Syncretism and Iconicity in Icelandic Noun Declensions:
A Distributed Morphology Approach

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1. Introduction

The main goal of this paper is to provide a reasonably comprehensive account of the core system of noun inflection in Icelandic. The analysis will make crucial use of principles developed in Distributed Morphology (see Halle & Marantz (1993), Harley & Noyer (2003)).

A conspicuous property of Icelandic noun inflection is that a small set of inflection markers is used to generate a large number of inflection classes (or declensions). Constant re-use of inflection markers implies that there is syncretism in abundance. Such syncretism comes in two varieties. First, there may be two (or more) cases that share a single marker; I will refer to this (standard) kind of syncretism that holds within a given inflection class as intra-paradigmatic syncretism. Second, there may be two (or more) inflection classes that share a single marker; and I will refer to this kind of syncretism that holds across inflection classes as trans-paradigmatic syncretism.[1] I will argue that a substantial number of these instances of syncretism can (and should) be derived systematically. This makes it necessary to refer to natural classes of cases and inflection classes, respectively. Such natural classes result from decomposing standard case features (like [nom], [acc]) and inflection class features (like [class 1], [class 2]) into more primitive features: Cross-classification of these features yields full specifications representing cases and inflection classes. Underspecification with respect to these features gives rise to natural classes of cases and inflection classes that inflection markers can then refer to.

Furthermore, the set of inflection markers that I propose for Icelandic noun inflection will be shown to meet an iconicity requirement, to the effect that the form of an inflection marker (more specifically, its position on the sonority hierarchy) and its function (more specifically, the degree of specificity of its feature make-up) correlate.

In addition to accounting for instances of syncretism and iconicity, the present analysis is designed to capture certain general properties and recurring patterns that the system of Icelandic noun declensions exhibits, and that do not seem to be

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[1]Throughout, I assume that paradigms do not exist as such, as objects that constraints of grammar can refer to, or that meta-grammatical generalizations can hold of. Rather, paradigms are considered as mere epiphenomena, as generalizations that must be derived from more basic assumptions.

accidental. It is at this point that the specific choice of morphological theory becomes relevant: Whereas feature decomposition and underspecification are devices that can be (and, in fact, are) used in many other morphological theories, Distributed Morphology is unique in assuming the operations of *impoverishment* (see Bonet (1991)) and *fission* (see Noyer (1992)), which will be argued to be responsible for the emergence of systematic patterns in Icelandic noun declensions.

I will proceed as follows. Section 2 lays out the system of Icelandic noun declensions, addressing weak declensions, strong feminine declensions, strong masculine declensions, and the strong neuter declension in turn. Section 3 identifies generalizations emerging from the empirical evidence presented in section 2 that a morphological analysis should account for. These generalizations concern syncretism, iconicity, and seven language-specific systematic patterns. Section 4 then presents an analysis in terms of Distributed Morphology that is based on (i) the formation of natural classes of cases and inflection classes, (ii) the application of impoverishment and fission, and (iii) vocabulary insertion determined by the Subset Principle. Finally, section 5 contains concluding remarks.

2. Icelandic Noun Declensions

Icelandic has four cases (nominative, accusative, dative, genitive) and two numbers (singular, plural). Noun stems combine with fusional, suffixal inflection markers. Choice of the correct inflection marker for a given noun stem depends on (a) case, (b) number, and (c) the inflection class that the noun stem belongs to. Icelandic exhibits a substantial number of inflection classes. Pétursson (1992) and Rögnvaldsson (1990), e.g., assume sixty and fifty-five declensions, respectively. However, if one is willing to abstract away from interfering factors like stem alternations, lexical idiosyncrasies, systematic morpho-phonological variation, and the like, and focusses on the core system of Icelandic noun inflection, the number of separate noun inflection classes can be assumed to be considerably smaller (even though it is still larger than in languages like Russian, Greek, or German). Based essentially on the system of declensions in Kress (1982) (also compare Guðfinnsson (1957), summarized in Hrafnbjargarson (2003)), I will assume that there are twelve basic noun inflection classes in Icelandic; and I will focus on these in what follows, disregarding the above-mentioned factors that increase complexity of the overall system.[2] Each inflection

[2]The view that stem alternation is an interfering factor that falls outside the core system of noun inflection can be disputed; see Cameron-Faulkner & Carstairs-McCarthy (2000), Carstairs-McCarthy (2001), and references cited there. It seems reasonable to assume that stem variation may in principle affect the core of inflectional systems. However, I believe that no such case can be made for Icelandic noun declensions, and that, therefore, the gist of the account of noun inflection in Icelandic to be developed below would not have to be changed significantly in a fuller treatment that integrates stem alternations. See in particular Kress (1982) on stem alternation in Icelandic; and Braunmüller (1984) on why this might be such a wide-spread phenomenon in

class is inherently tied to a specific gender: There are five masculine classes, five feminine classes, and two neuter classes. A first basic distinction is between weak and strong declensions. Let me begin with the former.

2.1. Weak Declensions

As shown in table 1, there are three weak declensions in Icelandic, one for each gender: Mw, Nw, and Fw represent the masculine, neuter, and feminine weak declensions, respectively.[3]

Table 1: Weak inflection classes

	Mw *penn* ('feather')	Nw *aug* ('eye')	Fw *húf* ('cap')
nom sg	penn-i	aug-a	húf-a
acc sg	penn-a	aug-a	húf-u
dat sg	penn-a	aug-a	húf-u
gen sg	penn-a	aug-a	húf-u
nom pl	penn-ar	aug-u	húf-ur
acc pl	penn-a	aug-u	húf-ur
dat pl	penn-um	aug-um	húf-um
gen pl	penn-a	aug-n-a	húf-a

There are only three distinct inflection markers in the weak declensions in the singular: First, /i/ is the nominative marker in the weak masculine declension. Second, /u/ is the marker for all non-nominative cases in the weak feminine declension. Finally, /a/ emerges as the default inflection marker for all cases in all weak declensions (i.e., the elsewhere case); it shows up whenever there is no more specific marker for a given morpho-syntactic function.[4] Thus, there is massive syncretism in the singular of the weak declensions, both of the intra-paradigmatic type (with /u/ and /a/) and of the trans-paradigmatic type (with /a/). Furthermore, without going into the details of the morphological analysis yet, we can already note that the distribution of singular markers in table 1 reveals an interesting pattern: The more specific a marker's function is (i.e., the more limited its distribution is), the less sonorous is its form. Thus, the default marker /a/ is least specific and most

Icelandic, emerging as actually more typical than stem rigidity within paradigms.

[3]Here and henceforth, the examples given in paradigms often do not involve umlaut or other instances of stem alternation. As just noted, phenomenona like these are quite widespread, but they are not inherently tied to the choice of inflection marker. They are therefore often suppressed in paradigms by choosing appropriate stems in order to increase overall perspicuity.

[4]Throughout, inflection markers are rendered in the / / notation. This is to emphasize that they have the status of abstract, underlying items that may undergo further phonological changes.

sonorous, the highly specific marker /i/ is least sonorous, and /u/ is in between in both respects. I would like to suggest that this pattern is not accidental but reflects a meta-grammatical iconicity restriction that underlies not only the weak singular declension but, as I will argue below, other domains of Icelandic noun declension as well.

In contrast to what we have seen with the singular markers, the plural markers and their patterns of distribution in the weak declensions are similar to those found with strong inflection classes, and I will turn to them later.[5] That said, let me now address the strong inflection classes for feminines, masculines, and neuters, in that order.

2.2. Strong Feminine Declensions

I assume that that there are four main strong inflection classes for feminines. Following standard practise, these can be referred to as the a-declension (Fa), the i-declension (Fi), and consonantal declensions 1 and 2 (Fc1, Fc2); see table 2.[6]

The four inflection classes are very similar in the singular: First, the genitive marker is /ur/ (Fc2) or /ar/ (all remaining classes). Second, the non-genitive cases have no overt marker at all. There is but one exception to the second generalization: In a subclass of Fa (here called Fa′), an inflection marker /u/ shows up in accusative and dative contexts. Fa′ primarily contains stems ending in *ing* or *ung* (often abstract nouns). However, singular /u/ is often absent even with these stems, especially in accusative contexts. The stems then follow Fa fully (see Kress (1982, 66)).

Given that the strong feminine inflection classes are nearly (or, in the case of Fa, Fi, and Fc1, completely) identical in the singular, it is clear that the differences that

[5]The bare /u/ in the nominative and accusative plural of Nw is an exception; I will address this issue below. Another exception is the occurrence of /na/ instead of /a/ in the genitive plural of Nw (see *aug-n-a*), and of some noun stems belonging to Fw (compare, e.g., the genitive plural forms of the two weak feminine noun stems *húf* ('cap') and *tung* ('tongue'): *húf-a* vs. *tung-n-a*). Such a marker /na/ is hardly ever present in strong declensions. The initial segment in /na/ is the very same /n/ that shows up in the German weak noun inflection in the non-nominative cases and in the plural (compare *Planet-en* ('planet(s)'). It occurs in all weak declensions in Old Norse (= Old Icelandic and Old Norwegian); however, its distribution was already limited with masculines; see, e.g., Noreen (1903, §§389-401), Kristoffersen (2002, 914-915). The consonantal segment has disappeared to varying degrees in modern Icelandic – almost completely with masculines, to some extent with feminines (where its "use ... is often arbitrary," as Kress (1982, 79) puts it), and least of all with neuters, of which there aren't many in the first place. (Pétursson (1992, 70) remarks that "in the genitive plural of some of these [weak neuter nouns], an /n/ can be inserted before the genitive ending /a/," which suggests that /n/ can be optional even with neuters, but this does not seem to be the case – /n/ is either obligatory or impossible with weak neuters.) In what follows, I will have nothing insightful to say about the /na/-/a/ alternation in the genitive plural, and will presuppose that it involves a lexically conditioned stem alternation, with /a/ assumed to be the sole proper inflection marker in these contexts.

[6]This is in line with Wurzel (1987) and Carstairs-McCarthy (1991, 1994). Kress (1982, 75-77) postulates three feminine declensions, with Fc1 and Fc2 viewed as subclasses of a single Fc class.

Table 2: Strong feminine inflection classes

	Fa *vél* ('ma- (chine')	Fa′ *drottning* ('queen')	Fi *mynd* ('picture')	Fc1 *geit* ('goat')	Fc2 *vík* ('bay')
nom sg	vél-Ø	drottning-Ø	mynd-Ø	geit-Ø	vík-Ø
acc sg	vél-Ø	drottning-u	mynd-Ø	geit-Ø	vík-Ø
dat sg	vél-Ø	drottning-u	mynd-Ø	geit-Ø	vík-Ø
gen sg	vél-ar	drottning-ar	mynd-ar	geit-ar	vík-ur
nom pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
acc pl	vél-ar	drottning-ar	mynd-ir	geit-ur	vík-ur
dat pl	vél-um	drottning-um	mynd-um	geit-um	vík-um
gen pl	vél-a	drottning-a	mynd-a	geit-a	vík-a

motivate these inflection classes in the first place must lie in the plural. The markers for dative and genitive plural contexts (/um/ and /a/, respectively) do not yet fulfill this expectation: Not only do they fail to vary across the strong feminine inflection classes; they are in fact uniform across *all* inflection classes and all genders (with the above proviso concerning /n/ in genitive plural contexts of weak feminine and neuter declensions). Thus, these markers fall outside the basic inflectional system (much like the Russian markers /am/, /ami/, and /ax/ for dative, instrumental, and locative plural contexts, respectively, and the Greek marker /on/ for genitive plural contexts).

