Differential Argument Encoding by Impoverishment*

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The present paper can be viewed as an extension of the theory of differential argument encoding developed in Aissen (1999, 2003). We maintain Aissen's hypothesis that the effects of differential argument encoding can be derived from harmonic alignment of scales, but we argue that differential encoding should best be viewed as a purely morphological phenomenon (rather than as a syntactic phenomenon, as in Aissen's approach). More specifically, we suggest that harmonic alignment of scales may bring about impoverishment operations that reduce syntactic inputs for morphological realization (see Halle & Marantz 1993). The evidence for this new approach comes from the observation that the *yes/no* alternations of case exponents as they are envisaged in Aissen's system are insufficient to account for degrees of morphological marking. As we will show based on data from a variety of languages (among them Hindi, Dyirbal, Mannheim German, Trumai, Cavineña, and Finnish), the *zero/non-zero* alternations discussed by Aissen are only part of a much broader *less/more* pattern.

1 Introduction

Implementing typologically motivated markedness hierarchies into formal theories of grammar is the basic aim of the approach to differential argument encoding developed by Aissen (1999, 2003). Essentially, a marked (or 'unusual') object DP (e.g., an object that is animate, or that is 1. person, or that is specific) is often overtly marked for case whereas an unmarked object DP (with prototypical object properties, like being inanimate, or 3. person, or non-specific) is left without an overt marker. Similarly, marked

*For helpful comments and discussion, we would like to thank the participants of the Leipzig workshop on scales (March 29, 2008), NELS 39 (November 7–9, 2008), and the Cologne workshop on transitivity (November 14–15, 2008), as well as written comments by Jochen Trommer and three anonymous reviewers. This work was supported by a DFG grant to the project *Argument Encoding in Morphology and Syntax*, as part of Forschergruppe 742.

subject DPs (e.g., 3. person subjects, or inanimate subjects) are often encoded by case marking where unmarked subjects are not. Aissen derives this phenomenon by means of two operations that are available in an optimality-theoretic approach to grammar: first, *harmonic alignment* of scales, and second, *local conjunction* of constraints. Harmonic alignment captures complex interactions between markedness constraints for case as follows: A general constraint blocking case marking (*$\textsc{Struc}_C$) may be ranked lower than a complex conflicting constraint demanding case marking for a certain (marked) type of argument (e.g., **Obj/anim & *$\emptyset_C$*) but ranked higher than a complex conflicting constraint that requires case marking for another (unmarked) type of argument (e.g., **Obj/inan & *$\emptyset_C$*), which results in overt marking in the former case, and zero marking in the latter.

The analysis presented here assumes that the basic mechanisms employed by Aissen – i. e., harmonic alignment, local conjunction, etc. –, provide the right tool for implementing scales in grammatical theory. However, in contrast to Aissen, we hold that this differential argument encoding is not the result of constraints that apply in the syntax; rather, these constraints belong to the morphological component (or, more precisely, the morphology-syntax interface). In essence, we argue that the theoretical means adopted by Aissen have to be combined with a a post-syntactic theory of morphology in which syntactic structures can be modified prior to morphological realization, such as Distributed Morphology (see Halle & Marantz 1993, 1994).[1]

The main empirical argument for this claim is that Aissen's analysis is not able to derive *all* cases of differential marking; it only derives a proper subpart of them. Since in her approach the case feature of canonical DPs is deleted syntactically, it can never be realized overtly. Thus, all instances of differential marking are predicted to be *zero/non-zero* alternations. This prediction is not borne out. As we will argue, there are in fact cases of marker alternations that adhere to the same scales and principles that are claimed by Aissen to regulate differential marking. Crucially, however, these alternations are between two (or possibly even more) *overt* markers. This means that there are *degrees* of morphological marking. Since the underlying factors are identical to the ones identified by Aissen, it is an undesirable state of affairs that only a proper subset of them can be accounted for. Clearly, this way a generalization is being missed.

By situating the system developed by Aissen within morphology one can overcome this shortcoming. Roughly speaking, in the approach proposed here it is not the case that the case feature of a DP can either be present or completely absent. Instead, it is possible that feature deletion only affects *parts* of case features. When the appropriate marker for a given DP is inserted, it might be the case that the best exponent is not the zero marker but a *second overt marker* (apart from the one standardly used to encode case). Hence, the system laid out here uniformly derives all cases of hierarchy-driven *less/more*

[1] See also Bank (2008) for an analysis of German pronominal declension that rests on similar assumptions.

alternations. Since these include the *zero/non-zero* alternation as a special case, it derives all instances of differential argument encoding discussed by Aissen but captures other functionally motivated alternations as well.

The article is structured as follows: Section 2 provides the background. Subsection 2.1 summarizes the analysis developed by Aissen (1999, 2003) for differential marking. In subsections 2.2 and 2.3, we briefly introduce the two theoretical concepts that we will rely on in our modification of Aissen's system, viz., *impoverishment* and *iconicity*, respectively. Section 3 sets the stage for the new analysis. In subsections 3.2 and 3.3, we informally provide some initial motivation for a new analysis by looking at differential argument encoding in Dyirbal and direct/inverse marking in Algonquian. After this, subsection 3.4 presents an overview of the grammatical architecture assumed in Distributed Morphology, and introduces the theoretical mechanisms that the analysis is based on in a more comprehensive way. Finally, section 4 forms the core of the present paper. Here we consider empirical phenomena that directly support the hypothesis that differential argument encoding is a morphological (rather than syntactic) phenomenon. First, the basic working of the theory is illustrated for Hindi. After this, we consider the cases of a colloquial variety of German spoken in the Mannheim area, the Brazilian language Trumai, and the Bolivian language Cavineña to argue that Aissen's system is insufficient. Finally, we develop a new analysis of object case marking in Finnish; in the course of doing so, we argue that what is traditionally viewed as a system comprising four different syntactic object cases should in fact be analyzed as a system based on only one object case, with a set of competing morphological exponents distributed over the various contexts according to the principles of differential argument encoding.

2 Background

2.1 *Harmonic Alignment of Scales*

The present approach follows Aissen (1999, 2003) in claiming that differential argument encoding can be derived by harmonic alignment of scales. This mechanism is illustrated below.

Consider first *Hale/Silverstein hierarchies* (Hale 1972, Silverstein 1976):[2]

(1) SCALES

a. *GF scale* (basic)
Subject > object

[2] The basic GF scale leaves open how "subject" and "object" are to be defined. Throughout this paper, we will presuppose that grammatical functions are derivative notions – essentially, positions in phrase structure representations (see Chomsky 1965). On this view, we can assume that "subject" means "specifier of vP", and object "complement of V" (see, e.g., Chomsky 2001). Still, to simplify the exposition, in what follows we will mostly use the labels "subject" and "object" (rather than, say, "Spec(v)" and "Comp(V)").

b. *θ scale*
Agent > patient
c. *Person scale*
Local Pers. (1,2) > 3. Pers.
d. *Prominence scale*
X > x
(discourse-prominent argument > non-discourse-prominent argument)
e. *Animacy scale*
Hum(an) > Anim(ate) > Inan(imate)
f. *Definiteness scale*
Personal pronoun (Pro) > Name (PN) > Def(inite) > Indefinite Specific (Spec) > NonSpecific (NSpec)

For instance, the definiteness scale states that pronouns are at one end of the hierarchy, that non-specific DPs are at the other end of the hierarchy, and that proper names, definite DPs, and indefinite specific DPs are in between. *Harmonic Alignment* provides a means to combine two such scales.

(2) HARMONIC ALIGNMENT (Prince & Smolensky 1993/2004)
Suppose given a binary dimension D_1 with a scale X > Y on its elements {X,Y}, and another dimension D_2 with a scale a > b >...> z on its elements {a,b,...,z}. The *harmonic alignment* of D_1 and D_2 is the pair of Harmony scales H_X, H_Y:
a. H_X: X/a $\succ$ X/b $\succ$ ... $\succ$ X/z
b. H_Y: Y/z $\succ$ ... $\succ$ Y/b $\succ$ Y/a

The *constraint alignment* is the pair of constraint hierarchies C_X, C_Y:
a. C_X: *X/z $\gg$ ... $\gg$ *X/b $\gg$ *X/a
b. C_Y: *Y/a $\gg$ *Y/b $\gg$ ... $\gg$ *Y/z

Take the binary GF scale and the animacy scale as an example. Applying harmonic alignment yields the harmony scales in (3):

(3) a. Subj/Hum $\succ$ Subj/Anim $\succ$ Subj/Inan
b. Obj/Inan $\succ$ Obj/Anim $\succ$ Obj/Hum

These combined scales express markedness relations between combinations of features. Thus, (3a) states that the least marked kind of subject is human, followed by animate subjects. Inanimate subjects are highly atypical and therefore most marked. As for objects, the situation is the other way around (see (3b)). In an optimality-theoretic setting, these markedness hierarchies can be reinterpreted as constraint hierarchies by transforming the members of (3a), (3b) into constraints that prohibit the respective configurations, and reversing their order; see (4).

(4) a. *Subj/Inan ≫ *Subj/Anim ≫ *Subj/Hum
b. *Obj/Hum ≫ *Obj/Anim ≫ *Obj/Inan

Take (4a) as an example. The constraint against inanimate subjects is ranked highest. This captures the generalization underlying (3a) that this kind of subject is more marked than an animate (but non-human) subject, which in turn is more marked than a human subject. Constraints are in principle violable in optimality theory; but it is of course more likely for a low-ranked constraint to be violated by an optimal candidate than it is for a high-ranked constraint. More specifically, harmonic alignment of scales captures implicational universals: If a subject argument with status X on some scale is permitted, then a subject argument with status Y on the same scale is also permitted in a language if Y outranks X; and vice versa for objects.

So far, so good. Constraints of the type in (4) may (in interaction with other constraints) lead to situations where certain kinds of arguments (as a tendency: those precluded by high-ranked constraints) cannot be realized at all; and this phenomenon is certainly well documented in the world's languages. However, differential argument encoding involves a slightly different state of affairs: The marked argument does not fail to show up completely; rather, it is morphologically marked in a way that a comparable unmarked argument is not. To derive a differential encoding of marked arguments, Aissen (1999, 2003) employs a second technique (in addition to harmonic alignment) that has been developed in optimality theory (see Smolensky 1993, 2006, Legendre, Smolensky & Wilson 1998, among others), viz., *local constraint conjunction*. Simplifying a bit, a constraint that is the local conjunction A & B of two constraints A, B is violated if both A and B are violated (in some local domain); by definition, A & B outranks both A and B. Local conjunction is not originally envisaged as an operation that combines a single constraint A with a fixed subhierarchy of constraints $B_1 \gg B_2 \gg \ldots \gg B_n$ (as it can be derived by harmonic alignment), but Aissen assumes just this as the basic procedure underlying differential argument encoding. Furthermore, she makes the plausible assumption that iterated local conjunction of some constraint A with each of the members of a fixed subhiearchy of constraints $B_1 \gg B_2 \gg \ldots \gg B_n$ must maintain the original order of constraints within the subhierarchy, yielding $A \,\&\, B_1 \gg A \,\&\, B_2 \gg \ldots \gg A \,\&\, B_n$. In the case at hand, Aissen stipulates that the markedness constraint $*\emptyset_C$ in (5), which acts as a general ban on absence of case marking (= A), can be locally conjoined with a subhierarchy of the type in (4) (= $B_1 \gg B_2 \gg \ldots \gg B_n$), yielding the fixed rankings in (5).

(5) $*\emptyset_C$ (Star-Zero(Case)):
"penalizes the absence of a value for the feature CASE"

(6) a. *Subj/Inan & $*\emptyset_C$ ≫ *Subj/Anim & $*\emptyset_C$ ≫ *Subj/Hum & $*\emptyset_C$
b. *Obj/Hum & $*\emptyset_C$ ≫ *Obj/Anim & $*\emptyset_C$ ≫ *Obj/Inan & $*\emptyset_C$

These constraints only regard the *case marking* of certain types of DPs. For instance, **Subj/Inan & *∅$_C$* is violated if an inanimate subject does not bear a case feature. Therefore, all constraints in (6) penalize the *absence* of case features.

*STRUC$_C$ is a conflicting markedness constraint. This constraint is violated if a DP bears a case feature; see (7).

(7) *STRUC$_C$ (Star-Structure(Case)):
"penalizes a value for the morphological category CASE"

This constraint is not conjoined with a constraint subhierarchy but interspersed with the subhierarchy constraints derived by local conjunction. It effects a suppression of case marking for all those arguments where the respective constraint that demands case marking is ranked lower. This general procedure is illustrated in (8) for the subhierarchy derived by locally conjoining *∅$_C$ (Star-Zero(Case)) with the original subhierarchy correlating object status with the definiteness scale (see Aissen 2003).[3,4]

(8)

	← *STRUC$_C$	Kalkatungu: no objects case-marked
*Obj/Pro & *∅$_C$ ≫		
	← *STRUC$_C$	Catalan: only pronominal objects case-marked
*Obj/PN & *∅$_C$ ≫		
	← *STRUC$_C$	Pitjantjatjara: only pronominal and PN objects case-marked
*Obj/Def & *∅$_C$ ≫		
	← *STRUC$_C$	Hebrew: only pronominal, PN, and definite objects case-marked
*Obj/Spec & *∅$_C$ ≫		
	← *STRUC$_C$	Turkish: all objects case-marked except non-specific objects
*Obj/NSpec & *∅$_C$		
	← *STRUC$_C$	Written Japanese: all objects case-marked

Taking Catalan as an example, *STRUC$_C$ outranks all constraints except **Obj/Pro & *∅$_C$*, which prohibits case features in all contexts except those involving object pronouns. As

[3] Importantly, whereas **∅$_C$ must* be locally conjoined with subhierarchies gained from harmonic alignment of Silverstein scales in order to derive the properties of differential argument encoding in Aissen's approach, *STRUC$_C$ *must not* be so conjoined. As far as we can see, this asymmetric behavious of the two opposed markedness constraints under consideration must be stipulated; deriving it from more basic assumptions would still seem to be a desideratum at this point.

