form in Estonian cannot in general be determined from the properties of its parts. Instead, sub-word units serve to distinguish a word from other members of its inflectional paradigm, and the properties of the word are determined by its place within this larger pattern of forms.

## 2. WORD-BASED EXPONENCE AND IMPLICATION

This section shows how a WP analysis brings out the organisation of the Estonian declensional system. As recognised in traditional descriptions, the class of an Estonian noun is identifiable from the prosodic and morphotactic structure of one or more principal parts. Matching the principal parts of a noun against the corresponding forms of an exemplary paradigm permits the analogical deduction of other forms. Since form-based analogies use principal parts as the basis for **predicting** forms, they accommodate patterns of morphomic stem syncretism that raise difficulties for analyses that attempt to **build** complex forms from smaller meaningful units.

The basic components of this analysis are set out in sections 2.1–2.3. The first is a set of exemplary paradigms or class patterns. The second is a characterisation of the principal parts that identify the class of a given noun. The third is a system of analogies that allows one to deduce a predictable form of a noun from its principal parts and the forms of an exemplary paradigm.

### 2.1. Declension classes

Traditional descriptions of Estonian noun paradigms represent regular nouns and adjectives by a set of *põhivormid* (Erelt et al.2000:155), ‘basic forms’ (Viks

1992:39) or ‘principal parts’ (Mürk 1997:12). This set minimally includes the nominative, genitive and partitive singular forms, and may also contain the genitive and partitive plural, and even the short illative singular. Nouns are grouped into classes or *käändkonnad* ‘declensions’ based on the prosodic structure of one or more principal parts, and on patterns of exponence and stem selection within the principal part inventories. Although there is no absolute consensus regarding the number of classes and subtypes in Estonian, most classifications distinguish at least the four productive classes in Table 5.<sup>3</sup>

Each class in Table 5 exhibits a characteristic prosodic structure and distinctive patterns of exponence. Although it is traditional to list the three singular grammatical cases for each noun, the nominative singular tends to be the least informative, most predictable, and least prosodically consistent form. Class membership is usually predictable from the prosodic structure of the genitive singular and/or the ending of the partitive singular. Matching these kennformen of a noun against the corresponding cells of an exemplary paradigm identifies class-specific forms.

Class 1 nouns have a trochaic genitive singular and a vowel-final partitive singular. The genitive singular exhibits a strong–weak trochaic pattern, with primary stress on the first syllable, and the partitive plural ends in a theme vowel. In class 1a, the genitive and partitive singulars are identical, so that the forms *pesa* and *seminari* realise the genitive and partitive singular. In ‘weakening’ class 1b, the genitive singular is a weak counterpart of the partitive singular, as illustrated by the genitive~partitive pairs *kooli*~`*kooli* and *tuleviku*~*tule*`*vikku*. Since only class 1 nouns have a vowel-final partitive singular, this form alone suffices to identify a class 1 noun.

Class 2 nouns have a non-trochaic genitive singular and a partitive singular in *-t*.<sup>4</sup> Class 2a contains monosyllables (`*tee*~`*teed*), and iambic bisyllables (*i*`*dee*~*i*`*deed*). Class 2b contains nouns with an initial Q3 foot that remains strong through their entire paradigm (`*aasta*~`*aastat*), and most nouns with trisyllabic genitive singulars (*raamatu*~*raamatut*). Class 2c contains nouns with trisyllabic genitive singulars in *-se*, as illustrated by *hobuse*~*hobust*, and *otsuse*~*otsust*.

Class 3 nouns combine a penultimate primary stress in the singular grammatical cases with a partitive singular in *-t*.<sup>5</sup> The pairs *auto*~*autot* or *kõne*~*kõnet* ‘speech’ can only belong to class 3: the partitive singulars in *-t* cannot be associated with class 1, and the trochaic structure of the genitive singulars does not conform to the class 2 pattern. In longer genitive singulars, such as *gorilla*, *lauljanna*, *šampánja* ‘champagne’ or even *primadónna* (in which stress is marked by an acute accent), the penultimate stress pattern is an unambiguous marker of class 3 membership.<sup>6</sup>

Class 4 contains nouns whose partitive singulars end in *-st* and whose genitive singulars consist of two feet, the second of which is a trochee. The quadrisyllabic genitive singulars *küsimuse* and *inimese* consist of two trochaic feet, whereas `*alguse* or `*jõulise* ‘forceful’ consist of an initial Q3 foot, followed by a trochee.