However, there is variation across inflection classes with the markers for nominative and accusative plural. Class Fa has /ar/ as the inflection marker for nominative and accusative plural; class Fi has /ir/ in these two contexts; and classes Fc1 and Fc2 have /ur/ here (as does the weak feminine declension Fw in table 1, which is thus identical to Fc in the plural). Thus, the nominative and accusative plural forms of a noun stem can be viewed as *Kennformen* (leading forms) (see Wurzel (1984, 1987); also see Blevins (2003)) that help to indicate inflection class, and that are thereby ultimately responsible for the name allotted to the inflection classes in table 2.[7]

[7]This is immediately obvious in the case of /ar/ in Fa and /ir/ in Fi, perhaps less so in the case of /ur/ in Fc1 and Fc2. These latter classes are dubbed Fc rather than Fu because of the slightly different situation in Old Norse (see Noreen (1903, §§402-412), Kristoffersen (2002, 914-915)): Whereas /ar/ and /ir/ are present in the nominative and accusative plural of the Fa and Fi classes of Old Norse already, it is a bare consonantal marker /r/ rather than a marker /ur/ that shows up in the original Fc class; i.e., from a diachronic point of view, /u/ in the nominative/accusative plural marker /ur/ of class Fc is an epenthetic vowel. – Note incidentally that, in contrast to Fc, Fw already has a /ur/ marker in these contexts in Old Norse.

2.3. Strong Masculine Declensions

Consider next strong masculine declensions. Again, four distinct classes can be identified: As with feminines, there is an a-declension (Ma), an i-declension (Mi), and a consonantal declension (Mc). In addition, there is a u-declension (Mu) that does not have a counterpart in the feminine domain.[8] The four strong masculine declensions are shown in table 3.

Table 3: Strong masculine inflection classes

	Ma *hest* ('horse')	Mi *stað* ('place')	Mu *fjörð* ('fjord')	Mc *fót* ('foot')
nom sg	hest-ur	stað-ur	fjörð-ur	fót-ur
acc sg	hest-Ø	stað-Ø	fjörð-Ø	fót-Ø
dat sg	hest-i	stað-Ø	firð-i	fæt-i
gen sg	hest-s	stað-ar	fjarð-ar	fót-ar
nom pl	hest-ar	stað-ir	firð-ir	fæt-ur
acc pl	hest-a	stað-i	firð-i	fæt-ur
dat pl	hest-um	stöð-um	fjörð-um	fót-um
gen pl	hest-a	stað-a	fjarð-a	fót-a

Again, differences between the four classes are minimal in the singular: The nominative is uniformly marked by /ur/; the accusative is without overt marking throughout. All strong masculine declensions have /i/ in the dative singular, except for Mi, which has no overt marker in this context. Finally, the marker for genitive singular is either /ar/ (Mi, Mu, Mc) or /s/ (Ma). In the plural, the dative and genitive markers (/um/ and /a/, respectively) are the same as before; as noted, these markers are invariant across inflection classes. The nominative and accusative markers in all strong declensions except for Mc show an interesting pattern: Whereas there is a single marker for both these cases in the plural in the feminine declensions (viz., /ar/, /ir/, or /ur/), and also in Mc (viz., /ur/), the respective markers for nominative and accusative plural in Ma, Mi, and Mu vary, but in a principled way: The nominative and accusative markers have identical vowels, but the nominative has an additional /r/. Thus, Ma has /ar/ in the nominative plural and /a/ in the accusative plural (the same goes for the weak masculine declension, which is identical to Ma in the plural); Mi has /ir/ in the nominative plural and /i/ in the accusative plural; and Mu also has /ir/ in the nominative plural and /i/ in the accusative plural. As with the strong feminine declensions, the nominative and accusative

[8] Interestingly, whereas Fi (and not, e.g., Fa) is the unmarked, dominating, and most productive inflection class among the strong feminine declensions (see Wurzel (1987)), it is Ma that has this status among the strong masculine declensions.

plural markers thus provide leading forms that can also be held responsible for the names given to the declensions.[9]

There is some variation in these classes, particularly with respect to the genitive singular markers (/s/ vs. /ar/). Mc, which is a small inflection class comprising only six noun stems, exhibits variation in this context, as well as in the nominative and accusative plural (which may remain without overt marking with some of the members of this class). However, I take it that, by and large, table 3 accurately depicts the situation in the strong masculine inflection classes.

2.4. Strong Neuter Declension

There is only one strong neuter declension, viz., Na in table 4. Nominative and accusative are identical in the singular and in the plural; this is a general Indo-European phenomenon with neuters.[10] These contexts remain without overt marking in the strong neuter declension in Icelandic (making this the only instance in the Icelandic noun inflection system where the plural of a weak declension is not identical to the plural of a strong declension of the same gender; compare the /u/ in Nw of table 1). The dative and genitive singular markers of Na (/i/ and /s/) are the same as those of Ma.[11] The dative and genitive plural markers of Na are, as in all the other declensions, /um/ and /a/.

3. Properties of the Inflection System

3.1. General Properties: Syncretism and Iconicity

Severing the inflection markers from their stems in the above paradigms, we end up with the system of noun inflection classes in Icelandic shown in table 5. Here, the grouping of strong declensions is not based on gender anymore. Rather, it is based on the traditional division of inflection classes into four types (see Kress (1982)): a-

[9]Thus, Mi qualifies as the i-declension by virtue of having /i(r)/ in nominative and accusative plural contexts (even though it is in fact the only strong masculine declension that does *not* have /i/ in the dative singular); similarly for Ma. Mu does not have /u/ in the nominative/accusative plural in modern Icelandic. The name of this declension can be traced back to its predecessor: The Old Norse masculine u-declension had /u/ in the accusative plural. Still, there was an /ir/ (as with the i-declension) in the nominative plural, whose vowel then spread onto accusative contexts and replaced the original /u/. (Note incidentally that this means that it is only the accusative plural, not the nominative plural, that acts as a leading form in Old Norse.) Finally, the reason for classifying the remaining declension Mc as consonantal is the same as with its counterparts in the strong feminine domain: An original bare /r/ was later accompanied by an epenthetic /u/.

[10]There are a few exceptions in Russian, though. See, e.g., Corbett & Fraser (1993), Krifka (2003).

[11]This is the synchronic reason for classifying the strong neuter declension as an a-declension. From a diachronic perspective, a theme vowel /a/ was present in Ancient Nordic (the predecessor of Old Norse) in the strong neuter declension.

Table 4: Strong neuter inflection class

	Na *borð* ('table')
nom sg	borð-Ø
acc sg	borð-Ø
dat sg	borð-i
gen sg	borð-s
nom pl	borð-Ø
acc pl	borð-Ø
dat pl	borð-um
gen pl	borð-a

declension, i-declension, u-declension, and consonantal declension. As we have seen, these names are mainly motivated by the form of the accusative plural markers in Old Norse (or even the theme vowels of Ancient Nordic). However, the declensions in each class in this taxonomy still show striking similarities, especially in the plural. The revised grouping of the twelve declensions in table 5 reflects this.

Table 5: Icelandic noun inflection classes

	1 Ma	2 Na	3 Fa(′)	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2	10 Mw	11 Nw	12 Fw
nom sg	ur	Ø	Ø	ur	Ø	ur	ur	Ø	Ø	i	a	a
acc sg	Ø	Ø	Ø (u)	Ø	Ø	Ø	Ø	Ø	Ø	a	a	u
dat sg	i	i	Ø (u)	Ø	Ø	i	i	Ø	Ø	a	a	u
gen sg	s	s	ar	ar	ar	ar	ar	ar	ur	a	a	u
nom pl	ar	Ø	ar	ir	ir	ir	ur	ur	ur	ar	u	ur
acc pl	a	Ø	ar	i	ir	i	ur	ur	ur	a	u	ur
dat pl	um	um	um	um	um	um	um	um	um	um	um	um
gen pl	a	a	a	a	a	a	a	a	a	a	(n)a	(n)a

Table 5 shows that the system of noun inflection in Icelandic exhibits a high degree of syncretism. First, there are instances of intra-paradigmatic syncretism, i.e., homonymy of two or more inflection markers within a single inflection class. For instance, the inflection marker /u/ shows up in accusative, dative, and genitive singular contexts of Fw (class 12); the inflection marker /ar/ shows up in nominative and accusative plural contexts of Fa (class 3); and so on. Second, there are also many instances of trans-paradigmatic syncretism, i.e., homonymy of two or more inflection markers across inflection classes. To name just a few examples: The inflection marker /i/ shows up in dative singular contexts of Ma, Na, Mu, and Mc (classes 1, 2, 6, and 7); the inflection marker /ar/ shows up in genitive singular contexts of Fa,

Mi, Fi, Mu, Mc, and Fc1 (classes 3–8); and the inflection markers in dative plural and genitive plural contexts (/um/ and /a/) are identical for all inflection classes. As a guiding meta-principle for morphological analysis, I will assume (1):

(1) *Syncretism Principle*:
Identity of form implies identity of function (within a certain domain, and unless there is evidence to the contrary).

I take the Syncretism Principle to be the null hypothesis for the child acquiring a language as well as for the linguist investigating it. In both respects, (1) plays an important role outside morphology, e.g., in syntax and semantics. The two qualifications in (1) are minimal and virtually unavoidable.

First, the restriction to a certain empirical domain ensures that, e.g., German inflectional endings of the form /en/ as they show up in, say, an accusative singular context of the weak masculine declension (compare *Planet-en* ('planet')), and in third person present tense indicative contexts of the verbal conjugation (compare *betracht-en* ('view')), do not have to be assumed to exhibit systematic syncretism, i.e., identity of function. Such a view would plainly be untenable. With respect to the case at hand, I assume that the system of Icelandic noun declensions has three domains in the sense of (1): the singular of the strong declensions, the singular of the weak declensions, and the plural.

There should be independent evidence for these domains that is available for a child acquiring such a system. I would like to suggest that homophonous inflection markers are assumed to belong to separate morphological domains in this sense when a different semantic or syntactic function is detectable that underlies the marking. This is straightforward in the case of number, which carries semantic information: Two homophonous inflection markers cannot be part of the same domain (i.e., exhibit systematic syncretism) if one shows up on a singular word form and the other one on a plural word form because the marker difference invariably signals a difference in meaning. Hence, "trans-number" syncretism will not be classified as systematic. The situation is different with inflection class and case (at least in Icelandic, which does not exhibit 'semantic cases'), which do not carry meaning. Therefore, trans-paradigmatic and intra-paradigmatic syncretism can be classified as systematic from this point of view.[12]

The next question then is: How can the existence of the strong and weak singular domains be independently motivated, where there is no semantic difference? The key to a solution is provided by the observation that strong and weak noun declensions have (similar, but not identical) counterparts in the adjectival domain (primarily the

[12]On the non-systematic nature of trans-number syncretism (as opposed to trans-paradigmatic and intra-paradigmatic syncretism), see also the discussion of noun inflection in Russian in Müller (2004), in Greek in Alexiadou & Müller (2004), and from a general, cross-linguistic perspective in Baerman et al. (2002). Also compare Stump (2001, 214) on homophonous forms of 1.SG and 3.PL in Rumanian verb inflection.

a-declensions in the strong case). However, with adjectives, the difference between strong and weak declensions is not merely a morphological phenomenon. Rather, the use of a strongly or weakly inflecting adjective signals a different syntactic function: Essentially, strong inflection serves to express case-marking, whereas weak inflection, which is typically dependent on the presence of case-marked D elements, serves to express NP-internal agreement; see Kress (1982, 179-183). (In line with this, the difference between strong and weak inflection can ultimately be traced back to a categorial distinction of 'pronominal' vs. 'adjectival' inflection in Germanic.) This difference in syntactic function motivates the postulation of two separate domains of strong and weak adjectival inflection; and, once established, these two domains can plausibly be taken to be obligatorily extended by the language learner to the system of noun inflection, with its similar set of markers. In contrast, *within* each of the three domains thus derived, the identity of markers across inflection classes does not signal a difference in syntactic function; and the same goes for the identity of markers across cases (which share a common syntactic function, viz., that of case-marking).[13,14]

The second qualification in (1) envisages the possibility that positive counter-evidence may make an analysis of a specific instance of syncretism as systematic impossible. This qualification is arguably also unavoidable, especially in inflectional morphology, where it seems clear that historical accidents and other non-systematic factors play some role in shaping the form of paradigms (see, e.g., Lass (1990) and Aronoff (1994)). Still, I believe that there is much less evidence against assuming instances of syncretism to be systematic than is sometimes made out (see, e.g., Carstairs (1987), Zwicky (1991), and Williams (1994)). More generally, then, the Syncretism Principle in (1) brings about a shift of perspective from much recent work in inflectional morphology, in that the burden of proof is not on considering a given instance of syncretism as systematic, but on considering it to be accidental.