[4] As for the phenomenon of differential object marking, see de Swart (2007) for recent discussion.

for object pronouns, the higher-ranked markedness constraint **Obj/Pro & *∅$_C$*, which requires a case feature for pronouns, renders a violation of *STRUC$_C$ non-fatal.

In what follows, we will presuppose the basic correctness of Aissen's approach to differential argument encoding in terms of local conjunction and harmonic alignment of markedness scales. However, we will deviate from Aissen's approach as far as the grammar-internal localization of these principles is concerned. In Aissen's view, the resulting constraint ranking constitutes a part of syntax: Optimization determines whether or not DP arguments bear a case feature. This yields a *yes/no* alternation: If a DPs bears a case feature, it is marked by an overt exponent; if there is no case feature, zero marking results. Hence, it is impossible to capture *degrees* of morphological marking as they arise if typical DPs are marked *less* than atypical ones, but marked nevertheless.

The present approach situates differential argument encoding within a post-syntactic morphological component where case features can be deleted post-syntactically by impoverishment. Impoverishment is triggered by markedness constraints which interact with complex faithfulness constraints (derived from scales by harmonic alignment and local conjunction) in more or less the same way that they do in Aissen's analysis. Crucially, we also assume that traditional case features (like, e.g., *accusative*) are to be decomposed into combinations of more primitive features and thus have internal structure (e.g., [–obl(ique),+gov(erned)]; see Bierwisch 1967). Consequently, a deletion of case features may be partial, i.e., may leave some of the more primitive case features that define the syntactic case category intact, and accessible for morphological realization. Accordingly, by relocating differential argument encoding to the morphological component, we end up with a more refined and flexible system in which differential argument encoding alternations can involve various overt exponents (rather than just one overt exponent and zero exponence). Variations in differential argument encoding that go beyond zero/non-zero marking are systematically unavailable in an approach that places all the relevant operations in syntax (or does not distinguish between morphological and syntactic aspects of case – in a sense, then, we identify the lack of discrimination between abstract, syntactic and concrete, morphological case as the main problem with Aissen's approach).[5,6]

[5] Compare also Legate (2008)'s arguments for a distinction between absolutive DPs that are inherently zero-marked and accusative DPs that may sometimes also be zero-marked morphologically but behave differently from a syntactic point of view.

[6] As noted above, throughout this paper we will assume that Aissen's approach to differential argument encoding in terms of harmonic alignment and local conjunction is basically on the right track. However, this is not a foregone conclusion; in line with this, several caveats are in order. First, various alternative (optimality-theoretic) systems have been proposed that modify or extend Aissen's approach in one way or the other; see particularly Stiebels (2000, 2002, 2008), Ortmann (2002), and Trommer (2006). We will have nothing to say about these alternative approaches in what follows (although it seems to us that most of what we have to say here could in principle also be implemented in these competing analyses, given that they share a number of properties).

2.2 *Impoverishment*

Impoverishment rules are a fundamental concept of Distributed Morphology. They are standardly taken to be deletion transformations that remove morpho-syntactic features (which need to be realized by morphological exponents in a post-syntactic morphological component) before marker (= vocabulary item) insertion takes place (see Bonet 1991, Noyer 1998, Halle & Marantz 1993, 1994, Bobaljik 2002, Frampton 2002). As a consequence of impoverishment, inflectional morphology applies to reduced feature matrices, and there can be a *retreat to the general case*: A less specific marker is inserted than would otherwise be expected. Thus, impoverishment can derive instances of syncretism; and it can do so in a way that a mere underspecification of exponents cannot: Unlike underspecification of individual markers, impoverishment can capture *system-defining* instances of syncretism, i.e., syncretism patterns that show up in more than one paradigm in a language.

A slightly different approach to impoverishment operations is put forward in Trommer (1999): On this view, there are no specific impoverishment rules that delete features. Rather, impoverishment is assumed to represent a subcase of regular vocabulary insertion: If a zero exponent is highly specific, it may have to be inserted into a functional morpheme before other (non-zero) vocabulary items (given that marker competition is resolved by choosing the most specific marker; see below). This produces the effect of impoverishment if a concept of vocabulary insertion is adopted according to which features in the functional morpheme which are not matched by the zero vocabulary item (and thereby discharged) remain accessible for further insertion (also see Noyer 1992 for this concept).

Finally, it has been suggested that impoverishment might best be viewed as being triggered by general filters blocking the co-occurrence of features (see Noyer 1992). A somewhat more flexible version of this proposal has been pursued in optimality-theoretic approaches (not necessarily by explicitly adopting the notion of "impoverishment", though): In this latter type of approach, interacting optimality-theoretic constraints

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Second, throughout this paper we will ignore recent attempts to derive the effects as epiphenomena of independently motivated syntactic assumptions; see Brown, Koch & Wiltschko (2004), Harbour (2008), and Richards (2008). We take these approaches to differential argument encoding to be highly interesting and definitely worth pursuing, but as things stand, they do not yet have an empirical coverage that is similar to Aissen's original system; it remains to be seen whether what we argue for here could be maintained in its essentials if a theory is adopted according to which differential marking is an epiphenomenon.

Third, we will have very little to say about possible arguments against the whole enterprise of deriving differential argument encoding in a grammar-internal way, as they can be found in Carnie (2005) and Haspelmath (2007).

Fourth and finally, throughout this paper we presuppose that the phenomenon of differential argument encoding is indeed real, and not an artefact of focussing on a non-representative typological sample. See Bickel (2008) for preliminary arguments to this effect, but also Bickel & Witzlack-Makarevich (this volume) for qualifications and further discussion of this issue.

may lead to optimal outputs in which morpho-syntactic features of the input have been suppressed, in violation of DEP constraints that prohibit deletion; see Grimshaw (2001), Kiparsky (2001), Trommer (2001, 2006), Wunderlich (2004), Don & Blom (2006), Lahne (2010), and Opitz (2008) for approaches along these lines.

Against this background, we would like to propose that Aissen's analyses should be reanalyzed in terms of impoverishment, by combining aspects of the various types of analyses just mentioned. First, impoverishment is a post-syntactic operation that deletes morpho-syntactic features, as is standardly assumed. And second, such deletion applies so as to satisfy complex faithfulness constraints in an optimality-theoretic setting that models the interface between syntax and (inflectional) morphology. These faithfulness constraints are created by means of harmonic alignment of markedness scales. On this view, impoverishment (at least of the type that is relevant in the present context) is functionally motivated.

2.3 *Iconicity*

Harmonic alignment of scales combined with impoverishment rules derives marker alternations for different kinds of DPs. However, nothing is said so far about the relation between these alternating markers. It might a priori be possible that for highly typical DPs impoverishment applies, yielding an reduced feature specification. Consequently, a less specific marker could be inserted that nevertheless could be phonologically more complex than the original marker. This would result in a typical DP being marked *more* than an atypical DP, clearly in contradiction to the intuition behind differential argument encoding. To restrict the system in such a way as to only allow for typical DPs to be marked *less* than atypical ones (and not vice versa), we adopt a meta-grammatical principle of *iconicity*, which correlates form and function of markers:

(9) *Iconicity Meta-Principle:*
Similarity of form implies similarity of function (within a certain domain).

For iconicity to work, it has to be the case that exponents can be *underspecified* with respect to morpho-syntactic features (which may in turn be more abstract than is motivated by purely syntactic considerations – cf., for instance, [±obj], [±obl] as primitive, decomposed case features whose cross-classification yields the four cases of German, with underspecification capturing natural classes of cases). As a matter of fact, underspecification of exponents is employed as a means to capture syncretism in most contemporary morphological theories, among them Distributed Morphology (see Halle & Marantz 1993, 1994, Noyer 1992, Halle 1997, Harley & Noyer 2003, among others), Paradigm Function Morphology (see Stump 2001), Minimalist Morphology (see Wunderlich 1996, 1997b), and Network Morphology (see Corbett & Fraser 1993, Baerman, Brown & Corbett 2005). In a typical inflectional paradigm, underspecification does not affect all exponents in the same way: Some exponents may not be underspecified at all

(if there is no systematic syncretism involved); some exponents may be underspecified to varying degrees (thereby accounting for syncretism domains of various sizes); and even full underspecification is often envisaged as a possibility (embodied in the concept of elsewhere, or default, markers).

Given this state of affairs, the Iconicity Meta-Principle leads us to expect that the form of an exponent correlates with the degree of its underspecification with respect to morpho-syntactic features (or, more precisely, its degree of specificity), in the sense that more underspecified markers tend to be phonologically less marked (e.g., *shorter*, or more *sonorous*) than less underspecified markers; the fact that radically underspecified markers are often zero therefore does not come as a surprise. Something along the lines of (9) is arguably tacitly assumed (at least as a tendency) in many analyses of inflectional paradigms (also compare Halle & Marantz 1993's discussion of highly specified zero exponents as a possible exception to the rule). To the best of our knowledge, it has first been explicitly recognized as a principle that may shape inflectional paradigms consisting of underspecified exponents in Bernd Wiese's work (see Wiese 1999, 2003, 2004).[7]

To give an example of meta-grammatical iconicity at work, consider Wiese (1999)'s analysis of determiner inflection in German. To derive various kinds of syncretism in this paradigm (which spans four cases, three genders, and two numbers), Wiese (1999) proposes (10) as the set of underspecified inflectional exponents .

(10) *Exponents for determiner inflection in German*

a.	(i)	/m/ ↔ [+masc,+obl,+gov]	(DAT.MASC.SG./NEUT.SG.)
	(ii)	/s/ ↔ [+masc,+obl]	(GEN.MASC.SG./NEUT.SG.)
	(iii)	/s/ ↔ [+masc,+fem]	(NOM./ACC.NEUT.SG.)
b.	(i)	/n/ ↔ [+masc,+gov]	(ACC.MASC.SG.)
	(ii)	/r/ ↔ [+masc]	(NOM.MASC.SG.)
	(iii)	/r/ ↔ [+obl,+fem]	(DAT./GEN.FEM.SG.)
	(iv)	/n/ ↔ [+obl,+gov]	(DAT.PL.)
	(v)	/r/ ↔ [+obl]	(GEN.PL.)
c.	(i)	/e/ ↔ [ ]	(NOM./ACC.FEM.SG./PL.)

For present purposes, it is not necessary to go through this list of markers in detail (so as to illustrate how underspecification derives syncretism). The only property of the list in (10) that is important at this point is that specificity decreases from top to bottom in this list.[8] In the same way, the three groups of markers identified in (10) (viz., (a), (b),

[7] Note that Wiese's proposal involves a radical break with traditional approaches, where iconicity is measured based on fully specified forms (see Plank 1979, Wurzel 1984).

[8] Note that Wiese assumes, in accordance with much relevant literature on this topic (also see below), that specificity of (possibly underspecified) markers cannot solely be derived by comparing the sizes of the sets of features that are associated with the exponents; rather, a hierarchy of features also contributes to determining specificity. For concreteness, the hierarchy that Wiese postulates is the one in (i).

and (c)) can be ordered according to an independently motivated phonological criterion: /m/ and /s/ are heavy markers, /n/ and /r/ are less heavy markers, and /e/ (= ə) is lightest. As Wiese notes, this does not look like a coincidence; and the correlation is explained if iconicity holds in general of inflectional paradigms. Here and in what follows, we will assume that this abstract, highly theory-dependent concept of iconicity is a recurring feature of inflectional systems (see, e. g. Müller 2004, 2005, 2007b, Opitz 2006, and Georgi 2008 for additional evidence from a variety of languages).

Returning to the domain of differential argument encoding, the Iconicity Meta-Principle implies that a situation where a marker is *less* specific in terms of morpho-syntactic features but *more* marked phonologically does not arise. The working of impoverishment ensures that contexts which are affected by the operation will have to be realized by less specific (i.e., more underspecified) markers than would otherwise be possible (a retreat to the general case). Given iconicity, the less specific exponent will then also be phonologically lighter (and/or more sonorous) than its more specific competitor that is blocked as a result of impoverishment. Therefore, given that differential argument encoding can be traced back to impoverishment operations that delete features in prototypical contexts (e.g., with inanimate 3. person objects) but not in atypical contexts (e.g., with animate 1. person objects), it follows that less typical argument DPs will be phonologically more marked than more typical argument DPs (and, of course, zero marking for highly typical argument DPs is also expected as an option). Thus, the core property of differential argument encoding is captured by the interaction of impoverishment and the Iconicity Meta-Principle. In the next section, we flesh out this proposal.

3 Towards a New Analysis

In this section, we will motivate the need for an extensions of Aissen's (1999, 2003) analysis of differential argument encoding on the basis of data from Dyirbal and Algonquian. We will then make explicit the background assumptions that the present proposal is based on.