Table 5. Major noun declensions in Estonian

|    | Nom Sg                                   | Gen Sg                                     | Part Sg                                      | Ill2 Sg                                | Part2 Pl                             | Gen Pl   | Part Pl  |
|----|--|--|--|--|--------------------------------------|--|--|
| 1a | pesa<br>seminar                          | pesa<br>seminari                           | pesa<br>seminari                             | `pessa<br>seminari                     | pesi<br>seminare                     | pesade<br>seminaride                             | pesasid<br>seminarisid   |
| 1b | `kool<br>tule`vik                        | kooli<br>tuleviku                          | `kooli<br>tule`vikku                         | `kooli<br>tule`vikku                   | `kooli<br>tule`vikke                 | `koolide<br>tule`vikkude                         | `koolisid<br>tule`vikkusid   |
| 2a | `tee<br>i`dee                            | `tee<br>i`dee                              | `teed<br>i`deed                              | —<br>—                                 | —<br>—                               | `teede<br>i`deede                                | `teid/`teesid<br>i`deid/i`deesid   |
| 2b | `aasta<br>raamat                         | `aasta<br>raamatu                          | `aastat<br>raamatut                          | —<br>—                                 | —<br>—                               | `aastate<br>raamatute                            | `aastaid<br>raamatuid  |
| 2c | hobune<br>otsus                          | hobuse<br>otsuse                           | hobust<br>otsust                             | —<br>—                                 | —<br>—                               | hobuste<br>otsuste                               | hobuseid<br>otsuseid   |
| 3  | auto<br>gorilla                          | auto<br>gorilla                            | autot<br>gorillat                            | —<br>—                                 | —<br>—                               | autode<br>gorillade                              | autosid<br>gorillasid  |
| 4  | laujanna<br>`algus<br>küsimus<br>inimene | laujanna<br>`alguse<br>küsimuse<br>inimese | laujannat<br>`algust<br>küsimumst<br>inimest | —<br>`alguse<br>küsimumsse<br>inimesse | —<br>`algusi<br>küsimumsi<br>inimesi | laujannade<br>`alguste<br>küsimumste<br>inimeste | laujannasid<br>(`alguseid)<br>—<br>—   |
|    |  |  |  |  |                                      |  | `nest<br>`seminar<br>`school<br>`future<br>`road<br>`idea<br>`year<br>`book<br>`horse<br>`decision<br>`car<br>`gorilla<br>`fem. singer<br>`beginning<br>`question<br>`person |

Given that a partitive singular in *-st* and a genitive singular in *-se* imply one another, class 4 nouns can be identified just from the form of their genitive singular.

The prosodic and morphotactic properties of these kennformen are summarised in Table 6.

Table 6. Prosodic and morphotactic structure of primary kennformen

|      | Gen Sg     | Prosody              | Part Sg    | 1σ          | 2σs                 | 3σs            | 4σs               |
|------|------------|----------------------|------------|-------------|---------------------|----------------|-------------------|
| 1a   | <i>Xv</i>  | trochaic             | <i>Xv</i>  | —           | <i>pesa</i>         | —              | <i>seminari</i>   |
| 1b   | <i>Xv</i>  | trochaic             | <i>`Xv</i> | —           | <i>`kooli</i>       | —              | <i>tule`vikku</i> |
| 2a,b | <i>X</i>   | non-trochaic         | <i>Xt</i>  | <i>`tee</i> | <i>i`dee/`aasta</i> | <i>raamatu</i> | —                 |
| 2c   | <i>Xse</i> | non-trochaic         | <i>Xst</i> | —           | —                   | <i>otsuse</i>  | —                 |
| 3    | <i>X</i>   | penult stress        | <i>Xt</i>  | —           | <i>auto</i>         | <i>gorilla</i> | <i>primadonna</i> |
| 4    | <i>Xse</i> | 2 feet, 2nd trochaic | <i>Xst</i> | —           | —                   | <i>`alguse</i> | <i>küsimuse</i>   |

## 2.2. Characterization of principal parts

The chart in Table 6 isolates some of prosodic and morphotactic factors that underlie traditional classifications of nouns and adjectives. A prosodic description of these classes in Table 5 can also be couched in most familiar models of prosodic analysis, such as Selkirk (1980) or McCarthy and Prince (1995). The central descriptive challenge that Estonian presents for any prosodic analysis concerns the treatment of the three-way contrast between short (Q1), long (Q2) and ‘overlong’ (Q3) syllables. As Viitso (2003a:11) observes, this ternary contrast reflects two binary distinctions. The first is a segmental length contrast between short Q1 and long Q2/Q3 syllables. The second is a prosodic weight contrast between light Q1/Q2 syllables and heavy Q3 syllables. This is not the place to review the extensive and largely inconclusive phonological literature on this topic. Of primary importance is the fact that only the weight contrast is relevant for the inflectional system. All quantitative grade alternations involve a binary contrast between a stressed Q3 and a non-Q3 syllable. Estonian reinforces this contrast with a binary split between Q3 syllables, which can function as words in isolation, and Q1 and Q2 syllables, which cannot. Conversely, class 3 nouns may contain an initial Q1 syllable, as in *kõne* ‘speech’ or *ratsu* ‘steed’, or an initial Q2 syllable, as in *auto* or *kiisu* ‘kitty’, but may not contain a Q3 syllable (Erelt et al.2000:247).