Thus, we end up with three domains in Icelandic noun inflection. The goal will then be to account for all instances of intra- and trans-paradigmatic syncretism within these domains in a systematic manner.

Recall next from section 2.1 that the singular of the weak declensions exhibits another interesting property: There is iconicity in addition to syncretism, such that inflection markers which have a more specific function (resulting in a more restricted distribution) seem to have a less sonorous form. I assume that this correspondence of form and function is not accidental but reflects the presence of a second meta-

[13]Arguably, traces of the different syntactic functions of strong and weak declensions can even be observed with nouns in German. See Müller (2002, 140-142), based on observations concerning 'case-marker drop' in Gallmann (1998) (also cf. Spencer (2003)). A syntactic difference between strongly and weakly inflecting nouns motivates two morphological domains without further ado.

[14]In principle, there might then be four domains, with the plural of weak declensions emerging as a domain in its own right; however, as noted above, the plural of weak declensions does not involve a separate system of markers but is parasitic on the plural of strong declensions.

principle guiding morphological analysis (of both the child and the linguist). This meta-principle can be formulated as in (2); like the Syncretism Principle, it has (implicitly or explitly) informed much recent morphological work.[15]

(2) *Iconicity Principle*:
Similarity of form implies similarity of function (within a certain domain, and unless there is evidence to the contrary).

Given (2), the task will be to show exactly how it is active in the singular of the weak declensions, and that it also underlies the two remaining domains in table 5 (singular of the strong declensions, plural).

Syncretism and iconicity seem to be general properties of nominal inflection systems involving fusional markers.[16] Adherence to the meta-principles of Syncretism and Iconicity radically narrows down the class of possible inflectional systems (given a set of markers), and can plausibly be assumed to enhance learnability of inflectional systems.

In addition to syncretism and iconicity, the above discussion also reveals less general, but still highly systematic, properties of the system of noun declensions in Icelandic given in table 5.

3.2. Language-Specific Properties

A list of systematic properties of the system of Icelandic noun declensions is given in (3).[17]

(3) *Language-specific properties*:
   a. Strong declensions (except for Fa′) do not have an overt marker in accusative singular contexts.
   b. Strong feminine declensions (except for Fa′) do not have an overt marker in non-genitive singular contexts.
   c. Neuter declensions have identical markers for nominative and accusative in both singular and plural contexts; these markers never end in /r/.
   d. Weak declensions never use /r/ in the singular.
   e. Feminine declensions have identical markers in nominative and accusative plural contexts; these markers begin with a vowel and end in /r/.

[15]Note in particular that the Syncretism Principle and the Iconicity Principle are versions of the meta-principles for morphological structure-building IV and V in Wurzel (1984, ch. 5).

[16]See, e.g., Shapiro (1969), Plank (1979), Wiese (2003), and Müller (2004) on noun inflection in Russian; Wiese (2001) on noun inflection in Latin; Wiese (1996), Wiese (1999), Bittner (2002), and Müller (2002) on pronominal inflection in German; and Wurzel (1984) and Carstairs (1987) for more general remarks.

[17]See Pétursson (1992, 70-71) and Thráinsson (1994, 154). Note that some of these 'language-specific' properties (or 'system-defining structural properties', in the terminology of Wurzel (1984, 82)) may in fact be more somewhat more general. This holds, e.g., for the generalization about neuters, a part of which reflects a basic principle of Indo-European.

f. Masculine declensions (except for Mc) have a marker beginning with a vowel and ending with an /r/ in nominative plural contexts; the accusative plural marker equals the nominative plural marker without the /r/.
g. All declensions have the same markers for dative plural and genitive plural contexts.

These generalizations do not appear to be spurious. They impose severe restrictions on the system of noun inflection in Icelandic, and this should be reflected in the analysis. Hence, a theory of inflectional morphology is called for that allows generalizations such as those in (3) to be expressed as restrictions on the possible shape of declensional systems (as opposed to merely stating the generalizations as properties that can be read off existing paradigms). With impoverishment and fission, Distributed Morphology has two devices designed to accomplish such a task.

4. Analysis

4.1. Background Assumptions

Let me begin with sketching some background assumptions (see Halle & Marantz (1993), Harley & Noyer (2003)). Assume that a noun stem (N) is a terminal node in the syntax. There is some controversy within Distributed Morphology approaches whether noun stems have phonological content in the syntax or not; following Chomsky (2001, 11), I will assume that they do. Noun stems are inherently equipped with fully specified gender and inflection class features (see below on what these features look like); in contrast, noun stems per se do not bear case or number features. Suppose furthermore that, at least in fusional languages of the type currently under consideration, a noun stem is accompanied in syntax by a case/number morpheme (cn). A cn head is phonologically empty; it is inherently equipped with fully specified case and number features. For present purposes, it does not matter whether N and cn form a complex head to begin with, or project a phrase each and combine via head movement of N to cn. What is important is that syntax ultimately provides a representation like (4), with N phonologically overt and cn phonologically empty.

(4) [N-cn]

I assume that the gender and inflection class features of N are copied onto the cn morpheme (this assumption is not crucial, though; it is made here mainly to simplify exposition). A case/number morpheme cn with a full set of gender, class, case, and number features must then be spelled out post-syntactically; it is spelled out by insertion of an appropriate inflection marker. An inflection marker is a *vocabulary item* that pairs phonological information and (possibly underspecified or absent) morpho-syntactic (gender, class, case, and number) features as the insertion context. Insertion of a vocabulary item follows the Subset Principle in (5) (see Kiparsky (1973), Anderson (1992), Lumsden (1992), Williams (1994), Halle (1997), Noyer (1992), Frampton (2002), Gunkel (2003) for various versions of this principle,

often with different names).

(5) *Subset Principle*:
A vocabulary item V is inserted into a functional morpheme F iff (i) and (ii) hold:
(i) The insertion context of V is a subset of the set of the morpho-syntactic features of F.
(ii) V is the most specific vocabulary item that satisfies (i).

(5-i) ensures that an inflection marker can only be inserted into a *cn* morpheme if it does not have any (gender, class, case, or number) features that are incompatible with the feature specification on *cn*. Insertion contexts of inflection markers will often rely on underspecified (or absent) feature specifications. This implies that there will often be more than one inflection marker that could in principle be inserted into *cn* in accordance with (5-i). The resulting competition is resolved by (5-ii), which ensures that only the most specific matching vocabulary item can be inserted. Specificity of vocabulary items is defined in (6).

(6) *Specificity of vocabulary items*:
A vocabulary item V_i is more specific than a vocabulary item V_j iff there is a feature class $\Im$ such that (i) and (ii) hold.
(i) The insertion context of V_i has more features in $\Im$ than the insertion context of V_j.
(ii) There is no higher-ranked feature class $\Im'$ such that the insertion contexts of V_i and V_j have a different number of features in $\Im'$.

(6) is reminiscent of the standard definition of optimality in Optimality Theory (see Prince & Smolensky (1993)). It presupposes an organization of similar features into feature classes, and a ranking of feature classes. For now, I will presuppose the following hierarchy, which identifies three different feature classes (but see (11) below; also see Harley (1994)).

(7) *Hierarchy of feature classes*:
Gender, class $\gg$ case

Simplifying a bit, it follows from (6) and (7) that the more higher-ranked features a vocabulary item has, the more specific it is (where quality takes preference over quantity).

So far, nothing has been said about the nature of all these features. As argued in the following section, there is reason to assume that both case and inflection class features are highly abstract items.

4.2. Natural Classes and Feature Decomposition

Instances of intra-paradigmatic syncretism, where two or more cases correspond to a single marker in an inflection class, suggest that cases form natural classes. The

question then is how these natural classes of cases can be formally captured. An elegant and simple way to achieve this can be traced back to foundational work by Jakobson (1962) (based on Russian) and Bierwisch (1967) (based on German). The idea is that standard (privative) case features like "nominative," "accusative" and so forth, can be decomposed into combinations of more primitive, abstract case features. Full specification with respect to these features encodes the standard cases; underspecification with respect to these features captures natural classes of cases. In the Jakobsonian tradition (which has influenced much work in Slavic linguistics), these primitive case features are semantics-based; in contrast, Bierwisch's proposal (which is arguably predominant in work on Germanic languages) assumes that the primitive case features are syntactically defined. I will adopt the latter view here, and suggest a decomposition of the four Icelandic cases into combinations of the three features [±n(ominal)], [±v(erbal)], and [±obl(ique)], as in (8).[18]

(8) *Decomposition of cases*: [±n], [±v], [±obl]

nominative:	[–n,–v,–obl]
accusative:	[–n,+v,–obl]
dative:	[–n,+v,+obl]
genitive:	[+n,+v,–obl]

On this view, the feature [±n] separates the genitive, which is a case that can be assigned by nouns, from the nominative, accusative, and dative, which are not assigned by nouns. The feature [±v] distinguishes between the accusative, the dative, and the genitive on the one hand, which can be assigned by verbs, and the nominative on the other hand, which is typically not assigned by verbs, but by the T(ense) node (the occurrence of nominative objects with certain verbs in Icelandic being an exception that proves the rule). Finally, the feature [±obl] singles out the dative as the basic non-structural case; the nominative and the accusative are typically structural (although they can also be lexically determined in some contexts), and the genitive is structural within the nominal domain.[19] Of the natural classes of

[18]The decomposition here freely draws on work by Bierwisch (1967), Wunderlich (1997, 2002), Wiese (2001), and others. I will leave open the question whether positive vs. negative feature values can or should be construed as reflecting marked vs. unmarked instantiations of the features; nothing in what follows hinges on this. Note that a more ecomonical system might recognize only two primitive binary case features in Icelandic, whose cross-classification would suffice to yield four cases. However, such a procedure would be at variance with the fact that three cases can form a natural class in Icelandic. The only way to express this in a system relying on two binary features would then be to assume that complements of natural classes also form natural classes. This has in fact sometimes been proposed (see Zwicky (1970)), and it does not strike me as unreasonable (for reasons laid out in Müller (2002)); but I will not pursue this strategy in the present paper (even if this implies that four of the eight possible cases derivable from cross-classifying the three binary case features in Icelandic must remain unused).

[19]The genitive is typically non-structural in the verbal domain; initially, it could therefore also be classified as [+obl]. One might speculate that languages have a choice as to whether the genitive is classified as [+obl] or [–obl] (assuming a feature inventory along these lines to be non-language-

Icelandic cases that are thus defined, the following ones will figure in the analysis:[20]

(9) *Natural classes of cases*:
   a. {nominative, accusative, dative} → [–n]
   b. {nominative, accusative, genitive} → [–obl]
   c. {nominative, accusative} → [–n,–obl]
   d. {accusative, dative, genitive} → [+v]
   e. {accusative, dative} → [–n,+v]

In the same way that intra-paradigmatic syncretism can be accounted for by natural classes of cases, trans-paradigmatic syncretism can be traced back to natural classes of inflection classes (see McCreight & Chvany (1991), Halle (1992), Oltra Massuet (1999), Wiese (2003), Alexiadou & Müller (2004), and Müller (2004)). As with cases, I will therefore not assume that inflection classes are encoded on *N* stems (thus on *cn* morphemes as a result of copying) as privative inflection class features (like [Ma], [Na], etc., or [class 1], [class 2], etc.); rather, inflection classes emerge as combinations of more abstract, binary features. I would like to suggest that the features used to define inflection classes in Icelandic comprise two types of binary features, viz., (i) gender features, and (ii) pure class features. The gender features are [±masc] and [±fem], where [–masc,+fem] defines feminine declensions, [+masc,–fem] defines masculine declensions, and [–masc,–fem] defines neuter declensions (see Bierwisch (1967), among many others). The abstract inflection class features adopted in the present approach are [±weak], [±a-type], [±i-type], and [±c-type] (the latter three classes will also be referred to as α-type classes). What is important here is not the fact that these features can be motivated diachronically (and, to some extent, synchronically, given that they play a role in identifying leading forms); it is the fact that they permit a reference to natural classes of inflection classes that are not determined by – indeed, cross-cut – gender distinctions.