3.1 *Claim*

We suggest that differential marking is not necessarily a categorial *yes/no* phenomenon; rather, it can be a gradient, *less/more* phenomenon. According to this view, alternation with zero exponence is but a special case of a more general option of differential marker realization. Differential argument encoding is brought about by impoverishment, i.e., post-syntactic deletion of morpho-syntactic features. Impoverishment is triggered

(i) [+masc] > [+obl] > [+fem] > [+gov]

Thus, e.g., /s/ in (a-ii) of (10) is more specific than, say, /r/ in (b-iii) of (10).

by faithfulness constraints which in turn are derived from a harmonic alignment of markedness scales. Impoverishment leads to the insertion of a less specific inflection marker. Consequently, it may lead to zero exponence, but it may also lead to a selection of other markers that instantiate a "retreat to the general case", and that – given the Iconicity Meta-Principle – are formally closer to zero exponence than the marker that would otherwise be expected (also see Opitz (2008)'s discussion of Tlapanec for relevant discussion).

The need for an extension of the system developed in Aissen (1999, 2003) can be illustrated on the basis of differential subject and object marking in Dyirbal and inverse marking in Algonquian languages. Aissen (1999, 2003) cites both Dyirbal and inverse marking as evidence for her approach. We will argue, however, that as soon as one takes into consideration a broader array of empirical facts, it becomes clear that Aissen's approach, being confined to *yes/no* alternations, misses crucial generalizations. The upshot of the argument is that a theory that treats zero/non-zero alternations and non-zero/non-zero ones on a par is to be preferred on empirical grounds.

3.2 *Differential Encoding of Subjects and Objects in Dyirbal*

Aissen (1999, 2003) uses Dyirbal as an argument in favour of her approach and argues that for both nouns and pronouns, a zero/non-zero alternation occurs that is conditioned by markedness hierarchies. In this section, based on Carnie (2005), Haspelmath (2007) and ultimately Dixon (1972, 1994), we argue that this is empirically wrong: There are alternations between two overt markers whose choice is determined by the same principles as the zero/non-zero alternation.[9]

As shown in (11), 1st and 2nd person pronouns are unmarked if used as subjects and bear the marker *-na* (accusative) if they occur in object position. The situation is reversed for nouns: Here subjects are marked overtly with *-ŋgu* (ergative) and objects show no overt exponence.

(11) a. nyura-∅ ŋana-na buɽa-n
2PL-NOM 1PL-ACC see-NONFUT
'You saw us.'

b. ŋana-∅ nyura-na buɽa-n
1PL-NOM 2PL-ACC see-NONFUT
'We saw you.'

c. ŋuma-∅ yabu-ŋgu buɽa-n
father-ABS mother-ERG see-NONFUT
'Mother saw father.'

[9] Similar points can be made for Djapu, another Australian language (Morphy 1983, Legate 2008).

This is consistent with the person hierarchy in (12): Local persons are canonical subjects and non-local persons are typical objects. Deviances have to be marked explicitly.

(12) *Person hierarchy*
1,2 (local persons) > 3, other DPs (non-local persons)

As shown by Aissen, the constraint ordering in (13) yields this result.

(13) *Constraint ranking for Dyirbal*
$$\left\{ \begin{array}{l} *\text{Subj/3} \;\&\; *\emptyset_C, \\ *\text{Obj/local} \;\&\; *\emptyset_C \end{array} \right\} \gg *\textsc{Struc}_C \gg \left\{ \begin{array}{l} *\text{Subj/local} \;\&\; *\emptyset_C, \\ *\text{Obj/3} \;\&\; \emptyset_C \end{array} \right\}$$

Upon closer scrutiny, this empirical pattern turns out to be incomplete. Local subjects and non-local objects are not always unmarked morphologically. Canonical arguments do bear case.

3.2.1 Noun-Class Particles In Dyirbal full DPs can take a noun-class particle, which expresses the proximity or visibility of the entity being referred to. These particles inflect for case, with nominatives/absolutives taking a different marker than -∅.

(14) Dyirbal noun-class particles

	NOM/ABS	ERG	DAT	GEN
Class 1	*bayi*	*baŋgul*	*bagul*	*baŋul*
Class 2	*balan*	*baŋgun*	*bagun*	*baŋun*

(15) is a relevant example.

(15) bayi ŋuma-∅ baŋgun yabu-ŋgu buɽa-n
CLASS1.ABS father-ABS CLASS2.ERG mother-ERG see-NONFUT
'Mother saw father.'

In contrast to nouns, the nominative/absolutive form of the particle *bayi* is *not* zero marked. This cannot be accommodated within Aissen's system: If the case feature of the whole DP, containing noun and particle, is deleted, it is impossible to state that the particle agrees *in case* with the noun, but this is what the suffix on the particle suggests.

Within the present analysis, this state of affairs falls into place: Impoverishment applies to both the noun and the particle. Since there are different sets of markers for nouns and class particles, in the case of nouns the zero marker wins, whereas an overt marker is attached to the particles.

3.2.2 Singular pronouns Within the pronominal system, the nominative shows zero exponence only in *most* cases, not in all cases. In 1SG and 2SG contexts, nominative

is morphologically marked as well: It is not formed by taking the accusative form and simply removing the accusative ending *-na*.

(16) Dyirbal pronouns

	NOMINATIVE	ACCUSATIVE
1DUAL	*ŋalidyi*	*ŋalidyi-na*
1PL	*ŋandyi*	*ŋandyi-na*
2DUAL	*ɲubaladyi*	*ɲubaladyi-na*
2PL	*ɲuradyi*	*ɲuradyi-na*
1SG	*ŋadya*	*nayguna*
2SG	*ŋinda*	*ninuna*

Consequently, Aissen's system is capable of deriving the forms of dual and plural pronouns but is forced to regard the singular pronouns as fundamentally different in nature as they cannot constitute a case of differential argument encoding in Aissen's terms. This, however, is doubtful. Not only are the distributional patterns of nominative and accusative identical for all kinds of pronouns, indicating that the person hierarchy is active for singular pronouns as well. Moreover, it is a striking fact that the accusative forms are *more* marked phonologically than the nominative markers (i.e., they consist of more segments). Hence, hierarchical markedness correlates with morphological markedness, which strongly suggests an approach treating all kinds of pronouns alike in terms of differential argument encoding.

The present approach assumes that for all kinds of pronouns impoverishment applies to the nominative forms. Since there are different marker sets for dual and plural on the one hand and singular pronouns on the other hand, an overt marker is inserted in the case of singulars, and the zero marker with duals and plurals.

3.3 *Direct and Inverse Marking*

On the basis of evidence from the Sino-Tibetan language Nocte, Aissen (1999) argues that her approach is capable of deriving direct-inverse marking as well. In Nocte, the hierarchically less marked direct form is not encoded overtly, but the hierarchically more marked inverse form is. The goal of this subsection is to point out that there are instances of direct-inverse marking that exhibit an alternation between two overt markers and hence cannot be derived within Aissen's system.

In Nocte, the direct form of the verb is chosen in the configurations 1-2, 1-3, 2-3 and 3-3 (where X is subject and Y is object in "X-Y"). In all other contexts, the inverse form is used. The inverse is encoded by an additional exponent, but the direct form is zero-marked. This is derived in Aissen's system by local conjunctions of constraints

on subjects and constraints on objects, followed by local conjunction with a constraint penalizing zero marking ("*$\emptyset_D$" stands for "express direction"), as in (17).

(17) *$\emptyset_D$ & *Su/3 & *Oj/loc

$$\gg \left\{ \begin{array}{l} *\emptyset_D \text{ \& *Su/3 \& *Oj/3,} \\ *\emptyset_D \text{ \& *Su/loc \& *Oj/loc} \end{array} \right\}$$

$$\gg *\emptyset_D \text{ \& *Su/loc \& *Oj/3}$$

The ranking for Nocte is given in (18).

(18) *Ranking in Nocte*

$$\left\{ \begin{array}{l} *\emptyset_D \text{ \& *Su/3 \& *Oj/loc,} \\ *\emptyset_D \text{ \& *Su/2 \& *Ob/1} \end{array} \right\} \gg *\textsc{Struc}_D \gg *\emptyset_D \text{ \& GR/Pers}$$

with: GR={Subj,Obj,Obl}; Pers={1,2,3}

Evidently, this analysis only works for languages that have a morphologically unmarked direct form (such as Nocte). Consider, on the other hand, Algonquian languages (see Blake 1994 and Macaulay 2005, among others): In Menominee, for example, direct is marked by *-ā*, and inverse by *-Eko*. In Western Naskapi, the direct marker is *-â*, and the inverse marker is *-ikw*. In Plains Cree, the direct form is marked by *-ā*, and the inverse by attaching *-ekw*. In all three cases, two markers coexist. While it is unproblematic in Aissen's system to capture the fact that both the direct and the inverse forms are morphologically marked, there is no way of deriving that the direct is marked *less*, i.e., by a marker with fewer segments than there are on the inverse form. In other words, although Aissen acknowledges that the inverse is hierarchically marked with respect to the direct, this fact cannot be correlated with the markedness of the exponents themselves. Therefore, in Aissen's approach one would be forced to treat the Algonquian and Nocte cases as fundamentally different.

Within the present analysis, on the other hand, these facts can be derived by impoverishment in direct contexts. Under this perspective Nocte is only a special case, with impoverishment leading to the selection of the zero marker.

To sum up, in the preceding two subsections we have provided empirical evidence that Aissen's approach is too narrow: As its scope it confined to zero/non-zero alternations, generalizations across patterns that involve overt/overt alternations cannot be captured. In the remainder of this article we will illustrate our extension to overcome this problem.[10]

[10] Another possible example is Russian. In Russian, there exists a (system-defining) identity of nominative and accusative marking with neuters, which is arguably best analyzed by impoverishment in a Distributed Morphology approach: There is a deletion of case features with neuters. Neuter nouns are the prototypical inanimate objects, and it seems hard to deny that the underlying motivations for differential object marking are active in this domain. However, neuter nouns in Russian do not involve zero exponence in accusative contexts. Rather, they exhibit a choice of a less specific, more general case marker that is

3.4 *Assumptions*

This subsection introduces the core theoretical concepts that our analysis of differential argument encoding rests on. The basic assumption about grammar is that it is organized as assumed in Distributed Morphology: Syntax precedes inflectional morphology; and syntactic structures can be manipulated before morphological realization (i.e., *vocabulary insertion*) takes place. The only crucial difference to standard versions of Distributed Morphology is that we assume that impoverishment is brought about not by specific rules, but by a system of conflicting constraints.

Vocabulary insertion applies as in Halle & Marantz (1993): Functional morphemes contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material. Inflection markers are vocabulary items that pair phonological and (often underspecified) morpho-syntactic features; they are inserted post-syntactically in accordance with the Subset Principle. The Subset Principle can be defined as in (19) (see Halle 1997, among others).

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

The Subset Principle relies on the concept of Specificity. We assume that Specificity is defined as in (20), based on a hierarchy of features (see the discussion of determiner inflection in German above), with quality emerging as more important than quantity.

(20) *Specificity of vocabulary items* (Lumsden 1992, Noyer 1992, Wiese 1999)
A vocabulary item V_i is more specific than a vocabulary item V_j iff there is a class of features $\mathbb{F}$ such that (i) and (ii) hold.
(i) V_i bears more features belonging to $\mathbb{F}$ than V_j does.
(ii) There is no higher-ranked class of features $\mathbb{F}'$ such that V_i and V_j have a different number of features in $\mathbb{F}'$.

---

underspecified with respect to the nominative/accusative distinction (viz., *-o*), instead of the more specific accusative/genitive marker that would otherwise be expected (viz., *-a*; see Wunderlich 2004), given that neuters and masculines essentially belong to one and the same inflection class.

It seems that in Aissen's approach, one would have to strictly separate the two classes. Such a step would however be at odds with the identical pattern (which is extended to all inflection classes and genders in the plural): Nominative and accusative are identical if the object is inanimate (see Comrie 1978 and Wiese 2004 for further discussion).

Finally (and most importantly), we adopt the following approach to impoverishment (see Grimshaw 2001, Kiparsky 2001, Trommer 2001, 2006, Wunderlich 2004, Lahne 2010, Opitz 2008):

(21) *Impoverishment*

a. Syntactic structures (inputs) are mapped onto structures (outputs) that in turn serve as the input to vocabulary insertion.
b. This mapping is subject to optimization (see Prince & Smolensky 1993/2004).
c. Markedness constraints may force feature deletion, in minimal violation of faithfulness (MAX) constraints.
d. Vocabulary insertion may face an impoverished structure.

So, post-syntactically, underspecified markers compete for insertion into abstract syntactic heads. These latter heads can be underspecified if impoverishment has applied. The one marker that actually gets inserted into the syntactic head is chosen on the basis of two conditions that form part of the Subset Principle. First, only those markers can be inserted at all whose features form a subset of the syntactic head. Hence, vocabulary insertion can never add new information to a given head. Given underspecification of inflectional markers, there is potentially more than one marker fulfilling the Subset Principle's compatibility requirement (i). Among those residual markers the choice is conditioned by the specificity requirement (ii): The most specific marker is chosen.

Impoverishment interacts with these principles in the following way. Suppose there are four markers A, B, C and D, and assume further that these exponents are specified as in (22).

(22) a. A $\leftrightarrow$ $[+\alpha, -\beta]$
b. B $\leftrightarrow$ $[+\alpha]$
c. C $\leftrightarrow$ $[\ ]$
d. D $\leftrightarrow$ $[+\beta]$

Suppose that these markers compete for insertion into a syntactic head Γ comprising the features $\{+\alpha, -\beta\}$. Then, first, the Subset Principle excludes D from the competition since its features do not constitute a subset of the head. Hence, specificity chooses among the remaining markers A, B and C. Assuming for the sake of simplicity that only set cardinality is relevant here (i.e., α and β count as equally ranked in the sense of (20)), A is most specific and consequently gets inserted into the head.