In short, the morphological system makes a clear binary split between ‘heavy’ Q3 syllables and ‘non-heavy’ Q1 and Q2 syllables. Moreover, the weight-sensitive processes of Estonian treat a Q3 syllable as the equivalent of two non-Q3 syllables. As noted above, a minimal word may consist of a single Q3 syllable, as in *`tee* or *`kool*, two Q1 syllables, as in *pesa* or *kivi* ‘stone’, or a Q2 and Q1 syllable, as in *kooli* or *kiisu* ‘kitty’. However, a word may not consist of a single Q1 syllable,

such as *pes* or *kiv*, or even a Q2 syllable, such as *kool* or *kiis*. Class 4 nouns exhibit a parallel correspondence, as their genitive singular kennform may consist of an initial Q3 syllable or an initial pair of non-Q3 syllables. To capture the fact that one Q3 syllable corresponds in weight to any two non-Q3 syllables, Ehala (2003) and Blevins (2004) analyse Q3 syllables as bimoraic, and treat both Q1 and Q2 as monomoraic syllables that differ in segmental length.<sup>7</sup>

Provided that the marked member of the opposition is Q2 (historically shortened Q3), one could consider Q1 a normal short and light (monomoraic) quantity and Q3 a normal long and heavy (bimoraic) quantity. Q2 would be something in between: segmentally long, but light by weight (monomoraic). (Ehala 2003:58)

### 2.2.1. Minimal words and nominative singulars

This treatment of syllable weight permits a straightforward description of the minimal word constraint that applies to open-class word forms in general, and the prosodic constraints that apply to nominative and short illative singular forms in particular. Adapting Prince (1980), feet can be defined as minimally bimoraic, and prosodic words as consisting of at least one foot. Assuming that only Q3 syllables are bimoraic and qualify as feet, provides an account for the fact that monosyllables must be Q3, as illustrated by class 2 nouns such as *ʔee* or *ʔoi* ‘moth’.

The minimal word constraint also conditions the form of nominative singulars, as McCarthy and Prince (1986:5) note, though morphotactic structure may play a role as well. The nominative singular of a regular Class 1 noun corresponds to the stem of partitive singular, provided that the stem constitutes a foot. Thus *KOOL* has the partitive singular *ʔooli* and the nominative singular *ʔool*, and *SEMINAR* has the partitive singular *seminari* and the nominative singular *seminar*. But since *pes-* alone is not bimoraic, hence not a foot, the theme vowel in the partitive singular *pesa* is preserved in the nominative singular *pesa*. The stem of a class 4 noun is always bimoraic, and class 4 nouns with genitive singulars *-use* have nominative singulars in *-s*. This is illustrated by the pairs *ʔalguse~ʔalgus* and *küsimuse~küsimumus*. But class 4 nouns with a genitive singular in *-ese* or *-ise* are predominantly adjectives, and have a nominative singular in *-ene* or *-ine*.<sup>8</sup>

Monomorphemic class 2 nouns also tend to have truncated nominative singulars. Thus *raamatu* and *otsuse* alternate with *raamat* and *otsus*. A class of mainly adjectival class 3 forms, including the noun *hobuse*, but more typically *soolase* ‘salty’, have nominative singulars in *-ne*. This represents the one productive nominal subtype in which the form of the nominative singular is genuinely informative, though in the majority of cases, the form of the nominative singular is predictable from the syntactic category of a noun with a genitive singular in *-use*.

Class 2 nouns whose genitive singulars end in a derivational suffix also lack truncated nominative singulars. This group includes nouns with trisyllabic genitive singulars such as *sigala* ‘pigsty’ (cf. *SIGA* ‘pig’), in which *-la* marks ‘nouns expressing a place for a certain action’ (Viitso 2003a:81), caritive adjectives in *-tu* such as *abitu* ‘helpless’ (cf. *ABI* ‘help’), along with nouns, such as *šöökla* (cf. *söök* ‘meal’) or *laulja* ‘singer’ (cf. *LAULMA* ‘sing’), whose bisyllabic genitive singulars contain an initial Q3 syllable that is strong through the entire paradigm.<sup>9</sup> Given that ‘non-trochaic’ class 2 nouns are already somewhat heterogeneous, one could recognise these morphotactically complex formations as a particular subtype of class 2, or else attribute the lack of truncation to a constraint against resyllabification across morph boundaries, or to some other condition. In either case, the class of these nouns, and the form of their nominative singulars, is predictable from the prosodic and morphotactic structure of the genitive singular kennform.

### 2.2.2. Principal part deduction

The fusional illative and partitive cases are similarly predictable from kennformen in classes 1 and 4. As noted above, illative singulars are minimally trimoraic. In class 1, short illative singulars are based on the partitive singular. A bisyllabic partitive singular with an initial Q3 syllable, such as *kooli*, or a quadrisyllabic partitive singular, such as *seminari*, implies an identical short illative singular. In paradigms with a bimoraic partitive singular, such as *pesa*, the short illative is a Q3 counterpart, here *pessa*. The genitive singular forms of class 4 nouns all satisfy the trimoraic length requirement, so there is no ‘strengthening’ in class 4. Instead, short illatives are distinguished by a purely segmental lengthening process in the final syllable. Thus the final syllables *-se* in the genitive singulars *alguse*, *küsimuse* and *inimese* all differ in length but not in weight from the final syllables *-sse* in the short illative singulars *algusse*, *küsimusse* and *inimesse*.