Closer scrutiny reveals that the gender and pure class features that play a role in characterizing inflection classes in Icelandic are organized hierarchically; they follow the general pattern [weak/strong > gender > α-type]. The basic organization of the classes underlying Icelandic noun inflection can be illustrated by the tree in (10).[21]

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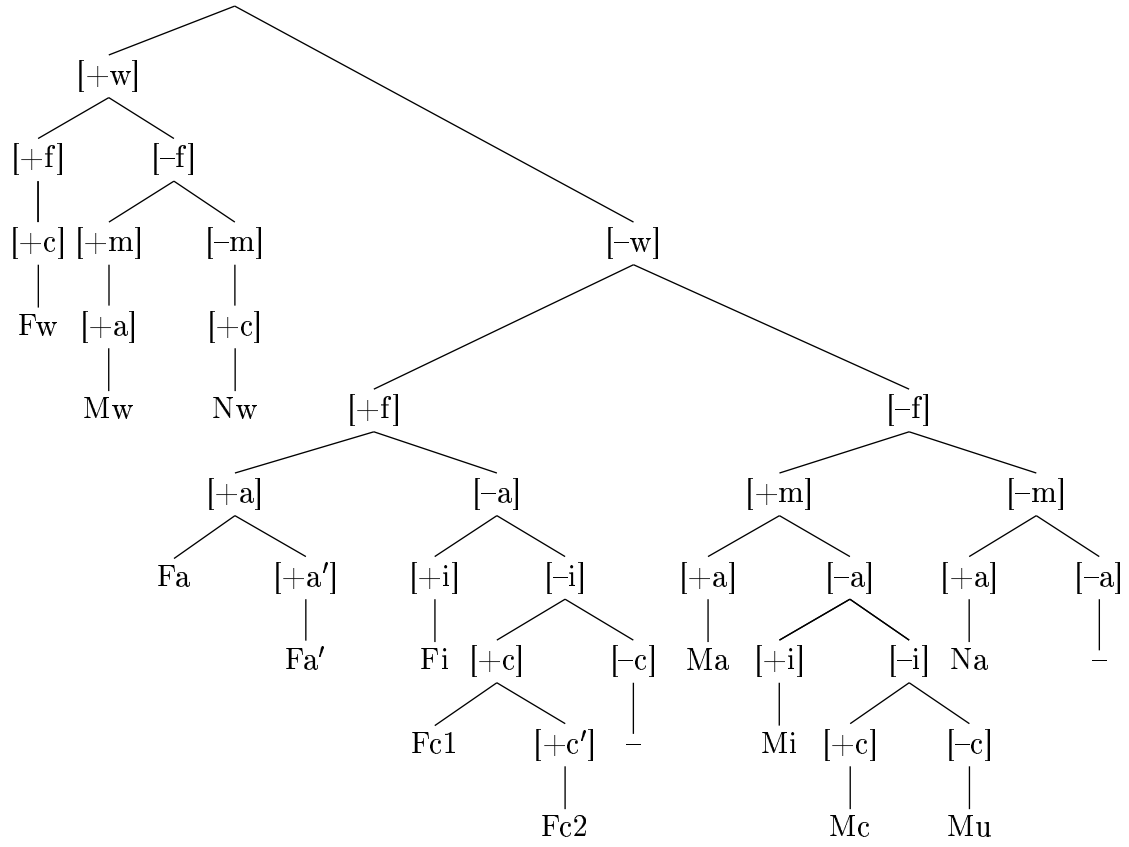
specific), with languages like German, Russian, and Greek opting for the former; see Alexiadou & Müller (2004).

[20] Also see Plank (1991, 184). Plank has three additional natural classes: one that contains all four cases; one containing only the accusative and the genitive; and one that comprises the nominative and the genitive. The first class is trivially defined by the absence of case features in the present system. However, I do not see evidence for the latter two classes in the domain of Icelandic noun inflection (and whereas an accusative/genitive class could be captured by the specification [+v,–obl], a nominative/genitive class cannot be defined by combining the primitive case features adopted here).

[21] For reasons of space, the features are abbreviated in (10): [±w(eak)], [±m(asc)], [±f(em)], [±a(-type)], [±i(-type)], [±c(-type)].

(10) *Decomposition of inflection classes*:



The main dividing line in (10) is between weak and strong inflection classes; the next one between feminine and non-feminine inflection classes; then, between masculine and non-masculine inflection classes; next, between inflection classes that belong to the a-type and those that do not; after that, between i-type and non-i-type classes; and finally, between c-type and non-c-type classes. Crucially, this order of features is invariant. I would like to suggest that the hierarchy in (10) also determines a somewhat more fine-grained hierarchy of features as required for determining specificity of vocabulary items (see (6)); thus, (7) can be extended as shown in (11).

(11) *Hierarchy of feature classes* (extended):
Weak/strong $\gg$ gender $\gg$ α-type $\gg$ case

A further property emerges: Given the basic weak/strong split, an inflection class can only be defined by at most one further positively specified class (i.e., α-type) feature.[22] Most declensions (in fact, all but Mu) also pick at least one positively specified α-type feature (including the three weak declensions, where [+c] is used

[22]An obvious proviso must be made here for Fa′ and Fc2, which have an additional subclass specification ([+a′] and [+c′], respectively) that accompanies the [+a] and [+c] specifications they inherit by virtue of their position in the hierarchy.

to define Fw and Nw, and [+a] is used to define Mw).[23] Still, I would like to contend that (11) does not yet properly define the existing inflection classes, which, as it stands, would be underspecified in almost all cases (the only exceptions would be Mc and Mu, which are fully specified for all six features in (10)). Rather, an inflection class is defined by combining (i) the (positively or negatively specified) features assigned to it in (10) with (ii) *negatively* specified instantiations of all the remaining features, resulting in a full specification comprising six features. In other words: If an inflection class is not explicitly characterized by a (gender or pure class) feature in (10), it exhibits a negative value for that feature. This means that a class like, say, Fw, is encoded on *cn* as [+weak,+fem,–masc,–a-type,–i-type,+c-type]; a class like Ma as [–weak,–fem,+masc,+a-type,–i-type,–c-type]; etc. Here is the full list.[24]

(12) *Inflection classes*:

1	Ma:	[–weak]	[–fem]	[+masc]	[+a-type]	[–i-type]	[–c-type]	
2	Na:	[–weak]	[–fem]	[–masc]	[+a-type]	[–i-type]	[–c-type]	
3	Fa(′):	[–weak]	[+fem]	[–masc]	[+a-type]	[–i-type]	[–c-type]	([+a′-type])
4	Mi:	[–weak]	[–fem]	[+masc]	[–a-type]	[+i-type]	[–c-type]	
5	Fi:	[–weak]	[+fem]	[–masc]	[–a-type]	[+i-type]	[–c-type]	
6	Mu:	[–weak]	[–fem]	[+masc]	[–a-type]	[–i-type]	[–c-type]	
7	Mc:	[–weak]	[–fem]	[+masc]	[–a-type]	[–i-type]	[+c-type]	
8	Fc1:	[–weak]	[+fem]	[–masc]	[–a-type]	[–i-type]	[+c-type]	
9	Fc2:	[–weak]	[+fem]	[–masc]	[–a-type]	[–i-type]	[+c-type]	[+c′-type]
10	Mw:	[+weak]	[–fem]	[+masc]	[+a-type]	[–i-type]	[–c-type]	
11	Nw:	[+weak]	[–fem]	[–masc]	[–a-type]	[–i-type]	[+c-type]	
12	Fw:	[+weak]	[+fem]	[–masc]	[–a-type]	[–i-type]	[+c-type]	

Natural classes of inflection classes are then defined by underspecified feature combinations, as shown above for the four cases (e.g., [+fem] defines a natural class comprising Fw, Fa, Fa′, Fi, Fc1, and Fc2; [+masc,–i-type] defines a natural class that consists of Ma, Mc, and Mu; and so on).

[23] Depending on how exactly the fixed order requirement for α-type features is understood, more structure involving branching [±a-type] and [±-i-type] could be assumed between [+fem]/[–masc] and [+c] in the weak domain in (10); but this additional structure would be vacuous.

[24] Note in passing that there is an interesting interaction of (i) the confinement to at most one positively specified α-class feature, and (ii) an inherent (albeit so far implicit) restriction to three genders (i.e., at most one positively specified gender feature – [+masc,+fem] is not a legitimate combination). Together, (i)–(ii) significantly reduce the set of possible inflection classes that can be generated by a set of given binary class/gender features in a given language. This makes up for the fact that an a priori more parsimonious (but linguistically less plausible) analysis might be conceivable that adopts only four binary class/gender featues giving rise to $2^4 = 16$ potential inflection classes, where the present analysis in terms of six binary class/gender features (abstracting away from the special features [+a′] and [+c′]) initially gives rise to $2^6 = 64$ potential inflection classes. Given (i)-(ii), this number is reduced to 24 (most of the additional options for further inflection classes would arise under the [+weak] and [–weak,–fem,–masc] nodes in (10)).

Given these assumptions about natural classes of cases and inflection classes in Icelandic, I now turn to an analysis of the system of Icelandic noun inflection that accounts for syncretism and iconicity in the three domains recognized above, and that furthermore acknowledges the regularities listed in (3).

4.3. Impoverishment and Fission

To the extent that the regularities in (3) reflect general restrictions on noun declensions in Icelandic, rather than accidental states of affair, they should be taken to follow from general, system-defining assumptions, rather than from the individual make-up of vocabulary items. Impoverishment rules are operations designed to achieve this in Distributed Morphology (see Bonet (1991), Noyer (1992, 1998), Halle & Marantz (1993), Bobaljik (2002), and Frampton (2002), among others). An impoverishment rule applies to a syntactic output representation and deletes morpho-syntactic features before vocabulary insertion into functional morphemes takes place. Impoverished insertion contexts lead to neutralization effects and thereby account for instances of syncretism, and, more generally, recurring patterns in inflectional paradigms in a systematic way, independently of the actual specification of insertion contexts of inflection markers in a language's vocabulary. I would like to suggest the following five impoverishment rules, which apply to *cn* morphemes in Icelandic before vocabulary insertion starts.[25]

(13) *Impoverishment operations in cn*:

a. [–obl] → Ø / {[–pl],[–n,+v]} ___
b. [±obl] → Ø / {[–pl],[+fem],[–n]} ___
c. [±v,–n,–obl] → Ø / {[–masc,–fem]} ___
d. [±obl] → Ø / {[–pl],[+weak]} ___
e. [–obl] → Ø / {[+pl],[+masc,–c-type],[–n,+v]} ___

The first thing to note is that the impoverishment rules in (13) already depend on natural classes of cases and inflection classes created by decomposing case, gender, and pure class features. All impoverishment rules involve deletion of [–obl] (plus, in some cases, other features). (13-a) deletes [–obl] in all accusative singular contexts; it will turn out that this rule underlies an account of regularity (3-a). (13-b) requires