Now consider a minimally different case where, prior to marker insertion, an impoverishment rule applies to the head Γ, yielding deletion of the feature $[-\beta]$. This results in a head $\Gamma_{\{+\alpha\}}$. As before, the Subset Principle directly excludes the (incompatible) marker D, but crucially, A now does not fulfill the Subset Principle either. Thus, the Specificity condition that is part of the Subset Principle only chooses between B and C, resulting in

insertion of B. This illustrates how impoverishment influences marker insertion into a given syntactic head.

On this basis, we now turn to a number of case studies, beginning with Hindi.

4 Case Studies

4.1 *Differential Encoding of Subjects and Objects in Hindi*

The phenomenon of split ergativity in Hindi has been studied extensively (see, e.g., Mahajan 1990, Mohanan 1994, Woolford 2001, Lee 2003, Stiebels 2002, Butt & King 2004, Anand & Nevins 2006). Most of the existing approaches have in common that they view the distribution of the relevant case markers as syntactically derived. In contrast, in Keine (2007) it is argued that case assignment within syntax is uniform, but morphological impoverishment affects marker insertion depending on contextual features. Although the approach assumed a conventional concept of impoverishment rules because they were triggered by explicitly stating the relevant features specification, it can easily be modified so as to fit into the present approach. To do this, we will first give a brief overview over the data, followed by an outline of the approach in Keine (2007), with a subsequent implementation into the analysis presented here. Since the intention of this section is to illustrate the mechanisms at work, the empirical survey is far from complete; see Keine (2007) for a more comprehensive discussion.

4.1.1 The Phenomenon The three case exponents under consideration here are *-ne* (traditionally called the ergative marker), *-ko* (accusative/dative) and *-∅* (nominative). Both *-ne* and *-ko* alternate with the zero marker. Objects of transitive verbs are standardly marked by *-ko*. However, if the object is highly typical in the sense of the Hale/Silverstein hierarchy, i.e., non-specific and non-human, there is zero marking of the object. This is shown in (23) (for specificity) and (24) (for humanness/animacy).

(23) a. Nadya=ne gaṛi cɑla-yi hɛ
Nadya.F.SG=ERG car.F.SG.NOM drive-PERF.F.SG be.PRES.3SG
'Nadya has driven a car.'

b. Nadya=ne gaṛi=ko cɑla-ya hɛ
Nadya.F.SG=ERG car.F.SG=ACC drive-PERF.M.SG be.PRES.3SG
'Nadya has driven the car.'

(24) a. Ilaa-ne ek bacce-ko / *baccaa uṭ^{h}aayaa
Ila-ERG one child-ACC child.NOM lift/carry.PERF
'Ila lifted a child.'

b. Ilaa-ne ek haar / *haar-ko uṭ^{h}aayaa
Ila-ERG one necklace.NOM necklace-ACC lift-PERF
'Ila lifted a necklace.'

This distribution can be derived by assuming that syntactically all transitive objects receive one and the same case feature (ACCUSATIVE) that, by default, yields attachment of *-ko* morphologically. Accusative case is not a primitive but a feature bundle (see Jakobson 1936, Bierwisch 1967, page 7 above, and below, for the decomposition of case categories into combinations of more primitive features). For present purposes, it suffices to assume that this feature bundle consists of a primitive case feature [+gov] plus other primitive case features. The marker *-ko* and the zero marker compete for insertion; *-ko* bears the feature [+gov], whereas, -∅ is radically underspecified, in accordance with the Iconicity Meta-Principle. Both markers thus realize a subset of the target specification, but *-ko* is more specific than the zero marker. However, if the object is highly typical, bearing the features [–specific,–human], impoverishment applies, deleting the feature [+gov] on the noun. In this case, the marker *-ko* no longer satisfies the compatibility requirement of the Subset Principle; it is therefore removed from the competition. Only the radically underspecified zero marker is left, which fulfills the Subset Principle by definition; this yields zero exponence. The cornerstones of this analysis are summarized in (25):

(25) a. *Case decomposition*
ACCUSATIVE: [+gov, . . .]
b. *Vocabulary items*
/-ko/ ↔ [+gov]
/-∅/ ↔ [ ]
c. *Impoverishment rule for objects*
[+gov] → ∅ / [–specific,–human]

The distribution of the marker *-ne* is analyzed along the same lines: *-ne* only shows up on the subjects of perfective clauses. Subjects of non-perfective clauses, on the other hand, are zero marked. Woolford (2007) argues that this constitutes a case of differential subject marking, since the appearance of the ending *-ne* is a clear indication that the sentence is in the perfective aspect. On this view, overt ergative marking in Hindi ultimately is functionally motivated. Woolford calls this phenomenon *parasitic marking*. It is illustrated in (26):

(26) a. Raam-ne ravii-ko piiṭaa
Ram-ERG Ravi-ACC beat.PERF
'Ram beat Ravi.'
b. Raam ravii-ko piiṭaa hai
Ram.NOM Ravi-ACC beat.IMPERF be.PR
'Ram beats Ravi.'

As before, it can be assumed that all subjects receive ergative case syntactically, regardless of aspectual information. The ergative case is made up of a set of primitive case

features that includes the feature [+subject]. The two markers satisfying the compatibility requirement of the Subset Principle are *-ne* ([+subject]) and -∅, which is again maximally underspecified in accordance with the Iconicity Meta-Principle. If the case feature is left unchanged by morphology, *-ne* is attached. However, if impoverishment deletes the feature [+subject] only the zero marker is available; and this is what happens in the context of non-perfective clauses. This is summarized in (27):

(27) a. *Case decomposition*
ERGATIVE: [+subject]
b. *Vocabulary items*
/-ne/ ↔ [+subject]
/-∅/ ↔ [ ]
c. *Impoverishment rule for ergatives*
[+subject] → ∅ / [−PERFECT]

4.1.2 Analysis The analysis developed in Keine (2007), which was sketched in the preceding subsection, can easily be modified so as to be compatible with the assumptions adopted in the present paper. Recall that under present assumptions, impoverishment is not brought about by context-sensitive deletion rules, as in (25) and (27) above, but by interspersing a markedness constraint that forces deletion, into a subhierarchy of complex faithfulness constraints that is derived from harmonic alignment of scales.

As for the *-ko*/zero alternation, the relevant scales are those in (28):

(28) SCALES
a. *Animacy Scale*
$\text{Human} > \overbrace{\text{Animate} > \text{Inanimate}}^{\text{Non-Human}}$
b. *Definiteness Scale*
$\ldots >$ Specific $>$ Non-Specific
c. *GF Scale*
Subject $>$ Object

Harmonic alignment of the GF scale with the animacy scale yields the harmony scales in (29a); harmonic alignment with the definiteness scale derives the harmony scales in (29):

(29) *Harmony scales*
a. (i) Subj/Hum $\succ$ Subj/NHum
(ii) Obj/NHum $\succ$ Obj/Hum
b. (i) Subj/Spec $\succ$ Subj/NSpec
(ii) Obj/NSpec $\succ$ Obj/Spec

These scales are then converted to constraint alignments:

(30) *Constraint alignments*

a. (i) *Subj/NHum ≫ *Subj/Hum
   (ii) *Obj/Hum ≫ *Obj/NHum
b. (i) *Subj/NSpec ≫ *Subj/Spec
   (ii) *Obj/Spec ≫ *Obj/NSpec

Only the constraint alignments in (ii) will be relevant here. Local conjunction of the sub-hierarchies in (30a-ii) and (30b-ii) yields the rankings in (31), which can be notationally simplified (following Aissen 2003) as shown in (32):

(31) *Local conjunction*

a. *Obj/Hum & *Obj/Spec ≫ *Obj/Hum & *Obj/NSpec
b. *Obj/NHum & *Obj/Spec ≫ *Obj/NHum & *Obj/NSpec
c. *Obj/Spec & *Obj/Hum ≫ *Obj/Spec & *Obj/NHum
d. *Obj/NSpec & *Obj/Hum ≫ *Obj/NSpec & *Obj/NHum

(32) *Notational simplification of (31)*

a. *Obj/Hum/Spec ≫ *Obj/Hum/NSpec
b. *Obj/NHum/Spec ≫ *Obj/NHum/NSpec
c. *Obj/Hum/Spec ≫ *Obj/NHum/Spec
d. *Obj/Hum/NSpec ≫ *Obj/NHum/NSpec

Finally, to make these constraints relevant for case marking, they are locally conjoined with the faithfulness constraint MAX-C that penalizes deletion of case features from input to output; see (33).

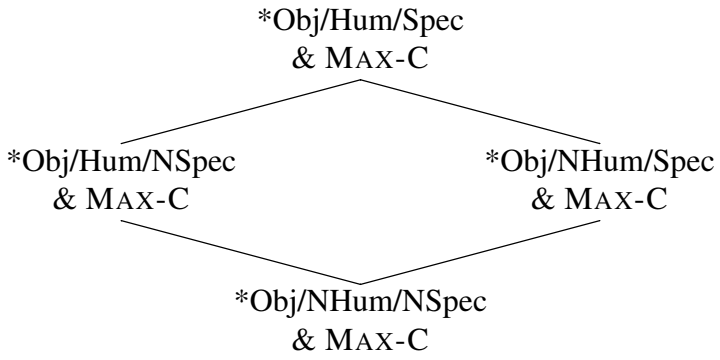
(33) *Local conjunction with* MAX-C(ASE)

a. *Obj/Hum/Spec & MAX-C ≫ *Obj/Hum/NSpec & MAX-C
b. *Obj/NHum/Spec & MAX-C ≫ *Obj/NHum/NSpec & MAX-C
c. *Obj/Hum/Spec & MAX-C ≫ *Obj/NHum/Spec & MAX-C
d. *Obj/Hum/NSpec & MAX-C ≫ *Obj/NHum/NSpec & MAX-C

The constraint **Obj/Hum/Spec & Max-C* states that case features cannot be deleted on object DPs that are [+human] and [+specific]; **Obj/Hum/NSpec & Max-C* demands a preservation of case features with [+human], [–specific] objects DPs; and so forth.

The domination relations of the constraints in (33) can be illustrated as in (34) (see Aissen 2003 for this type of graphic representation of multi-dimensional differential argument encoding):

(34) *Inherent ranking of faithfulness constraints:*



Thus, there is a fixed, invariable ranking that goes back to local conjunction for only some of the constraints in (33): While **Obj/Hum/Spec & Max-C* inherently outranks all other constraints, the relation between the constraints **Obj/Hum/NSpec & Max-C* and **Obj/NHum/Spec & Max-C* is not intrinsically specified, and can be fixed in one way or the other. **Obj/NHum/NSpec & Max-C*, in contrast, is necessarily dominated by all the other constraints in (33).

All these constraints are faithfulness constraints that prohibit deletion of input information in outputs. In order to derive changes from input to output, the markedness constraint *[+gov] is inserted into the constraint ranking established so far. This constraint penalizes a case feature [+gov] in the output. It differs from Aissen's similar constraint *STRUC$_C$ in that it does not simply penalize any case feature but only the occurrence of the case feature [+gov]. If a syntactic case feature consists of the two features [+gov,+α], the constraint only triggers deletion of [+gov], leaving [+α] intact. Consequently, it is possible that *more than one* markedness constraint exists that penalizes case features.[11]

The relevant ranking for Hindi is the one in (35). The ranking of the first three contraints is ignored here since it is irrelevant for the present analysis (but **Obj/Hum/Spec & Max-C* must of course outrank the remaining two constraints; see (34)).

(35) *Ranking for Hindi*

$$\left\{\begin{array}{l}\text{*Obj/Hum/Spec \& Max-C,}\\ \text{*Obj/Hum/NSpec \& Max-C,}\\ \text{*Obj/NHum/Spec \& Max-C}\end{array}\right\} \gg \text{*[+gov]} \gg \text{*Obj/NHum/NSpec \& Max-C}$$

[11] As far as the case currently under consideration is concerned, a second constraint *[+α] could be inserted into the ranking independently of *[+gov]. This would yield *gradual impoverishment*: A highly atypical object DP might maintain all of its case features; for less marked ones, parts of their syntactic case features are deleted, whereas all case features of canonical objects are deleted. Such considerations are irrelevant for Hindi, but their usefulness will be demonstrated for Trumai in § 4.3 and Finnish in § 4.5 below.

This ranking triggers the deletion of [+gov] in exactly the same contexts that the stipulative impoverishment rule (25c) did: *[+gov] forces deletion of the case feature [+gov] in all those contexts where the corresponding faithfulness constraint is ranked lower. Given the ranking in (35), *[+gov] only outranks **Obj/NHum/NSpec & Max-C*. Therefore, impoverishment applies only to highly canonical objects, viz., those that are [–human] and [–specific]. In all other cases, the higher ranked faithfulness constraints prevent case feature deletion.

Let us go through one case in detail. Consider again the sentences in (23), which are repeated here in (36) (with zero marking in (36a) now glossed as accusative rather than nominative, in line with the analysis adopted here).

(36) a. Nadya=ne gaṛi-Ø cɑla-yi hɛ
Nadya.F.SG=ERG car.F.SG-ACC drive-PERF.F.SG be.PRES.3SG
'Nadya has driven a car.'

b. Nadya=ne gaṛi=ko cɑla-ya hɛ
Nadya.F.SG=ERG car.F.SG=ACC drive-PERF.M.SG be.PRES.3SG
'Nadya has driven the car.'