The ‘stem’ partitive plurals are based on the same kennformen as the short illatives, but exhibit a distinctive pattern of exponence. Stem partitive plurals operate by a system of ‘vowel reversal’ (Matthews 1991:199) or, more generally, ‘vowel exchange’. In class 1, a partitive singular in *-i* implies a partitive plural in *-e*, and conversely. The first of these patterns is illustrated by the pairs *kooli*~*koole* and *hekki*~*hekke* and the second by the pairs *kukke*~*kukki* ‘rooster’ and *lille*~*lilli* ‘flower’. A partitive plural in *-e* is also implied by a partitive singular in *-u*, as illustrated by *lukku*~*lukke* ‘lock’, and a partitive plural in *-i* is implied by a partitive singular in *-a*, as illustrated by *pesa*~*pesi* and *mokka*~*mokki* ‘lip’. Since the genitive singular kennformen of class 4 nouns end in *-se*, the corresponding stem partitive plural ends in *-si*. Thus class 4 exhibits the characteristic alternations *alguse*~*algusi*, *küsimuse*~*küsimusi*, and *inimese*~*inimesi*.<sup>10</sup>

The prosodic and morphotactic structure of genitive and partitive singular kennformen thus identify word class, and also determine the form of other principal parts.<sup>11</sup> In contrast, the other principal parts are **not** predictable in general

from the nominative singular citation form. Although Estonian preserves traces of a vowel harmony system, reconstructable for proto-Finnic (Viitso 2003b:173) or even Uralic (Laakso 2001:83), theme vowels are not predictable from noun stems. In ‘truncating’ classes 1 and 2 paradigms, the theme vowel is therefore not recoverable from the nominative singular. Without the theme vowel, one cannot define the genitive or partitive singulars, or the case forms that are based, directly or indirectly, on these principal parts.

The deficiencies of the nominative singular are, moreover, shared by any prosodic unit smaller than the genitive and partitive singular. Not only are stems and theme vowels of limited predictive value, but, as noted in section 1.1 above, they do not carry any grammatical properties in isolation. The difference between the forms *heki* and *pesi*, for example, cannot be attributed to any aspect of their syntagmatic structure. No part of the form *heki* signals that it realises genitive singular, rather than, like *pesi*, partitive plural. These forms have parallel morphotactic structures, down to the choice of the final vowel *-i*. Yet they occupy different niches in their respective paradigms, and it is this association that determines their grammatical meaning. The genitive singular interpretation of *heki* reflects its place within the paradigm of *HEKK* ‘hedge’ and the partitive plural interpretation of *pesi* reflects its place within the paradigm of *PESA* ‘nest’. The interpretation of the strong forms *ˈhekki* and *ˈkukki* ‘rooster’ is similarly dependent on paradigmatic context. Both forms contain a strong stem and the vowel *-i*. But *ˈhekki* is part of the singular–plural opposition *ˈhekki*~*ˈhekke*, whereas *ˈkukki* is part of the inverse pattern *ˈkukke*~*ˈkukki*.

The meaning of forms such as *heki* and *pesi* or *ˈhekki* and *ˈkukki* is thus context-dependent. But the context is paradigmatic, as the grammatically significant part-whole relations in Estonian declensions hold between words and paradigms, not between morphemes and words. Relations at this level clearly fall outside the descriptive scope of post-Bloomfieldian procedures of segmentation and classification. Even more generally, these declensional patterns challenge any strategy that isolates minimal elements for the purpose of ‘building’ other forms. Techniques of ‘isolation and recombination’ are designed to relate forms by deriving them from recurrent elements that contribute a constant meaning in each of their uses. However, the members of nominal paradigms in Estonian are related in a different way, via patterns of implication.

### 2.3. Analogical formations

These implicational patterns are traditionally expressed in terms of procedures of **analogy**. Analogy operates at two levels in Estonian declensions. The first level involves cross-paradigm analogies that deduce the principal parts of a noun from the basic kennformen of the noun and an exemplary set of principal parts. The second level involves paradigm-internal analogies that deduce the grammatical and semantic case forms that are based on the principal parts.

Traditional descriptions of Estonian declensions exploit both types of analogical formation. Viks (1992:39–47) identifies six basic forms, and defines ‘rules of analogy’ that apply to the genitives. The *Eesti keele sõnaraamat* (Erelt 1999) gives exemplary principal part inventories for each of the ‘word types’ (*tüüpsõnad*) that it recognises, and then identifies the type of each noun that it lists. Erelt et al. (2000:154) likewise distinguish a class of ‘basic forms’ (*põhivormid*), as in section 2.1, and define a larger class of ‘analogue forms’ (*analoožiavormid*) as ‘forms that can be formed on analogy to some basic form’ (*vormid, mida saab moodustada mingi põhivormi analoogial*).

Traditional analogical models supply the paradigmatic context that resists description in syntagmatic terms. For example, the Q3 partitive singular *hoovi* identifies the noun *hoov* ‘yard’ as a grade-alternating noun of class 1. Given this kennform, and the exemplary forms of *koole* in Table 5, one can deduce the corresponding forms of *hoov*. Each deduction can be expressed as a standard four-part proportional analogy. To determine the short partitive plural of *hoov*, one matches the partitive singular kennform *hoovi* against the exemplary form *kooli*, as in Table 7a, and then ‘solves for *X*’, as in Table 7b. The forms *hoov*, *hoovi* and *hoovi* can be defined similarly.

Table 7. Form-based  
analogical deduction

- 
- a.  $\text{`kooli} : \text{`hoovi} = \text{`koole} : X$   
 b.  $X = \text{`hoove}$
- 

Although traditional accounts characteristically refer to ‘forms’, they tend to mean ‘forms with a given interpretation’, which amount, in effect, to entries. The intended interpretation of Table 7 can be expressed more explicitly in Table 8, using the ‘realisation pair’ notation of Aronoff (1994).