[25]Given that *cn* heads bear fully specified case, number, class, and gender information (in the two latter cases because of copying from *N*), the rules are to be understood as follows: A feature specification to the left of the arrow → is deleted in *cn* in the presence of the set of features to the right of the arrow, which provides other features present in *cn* that make up the application context of the deletion rule. The fact that this context shows up to the left (rather than to the right) of ___ in the rules has thus no significance. Note that the [±obl] notation in (13-b), (13-d) is to be understood in such a way that a [–obl] feature is deleted in the respective contexts, and that a [+obl] feature is also deleted in these contexts. The notation is thus merely a shorthand for a more complex (disjunctive) rule formulation; in no way should this be construed as an extension of the simple binary feature system adopted throughout. (Similarly for [±v] in (13-c).)

deletion of [±obl] in non-genitive singular contexts with feminine declensions; this rule will be essential in deriving (3-b) (including its exception for Fa′). According to (13-c), if the features [±v], [–n] and [–obl] co-occur on a *cn* morpheme (as they do in the nominative and in the accusative), they are all deleted in the singular and in the plural of all neuter declensions (if only a subset of these features shows up, as in the dative and the genitive, (13-c) does not apply). This implies that impoverishment leaves no case features in nominative and accusative neuter contexts, which will be shown to underlie (3-c). The fourth impoverishment rule, (13-d), will emerge as the reason behind (3-d). Finally, (3-e) and (3-f) will be covered by (13-e), which deletes [–obl] in accusative plural contexts of most masculine declensions.[26]

After the impoverishment rules in (13) have applied, the morpho-syntactic feature specifications in *cn* that vocabulary insertion can operate on look very different from the original, fully specified syntactic contexts. This is shown in table 6, which lists the morpho-syntactic contexts for insertion of an inflection marker for all cases, numbers, and inflection classes.[27]

Table 6: Feature specifications on cn after impoverishment

	1 Ma	2 Na	3 Fa(′)	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2	10 Mw	11 Nw	12 Fw
nom sg	[–n–v –o]		[–n–v]	[–n–v –o]	[–n–v]	[–n–v –o]	[–n–v –o]	[–n–v]	[–n–v]	[–n–v]		[–n–v]
acc sg	[–n+v]		[–n+v]	[–n+v]	[–n+v]	[–n+v]	[–n+v]	[–n+v]	[–n+v]	[–n+v]		[–n+v]
dat sg	[–n+v +o]	[–n+v +o]	[–n+v]	[–n+v +o]	[–n+v]	[–n+v +o]	[–n+v +o]	[–n+v]	[–n+v]	[–n+v]	[–n+v]	[–n+v]
gen sg	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v]	[+n+v]	[+n+v]
nom pl	[–n–v –o]		[–n–v –o]	[–n–v –o]	[–n–v –o]	[–n–v –o]	[–n–v –o]	[–n–v –o]	[–n–v –o]	[–n–v –o]		[–n–v –o]
acc pl	[–n+v]		[–n+v –o]	[–n+v]	[–n+v –o]	[–n+v]	[–n+v –o]	[–n+v –o]	[–n+v –o]	[–n+v]		[–n+v –o]
dat pl	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]	[–n+v +o]
gen pl	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]	[+n+v –o]

[26] What about the last regularity in (3), viz., (3-g), which concerns the uniformity of dative and genitive plural markers? This generalization will not be treated by invoking impoverishment; see below.

[27] For reasons of space, an abbreviation is used again: [±n], [±v], [±o(bl)]. For the same reason, gender, class, and number features are not explicitly listed here. For instance, the cell in the upper left corner in table 6 has the full specification {[–pl],[–weak,–fem,+masc,+a-type,–i-type,–c-type],[–n,–v,–obl]}.

The impoverishment rules are formulated in a maximally general way. This means that they overlap to some extent (like the generalizations in (3)). In most instances, this is innocuous since the overlapping impoverishment rules have identical effects. However, in one case, the issue of rule ordering arises: If either (13-a) or (13-d) applies before (13-c), [±v] and [–n] will not be deleted in accusative singular contexts of the two neuter declensions (Na, Nw). Given the list of vocabulary items in (14) below, this would not actually make different empirical predictions; but it would not be a system-inherent property anymore that Icelandic neuter declensions must always have identical markers for nominative and accusative. I will therefore assume that impoverishment rules are ordered according to specificity in the same way that the insertion of vocabulary items is (see (6)), where specificity of an impoverishment rule is determined by the feature specification that is deleted by the rule (not by the context). Consequently, (13-c) applies before (13-a) and (13-d), and [–n] is deleted in accusative singular contexts of neuter declensions, as shown in table 6.[28]

In addition to impoverishment, fission applies in the Icelandic *cn* morpheme of *N*. The basic idea underlying fission is this (see Noyer (1992) and Frampton (2002), among others; but see Halle & Marantz (1993), Halle (1997) for a different conception): Normally, vocabulary insertion can only apply once to a functional morpheme, even if the vocabulary item is underspecified (i.e., if the morpho-syntactic features of the vocabulary item's insertion context form a *proper* subset of the morpho-syntactic features in the functional morpheme). With a fissioned morpheme, things are different: If a vocabulary item matches only some of the features in the functional morpheme, these feature are discharged by vocabulary insertion, but the remaining features remain accessible for further vocabulary insertion. Thus, vocabulary insertion stops only when there is no feature in the functional morpheme left that can be matched by a vocabulary item. As before, all potential cases of conflict are resolved by the specificity requirement of the Subset Principle.

The underlying rationale behind postulating fission of *cn* is that there is good evidence for distinguishing a first (vocalic) and a second (consonantal) part in endings like /ar/, /ir/, and /ur/. Perhaps the most obvious reason for this comes from considering the subtraction effect in accusative vs. nominative plurals of most masculine declensions (see (3-f)): /ar/ alternates with /a/, /ir/ alternates with /i/, and /ur/ alternates with /u/. Hence, an important generalization would be lost if an ending like /ar/ were taken to be primitive; the alternation effect clearly suggests that it must be broken up into one marker /a/ followed by another marker /r/. Such a presence of two markers in one functional morpheme can then be captured

[28] As it turns out, of the three rules in question, (13-c) also has the most limited distribution, being confined to eight cells in table 6 (as opposed to twelve cells each for (13-a) and (13-d)); this might provide a viable alternative to the one in the text for measuring specificity of impoverishment rules.

straightforwardly by assuming fission.[29,30]

4.4. Vocabulary Insertion

Now we can finally address the vocabulary items and the (typically underspecified) morpho-syntactic features that make up the insertion contexts associated with them.

[29]An alternative would be to assume two separate morphemes for vocabulary insertion (equivalently, two rule blocks in the sense of Anderson (1992), Stump (2001)). This is done by Halle (1994) for Russian noun inflection. I will not adopt this assumption here for the following reasons: First, it would imply a proliferation of phonologically empty morphemes. (A similar problem shows up with Russian noun inflection in Halle's approach, where he assumes that both morphemes are actually always filled by overt markers in the morphological component, one of which then undergoes deletion in phonology in most contexts.) Second, the alternative approach would ceteris paribus bring with it a complication of syntactic structure for which there is no evidence. Third, it would impose an agglutinative-like structure on the system of Icelandic noun inflection that does not seem to be empirically supported because there is no corresponding principled difference in feature types: As we will see, the two positions of a composite marker do not encode case and number, respectively; rather, both encode case information. And fourth, it will turn out that the situation can arise where a 'second-position marker' must be able to crucially interact with a 'first-position marker'; such interaction is impossible if the two positions correspond to two morphemes, but it is expected if the two positions correspond to a single fissioned morpheme.

[30]Stump (2001, 156-166) calls into question the concept of fission in general (and argues for a rule block/multiple morpheme approach) on the grounds that fission faces problems with the phenomenon of "extended exponence," i.e., cases where it seems as though a feature specification is realized by more than one marker, as in German past participles like *gesprochen* ('spoken'), which is "distinguished as a past participle both by its stem vocalism and by its affixes" (Stump (2001, 4)): If features in a fissioned morpheme are discharged by insertion of a vocabulary item in whose insertion context they occur, there is nothing that might trigger subsequent insertion of another vocabulary item with the same features. As shown by Noyer (1992), this problem can be addressed in a fission approach by distinguishing between primary and secondary exponence (on which also see Carstairs (1987)), such that a feature specification may serve as the primary insertion context of one marker, and as the secondary insertion context (noted in parentheses) of some other marker (which then also has a primary insertion context; also see Frampton (2002), Harley & Noyer (2003)). However, Stump (2001, 162) argues that such an approach is conceptually problematic, and can lead to a dilemma because there are cases where it seems that a single marker must act as the primary exponent of some feature specification in one case, and as a secondary exponent of the same feature specification in another case. Now, there may or may not be a systematic way to overcome such problems in a pure fission approach, but this issue does not really affect the case at hand: Extended exponence is certainly not an obvious property of the system of Icelandic noun declensions, and will in any event not play a role in the analysis developed below; but with extended exponence not at issue, there is no argument against a fission approach to Icelandic noun declensions. (Of course, the question remains how extended exponence should be handled in Distributed Morphology. One possibility would indeed be a multiple morpheme approach, which, as such, is fully compatible with the simultaneous postulation of fissioned morphemes in other domains of a grammar (or other languages). However, for reasons similar to those that led me to abandon a multiple morpheme approach to Icelandic noun inflection, I think that extended exponence might in fact best be addressed by a post-syntactic feature copying operation that takes place before vocabulary insertion. For reasons of space and coherence, I cannot pursue this topic here, though.)

The list of the vocabulary items used in Icelandic noun declensions is given in (14).[31] There are four different groups of vocabulary items. II, III, and IV directly correspond to the three domains of Icelandic noun inflection identified above (singular of strong declensions, singular of weak declensions, and plural). In contrast, group I has a single, domain-independent marker: /r/ is a highly general marker that can be inserted in all contexts in which a [–obl] feature shows up that has not yet been matched by a more specific marker.[32]

(14) *Vocabulary items*:

I	/r/	↔	{[–obl]}
II	/a/	↔	{[–pl],[–weak],[+n]}
	/u/	↔	{[–pl],[–weak,–fem],[–v]}
	/i/	↔	{[–pl],[–weak,–fem,–i-type],[+obl]}
	/s/	↔	{[–pl],[–weak,–fem,+a-type],[+n,–obl]}
	/u/$_2$	↔	{[–pl],[–weak,+fem,+c′-type],[+n]}
	/u/$_3$	↔	{[–pl],[–weak,+fem,+a′-type],[–n,+v]}
III	/a/	↔	{[–pl],[+weak]}
	/u/	↔	{[–pl],[+weak,+fem],[+v]}
	/i/	↔	{[–pl],[+weak,+masc],[–n,–v]}
IV	/a/	↔	{[+pl],[–n]}
	/u/	↔	{[+pl],[–a-type]}
	/i/	↔	{[+pl],[–a-type,–c-type]}
	/um/	↔	{[+pl],[–n,+v,+obl]}
	/a/$_2$	↔	{[+pl],[+n,+v,–obl]}

Let me now discuss the three domains, beginning with domain II: the singular of the strong declensions.

4.4.1. Syncretism and Iconicity in the Singular of Strong Declensions

Table 7 combines feature specifications in the *cn* morpheme after impoverishment in the singular strong declensions (see table 6) and the inflection markers that are selected under the Subset Principle for each specification (see table 5).

The vocabulary items that are a priori compatible with a nominative specification [–n,–v,–obl] in domain II are /r/ in (14)-I and /u/ in (14)-II. All the other

[31] Strictly speaking, the insertion contexts would have to be accompanied by category features, to ensure that the vocabulary items can only be inserted in *cn* morphemes of *N* heads. This is tacitly presupposed in (14).

[32] The order of the vocabulary items in each domain corresponds to increasing specifity from top to bottom. This deviates from standard practise so as to highlight the core of each domain, and to separate it from what I take to be more marginal markers (like /u/$_2$, /u/$_3$ in II).