By assumption, the structure generated by syntactic operations is used as the input for the mapping from syntax to morphology. Possible outputs (which in turn function as inputs to morphological realization) may either leave the feature specifications of the input unchanged, or they may carry out various kinds of deletion operations; deletion violates faithfulness constraints but may lead to a better constraint profile with respect to markedness constraints.[12] As shown in (37), deletion of [+gov] is optimal if the conflicting active faithfulness constraint is lower-ranked, but suboptimal (hence, blocked) if it is higher-ranked.

(37) a. *Tableau for (36a)*

INPUT: [obj, –hum, –spec][+gov]	*o/+h/+s & MAX-C	*o/+h/–s & MAX-C	*o/–h/+s & MAX-C	*[+gov]	*o/–h/–s & MAX-C
☞ [obj,–hum,–spec]					*
[obj,–hum,–spec][+gov]				*!	

[12] The type of optimality-theoretic model adopted here also has to envisage the possibility of unfaithful feature *insertion* operations in outputs. This issue is irrelevant for the present discussion, but it certainly is an option in general. See Müller (2007a) for discussion, and for arguments that there is reason to adopt an operation that is complementary to impoverishment even in standard (rule-based) approaches to impoverishment.

b. *Tableau for (36b)*

INPUT: [obj, –hum, +spec][+gov]	*o/+h/+s & MAX-C	*o/+h/–s & MAX-C	*o/–h/+s & MAX-C	*[+gov]	*o/–h/–s & MAX-C
[obj,–hum,+spec]			*!		
☞ [obj,–hum,+spec][+gov]				*	

The outputs of the syntax-morphology mapping are then used as the inputs for morphological realization. Here, marker insertion takes place exactly as assumed in standard Distributed Morphology approaches, governed by the Subset Principle.[13] The relevant vocabulary items (accusative allomorphs) are repeated in (38).

(38) *Vocabulary items for accusative contexts*
/-ko/ ↔ [+gov]
/-∅/ ↔ [ ]

In the output of (37a) the case feature is deleted. Hence, only -∅ fulfills the Subset Principle, which results in zero marking. The optimal output of (37b), on the other hand, retains its case feature so that both *-ko* and the zero marker satisfy the compatibility requirement of the Subset Principle. This gives rise to the insertion of the more specific marker *-ko*. More generally, the zero marker can only be attached if impoverishment has applied, which in turn is only active for canonical objects ([–hum,–spec]). Consequently, the overt exponent only shows up on atypical objects, and this produces the effect of differential object marking.[14]

[13] Of course, the actual realization (or insertion) of exponents could also be handled by an optimization procedure that incorporates the compatibility and specificity requirements of the Subset Principle as separate constraints; see, e.g., Wunderlich (2004). However, we believe that there are two reasons for not adopting such an approach. First, the compatibility and specificity requirements embodied in the Subset Principle do not seem to be violable; accordingly, they always have to be assumed to be undominated in constraint rankings. In our view, this can be taken to suggest that these requirements are very different from constraints of the type in (37), and should therefore best be kept apart. Second, the two types of constraints concern different kinds of operations (optimization of abstract feature structures on the one hand, and insertion of concrete morphological exponents on the other), which again would seem to suggest a different formal treatment.

[14] Upon closer scrutiny, this turns out to be an oversimplification. There are some verbs whose object is zero marked regardless of its definiteness/humanness properties. This class contains verbs such as *banaa* 'make', *pad*^{h} 'read', *gaa* 'sing', and *pii* 'drink'. One example is given in (i).

(i) ilaa-ne yah k^{h}at / *is k^{h}at-ko lik^{h}aa
Ila-ERG this.NOM letter.NOM this.NONNOM letter-ACC write.PERF
'Ila wrote this letter.' (Mohanan 1994, 81)

In (i), the object *yah k^{h}at* 'this letter' may not bear *-ko* despite being definite. The simplest way to account for this class of verbs is to assume that they assign a distinct syntactic case, say, objective. Due to its case subfeatures the objective only and always receives default case exponence, i.e. -∅. There is thus no impoverishment active here.

This analysis differs from the one in Keine (2007) in one respect: It does not explicitly state the context of the impoverishment rule but derives its application from the interaction of markedness and faithfulness constraints, the ordering among which is not arbitrary but conditioned by Hale/Silverstein hierarchies. As a consequence, the present approach is more restrictive. If the contextual features are simply listed as part of an impoverishment rule, there are no constraints on what kind of objects can trigger impoverishment. It would, in principle, be possible to impoverish in the case of highly typical and highly untypical objects and only in those cases. Take (34) as an example: If the impoverishment rule were to apply in exactly the topmost and lowermost kinds of objects, those two would be zero marked while the ones in between woul be marked with *-ko*. This would run counter to the well-established functional motivation of differential argument encoding. If, by contrast, impoverishment results from constraint ranking, such a problem does not emerge. No matter where *[+gov] is inserted into the ranking of faithfulness constraints in (34), there never can be a scenario with case feature deletion for only the topmost and the lowermost configuration. If *[+gov] dominates the topmost constraint it must dominate the constraints in the middle as well, resulting in zero marking for all kinds of objects. On the other hand, if it does not dominate the constraints in the middle, it does not dominate the topmost constraint either, yielding overt marking for all those cases.[15]

So far, we have introduced our morphology-based approach to differential argument encoding on the basis of data from Hindi. However, since both instances of differential marking in Hindi involve zero/non-zero alternations, this does not yet constitute an empirical argument in favour of the present approach, and against the view taken by Aissen. The present approach differs from Aissen's in that it allows for alternations between two overt markers as well. This state of affairs would arise for Hindi if, in addition to the zero marker and *-ko*, there were a third marker that would also fulfill the Subset Principle for the impoverished feature specification but would be more specific than the zero marker; but there isn't. In the following subsections, we argue that the situation may be slightly different in other languages.

4.2 *Differential Encoding of Objects in Mannheim German*

4.2.1 The Phenomenon In all varieties of German, feminine, neuter and plural DPs are morphologically indistinguishable in nominative and accusative environments. In the variety of German spoken in and around Mannheim (and elsewhere in Palatine and Rhine areas), the same holds for non-pronominal masculine DPs (the so-called "Rheinischer Akkusativ"; see Behaghel 1911, Karch 1975, Müller 2003, and literature cited there). Crucially, this pattern is not extended to pronouns – masculine personal pronouns

[15] One point that we would like to note only in passing here is that differential object marking in Hindi (amongst other languages) interacts with verbal agreement. Scale-driven impoverishment of case features must hence likewise affect agreement. An account along the lines sketched here and incorporating questions of agreement may be found in Keine (2010).

are marked differently in nominative and accusative contexts. Thus, Hale/Silverstein scales seem to be at work: Pronouns outrank nouns on the definiteness scale (see (1f)). This suggests a unified approach; but a unified approach is not available if the theory of differential argument encoding is limited to differences between zero and non-zero encoding. The reason is that the nominative forms of German determiner inflection are not strictly zero-marked.

For concreteness, consider the examples in (39), which exhibit case marking of non-pronominal masculine objects in Mannheim German.[16]

(39) a. Ich wünsch Ihnen [$_{DP}$ ein-∅ schön-er Tag] noch
I wish you.DAT a-NOM nice-NOM day PRT

b. Wir haben [$_{DP}$ pädagogisch-er Planungstag]
we have pedagogical-NOM planning day

c. Ich hab auch [$_{DP}$ ein-∅ schön-er Ball], meinst du, bloß du hast [$_{DP}$ ein-er] ?
I have also a-NOM nice-NOM ball, think you, just you have a-NOM

d. Man müsste mal wieder so richtig [$_{DP}$ einer] drauf machen
one should PRT again PRT really one-NOM on it make
'We should really have a night on the town again.'

e. Hol mir mal [$_{DP}$ der Eimer]
fetch me PRT the-NOM bucket

In all these cases, the accusative form of the masculine object DP is indistinguishable from the corresponding nominative form. Still, this does not mean that there is no nominative/accusative distinction left in Mannheim German: Masculine personal pronouns in (structually governed) object positions are marked by the accusative exponent *-n*, and cannot be marked by the nominative exponent *-r*. Compare the case marking on the pronoun in (40) with the case marking on the minimally different non-pronominal DP in (39e).

(40) Hol en/*er mir mal her
fetch he-ACC/*he-NOM me-DAT PRT PRT

It would be highly implausible to assume that in two completely identical contexts, structural accusative case is assigned to pronominal objects whereas structural nominative case is assigned to non-prononominal objects. Therefore, we may conclude that the

[16] Case marking in German DPs is located mainly on determiners, to some extent on pre-nominal adjectives, and much less so on the nouns themselves. Note also that the glossing as 'NOM' is just for expository convenience; the assumption that the exponents are NOM markers will actually be abandoned below.

DP-internal case/number/gender markers in (39) are exponents that realize a syntactic accusative specification, just like their counterpart in (40) does. We develop such an analysis in the following subsection.

4.2.2 Analysis Recall Wiese (1999)'s underspecification analysis of determiner inflection in Standard German summarized in subsection 2.3 above.[17] Case and gender/number are subanalysed in the following way:

(41)

Case	*Gender/Number*
NOM: [–obl,–gov]	MASC: [+masc,–fem]
ACC: [–obl,+gov]	FEM: [–masc,+fem]
DAT: [+obl,+gov]	NEUT: [+masc,+fem]
GEN: [+obl,–gov]	PL: [–masc,–fem]

The vocabulary items postulated by Wiese are repeated in (42), with the ones that are most relevant in the context of the present discussion rendered in boldface. At least for present purposes, we can assume that this inventory is identical in Standard and Mannheim German (there are minor phonological differences that we can ignore here).

(42) *Vocabulary items for determiner inflection in German*

a.	(i)	/m/ ↔ [+masc,+obl,+gov]	(DAT.MASC.SG./NEUT.SG.)
	(ii)	/s/ ↔ [+masc,+obl]	(GEN.MASC.SG./NEUT.SG.)
	(iii)	/s/ ↔ [+masc,+fem]	(NOM./ACC.NEUT.SG.)
b.	(i)	**/n/ ↔ [+masc,+gov]**	**(**ACC.MASC.SG.**)**
	(ii)	**/r/ ↔ [+masc]**	**(**NOM.MASC.SG.**)**
	(iii)	/r/ ↔ [+obl,+fem]	(DAT./GEN.FEM.SG.)
	(iv)	/n/ ↔ [+obl,+gov]	(DAT.PL.)
	(v)	/r/ ↔ [+obl]	(GEN.PL.)
c.	(i)	/e/ ↔ [ ]	(NOM./ACC.FEM.SG./PL.)

It is clear that that /n/ qualifies as more specific than /r/, under any definition of specificity. The relevant scales for the case of differential argument encoding in Mannheim German are the ones in (43).

(43) a. *GF scale* (basic)
Subject > Object

b. *Definiteness scale*
Pro(noun) > Name (PN) > Def(inite) > Indefinite Specific (Spec) > Non-Specific (NSpec)

[17] See Bierwisch (1967), Blevins (1995), Wunderlich (1997a), and Trommer (2005) for alternative suggestions, most of which could just as well be adopted for present purposes.

Harmonic alignment applied to these scales yields the constraint ranking in (44).

(44) *Constraint alignment*
*Obj/Pro ≫ *Obj/PN ≫ *Obj/Def ≫ *Obj/Spec ≫ *Obj/NSpec

Finally, order-preserving local conjunction of these constraints with the constraint MAX-CASE (corresponding to Aissen's $*\emptyset_C$) that penalizes deletion of case features results in the ranking of faithfulness constraints in (45).

(45) *Local conjunction with* MAX-CASE
*Obj/Pro & Max-C ≫ *Obj/PN & Max-C ≫ *Obj/Def & Max-C ≫ *Obj/Spec & Max-C ≫ *Obj/NSpec & Max-C

**Obj/Pro & Max-C* is violated if a case feature of a VP-internal pronoun is deleted post-syntactically (i.e., before morphological realization); **Obj/PN & Max-C* is violated if a case feature of a VP-internal proper name DP is deleted post-syntactically; and so on.

The conflicting markedness constraint that prohibits a case feature from appearing in the output and hence triggers impoverishment of this case feature is (46). It constitutes a special case of Aissen's general $*\text{STRUC}_C$ constraint since it does not penalize *any* case feature in the output but only one special feature.

(46) *Markedness constraint triggering impoverishment*
*[+gov]

To derive the deletion of the case feature [+gov] everywhere except with pronouns in Mannheim German (i.e., to ensure a neutralization of nominative/accusative distinctions in all non-pronominal contexts), *[+gov] must be ranked in (45) just below the faithfulness constraint for object pronouns, but higher than the other faithfulness constraints:

(47) *Ranking in Mannheim German*

$$*\text{Obj/Pro \& MAX-C} \gg *[+\text{gov}] \gg \left\{ \begin{array}{l} *\text{Obj/PN \& MAX-C} \\ *\text{Obj/Def \& MAX-C} \\ *\text{Obj/Spec \& MAX-C} \\ *\text{Obj/NSpec \& MAX-C} \end{array} \right\}$$

This ranking yields the result that [+gov] is maintained with object pronouns, and accordingly leads to a different realization of the pronoun in accusative and nominative contexts.[18] With all other (structurally case marked) objects, [+gov] is deleted due to the

[18] This reasoning presupposes that personal pronouns follow essentially the same system of inflection as determiners. We would indeed like to contend that the inflectional exponents for personal pronouns are to a large extent those listed in (42). It is certainly not an accident that *e-r* (MASC.NOM.SG pronoun) parallels *dies-er* (MASC.NOM.SG inflected determiner); *ih-n* or its Mannheim German variant *e-n* (MASC.ACC.SG pronoun) parallels *dies-en* (MASC.ACC.SG inflected determiner); *ihn-en* (DAT.PL pronoun) parallels *dies-en*

constraint *[+gov], which is ranked higher than the relevant faithfulness constraints that penalize deletion. Here, /n/ cannot be inserted anymore, and the more general marker /r/ must be chosen.[19] On this view, Standard German differs from Mannheim German (with respect to the syntax-morphology mapping in the nominal domain) only in that *[+gov] is ranked lower than all the faithfulness constraints in (47).