Table 8. Entry-based analogical deduction

- 
- a.  $\langle [\text{Part Sg}], \text{`kooli} \rangle : \langle [\text{Part Sg}], \text{`hoovi} \rangle = \langle [\text{Part Pl}], \text{`koole} \rangle : \langle [\text{Part Pl}], X \rangle$   
 b.  $X = \text{`hoove}$
- 

The refinement in Table 8 brings out the tacit assumption that analogical deduction involves matching a ‘leading entry’ against the corresponding cell in an exemplary paradigm. The sole function of the properties in a leading entry is to guide this matching. The deductions in Tables 7 and 8 do not ‘construct’ a derived form or entry from the exemplar, but merely use the exemplar as a model for forming the deduced element. A kennform or leading entry is therefore not a kind of ‘basic unit’ that underlies analogue forms, but rather a ‘hook’ into a deductive pattern.

The ‘non-derivational’ character of analogical deductions allows them to capture morphomic paradigm-internal patterns as well. The chart in Table 9

Table 9. Priscianic stem syncretism in semantic and plural grammatical cases

|   | Singular Grammatical Cases |          | Plural Grammatical Cases |           |           | Semantic Cases |             |              |
|---|----------------------------|----------|--------------------------|-----------|-----------|----------------|-------------|--------------|
|   | Nom                        | Gen      | Part                     | Nom       | Gen       | Part           | IIIa Sg     | IIIa Pl      |
| 1 | kool                       | kooli    | kooli                    | koolid    | koolide   | koolisid       | koolisse    | koolidesse   |
| 2 | raamat                     | raamatu  | raamatut                 | raamatud  | raamatute | raamatuid      | raamatusse  | raamatutesse |
| 3 | auto                       | auto     | autot                    | autod     | autode    | autosid        | autosse     | autodesse    |
| 4 | küsimus                    | küsimuse | küsimust                 | küsimused | küsimuste | küsimusi       | küsimusesse | küsimustesse |

reviews the Priscianic structure of the case forms that are based, directly or indirectly, on the singular grammatical cases.

Forms such as *kooli* or *'kooli* make no uniform morphosyntactic contribution to the case forms that they underlie, other than in identifying those elements as forms of the noun *KOOL*. To paraphrase Matthews (1991:200), there is no sense in which the meaning of the genitive plural includes that of the partitive singular, or in which the meaning of the long illative plural includes that of the genitive plural. Rather, the illative plural *'koolidesse* is based on the form of the genitive plural *'koolide* and *'koolide* is based in turn on the form of the partitive singular *'kooli* in the same way that the partitive singular is itself based on the sub-meaningful strong stem *'kool*.

These pure form correspondences between members of a paradigm can again be expressed as analogical deductions. If one uses '*Xv*' to represent a vowel-final form, the formation of genitive and partitive plurals in class 1 can be expressed by the simple two-part analogies in Table 10.

Table 10. Paradigm-internal analogy  
in class 1

- |    |  |
|----|--|
| a. | $\langle [\text{Part Sg}], Xv \rangle = \langle [\text{Gen Pl}], Xvde \rangle$   |
| b. | $\langle [\text{Part Sg}], Xv \rangle = \langle [\text{Part Pl}], Xvsid \rangle$ |

Nominative plural and semantic cases are defined by the more general deductions in Table 11.

Table 11. General  
paradigm-internal analogy

- |    |  |
|----|--|
| a. | $\langle [\text{Gen Sg}], X \rangle = \langle [\text{Nom Pl}], Xd \rangle$ |
| b. | $\langle [\text{Gen}], X \rangle = \langle [\text{Ill a}], Xsse \rangle$   |

In an analogical pattern, the properties of the antecedent identify the value of the form variable *X*. These properties are explicitly not associated with the consequent, but other properties of the matching entry are preserved. Hence the nominative plural defined in Table 11a differs in case and number from its genitive singular base, whereas the long illatives defined in Table 11b preserve the number features of the corresponding genitives. The illative singular *koolisse* is parasitic on the singular genitive, while the illative plural *'koolidesse* is formed analogically from *'koolide*. But the stems *kooli* and *'koolide* do not contribute number properties to the forms that they underlie, any more than they contribute case properties, because semantic forms are deduced from these stems, not 'constructed' from stems through the addition of properties and exponents.

The remaining semantic case forms of *KOOL* can be formed by similar analogies. A combination of general and class-specific analogies will also define the

paradigm of other open-class nouns. In each case, a noun can be identified by its kennformen, and any of its principal parts that are below the frequency threshold for storage can be defined by analogy. The principal parts will in turn imply the form of the plural grammatical cases, and, ultimately, the semantic cases.

Exactly the same strategy applies to irregular nouns. Given that irregularity is largely concentrated in the singular grammatical cases, many non-productive patterns can be represented by associating a noun or noun class with an exceptional set of principal parts, with as many forms as are needed to represent additional irregularities or distinctive patterns of stem syncretism. The nouns TÜVI ‘stem’, TULI ‘fire’ and KÄSI ‘hand’ in Table 12 illustrates successively more irregular patterns, each of which is followed by under a dozen nouns (Erelt et al. 2000:240–241). The irregularity of TÜVI is essentially confined to the exceptional nominative singular in *-i*. To this pattern, the paradigm of TULI adds the exceptional partitive singular *\tuld*. The plural grammatical cases of both nouns are based on the genitive singular kennform, and the semantic cases in turn on the genitive singular and genitive plural forms. At the other extreme, all of the forms of KÄSI in Table 12 must be stored, apart from the nominative singular. But given these forms, the semantic cases can be formed analogically from the genitive singular *\käe* and genitive plural *käte*.