Table 7: Vocabulary insertion in the singular of strong declensions

	1 Ma	2 Na	3 Fa(′)	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2
nom sg	[–n–v–o] u-r	Ø	[–n–v] Ø	[–n–v–o] u-r	[–n–v] Ø	[–n–v–o] u-r	[–n–v–o] u-r	[–n–v] Ø	[–n–v] Ø
acc sg	[–n+v] Ø	Ø	[–n+v] Ø (u)	[–n+v] Ø	[–n+v] Ø	[–n+v] Ø	[–n+v] Ø	[–n+v] Ø	[–n+v] Ø
dat sg	[–n+v+o] i	[–n+v+o] i	[–n+v] Ø (u)	[–n+v+o] Ø	[–n+v] Ø	[–n+v+o] i	[–n+v+o] i	[–n+v] Ø	[–n+v] Ø
gen sg	[+n+v –o] s	[+n+v –o] s	[+n+v –o] a-r	[+n+v –o] a-r	[+n+v –o] a-r	[+n+v –o] a-r	[+n+v –o] a-r	[+n+v –o] a-r	[+n+v –o] u-r

markers in (14)-II have an incompatible case specification; and the markers in (14)-III and (14)-IV have an incompatible class or number specification ([+weak] and [+plural], respectively). However, impoverishment has modified the original nominative specification in *cn* in the case of neuters, which are now unspecified for case, and in the case of feminines, which are now specified [–n,–v]. The marker /u/ cannot be inserted in feminine contexts in the first place, and it cannot show up in neuter contexts as a result of impoverishment (see generalization (3-c)). Consequently, it is inserted only in masculine contexts, discharging the [–v] specification there, but leaving the [–obl] feature accessible for further insertion, given fission. Hence, in masculine contexts, /r/ is next inserted, in accordance with the Subset Principle, creating a composite inflection marker /u/-/r/. Insertion of /r/ must follow insertion of /u/ because the latter is more specific, due to the class/gender features in its insertion context. Still, something needs to be said about the linear order of two vocabulary items inserted in fissioned morphemes; i.e., it must be ensured that the correct outcome is /u/-/r/ rather than /r/-/u/. For present purposes (and with all relevant inflection marking suffixal), we can simply assume that insertion in fissioned morphemes always takes place to the right of material inserted earlier.[33]

[33]Note that the nominative singular of the strong masculine classes had a bare /r/ marker in Old Norse (see Noreen (1903), Kristoffersen (2002)), in the same way that the nominative/accusative plural of the Fc class originally had a bare /r/ marker (see footnote 7); /u/ is epenthetic from a diachronic point of view. In fact, Anderson (1969, 56-57) argues that /u/ in the nominative singular marker /u/-/r/ is introduced by a late phonological epenthesis rule, and thus does not act as (part of) a morphological marker, even from a synchronic perspective (also see Anderson (1985)). He takes this approach to be supported by the fact that nominative singular /u/ cannot trigger u-umlaut, in contrast to, say, the dative plural marker /um/ (see, e.g., *stað-ur* vs. *stöð-um* in table 3, the assumption being that the /u/-epenthesis rule applies after the u-umlaut rule); and by the observation that /u/ does not show up in nominative singular contexts if the masculine stem ends in a vowel (compare *lækni-r* vs. **lækni-ur* ('doctor')). The analysis developed in this article would in principle be compatible with such a view (leaving out /u/ in the marker inventory in (14)-II and adopting an appropriate epenthesis rule would suffice to accomodate it). However, following Kress (1982, 44), I will continue to assume that synchronically, /u/ is a proper marker in nominative singular contexts, and that u-umlaut effects are to be explained diachronically. One

In all non-masculine contexts, there is no matching marker and hence, no inflection for case/number (signalled by Ø).

Consider next accusative contexts in table 7. The original accusative specification [–n,+v,–obl] is reduced to [–n,+v] throughout, and to nothing in neuter contexts, by impoverishment. The only marker that is compatible with a [–n,+v] specification in (14)-I-IV is /u/$_3$, which, however, is restricted to a single feminine subdeclension, viz., Fa′ (and which is given its index 3 so as to distinguish it from the two other markers /u/ and /u/$_2$ in (14)-II). Impoverishment has made insertion of /r/ impossible throughout; consequently, there is no marker for any of the non-Fa′ declensions (see generalization (3-a)).[34]

Dative contexts are initially (syntactically) defined by the feature specification [–n,+v,+obl]. These contexts are impoverished only in the feminine declensions (by deletion of [+obl], which ensures that there can be no [+obl]-marked vocabulary item for feminine declensions in the singular, a subcase of generalization (3-b)). The only markers that fit into dative singular contexts of strong declensions are /i/ and /u/$_3$ in (14)-II (note that /r/, which is marked [–obl], never fits in dative contexts). The highly specific marker /u/$_3$ can only be used with Fa′; /i/ can only be used with non-feminine classes, viz., Ma, Na, Mu, and Mc (but not with Mi, which is the only non-feminine [+i-type]-marked class and therefore incompatible with /i/'s [–i-type]-specification). All other declensions remain marker-less.

There is no impoverishment in genitive contexts. Vocabulary items that match the [+n,+v,–obl] specification are /a/, /s/, and /u/$_2$ in (14)-II, and /r/ in (14)-I. /u/$_2$ is a highly specific marker, and is therefore chosen in the only context in

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reason for doing so is that the assumption that u-umlaut is a synchronic process in Icelandic leads to extremely abstract analyses: For instance, the umlaut in *börn*-Ø (Na, nominative plural) vs. *barn*-Ø (Na, nominative singular) is traced back to an abstract lax /u/ in Anderson (1969, 57) that is obligatorily deleted after triggering umlaut; however, the abstract /u/ posited here would not be confined to modern Icelandic; it would also have to be present in Old Norse already, where there is also no overt /u/ in nominative plural contexts of Na, and where u-umlaut shows up in the same way (see Noreen (1903, §347)). Thus, not only can u-umlaut fail to occur in the presence of /u/; u-umlaut can also occur in the absence of /u/.

Deletion of /u/ with masculine stems ending in a vowel must then be effected in one way or the other (by invoking a deletion rule, or, in optimality-theoretic terms, a faithfulness violation incurred in order to respect a higher-ranked markedness constraint against hiatus). The view that absence of /u/ is the special case rather than the norm is reinforced by the observation that Icelandic speakers often treat forms like *lækni-r* (nominative singular) as pure stems without an ending, and consequently produce substandard forms like $^{\#}$*læknir-s* (genitive singular) or $^{\#}$*læknir-ar* (nominative plural) (see Kress (1982, 59)). This can be taken to indicate that /r/ is not the sole marker in nominative singular contexts of strong masculine declensions – if it were, we would not expect nominative singular forms with /r/ and without /u/ to be considered marker-less by speakers.)

[34]Without impoverishment in accusative singular contexts, we might thus expect /r/ to be the sole marker, other things being equal, which then might or might not trigger vowel (schwa) epenthesis. (Recall the remarks in footnotes 7, 33.)

which it fits, viz., the genitive singular of Fc2. Next, /s/ is also highly specific; it is selected in the two non-feminine [+a-type] declensions that match its insertion context. Since /s/ is marked [+n,–obl], it discharges all features in *cn* except for [+v], thereby blocking subsequent /r/ insertion. Finally, /a/ is essentially just a genitive marker without inflection class restriction; it is therefore chosen wherever /u/$_2$ and /s/ do not match the *cn* specification (thereby providing a default marker for the genitive). Since insertion of both /u/$_2$ and /a/ leaves [–obl] accessible for further insertion, /r/ is also inserted in these contexts.

Thus, most of the instances of syncretism in the singular of strong declensions are accounted for systematically. There is only one marker where identity of form does not imply identity of function, viz., /u/: In addition to the "regular" /u/, the present approach recognizes /u/$_2$ and /u/$_3$. This may reflect either an imperfection of the analysis, or an imperfection of the inflectional system under consideration. There is evidence pointing in the latter direction: First note that both /u/$_2$ and /u/$_3$ occur with marginal feminine sub-declensions, viz., Fc2 and Fa′, respectively, that do not differ in any respect from their regular counterparts Fc1 and Fa, except for this very marker. Second, recall that /u/$_2$ only occurs with certain and, for the most part, arguably independently – i.e., phonologically – definable [+a-type] stems; in fact, it would not strike me as completely impossible to argue that /u/$_2$ is not a regular morphological inflectional ending at all, but a segment added by a phonological rule applying later.[35] Third, with respect to /u/$_3$, diachronic evidence might suggest that it is to be treated differently from /u/: Whereas /u/ in /u/-/r/ of the nominative singular of masculine declensions was not yet present in Old Norse (where only a bare /r/ occurred, see above), /u/$_2$ in /u/$_2$-/r/ of the genitive singular occurred in Fc in Old Norse (and there was still a bare /r/ in the nominative/accusative plural of Fc). Compare, e.g., Old Norse *móð-ur* ('mother', genitive singular, Fc) with Old Norse *mæð-r* ('mother', nominative/accusative plural, Fc) and Old Norse *nið-r* ('relative', nominative singular, Ma) (see Kristoffersen (2002, 915/912)).

In addition to syncretism, the system exhibits iconicity. If we abstract away from the unresolved syncretism with the highly specific markers /u/$_2$ and /u/$_3$ and concentrate on the remaining four vocabulary items in II, it turns out that there is a correlation between the phonological form of the marker and its function in the system: The higher a vocabulary item is on the sonority hierarchy (see Hankamer & Aissen (1974)) – i.e., the less consonantal it is –, the less specific it is according to (6). Thus, the order determined by the sonority hierarchy is [/a/ > /u/ > /i/ > /s/], and the same order is also determined by specificity.[36] This correspondence of form and function is probably not accidental. By assigning similar forms similar

[35]Incidentally, this is the reason why I have been hesitant to assign full inflection class status to Fa′ in tables 2 and 5.

[36]See, e.g., Matthews (1974, 113-114), Ross (1980, 42), and Crosswhite (2000) for independent motivation of this partial sonority hierarchy based on external sandhi in Greek, binomial formation in German, and sonority-driven reduction in Bulgarian and Catalan, respectively.

types of insertion contexts (e.g., /a/ is closer to /u/ than to /i/ with respect to both form (sonority) and function (feature specification)), the sub-system of Icelandic noun declensions in II meets the demands of the Iconicity Principle.

4.4.2. Syncretism and Iconicity in the Singular of Weak Declensions

Table 8 illustrates the feature specifications in *cn* morphemes after impoverishment has applied in the singular of weak declensions, and lists the vocabulary items selected for each specification.

Table 8: Vocabulary insertion in the singular of weak declensions

	10 Mw	11 Nw	12 Fw
nom sg	[–n–v] i	 a	[–n–v] a
acc sg	[–n+v] a	 a	[–n+v] u
dat sg	[–n+v] a	[–n+v] a	[–n+v] u
gen sg	[+n+v] a	[+n+v] a	[+n+v] u

The relevant vocabulary items are those in (14)-III. Vocabulary items from (14)-II and (14)-IV do not fit because they are marked [–weak] or [+pl], which clashes with the [–pl,+weak] specification on a *cn* in the singular of weak declensions. Impoverishment has removed all [–obl] specifications; hence, /r/ can never show up in the singular of the weak declensions (see (3-d)). The most general vocabulary item is /a/, which does not have gender, class (except for the feature [+weak]), or case specification, and can thus occur in all contexts. It is blocked by the more specific marker /u/ in the non-nominative (i.e., [+v]) cases of the weak feminine declension; and by the most specific marker /i/ in the nominative singular of the weak masculine declension. All instances of syncretism in this domain are thus accounted for, as required by the Syncretism Principle; and the domain fully respects the Iconicity Principle, with the sonority-based hierarchy [/a/ > /u/ > /i/] reflected in increasing specificity of the markers (which corresponds to their distribution in table 8, where /i/ is confined to one context, /u/ shows up in three contexts, and /a/ is the elsewhere case).