4.3 *Differential Object Marking in Trumai*

The line of argumentation for Trumai is identical to Mannheim German above, but the empirical evidence is more intricate in an interesting way: The alternation involves three overt exponents and one zero exponent. This confirms a prediction of the present analysis: In contrast to what is the case under the approach developed by Aissen (1999, 2003), the present approach does not envisage a single *STRUC-CASE constraint that penalizes *any* case feature in the output. Instead, there are more specific markedness constraints against certain case features (*[+gov] in Hindi and Mannheim German). Since these markedness constraints can be freely interspersed with the faithfulness constraints, it should be possible for objects that are slightly (i.e., not maximally) atypical to get one (decomposed, primitive) case feature deleted, which results in the choice of a less specific marker than would otherwise be expected (i.e., as it shows up with fully atypical objects). A second markedness constraint can now be ranked between the faithfulness constraints for slightly atypical and typical objects. This leads to deletion of a second decomposed case feature with typical objects. This results in a yet more impoverished head; consequently, an even less specific exponent is inserted in this context. In this case, a threefold division arises. Since there is no inherent boundary for this mechanism, more than three distinctions should also be possible. In this section, we will discuss differential object marking in Trumai, which involves three overt markers, differentiated along the lines just sketched.

Trumai, a language isolate spoken in central Brazil by 51 speakers, has three dative markers *-(V)tl*, *-ki*, and *-(V)s* (Guirardello 1999). The choice among them is conditioned by the factors *individuation* and *prominence*, as shown in (48). Some examples are provided in (49)–(51)

(DAT.PL inflected determiner); etc. Approaches that subanalyze personal pronoun forms into combinations of stem and inflectional exponent (including suppletion phenomena) along the lines of (42) are developed in Wiese (2001) and Fischer (2006).

[19] One might ask why the ranking in (47) does not lead to deletion of [+gov] in dative contexts. It obviously does not because masculine/neuter /m/ is not replaced with less specific /s/ with non-pronominal DPs, and plural /n/ is not replaced with /r/ either: **Ich danke dieses Mann, *Ich danke dieser Männer.* One possible answer is that "Obj" means Comp(V) (see above), but dative arguments show up as Spec(V). The **Spec(V)/X & Max-C* constraints are all ranked higher than *[+gov].

(48) Distribution of dative markers in Trumai (Guirardello 1999, 280)

-(V)tl	>	*-ki*	>	*-(V)s*
• individuated • identifiable • prominent		• individuated but not identifiable • individuated but not prominent • non individuated, identifiable		• not individuated, not identifiable • not individuated not prominent

(49) a. ha hu'tsa chï_in kasoro-tl
I see Foc/Tens dog-DAT
'I saw the dog (I know it).'
b. ha hu'tsa chï_in kasoro yi-ki
I see Foc/Tens dog YI-DAT
'I saw a dog/the dog (I do not know it well).'
c. ha hu'tsa chï_in kasoro-s
I see Foc/Tens dog-DAT
'I saw dogs.' (Guirardello 1999, 276)

(50) a. hi fa-tke-a hai-tl?
I kill/hit-DES-QUEST 1-DAT
'Do you want to kill me?' (ibid, 271)
b. ha fa fa chï_in ine-tl[20]
I kill/hit kill/hit FOC/TENS 3-DAT
'I beat him (someone that I know well).'
c. ha fa fa chï_in ine yi-ki
I kill/hit kill/hit FOC/TENS 3 YI-DAT
'I beat him (somebody that I do not know; he is a stranger).' (ibid, 272)

(51) a. ha sone-tke misu-ki
I drink-DES water-DAT
'I want to drink water (a little/a glass).'
b. ha sone-tke misu-s
I drink-DES water-DAT
'I want to drink some water.' (ibid, 277)

The distribution of the three markers in terms of markedness scales corresponds to their phonological markedness: *-(V)tl* is most marked both for distribution and phono-

[20] The verb *fa* can mean both 'hit' and 'kill'. Duplication of the verb disambiguates it to the former meaning. Duplication, however, is not obligatory, even if the meaning 'hit' is intended (Guirardello 1999, 272 fn. 8).

logical complexity, followed by *-ki*; *-(V)s* is the least marked among the three. This correspondence can be straightforwardly derived within the present system as follows.

Assume the scales in (52). Harmonic alignment, conversion into a constraint ranking and local conjunction with the constraint MAX-CASE leads to the ranking in (53).

(52) a. *Individuation scale*
Ind(ividuated) > Non-ind(ividuated)
b. *Prominence scale*
X > x
(discourse-prominent argument > non-discourse prominent argument)
c. *GF scale*
Subject > Object

(53) *Ranking of faithfulness constraints*
a. *Obj/Ind/X & MAX-C ≫ *Obj/Ind/x & MAX-C
b. *Obj/Non-ind/X & MAX-C ≫ *Obj/Non-ind/x & MAX-C

Analysing the dative as consisting of the subfeatures in (54), the three dative markers can be considered as being specified as in (55). Note that all three markers conform to iconicity.

(54) DATIVE: [+obl, –subj, +gov]

(55) *Vocabulary items*
/-(V)tl/ ↔ [+obl, –subj, +gov]
/-ki/ ↔ [–subj, +gov]
/-(V)s/ ↔ [–subj]

Since markedness constraints are only sensitive to the presence of a certain case subfeature, two such constraints can be inserted into different positions within the ranking. This yields the three-way alternation of the dative. Here we assume the constraints *[+obl] and *[+gov]. Consider the ranking in (56).

(56) *Ranking for Trumai*
*Obj/Ind/X & MAX-C ≫ *[+obl]
$$\gg \left\{ \begin{array}{l} \text{*Obj/Ind/x \& MAX-C,} \\ \text{*Obj/Non-ind/X \& MAX-C} \end{array} \right\} \gg \text{*[+gov]}$$
≫ *Obj/Non-ind/x & MAX-C

This ranking has the effect that highly marked objects are not impoverished at all. For more canonical objects, [+obl] is deleted, but only highly canonical objects additionally have their [+gov] deleted. Due to iconicity, every impoverishment step is associated with insertion of a phonologically less marked exponent. This yields the pattern in (49) and

(50): Prominent and individuated objects bear *-(V)tl*, less marked objects are marked with *-ki*, and non-prominent, non-individuated objects—the least marked object type—bear *-(V)s*.

In contrast, Aissen's approach is not appropriate for an analysis of the Trumai data as it does not involve a zero/non-zero alternation. That the principles at work here are the same as in the cases considered by her but cannot nonetheless resist a unified treatment. The present approach, on the other hand, derives these alternations along the same lines and therefore captures their striking similarity.

4.4 *Differential Object Marking in Cavineña*

Another system that exhibits an overt/overt alternation is Cavineña, a Tacanan language spoken in Bolivia by less than 1,200 speakers (Guillaume 2008). There are two overt dative/genitive markers: *-kwe* and *-ja*. Their choice is conditioned by person and number of the stem: Highly non-canonical objects—local person and singular—bear *-kwe*. All other combinations select *-ja*. This distribution correlates with the phonological complexity of the two markers: *-kwe* is more marked phonologically than *-ja*. Hierarchical markedness thus corresponds to morphological markedness. This instantiates a more/less alternation in differential object marking. The distribution of the two markers is given in (57), along with some examples in (58).[21]

(57) Marker distribution

PERSON	SINGULAR	DUAL	PLURAL
1	e-∅-*kwe*	ya-tse-*ja*	e-kwana-*ja*
2	mi-∅-*kwe*	me-tse-*ja*	mi-kwana-*ja*
3	tu-∅-*ja*	ta-tse-*ja*	tu-na-*ja*
3PROX	riya-∅-*ja*	re-tse-*ja*	re-na-*ja*

(58) a. E-kwe ani-kware [maletero ari-da$_{CC}$=ke$_{RC}$]$_S$
1SG-DAT sit-REM.PAST bag big-ASF=LIG
'I had a big bag (lit. a big bag sat to me).' (Guillaume 2008, 567)

b. Sergio=ja ani-ya [ata Ramón bakani]$_S$
Sergio=DAT sit-IMPFV relative Ramsón name
'Sergio had a relative called Ramón (lit. a relative called Ramón was sitting to Sergio).' (ibid, 603)

[21] The following abbreviations are used in the glosses: ASF: adjective suffix; CC: copula complement; FM: formative; LIG: ligature; O: transitive object; RC: relative clause; S: intransitive subject; TEMP: temporarily.

c. Tume =tuna-ja =tu-ke =$\emptyset_A$ be-ti-wa budari$_O$
then =3PL-DAT =3SG-FM (=1SG.ERG) bring-GO.TEMP-PERF banana
'I will go and bring bananas for them.' (ibid, 575)

Since the distribution of these two markers depends on person and number, the person and number scale, along with the GF scale, are relevant for Cavineña.

(59) a. *Person scale*
Loc(al) (1/2) > N(on)loc(al)
b. *Number scale*
Sg > Non-sg
c. *GF scale*
Subj > Obj

Harmonic alignment, conversion into a constraint ranking and subsequent conjunction with MAX-CASE leads to the ranking of faithfulness constraints in (60).

(60) a. *Obj/Loc/Sg & MAX-C ≫ *Obj/Loc/Non-sg & MAX-C
b. *Obj/Nloc/Sg & MAX-C ≫ *Obj/Nloc/Non-sg & MAX-C

We assume that the dative comprises the subfeatures in (61). The markers *-kwe* and *-ja* are analysed as in (62), obeying iconicity.

(61) DATIVE: [+obl, +obj]

(62) *Marker specification*
/-kwe/ ↔ [+obl, +obj]
/-ja/ ↔ [+obj]

The markedness constraint *[+obl] is then inserted into the ranking of faithfulness constraints, cf. (63). This ranking leads to deletion of [+obl] for all except highly marked objects (local person, singular) because only the for this type of object does the faithfulness constraint outrank the markedness constraint. Given the markers as specified in (62), deletion of [+obl] bleeds insertion of *-kwe* and thus leads to a retreat to the more general marker *-ja*.

(63) *Ranking for Cavineña*

$$\text{*Obj/Loc/Sg \& MAX-C} \gg \text{*[+obl]} \gg \left\{ \begin{array}{l} \text{*Obj/Loc/Non-sg \& MAX-C} \\ \text{*Obj/Nloc/Sg \& MAX-C} \\ \text{*Obj/Nloc/Non-sg \& MAX-C} \end{array} \right\}$$

Notably, apart from being more restrictive, the constraint ranking in (63) has another advantage over an explicit impoverishment rule with the same effect: Impoverishment applies if the object is non-local *or* non-singular. As these contexts arguably do not form

a natural class, the impoverishment rule at hand would have to involve a disjunction, as exemplified by (64).

(64) *System with explicit impoverishment rules*
[+obl] → ∅ / _[3 ∨ −SG]

If, on the other hand, the context in which impoverishment takes place is derived by harmonic alignment of scales as in the present approach, the case feature is deleted in all environments that are dominated by the markedness constraint *[+obl]. (63) shows that this comprises exactly the domain of objects that are non-singular *or* non-local. What these contexts have in common, then, is that they form a homogenuous section of a constraint ranking: They are less marked than a certain cut-off point established by the insertion of the markedness constraint *[+obl]. The approach developed here is therefore superior on conceptual grounds.

The Cavineña data clearly conform to what is expected from the point of view of Hale/Silverstein hierarchies—more marking for unexpected objects. These data are nevertheless surprising if scales can only lead to a total reduction in morphological marking.

4.5 *Differential Encoding of Objects in Finnish*

The last system that we will discuss is object marking in Finnish. Recall that in the present proposal markedness constraints against case features do not simply penalize the presence of just any case feature. Instead, they are relativized to certain subfeatures. Consequently, several markedness constraints can be inserted into distinct positions, thereby outranking a different set of faithfulness constraints. Impoverishment then proceeds in several steps, giving rise to alternations between more than two markers. Object marking in Trumai instantiates such a system and thus provides further evidence for the present proposal. A second example of gradual impoverishment is provided by Finnish differential object marking, which comprises four markers.

4.5.1 The Phenomenon Finnish objects can be structurally case-marked by four different exponents, only one of which is zero: /t/, /n/, /a/ and /∅/. The principles that determine the choice of the correct exponents are exactly the ones that Aissen argues to underlie zero/non-zero alternations in differential argument encoding. This strongly suggests a unified approach; but a unified approach is not available if the theory of differential argument encoding is confined to differences between zero and non-zero encoding. We

conclude from this that differential case marking of objects in Finnish is best treated as a morphological phenomenon.[22]

Variation in the case marking of objects in Finnish is illustrated by the examples in (65) (see Kiparsky 2001).

(65) a. Tuo-n he-t
bring-1.SG he-ACC
'I'll bring him.'

b. Tuo-n karhu-n
bring-1.SG bear-GEN
'I'll bring the/a bear.'

c. Tuo-Ø karhu-∅
bring-IMP bear-NOM
'Bring the/a bear!'

d. Etsi-n karhu-a
seek-1.SG bear-PART
'I'm looking for the/a bear.'