Table 12. Degrees of irregularity in non-productive class 1 nouns

| No. of nouns | Sing Grammatical Cases |      |       | ‘Fusional’ Cases |          | Plur Grammatical Cases |        |         |
|--------------|------------------------|------|-------|------------------|----------|------------------------|--------|---------|
|              | Nom                    | Gen  | Part  | Illa2 Sg         | Part2 Pl | Nom                    | Gen    | Part    |
| 8            | tüvi                   | tüve | tüve  | \tävve           | —        | tüved                  | tüvede | tüvesid |
| 6            | tuli                   | tule | \tuld | \tulle           | —        | tuled                  | tulede | tulesid |
| 9            | käsi                   | \käe | \kätt | \kätte           | \käsi    | käed                   | käte   | —       |

#### 2.4. Summary

The analysis above factors the declensional system of Estonian into two traditional parts. The first is a set of exemplary paradigms (or, alternatively, sets of exemplary grammatical case inventories), and the second is a smaller set of kennformen for each non-exemplary noun or adjective. These components are related by word-based principles of analogy that permit the deduction of novel forms from existing forms or patterns. Since analogical principles are invoked to deduce forms that are not already part of the speaker’s lexicon, they do not apply if the lexicon already contains a suppletive form that is frequent enough to maintain its irregular characteristics.

Principles of word-based analogy also provide a general analysis of overlapping exponence in basic forms and Priscianic stem syncretism in complex case

forms. If one regards stems and exponents as abstractions over whole word forms, as proposed by Kuryłowicz (1949), among others, morphomic patterns raise no difficulties of any kind. Full word forms will have determinate properties, and be distinguished by patterns of prosody, exponence and/or stem selection. However, there will be no reason to expect that any individual pattern or sub-word unit will be biuniquely associated with differences in meaning, except insofar as the patterns reflect recently or otherwise transparently grammaticalised sources that retain some morphosyntactic unity.

A speaker must learn that *'kooli* is the partitive singular of *KOOL*, as this information is not predictable from properties that can be associated with the stem *'kool-* or with the vowel *-i*. However, classifying *'kooli* as a partitive singular permits the analogical deduction of the entire paradigm of *KOOL*. The form *'kooli* predicts the genitive plural *'koolide*, and ultimately the semantic case forms based on *'koolide*, given that each of the semantic case exponents are constant. But this implicational structure cannot be attributed to the derivation of case forms from a set of 'minimal meaningful' units. The elements *'kool-* and *-i* contribute 'units of form' but no 'units of content' to *'kooli* in the same way that *'kooli* contributes form but not content to *'koolide*, and *'koolide* in turn contributes pure form to *'koolidesse* and other semantic case forms. The patterns are transparent and systematic, but they are analogical and deductive, not derivational.

### 3. EXTENSIONS AND ALTERNATIVES

The traditional perspective adopted in the analysis in section 2 incorporates a number of idealisations and assumptions that are independent of the central claims. One important issue concerns the demarcation between exemplary paradigms and principal part inventories. There is compelling evidence that the forms of highly frequent nouns are stored by speakers, irrespective of their regularity (Baayen et al. 2003). Hence the artificiality of a traditional account is not that it relies on an exemplary paradigm for each inflection class, but that it arbitrarily selects a **particular** lexeme from the many that would be contained in the mental lexicon of most native speakers.

The idealisation that non-exemplary nouns are represented by a minimal principal part inventory requires a similar qualification. The key assumption of a traditional WP account is that an inflectional system can be factored into exemplary patterns, and that one can identify the appropriate pattern for a non-exemplary item from a principal part inventory that contains fewer forms than the pattern itself. An inflectional class system that cannot be factored in this way cannot be analysed in terms of a traditional WP model. However, there is no reason to assume that a speaker's principal part inventories must therefore contain the **fewest** informative forms, any more than there is a reason to assume that a speaker must identify a unique exemplary paradigm. On a WP

analysis, principal part inventories must contain forms that identify class. But other factors, notably frequency, will determine whether additional forms are stored as well.

The selection of particular kennformen in section 2 also reflects traditional but inessential assumptions. Standard descriptions of Estonian declensions tend to classify nouns on the basis of sets of morphotactically simple forms, to the exclusion of sets of equally informative but more complex forms. This bias is reflected in the traditional choice of genitive and partitive singular kennformen in section 2.1. However, other forms or collections of forms may be equally informative. The short illative singular or stem partitive plural often suffice to identify the class of a noun that contains these forms. Noun class is also generally predictable from the partitive singular and either the partitive or the genitive plural, as discussed in Blevins (2004). Any pair of singular and plural semantic case forms will likewise identify the genitive singular and plural forms of a noun, as well as the base of the genitive plural. So the choice of simple kennformen, the same for each non-exemplary lexeme, serves mainly to identify the properties than any kennformen must have.