4.4.3. Syncretism and Iconicity in the Plural

Finally, table 9 shows how vocabulary insertion takes place in plural contexts (of strong and weak declensions).

Impoverishment has removed the feature bundle [±v,–n,–obl] in neuter contexts, and the feature [–obl] in the accusative of all masculine declensions but Mc. Fo-

Table 9: Vocabulary insertion in the plural

	1 Ma	2 Na	3 Fa(′)	4 Mi	5 Fi	6 Mu	7 Mc	8 Fc1	9 Fc2	10 Mw	11 Nw	12 Fw
nom pl	[–n–v –o] a-r	Ø	[–n–v –o] a-r	[–n–v –o] i-r	[–n–v –o] i-r	[–n–v –o] i-r	[–n–v –o] u-r	[–n–v –o] u-r	[–n–v –o] u-r	[–n–v –o] a-r	u	[–n–v –o] u-r
acc pl	[–n+v] a	Ø	[–n+v –o] a-r	[–n+v] i	[–n+v –o] i-r	[–n+v] i	[–n+v –o] u-r	[–n+v –o] u-r	[–n+v –o] u-r	[–n+v] a	u	[–n+v –o] u-r
dat pl	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um	[–n+v +o] um
gen pl	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] a	[+n+v –o] (n)a	[+n+v –o] (n)a

cussing on nominative and accusative environments for now, the three markers /a/, /u/, and /i/ in (14)-IV are compatible with both these contexts. /i/ is most specific; it is selected in [–a-type,–c-type] declensions in the nominative and in the accusative, i.e., in Mi, Fi, and Mu. Insertion of /i/ leaves a possible [–obl] feature accessible for further insertion of /r/. Such a [–obl] feature shows up in the nominative of non-neuter declensions throughout, but not in the accusative of Mi and Mu (due to impoverishment). Hence, the three declensions uniformly have /i/-/r/ in the nominative, and Fi also has /i/-/r/ in the accusative, but Mi and Mu have only /i/ in the accusative (see (3-e), (3-f)).

Next on the specificity scale is /u/, which can be used by all declensions that are characterized as [–a-type], i.e., Mi, Fi, Mu, Mc, Fc1, Fc2, Nw, and Fw. As we have just seen, the first three of these select the more specific marker /i/, which leaves Mc, Fc1, Fc2, Nw, and Fw; and /u/ does indeed show up in the nominative and accusative plural of these inflection classes.[37] All these declensions (including Mc) then insert /r/ for an otherwise unchecked [–obl] feature in both the nominative and the accusative, except for Nw, where [–obl] has been deleted by impoverishment in both cases.

The remaining declensions receive the marker /a/, provided that at least [–n] is present in the *cn* specification. This is the case with Ma, Fa(′), and Mw. As before, the feminine declension inserts /r/ in the nominative and in the accusative; the masculine declensions do so only in the nominative, due to impoverishment in the accusative. Finally, consider Na. Impoverishment has removed all case features in *cn* in this class. Hence, there is no matching marker in (14)-IV. Since there is no matching marker in (14)-III or (14)-II either, there is no marker that fits in

[37] Note that the grouping of Nw and Fw with the strong consonantal classes in the nominative and accusative of the plural forms the rationale behind classifying these weak declensions as [+c-type] in (10).

nominative and accusative plural contexts of Na.

This leaves only dative and genitive plural contexts to be accounted for. As noted, the respective markers /um/ and /a/$_2$ have a different status, in the sense that they show no sensitivity to inflection class (see (3-g)). I would therefore like to contend that they lie outside the core of the system of Icelandic noun inflection: They are the only markers with fully specified case information, and they simply do not interact with other markers in terms of specificity (i.e., they cannot be blocked by another plural markers even if it is equipped with (higher-ranked) class features). Given this proviso, we can again note that the Syncretism Principle and the Iconicity Principle are fully respected in the plural domain: There is only one entry each for /a/, /u/, and /i/, which accounts for all cases of intra-paradigmatic and trans-paradigmatic syncretism; and the sonority-based order of the markers is the same as the specificity-based order. Thus, the core system of Icelandic noun declensions is accounted for in its entirety.[38,39]

4.5. Alternatives

It goes without saying that the system developed here does not represent the only possibility to account for Icelandic noun declensions in a simple way. There are alternatives that may have properties that do not characterize the present approach,

[38]The next obvious step would be to extend this analysis to the system of (strong and weak) adjective declensions in Icelandic, which, as noted, is similar in some respects, and different in others (see Kress (1982, 84-92)). A Distributed Morphology analysis of adjective inflection in Icelandic has in fact been developed in Sauerland (1996, 31-33). However, the impoverishment rules and insertion contexts of adjective inflection markers given there are quite different from what has been suggested here for noun inflection markers. A unified approach to the two systems will have to remain outside the scope of the present paper.

[39]Icelandic noun inflection markers consist of maximally a single [VC] sequence. A reviewer contends (i) that this generalization should be assumed to have the same status as the systematic properties of the declensional system listed in (3); (ii) that it cannot be derived in a principled way if fission is assumed (the reason being that it is only a conspiracy of the make-up of the individual vocabulary items in (14) that ensures that markers are at most two-segmental and not, say, three-, four-, or n-segmental); and (iii) that assuming two morphemes (or rule blocks) without fission (rather than one morpheme with fission), as envisaged in footnote 29, would account for the restriction to two segments straightforwardly. It is unclear to me whether (i) is valid, given that, e.g., the related system of adjectival declension in Icelandic has markers with more than two segments. More importantly, (iii) is correct only if it is stipulated that all Icelandic noun inflection markers must be mono-segmental, an assumption that can hardly be maintained in view of the dative plural marker /um/, which cannot plausibly be split up into two markers. Thus, even under a two-morpheme approach (or, for that matter, a one-morpheme approach), the question arises why Icelandic noun inflection markers do not have more than two segments. Finally, concerning this last question (hence, (ii)) I would like to suggest that the tendency to minimize segments in inflection markers may ultimately be traced back to the fact that /a/, /u/, and /i/ are the only vowels that can show up in unstressed syllables in Icelandic; that the consonantal marker inventory is extremely small to begin with (basically, /r/ and /s/); and that the Syncretism Principle drastically restricts the free re-use of segmental markers within a given domain.

and that one may find initially attractive. Let me discuss two such properties here: maximal underspecification of insertion contexts, and absence of impoverishment rules.[40] As a background to this discussion, it may be useful to take a step back, outline the system developed in this paper from a somewhat broader perspective, and sketch an abstract acquisition scenario. The alternatives can then be evaluated against this background.

First, on the basis of the empirical evidence, three domains must be identified by a child acquiring the system: plural, weak singular, and strong singular; this can be done by invoking the semantic and syntactic functions that the markers are involved in. Second, natural classes of cases and inflection classes (as well as genders) must be identified, and decomposition must take place so as to capture these natural classes. Third, generalizations of the type in (3) must be extracted from the data, and these generalizations must be encoded by appropriate impoverishment operations; one of these generalizations concerns the subtraction effect in the plural, which is sufficient to signal fission of the *cn* morpheme and the special role of /r/. Fourth and finally, the child proceeds on the assumption that the inflectional system obeys the Syncretism Principle and the Iconicity Principle, and constructs insertion contexts for inflection markers accordingly whenever possible; deviations are necessary only for /u/$_2$ and /u/$_3$ in (14)-II, and for /a/$_2$ in (14)-IV. Crucially, then, the resulting system is shaped by the overarching requirements imposed by the Syncretism and Iconicity Principles, and by the language-specific generalizations in (3). These three types of requirements constrain the hypothesis space and narrow down the class of possible analyses. Therefore, I would like to contend that a principled adherence to these three kinds of requirements is a possible criterion against which alternative approaches can be evaluated ("a possible criterion" because I do not want to claim that it is the only conceivable evaluation criterion).

4.5.1. Maximal Underspecification of Insertion Contexts

The insertion contexts of vocabulary items in (14) are a first case in point. In contrast to what is the case in some other approaches that rely on underspecification (e.g., Anderson (1992)), there are markers in (14) which are not *maximally* underspecified: Some markers have features in their insertion contexts that are strictly speaking redundant for the purpose of unambiguously identifying the environment in which they can show up. In the core system, there are two such markers with redundant case features: /i/ in (14)-III, which has a redundant [–n] specification (nominative is unambiguously identified by [–v]), and /s/ in (14)-II, which has a redundant [–obl] specification (genitive is unambiguously identified by [+n]).[41] What happens if these additional features are dispensed with? The consequences are not

[40] Thanks are due to two reviewers for suggesting these two alternatives.

[41] As noted, the markers /um/ and /a/$_2$ in (14)-IV do not interact with other markers; hence, the issue of redundancy in insertion contexts does not come up in the first place.

dramatic, as far as the correct determination of markers for morpho-syntactic contexts is concerned: /u/ in (14)-II and /i/ in (14)-III will continue to surface in the right environments; /s/ will now cease to block subsequent insertion of /r/, but a composite inflection marker /s/-/r/ (with or without epenthesis) could plausibly be assumed to be blocked by general constraints on the shape of inflection markers in Icelandic. Why, then, do these these redundant features show up in (14)? The answer is that the system thus respects the Iconicity Principle in a more transparent way than would otherwise be the case (at least as long as all case features are considered as specific to the same degree, an assumption that might eventually not be correct; see, e.g., Wiese (1999)). This does not imply that iconicity is artificially imposed on the system: As noted in section 2.1, iconicity can pre-theoretically be read off the system of Icelandic noun inflection, by simply comparing the respective distributions of markers (ranging from extremely narrow to unrestricted) with their shape; in addition, I take the ease with which the system fits into a fully iconic pattern once a few redundant features are added to be suggestive. (In contrast, even abstracting away from issues of linguistic plausibility, it would be quite difficult to construe a fully anti-iconic system that has otherwise similar properties, e.g., with respect to the Syncretism Principle.)[42]

If maximal underspecification is not an option in the present approach, one might think that *minimal* underspecification could be. Minimal underspecification of an insertion context of a vocabulary item would imply that the feature specification is as close to being complete as possible, given the Syncretism Principle (or, more generally, a minimization of marker entries). Consider, e.g., the plural domain in (14)-IV. A minimally underspecified insertion context of /a/ would consist of the features {[+pl],[+a-type,–i-type,–c-type],[–n,–obl]} instead of {[+pl],[–n]}; for /u/, the context would be {[+pl],[–a-type,–i-type,+c-type],[–n,–obl]} instead of {[+pl],[–a-type]}; and for /i/, {[+pl],[–weak,–a-type,–c-type],[–n,–obl]} instead of {[+pl],[–a-type,–c-type]}. In the weak singular domain in (14)-III, /a/ would have the insertion context {[–pl],[+weak,–i-type]} instead of {[–pl],[+weak]}; /u/ would have {[–pl],[+weak,+fem,–masc,–a-type,–i-type,+c-type],[+v]} instead of {[–pl],[+weak,+fem],[+v]}; and /i/ would have {[–pl],[+weak,–fem,+masc,+a-type,–i-type,–c-type],[–n,–v]}. In the strong singular domain in (14)-II, /a/ would have the insertion context {[–pl],[–weak],[+n,+v,–obl]} instead of {[–pl],[–weak],[+n]}; /u/ would have {[–pl],[–weak,–fem,+masc],[–n,–v]} instead of {[–pl],[–weak,–fem],[–n,–v]}; /i/ would have {[–pl],[–weak,–fem,–i-type],[–n,+v,+obl]} instead of {[–pl],[–weak,–fem,–i-type],[+obl]}; and /s/ would have {[–pl],[–weak,–fem,+a-type,–i-type,–c-type],[+n,+v,–obl]} instead of {[–pl],[–weak,–fem,+a-type],[+n,–obl]}. Fi-

[42]Note in passing that, like the case features just discussed, some of the [±weak] class features in (14) would emerge as redundant in an approach that dispenses with the Iconicity Principle. The same would go for some [±pl] number features, given that number features are integrated into the feature hierarchy in (11).

nally, in (14)-I, /r/ would remain [–obl], as before.