Traditionally, it is assumed that the structural case markers for singular contexts in Finnish are those in (66).

(66) *Structural case markers (singular)* (traditional grammar)

	NOUNS: 'bear'	PRONOUNS: 'you'
NOM	/∅/	/Ø/
ACC	/∅/, /n/	/t/
GEN	/n/	/n/
PART	/a/	/a/

Based on the observation that the accusative form of nouns corresponds to either the nominative form or the genitive form in (66), Kiparsky (2001) argues for a re-interpretation of this system. On his view, there is no genuine accusative form for nouns; see (67).

(67) *Structural case markers (singular)* (Kiparsky's 2001 reconstruction)

	NOUNS: 'bears'	PRONOUNS: 'you'
NOM	/∅/	/∅/
ACC	–	/t/
GEN	/n/	/n/
PART	/a/	/a/

Assuming for the time being the correctness of (67), the following five generalizations hold.

[22] To some extent, suggestions along these lines can already be found in Kiparsky (1998, 2001) and Wunderlich (2000), and what follows owes a lot to these works. However, the analysis below is much more radical in its treatment of objective case, and also fairly different in several other respects.

(68) *Empirical generalizations* (Kiparsky 2001)

(i) Objects of predicates that give rise to an *unbounded* (atelic) interpretation always take the partitive exponent.

(ii) Objects of predicates that give rise to a *bounded* (telic) (resultative, or quasi-resultative) interpretation take the partitive marker if they have a "quantitatively indeterminate denotation.'

(iii) Otherwise, objects of the latter predicates take the accusative marker if they are personal pronouns;

(iv) and they take the genitive marker if they are non-pronominal, and c-commanded by an overt subject.

(v) In all other cases, a structurally case-marked object DP takes the nominative marker.

Thus, we have a system where pronouns are marked differently from other DPs, and where non-specific DPs are marked differently from other DPs. In an Aissen-type approach, this strongly suggests harmonic alignment of the grammatical function scale with the definiteness scale as the underlying principle at work here.

4.5.2 Analysis We claim that there is in fact only one kind of object case in all the examples in (65), viz., accusative.[23] Under this assumption, marker variation can be

[23] Needless to say, this makes a number of non-trivial predictions that will ultimately have to be explored further. To name just one consequence of the present, morphology-based approach to variation in object encoding in Finnish: If all object exponents in (65) are instantiations of one and the same syntactic case (accusative) – particularly, if what is called 'accusative' and what is called 'partitive' in (66) and (67) can emerge as a single case –, we do not expect syntactic operations to be sensitive of the morphological differences. Passiviziation is a case in point: Standardly, it is postulated that if two object cases behave differently with respect to absorption in the passive, they cannot be identical. There is some disagreement in the literature as to whether Finnish has a true passive construction in the first place (see Blevins 2003 vs. Manninen & Nelson 2004). Assuming that it does, it can be noted that 'partitive' markers (in the sense of (66), (67)) are maintained on objects in passive constructions (see (i-c), with an epenthetic *t* accompanying the partitive exponent), whereas 'accusative' markers typically disappear (see (i-a)). However, there is an interesting exception: Pronouns that are [+human] retain the accusative marker in the passive (see (i-b)).

(i) a. Jussi-∅ murha-ttiin
Jussi-NOM murder-PASS.PAST
'Jussi was murdered.'

b. He-t murha-ttiin
(s)he-ACC murder-PASS.PAST
'(S)he was murdered.'

c. Etanoi-(t)a tape-ttin
slugs-PART kill-PASS.PAST
'Some slugs were killed.'

Thus, if we were to conclude that the difference with respect to absorption implies that the object case assigned to the active counterpart of (i-c) is syntactically different from the object case assigned to the

derived as a morphological phenomenon resulting from impoverishment. Thus, suppose that structural cases in Finnish can be decomposed as in (69).[24]

(69) *Structural cases in Finnish*

a. NOM: [–gov,–obl,+subj]
b. GEN: [+gov,+obl,+subj]
c. ACC: [+gov,–obl,–subj]

Relevant scales are the basic (binary) GF scale and the definiteness scale; see (70a,b) (= (43)). In addition, we will invoke a boundedness scale, as in (70c); recall from (68) that interpretational differences along this dimension (i.e., bounded vs. unbounded) give rise to different marker choices.

(70) a. *GF scale* (basic)
Subject > object
b. *Definiteness scale*
Pro(noun) > Name (PN) > Def(inite) > Indefinite Specific (Spec) > Non-Specific (NSpec)
c. *Boundedness scale*
Bounded > unbounded (Bd > NBd)

By harmonic alignment, the constraint hierarchies in (71a) (for the definiteness scale) and (71b) (for the boundedness scale) are derived.

(71) *Constraint alignments*

a. *Obj/Pro ≫ *Obj/PN ≫ *Obj/Def ≫ *Obj/Spec ≫ *Obj/NSpec
b. *Obj/Bd ≫ *Obj/NBd

---

active counterpart of (i-a), the same reasoning would lead us to conclude that the object case assigned to the active counterpart of (i-b) is syntactically different from the object case assigned to the active counterpart of (i-a) – i.e., that human pronouns receive a different syntactic object case from non-pronominal DPs. This seems highly unlikely (and it would not be compatible with the labelling in (66), (67) either). We cannot offer a comprehensive analysis of case absorption in Finnish passive (or passive-like) constructions here. Suffice it to point out that the three groups of objects which are distinguished by this operation lend themselves to a description in terms of scales of the type investigated in this article, and that it might therefore eventually prove best to view case absorption in passive constructions as a morphological phenomenon (see Anderson 1992 for relevant discussion).

[24] See Bierwisch (1967), Levin (1986), Alsina (1996), and Wiese (1999) for the primitive case features adopted here. The non-structural cases of Finnish can be assumed to be composed of primitive features encoding semantic concepts in addition to features of the type adopted here; but non-structural cases are of no importance in the present context. Note also that the classification of the Finnish genitive as [+subj] is motivated by its function as a DP-internal marker of possession, a subject-like property. Alternatively, the genitive could be taken to be defined by [–subj]. This would not radically change things; on the contrary, it would make it possible to invoke an arguably somewhat simpler concept of specificity. See below.

As seen before for Hindi, local conjuction then applies to the members of the two constraint hierarchies in (71), preserving order; see (72). This makes it possible to express the generalization that differential argument encoding in Finnish is two-dimensional (it involves degrees both of definiteness and of boundedness).

(72) *Local conjunction*

a. *Obj/Pro & *Obj/Bd ≫ *Obj/PN & *Obj/Bd ≫ *Obj/Def & *Obj/Bd ≫ *Obj/Spec & *Obj/Bd ≫ *Obj/NSpec & *Obj/Bd

b. *Obj/Pro & *Obj/NBd ≫ *Obj/PN & *Obj/NBd ≫ *Obj/Def & *Obj/NBd ≫ *Obj/Spec & *Obj/NBd ≫ *Obj/NSpec & *Obj/NBd

Again, a notational simplification can be carried out; compare (73) with (72).

(73) *Notational variant (simplification)*

a. *Obj/Pro/Bd ≫ *Obj/PN/Bd ≫ *Obj/Def/Bd ≫ *Obj/Spec/Bd ≫ *Obj/NSpec/Bd

b. *Obj/Pro/NBd ≫ *Obj/PN/NBd ≫ *Obj/Def/NBd ≫ *Obj/Spec/NBd ≫ *Obj/NSpec/NBd

Finally, the faithfulness constraint MAX-CASE (formerly $*\emptyset_C$) is locally conjoined with each of the constraints in (73a) and (73b), preserving the original order of constraints.

(74) *Order-preserving local conjunction with* MAX-CASE:

a. *Obj/Pro/Bd & Max-C ≫ *Obj/PN/Bd & Max-C ≫ *Obj/Def/Bd & Max-C ≫ *Obj/Spec/Bd & Max-C ≫ *Obj/NSpec/Bd & Max-C

b. *Obj/Pro/NBd & Max-C ≫ *Obj/PN/NBd & Max-C ≫ *Obj/Def/NBd & Max-C ≫ *Obj/Spec/NBd & Max-C ≫ *Obj/NSpec/NBd & Max-C

Thus, we arrive at invariant hierarchies of faithfulness constraints that penalize the deletion of case features depending on definiteness and boundedness features of the DP. For instance, **Obj/Pro/Bd & Max-C* is violated if a case feature of a VP-internal pronoun in a clause with a bounded interpretation of the predicate is deleted post-syntactically (before morphological realization). As a consequence of order-preserving local conjunction, this constraint must outrank all the other constraints in (74). Similarly, **Obj/NSpec/NBd & Max-C* is violated if a case feature of a VP-internal indefinite non-specific DP in a clause with an unbounded interpretation of the predicate is deleted post-syntactically (before morphological realization). This constraint is necessarily lowest-ranked (among the constraints in (74)). It will prove important to assume that constraints of this type are *gradient*; i.e., multiple violations add up, and a candidate α that differs from another candidate β only in that it incurs fewer violations of such a complex faithfulness constraint always has a better constraint profile.

In addition to the hierarchies of faithfulness constraints in (74a), there are conflicting markedness constraints that trigger deletion of decomposed, primitive case features (i.e., more fine-grained versions of Aissen's *STRUC$_C$):; see (75).[25]

(75) *Markedness constraints that trigger case feature deletion*
a. *[–obl] b. *[+gov] c. *[–subj]

The ranking that captures the variation in object encoding in Finnish is given in (76). Three groups of faithfulness constraints for case features of DP types can be identified (they are referred to as I, II, and III); members of each group exhibit a uniform behaviour with respect to the interspersed markedness constraints.

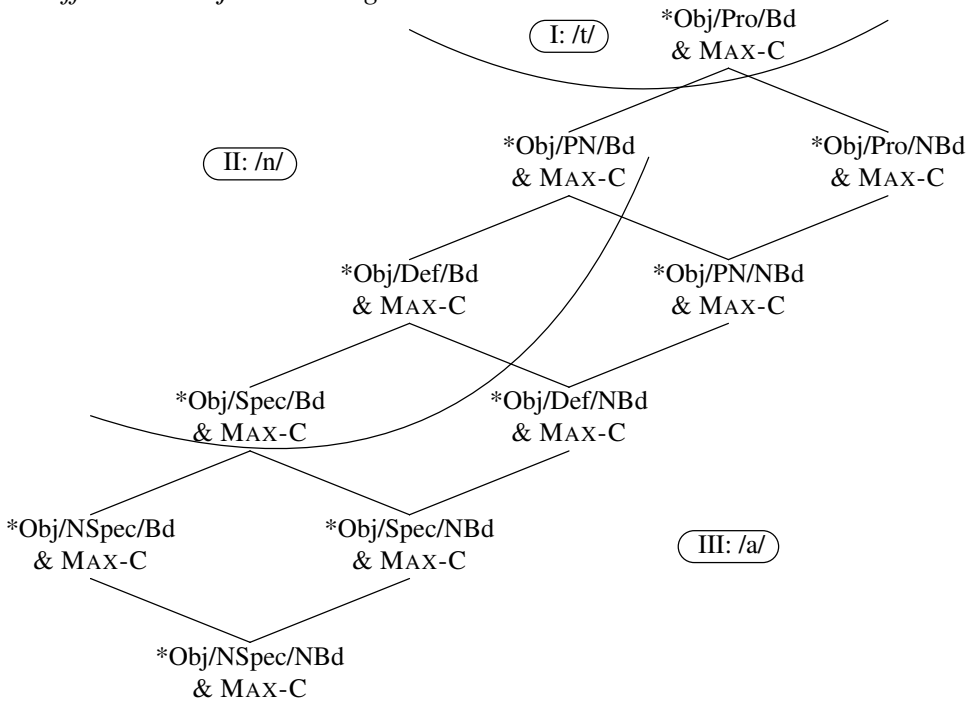
(76) *Ranking in Finnish*

$$\text{I: } \{\text{*Obj/Pro/Bd \& Max-C}\} \gg \text{*[–obl]} \gg \text{II: } \left\{ \begin{array}{l} \text{*Obj/PN/Bd \& Max-C} \gg \\ \text{*Obj/Def/Bd \& Max-C} \gg \\ \text{*Obj/Spec/Bd \& Max-C} \end{array} \right\} \gg \text{*[+gov]} \gg \text{III: } \left\{ \begin{array}{l} \text{*Obj/NSpec/Bd \& Max-C} \gg \\ \text{*Obj/Pro/NBd \& Max-C} \gg \\ \text{*Obj/PN/NBd \& Max-C} \gg \\ \text{*Obj/Def/NBd \& Max-C} \gg \\ \text{*Obj/Spec/NBd \& Max-C} \gg \\ \text{*Obj/NSpec/NBd \& Max-C} \end{array} \right\} \gg \text{*[–subj]}$$

The overall system of multi-dimensional differential argument encoding in Finnish that arises under the present view looks as in (77) (as before, we use Aissen (2003)'s method of graphically representing multi-dimensional differential object marking). On the basis of an initial (i.e., syntactic) accusative specification (viz., [+gov,–obl,–subj]), the markedness constraints in (75) trigger impoverishment operations for different kinds of objects (groups I, II, and III), with a different exponent emerging for each group.

[25] Note that it must be assumed that these markedness constraints cannot undergo local conjunction with the constraint hierarchies in (73). Otherwise, case features would preferentially be deleted in contexts with atypical objects, and retained in contexts with typical objects, thereby undermining the functional justification of differential object encoding. This is exactly as in Aissen (1999, 2003), where *STRUC$_C$ must be prevented from participating in local conjunction with constraint hierarchies; see footnote 3.