### *3.1. Referrals, families and constructions*

On the traditional approach outlined above, an inflectional system consists of a stock of word forms, and a network of analogical principles that extend the patterns exhibited by these forms. This approach casts light on a number of contemporary idealizations. One assumption that is implicit, in one form or another, in many theoretical models, is that the analysis of a given form proceeds in isolation from all other forms of a system. This assumption is reflected in the fact that rules or combinatoric principles apply to a single form in nearly all morphological models, and that these rules define derivations that are fully independent of one another. Rules of ‘referral’ (Zwicky 1985, Stump 1993) are a prominent exception, as they permit one form to be defined with ‘reference’ to another. Yet rules of this type are deprecated or rejected altogether in many approaches, due in part to concerns about their seemingly ‘transderivational’ character.

From a traditional WP perspective, these types of fears are misplaced. A model in which novel forms are deduced by analogy to existing forms places referral-type relations at the centre of a morphological system. It is instead the rules that construct one form at a time from smaller, autonomous parts that represent the marginal and theoretically suspect device. A measure of empirical support for this traditional conception comes from studies of the effects of ‘morphological families’. Schreuder and Baayen (1997) and de Jong et al. (2000), among others, have found that the ‘family size’ of a simple form, i.e. the number of complex forms that it underlies, has a striking effect on lexical decision tasks. By controlling for the token frequency of family members, they are able to

establish that ‘[t]he larger the morphological family, the faster and more accurate[ly] participants decide whether a word is an existing word’ (de Jong 2002:7). While there are questions about how to model these effects, the studies carry a clear implication that the members of a morphological family are not only listed, but activated in processing tasks.

A last general issue concerns the format in which productive patterns are expressed. Analogical relations between forms can be characterised in a variety of different ways, depending on the importance that one attaches to the symbolic representation of patterns. In any analogical model, the deductions that predict novel principal parts will exploit the implicational structure implicit in a set of exemplary forms. But this structure can either remain resident in existing form inventories, or it can be encapsulated in a separate system of rules, constraints, templates or schemas. For example, one could express the truncation of nominative singulars solely in the relation between a kennform and a truncated exemplary nominative singular, or else represent truncation symbolically, as a process that relates a kennform to a nominative singular. Similar remarks apply to the relation between a kennform and the stem partitive plural, etc.

The paradigm-internal analogies in Tables 10 and 11 can likewise be recast in more of a constructional idiom. On this alternative, the genitive plural is construed as a construction that selects a partitive singular stem and the exponent *-de*, the nominative plural as a construction that selects a genitive singular stem and the exponent *-d*, and the long illative as a construction that selects a genitive stem and the exponent *-sse*. Each analogised case form would correspond to a construction that determines the choice of a stem and ending. The result would have more of a ‘top-down’ structure, in that the whole would more explicitly determine its parts. But it would still be the entire construction, i.e. the full word that would carry grammatical meaning.

### 3.2. *Stem sets and morphotactic features*

Other types of alternative analyses may differ in what may at least appear to be more substantial respects. One fairly straightforward alternative to a traditional word-based analysis would be to describe Estonian declensions in terms of a system of abstract stems. The generally morphomic character of these stems would then reflect the assumption that they are not associated with any properties other than the ‘intrinsic’ features of the basic stem or root. Versions of this type of stem analysis are presented in Mürk (1997) and Hughes and Ackerman (2002). The question that arises for this type of account is whether it represents a genuine alternative. Apart from forms such as *hek-* or *hekk-*, which represent stems on nearly any account, the expanded class of ‘stems’ will turn out to comprise just those word forms that may underlie other word forms. With the exception of the genitive (and nominative) singular none of these stems will participate

in derivational processes or other processes that might confirm their sub-word status. Hence it is not obvious that calling *hekkide* a stem achieves anything other than preserving the generalisation that words are based on stems, rather than other words. But if preserving this generalisation involves designating all bases as stems, whether or not they exhibit any other stem-like behaviour, it becomes fairly clear that the only real difference is terminological.

A second, and, on the face of it, more radical alternative would adopt a neo-Jakobsonian perspective, and assign more abstract ‘meanings’ to the exponents in Estonian. The three basic grammatical cases could be described in terms of a pair of binary features, say  $\pm F_1$  and  $\pm F_2$ . Seemingly sub-meaningful elements, such as strong stems and theme vowels could be assigned values for these features, and then the combination of abstract values on a word form would define a conventional case property, such as nominative, genitive or partitive. For example, a strong stem *hekk-* could be assigned the value  $[+F_1]$ , the theme vowel *-i* the value  $[+F_2]$ , and the property ‘partitive’ defined as  $[+F_1, +F_2]$ . Then the parts of *hekki* could contribute meanings that determine the properties of the whole word. The problem with this alternative is that it merely projects the sub-meaningful character of the formatives *hekk-* and *-i* onto a level of morphotactic features. The abstract feature analysis just redundantly mirrors the morphotactic structure. Most importantly, these features will not define any actual case values below the word level, since it is only at this level that the features of stems and exponents are combined. So the level of morphotactic features is not only redundant, but utterly inert. Case remains a word-level property, but the representation of case is mediated through an extraneous level of description. Clearly nothing is achieved by preserving the letter of a post-Bloomfieldian model in this way.