Iconicity would be respected in many cases (even if some distinctions would be blurred because of identical specificity), but it would be violated with /u/ vs. /i/, /s/ in (14)-II. Irrespective of this issue, however, I would like to conclude that, in the absence of compelling arguments in support of minimal underspecification, the system developed above is more economical, and hence preferable. The present system relies on maximal underspecification to the extent that it is permitted by the Syncretism Principle, the Iconicity Principle, and the generalizations in (3).

4.5.2. Absence of Impoverishment

Consider an alternative system (suggested by a reviewer) that does without impoverishment; instead of fission, two separate morphemes (or rule blocks) are postulated (see footnote 29). Cases are decomposed in the way suggested above. Gender decomposition works slightly differently, though, in that neuter is not assumed to be [–masc,–fem], as in the traditional (and pre-theoretic) understanding of the term, but rather a primitive: masculine = [–neuter,–fem], feminine = [–neuter,+fem], and neuter = [+neuter]; this way, masculine and feminine form a natural class. Inflection classes are also decomposed, in a way that is similar but not identical to the decomposition in (10) above (for reasons of space, the relevant tree is given in labelled bracketing):

(15) [4 [$_{A}$ 5 6 [$_{B}$ 7 8 9 [$_{C}$ [$_{D}$ 1 2 3(′)] [$_{E}$ 10 [$_{F}$ 11 12]]]]]]

Finally, (16) lists the revised set of vocabulary items with their insertion contexts:[43]

(16) a. *Morpheme 1*:

/ur/ ↔ {[–pl],[–neut,–fem],[–n,–v]}
/u/ ↔ {[–pl],[–n,+v],[+3′]}
/i/ ↔ {[–pl],[–fem],[+obl],[+A,–E]}
/ar/ ↔ {[–pl],[+n],[–E]}
/s/ ↔ {[–pl],[–fem],[+n],[+D]}
/ur/ ↔ {[–pl],[+n],[+9]}

/i/ ↔ {[–pl],[–neut,–fem],[–n,–v],[+10]}
/a/ ↔ {[–pl],[+E]}
/u/ ↔ {[–pl],[+v],[+12]}

/a/ ↔ {[+pl],[–neut],[–n,–obl],[+C,–F]}
/i/ ↔ {[+pl],[–n,–obl],[–B]}
/u/ ↔ {[+pl],[–n,–obl],[–2]}
/um/ ↔ {[+pl],[+obl]}

[43] A marker like the second /i/ would also fail to comply with maximal underspecification.

b. *Morpheme 2*:
/r/ ↔ {[+pl],[–neut],[–n,–obl]}
/Ø/ ↔ {[+pl],[–neut,–fem],[–n,+v,–obl],[–7]}
/a/ ↔ {[+pl],[+n]}

As can easily be verified, this approach derives the correct markers for all contexts in Icelandic noun declensions. The analysis shares a number of fundamental insights with the approach I have developed above, most notably the assumption that case and class features should be decomposed (thereby generating natural classes of cases and inflection classes which insertion contexts of markers can refer to) in order to account for intra- and trans-paradigmatic syncretism. As can be seen by the partioning into three domains in (16-a), the analysis accounts for syncretism in much the same way that the approach above does (i.e., within the strong singular, the weak singular, and the plural). However, the analysis in (16) is different in three fundamental respects. First, it does not respect the Iconicity Principle. Second, it does not recognize the generalizations in (3) as system-defining properties of Icelandic noun inflection; rather, these generalizations emerge as accidental properties resulting from the individual make-up of inflection markers. And third, there is no uniform entry for /r/ (i.e., markers with /r/ in the singular are not considered composite, despite the system-internal and diachronic evidence that these markers are to be treated as composite in both the singular and the plural). This, it seems, is the price that must be paid if impoverishment is dispensed with.

Interestingly, closer scrutiny reveals that there is one case where the system embodied in (16) does in fact account for a generalization in (3) in a systematic way, and that is the subtraction effect in the nominative vs. accusative plural of masculine declensions (see (3-f)). This effect is captured by assuming a morpheme 2 which can be filled by /r/ and an empty marker /Ø/ (plus, irrelevantly for present purposes, by genitive plural /a/). /Ø/ is a marker that finds no analogue in the list in (14), and this is so for a good reason: It turns out that the sole function of /Ø/ is to make insertion of /r/ in morpheme 2 impossible in accusative plural contexts of all masculine declensions except for Mc, and thereby derive the subtraction effect. Crucially, this role of /Ø/ in the system in (16) is not only equivalent to the role of the impoverishment rule (13-e) in the system I have developed above; as has been shown by Trommer (1999, 2003), such a use of highly specific /Ø/ markers is in fact a way to systematically encode impoverishment operations in general. This means that the abandonment of impoverishment in the alternative approach currently under consideration is only apparent, and there is no principled reason why other highly specific /Ø/ markers could not also be invoked to capture other regularities in (3). More specifically, and for the case at hand, we can venture the hypothesis that a systematic account of the subtraction effect in the plural will have

to rely on some form of impoverishment.[44]

Thus, for the time being, I would like to conclude that, even though the alternative system just sketched may well have its virtues, there are principled reasons for maintaining the system developed in this paper, and they are related to meta-theoretical syncretism and iconicity requirements, and to the generalizations in (3).

5. Concluding Remarks

Let me draw a conclusion. I have presented an analysis of noun inflection in Icelandic that centers around three main assumptions. First, case and inflection class features are decomposed into more primitive binary features, so that natural classes of cases and inflection classes are created that can be referred to by inflection markers. Second, impoverishment rules apply to the Icelandic *cn* morpheme after syntax and before inflection marker insertion. And third, the Icelandic *cn* morpheme is subject to fission. Given these assumptions, it has proven possible to account for most instances of both intra-paradigmatic and trans-paradigmatic syncretism within the three basic domains identified for the Icelandic noun declension system (singular of strong declensions, singular of weak declensions, and plural) in a systematic way that acknowledges certain system-defining regularities. In addition, it has turned out that all three domains obey iconicity – the more sonorous the phonological form of an inflection marker is, the less specific is its morpho-syntactic function. A further interesting property of the system of Icelandic noun declensions is the constant re-use of inflection markers: The markers employed in all three domains are mainly drawn from a small set comprising /a/, /u/, /i/, and /r/. By thus maximizing syncretism and iconicity, and minimizing the set of separate inflection marker forms, the system arguably comes close to optimal design.[45]

Such design considerations also play a role in the analyses of the Icelandic strong feminine declensions developed in Wurzel (1987) and Carstairs-McCarthy (1991, 1994) (the remaining declensions are not considered by either Wurzel or Carstairs-McCarthy). Interestingly, though, the conclusions reached there are quite different from the ones reached in the present paper. To end this paper, I will briefly address these alternative conceptions.

The account in Wurzel (1987) strives to minimize the assumptions needed to

[44]The question arises of whether the impoverishment rules adopted above could all be formulated in Trommer's terms, as insertion contexts of highly specific /Ø/ markers. This may be the case, but I will refrain from attempting it here because (a) it seems to me that such a procedure would illegitimately mix two operations (impoverishment and vocabulary insertion) that are conceptually quite distinct, and (b) highly specific /Ø/ markers strike me as a dubious concept, all the more so in view of iconicity considerations.

[45]As briefly noted above, inflectional systems that respect the Syncretism Principle reduce the number of possible inflection classes; and the smaller the number of markers, the stronger the reduction effect. See Müller (i.p.).

predict for each stem the correct inflection markers chosen in different cases and numbers. The analysis relies on Paradigm Structure Conditions, which have the status of default implications that are in turn based on the identification of leading forms. For instance, Wurzel notes that the nominative/accusative plural marker /ar/ suffices to predict all other markers in the domain of strong feminine declensions (see table 2), and that it is therefore possible to assume that only this marker with its insertion context (accusative/nominative plural) must be stipulated on a noun stem in the lexicon; the marker thus comes close to acting as a class feature for Fa. On this view, the (unmarked) declension Fi does not need any lexical specification (i.e., class feature); Fc1 needs /ur/ for nominative/accusative plural as a lexical specification; and Fc2 has /ur/ for genitive singular as a lexical specification (i.e., the genitive singular form is the leading form of this class).

In contrast, the analysis in Carstairs-McCarthy (1994) is based on the No Blur Principle (a successor to his earlier Paradigm Economy Principle, which Icelandic noun inflection raises problems for, for reasons discussed in Carstairs-McCarthy (1991)). According to the No Blur Principle, no more than one inflection marker can fail to unambiguously identify inflection class within a set of competing markers. With respect to the strong feminine declensions shown in table 2, there is indeed at worst one inflection marker for any given case/number specification that fails to unambiguously encode inflection class: in nominative, accusative, and dative singular contexts, there is no marker, hence, no marker variation; /ar/ fails to do so in genitive singular contexts (but /ur/ does); /ur/ fails to do so in nominative and accusative plural contexts (but /ir/ and /ar/ do); and No Blur is trivially satisfied in dative and genitive plural contexts.

In a nutshell, both Wurzel (1987) and Carstairs-McCarthy (1994) are concerned with identifying leading forms in paradigms, based on the assumption that the existence of such forms makes inflectional systems more economical than they would otherwise be. Both times, the underlying idea is that there are leading forms that encode inflection class; however, the kinds of leading forms envisaged by the two authors are not identical. In Wurzel's case, a leading form is sought on vertical axes of an inflectional paradigm; in Carstairs-McCarthy's case, only one non-leading form can be tolerated on horizontal axes of an inflectional paradigm.

However, it seems to me that the system of Icelandic noun declensions, when considered in its entirety (rather than with a focus on a small part of it), does not necessarily support theories that rely on leading forms as identifiers of particular inflection classes (as opposed to natural classes of inflection classes). Thus, plural forms like /ar/, /ir/, and /ur/ cease to predict inflection class when strong masculine/neuter declensions and weak declensions are also taken into account. Similarly, if one looks at the system of noun declensions as a whole (see table 5), all case/number specifications apart from dative and genitive plural exhibit more than one marker that fails to unambiguously identify inflection class (e.g., in the nominative plural, /ar/ belongs to Ma, Fa(′), and Mw; /ir/ belongs to Mi, Fi, and

Mu; and /ur/ belongs to Mc, Fc1, Fc2, and Fw). Of course, these problems can in principle be solved by reducing the domains in which the leadings forms must be sought. This is in fact explicitly done by Carstairs-McCarthy (1994, 744) (in the context of discussing noun inflection in German); the assumption there is that there is no interaction between markers across genders. The same would then have to be assumed for the weak/strong distinction (otherwise, both /ar/ and /ir/ would fail to unambiguously identify inflection class in nominative plural contexts of the masculine domain).

Still, such an approach does not strike me as entirely unproblematic. One reason is that the domains that would be needed to make the search for leadings forms successful do not correspond to the domains identified above, on the basis of considerations involving syncretism and iconicity. For instance, there is no doubt that masculine and feminine, strong and weak declensions can interact in the plural (compare the distribution of syncretism in nominative and accusative plural contexts in table 5), which implies that they belong to the same domain.

More importantly, however, the search for inflection markers that act as leading forms in Icelandic noun declensions is at variance with what I have argued to be the most conspicuous property of the system: the constant re-use of inflection markers. Accordingly, only very few of the core inflection markers in the list of vocabulary items in (14) identify a single inflection class. I would therefore like to contend that economy and optimal design are indeed prevalent properties of the system of Icelandic noun declensions; but it is in the interaction of the inflection markers rather than in the inflection markers themselves that these properties become manifest.

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