(77) *Differential object marking in Finnish*



In order to derive the effect of the optimality-theoretic system in (76) by means of standard impoverishment rules, one would have to postulate the rules in (78).

(78) *Impoverishment rules*

a. [–obl] → ∅/_[¬(Pro,Bd)]
b. [+gov] → ∅/_[Nbd ∨ (NSpec,Bd)]

However, there are at least two reasons for why an approach based on the two rules in (78) is inferior to an approach based on (76). First, the optimality-theoretic analysis in (76) is based on fixed rankings of constraints that are derived from independently motivated scales; in contrast, the two rules in (78) are arbitary statements that stipulate, but are not inherently connected to, the functional motivation for differential object marking. And second, the form of the rules in (78) reveals that, in a canonical impoverishment approach that does not rely on optimization, it is extremely difficult to characterize the relevant environments in which impoverishment takes place as *natural classes*. Thus, negation and disjunction are needed: Rule (78a) applies to every object DP which is *not* a pronoun in a clause with a bounded interpretation of the predicate; the class of objects so defined is not a natural class. Similarly, rule (78b) applies to object DPs that *either* show up in a clause with an unbounded interpretation of the predicate, *or* qualify as nonspecific and show up in a clause with a bounded interpretation of the predicate; again, these contexts do not form a natural class. The same problem for a rule-based treatment emerged in

Cavineña (see § 4.4), where impoverishment applies if the object is non-singular *or* third person. In both Finnish and Cavineña, the only way out, it seems, would be to postulate a more fine-grained, highly abstract feature structure underlying the various categories. Such a step might be possible from a purely technical point of view, but seems poorly motivated linguistically. No such problem arises in (76): The classes of objects that show an identical behaviour vis-a-vis differential argument encoding are defined naturally, as being subject to constraints that show the same ranking with respect to the markedness constraints in (75).[26]

On this basis, the vocabulary items for encoding accusative case (i.e., [+gov, –obl, –subj]) in Finnish can be assumed to look as in (79).

(79) *Vocabulary items*
/t/ ↔ [+gov,–obl,–subj]
/n/ ↔ [+gov]
/a/ ↔ [–subj]
/∅/ ↔ [ ]

By assumption, /t/ is an exponent that is not underspecified: It completely matches the syntactic accusative specification. However, if deletion of [–obl] applies (triggered by *[–obl] if it outranks the relevant faithfulness constraint for a DP), /t/ cannot be inserted anymore, and the most specific exponent among the remaining (less specific) markers is inserted: /n/, which is marked as [+gov]. Note that, assuming that the genitive is defined as [+gov,+obl,**+subj**], /n/ cannot be characterized by [+gov,**–subj**] – if it were, the syncretism with the /n/ exponent in typical genitive contexts could not be captured by postulating a single entry. This assumption then necessitates a partial hierarchy of features [+gov] > [–subj] so as to ensure the correct choice of exponent in II contexts: /n/ must qualify as more specific than /a/.[27]

If deletion of [+gov] also takes place before morphological realization (forced by the markedness constraint *[+gov]), neither /t/ nor /n/ can be inserted, and the less specific marker /a/ is resorted to.

Let us go through a couple of derivations (one for each of the four accusative markers) that exemplify the basic working of the approach just outlined. Suppose first that the syntactic component delivers a pronominal object DP with structural accusative case ([+gov,–obl,–subj]) that occurs with a predicate which gives rise to a bounded interpretation (i.e., the object DP belongs to class I in (76)). The syntax-morphology

[26] A similar argument for defining natural classes by reference to discrete domains in linear orders (rather than by shared features) is provided by Wiese (2003) in his account of Latin noun inflection.

[27] That said, it is not quite clear how strong the evidence is for assuming the genitive to be [+subj] rather than [–subj] in the first place (see footnote 24). If we were to assume that the Finnish genitive is defined as [+gov,+obl,–subj], the exponent /n/ could be associated with the features [+gov,–subj], and the fact that /n/ is more specific than /a/ would follow without resort to a feature hiearchy, just by comparing the size of the feature sets involved.

mapping then takes this feature structure as the input and produces various outputs that selectively delete features of the input, as in (80) (as noted in footnote 12 above, there may also be outputs that enrich the input's feature structure by adding material, but this option does not play a role in the present context).[28]

(80) *Sample optimizations 1*: /t/

INPUT: TYPE I [+gov,–obl,–subj],[Pro],[Bd]	I	*[–obl]	II	*[+gov]	III	*[–subj]
☞ O_1: [+gov,–obl,–subj]		*		*		*
O_2: [+gov,–obl]	*!	*		*		
O_3: [+gov,–subj]	*!			*		*
O_4: [–obl,–subj]	*!	*				*
O_5: [+gov]	*!*			*		
O_6: [–obl]	*!*	*				
O_7: [–subj]	*!*					*
O_8: [ ]	*!**					

Output O_1 emerges as optimal. It faithfully maintains all of the input's (i.e., the syntactic output's) feature structure by violating all markedness constraints that demand impoverishment because this is the only way to fulfill the highest-ranked constraint I (= *OBJ/PRO/BD & MAX-C). After optimization of syntactic structures before morphological realization, vocabulary insertion takes place in accordance with the Subset Principle. Since /t/ is the most specific vocabulary item that fits into the O_1 structure, it is inserted, thereby blocking the less specific markers /n/, /a/, and /∅/.

Suppose next that the syntax has delivered an accusative-marked definite object DP in a clause in which the predicate receives a bounded interpretation; these pieces of information are encoded in the feature bundle {[+gov,–obl,–subj],[Def],[Bd]}. The object DP now falls under a faithfulness constraint of type II in (76); I is vacuously satisfied by all outputs. As shown in (81), the markedness constraint *[–obl] forcing deletion of [–obl] is ranked higher than the pertinent faithfulness constraint of class II (viz., **Obj/Def/Bd & Max-C*). Therefore, output O_3 (with the features [+gov,–subj]) is optimal; there is impoverishment (post-syntactic deletion of [–obl]).

[28] I, II, III in (80) stand for the three ranked sets of constraints in (76). Features related to definiteness and boundedness are ignored in outputs since they are irrelevant for morphological realization.

(81) *Sample optimizations 2*: /n/

INPUT: TYPE II [+gov,–obl,–subj],[Def],[Bd]	I	*[–obl]	II	*[+gov]	III	*[–subj]
O_1: [+gov,–obl,–subj]		*!		*		*
O_2: [+gov,–obl]		*!	*	*		
☞ O_3: [+gov,–subj]			*	*		*
O_4: [–obl,–subj]		*!	*			*
O_5: [+gov]			**!	*		
O_6: [–obl]		*!	**			
O_7: [–subj]			**!			*
O_8: [ ]			**!*			

Consequently, output O_3 is what morphological realization works on. Since the most specific exponent /t/ does not realize a subset of the (impoverished) syntactic structure anymore, the (compatibility requirement of the) Subset Principle ensures that it cannot be inserted in this context. There is a (minimal) retreat to the more general case: The next-specific marker /n/ is inserted; recall that /n/ is more specific than /a/, either because [+gov] belongs to a more specific feature class than [–subj], or because /n/ is in fact associated with more features to begin with (see footnote 27).

Next, consider a case where the syntactic component has produced an object DP belonging to class III, with, say, the feature set $\{$[+gov,–obl,–subj], [Nspec], [Nbd]$\}$. Higher-ranked faithfulness constraints active for class I and class II object DPs are now vacuously fulfilled, and the lower-ranked markedness constraint *[+gov] springs into action (in addition to higher-ranked *[–obl]), creating a more far-reaching impoverishment effect in violation of class III faithfulness. This is shown in (82): The optimal output is O_7, which has both [+gov] and [–obl] deleted in violation of the lower-ranked class III faithfulness constraint **Obj/NSpec/NBd & Max-C*, maintaining only [–subj] – this latter primitive case feature cannot be deleted because deletion would incur a fatal violation of the class III constraint **Obj/NSpec/NBd & Max-C*, given that the markedness constraint *[–subj] is ranked lower (cf. O_8).

(82) *Sample optimizations 3*: /a/

INPUT: TYPE III [+gov,–obl,–subj],[Nspec],[Nbd]	I	*[–obl]	II	*[+gov]	III	*[–subj]
O_1: [+gov,–obl,–subj]		*!		*		*
O_2: [+gov,–obl]		*!		*	*	
O_3: [+gov,–subj]				*!	*	*
O_4: [–obl,–subj]		*!			*	*
O_5: [+gov]				*!	**	
O_6: [–obl]		*!			**	
☞ O_7: [–subj]					**	*
O_8: [ ]					***!	

Consequently, morphological realization of a structure O_7 finds a feature specification that blocks insertion of both /t/ and /a/, due to the compatibility requirement of the Subset Principle. The most specific vocabulary item that can be inserted is /a/ (which blocks less specific /∅/).

Finally, let us turn to the fourth, least specific, exponent for accusative contexts: /∅/. Zero exponence results from massive impoverishment (a deletion of all case features). Simplifying a bit, it shows up when there is no overt subject argument present (e.g., in imperatives). Again, this would seem to suggest a clear functional motivation. There are two analytic possibilites:[29]

- Objects do not participate in harmonic alignment in the first place when they are not accompanied by an overt subject. Hence, sole objects do not obey any of the constraints in I-III, and the *[case] constraints demand full deletion of case features.
- Sole objects participate in harmonic alignment and thus fall under I-III. However, there is an undominated constraint that demands deletion of case features in object positions when no (relevant) subject is present.

Both options seem to us to be viable in principle. For the sake of concreteness, we adopt the first one here. The syntax-morphology mapping in cases where a structurally case-marked object DP is not accompanied by a subject then proceeds as shown in (83) (we may refer to this type of object as belonging to a further class IV).

[29] Both solutions presuppose that whether a subject argument is overtly present or not can be read off syntactic structures, before post-syntacatic morphology takes place.

(83) *Sample optimizations 4*: /∅/

INPUT: TYPE IV [+gov,–obl,–subj], [no subject]	I	*[–obl]	II	*[+gov]	III	*[–subj]
O_1: [+gov,–obl,–subj]		*!		*		*
O_2: [+gov,–obl]		*!		*		
O_3: [+gov,–subj]				*!		*
O_4: [–obl,–subj]		*!				*
O_5: [+gov]				*!		
O_6: [–obl]		*!				
O_7: [–subj]						*!
☞ O_8: [ ]						

Since faithfulness constraints are irrelevant, the markedness constraints force deletion of all case features. Thus, output O_8 (with feature structure [ ]) is optimal; radical impoverishment takes place. Therefore, /∅/ is the only remaining marker that fits; there is a full retreat to the general case.

Note finally that the system reveals iconicity, as argued by Wiese (1999) for German (see subsection 4.2 above): /t/ is less sonorous than /n/, which is less sonorous than /a/; /∅/ is least marked.[30] This corresponds to the exponents' degree of specificity.

5 Concluding Remarks

To sum up, we have seen that differential argument encoding regulated by Hale/Silverstein hierarchies is not necessarily confined to zero/non-zero alternations, as predicted under the approach developed in Aissen (1999, 2003). Rather, differential argument encoding may also involve two or more non-zero exponents, with Hale/Silverstein hierarchies determining marker choice in exactly the same way as in the data considered by Aissen, and the alternating markers exhibiting iconicity effects (less/more alternations in marker form corresponding to the degree of case information available). We have argued that an approach according to which case may or may not be expressed is therefore not fine-grained enough. The alternative that we have developed in this paper takes Aissen's optimality-theoretic approach to be essentially correct: There is harmonic alignment of markedness scales and (order-preserving) local conjunction with faithfulness constraints blocking case feature deletion; and the resulting constraint hierarchies can be interspersed with markedness constraints blocking case. However, the present approach relies on a

[30] There is a proviso. In certain morpho-phonologically defined contexts, an initial *t* shows up with /a/. We assume this consonant to be truly epenthetic, and irrelevant to the more abstract system measuring sonority for the purposes of iconicity as such. In other words: The form accessed by the Iconicity Meta-Principle must be an underlying phonological representation, and need not directly correspond to the surface form.

more elaborate system of primitive case features that have independently been postulated in theories of inflectional morphology in order to handle instances of syncretism, and it relocates the deletion of case features from the syntax to the morphology – or, more precisely, the morphology-syntax interface. The main claim that we have tried to defend in this context is that the optimality-theoretic system of selective post-syntactic deletion of case features underlying instances of differential argument encoding should be viewed as a principled approach to impoverishment operations as they have been proposed in Distributed Morphology.[31]

The overall picture of grammar (and of the morphology-syntax interface in particular) that emerges is a fairly conservative one (though see Keine 2010 for a different view). It is essentially identical to the one standardly adopted in Distributed Morphology, with one minimal qualification: Impoverishment does not result from the application of specific, arbitrarily defined rules, but from the interaction of simple optimality-theoretic constraints, many of which show a fixed order (due to order-preserving nature of harmonic alignment and local conjunction). On this view, Optimality Theory emerges as a theory of the morphology-syntax interface.[32] Whether optimization procedures also affect the inner workings of the syntactic and/or morphological components proper is an issue that is for the most part orthogonal to the questions that we have pursued here (but recall footnote 13).

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[31] At this point, we have to leave open the question of whether *all* instances of impoverishment can ultimately be conceived of in this way, as functionally motivated; but assuming this to be the case does not seem unreasonable as a research hypothesis.

[32] This corresponds to the assumption that Optimality Theory should in general be considered to be a theory of linguistic interfaces; see, e.g., Pesetsky (1998).

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