#### 4. CONCLUSION

This brief discussion of alternatives brings the central claims of the paper into sharper relief. The most basic claim is that the declensional system of Estonian is word-based, and exhibits word-level patterns of exponence, stem syncretism and implication that cannot be expressed in terms of sub-word units. A related claim is that the properties of a noun form cannot in general be determined from its syntagmatic structure, but reflect its place in a larger set of forms. Estonian thus accords with a traditional WP perspective, in which form variation is distinctive at the level of words, but interpreted within the larger pattern of a language. The syntagmatic parts of a word distinguish it from other words, but the grammatical meaning of the word depends on the organisation of words into paradigms, and paradigms into inflection classes. Each noun form is distinguished from the other forms in its paradigm by a combination of characteristics that mark the same properties in a class of congruent paradigms. This system-level

congruence provides the basis for the analogical deduction of forms, within and across paradigms. In some cases, the full paradigm of a noun can even be deduced from a single, frequent, kennform.

Procedures of segmentation and classification apply at the wrong level of analysis to capture these patterns, and no amount of technical refinement will allow a post-Bloomfieldian approach to characterise the part-whole relation between words and paradigms without conceding the central claims of a WP model. Any model that assumes the biunique correspondence encapsulated in the structuralist morpheme is bound to regard a paradigmatic system ‘as an agglutinating system that has somehow gone wrong’ (Matthews 1991:204). But the way in which the system goes wrong are symptoms of a model that has been wrongly applied. A model that leads the analyst to ask what a strong stem or theme vowel ‘means’ in isolation, or to ask which characteristic ‘realises’ partitive case, is simply ill suited to describe this type of inflectional system.

## NOTES

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<sup>1</sup> Since, as these examples show, the contrast between long and overlong forms is not consistently represented in the standard Estonian orthography, strong overlong forms are marked by a preceding grave accent, as in Viks (1992).

<sup>2</sup> See, for example, Booij (2005) and Shibatani and Thompson (1996), and references cited therein.

<sup>3</sup> Viks (1992) and Erelt (1999) provide the most widely accepted descriptions of inflection classes in Estonian. Analyses of the declensional system can be found in Erelt et al. (1995), Ehala (1997) and Peebo (1997). Erelt et al. (2000) usefully distinguish open from closed noun classes. Although the literature in English is sparser, Viitso (2003a) gives an accessible overview. Mürk (1997) and Saagpakk (2000) also offer highly detailed classifications, but their descriptions often differ significantly from Estonian sources, and should be verified against these sources.

<sup>4</sup> The distinction between *t* and *d* marks a **length** contrast in Estonian. Orthographic *t* represents a long voiceless stop /t:/, and *d* a short counterpart /t/. A long *t* is shortened to *d* following a Q3 syllable, as in *teed* and *i`deed*.

<sup>5</sup> I am indebted to T.-R. Viitso for drawing this stress pattern to my attention.

<sup>6</sup> From a representational perspective, the penultimate stress pattern in class 3 can be described by associating class 3 nouns lexically with a single trochee at the right edge of the word.

<sup>7</sup> This classification of syllable types in Estonian entails that ‘the representation of weight and segmental length should be separated’ (Ehala 2003:58–59), a position which is advocated on independent grounds in Blevins (1995). See also Lehiste (1971) and Lehiste (1997) for discussion of the phonetic correlates of quantity contrasts.

<sup>8</sup> There is also a class of adjectives in *-Cse* that have nominative singulars in *-Cne*, partitive singulars in *-Cset*, and otherwise inflect like class 3 nouns. Genitive singulars in this subclass class end in a trochee with a strong first syllable, as illustrated by *viimse* ‘final’, *to* ‘total’, *produktiiivse* ‘productive’ and *territori* ‘aalse’ ‘territorial’.

<sup>9</sup> The theme vowel is also preserved in the nominative singular of some historically complex class 2 nouns, such as *AASTA*, which corresponds to compound *AAST-AAN* ‘time-from-time-to’ (M. Ehala, personal communication).

<sup>10</sup> Class nouns with an initial Q3 foot may also follow the class 3 pattern, with a partitive plural in *-id* (Erelt et al. 2000:252), a development that Ehala (2003:73) attributes to a shift from moraic to syllabic stress assignment.

<sup>11</sup> Although there are some exceptions to the prosodic patterns in Table 6, these exceptions tend to fall under other morphological generalisations. For example, class 1 contains some nominals in *-ik* whose partitive singulars appear to have an odd number of syllables and thus deviate from a trochaic structure. Examples include the trisyllabic genitive singular *hapniku*, ‘oxygen’ or the forms *harjumusliku* ‘habitual’ and *raamatuliku* ‘bookish’, which have five syllables. However, these examples pattern with compounds, in which the class of the final word determines the class of the compound. It is the trochaic genitive singular *kogu* ‘collection’ that determines the class of *RAAMATUKOGU* ‘library’ (‘book collection’) not the non-trochaic genitive singular *raamatukogu*. Moreover, even though *raamatukogu* satisfies the trimoraic length requirement on short illative singulars, the short illative *raamatu* ‘kokku’ still contains the Q3 form ‘kokku’. The noun *RAAMATUKOGUKAART* ‘library card’ in turn inflects following the pattern of class 1 *KAART*.

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