Syntax II
Modul 04-006-1006
WiSe 2014/2015

Differential Argument Encoding

On Aissen (1999, 2003) and Keine & Müller (2008, 2011) November 11, 2014

1. Harmonic Alignment

(1) *Harmonic Alignment* (Prince & Smolensky (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

Proposal (Aissen (1999, 2003)):
By combining (i) *harmonic alignment* applied to the scales identified by Hale (1972) and Silverstein (1976) as in (2) and (ii) *local conjunction* with markedness constraints in an OT grammar, alternations between zero and non-zero exponence can be derived (differential subject marking, differential object marking).

(2) *Scales*:

a. *GF scale* (basic):
Subject > Object
("Subject" = "specifier of vP", object = "complement of V": Chomsky (1965, 2001))
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*:
Pro(noun) > Name (PN) > Def(inite) > Indefinite Specific (Spec) > NonSpecific (NSpec)

(3) *Markedness constraints*:

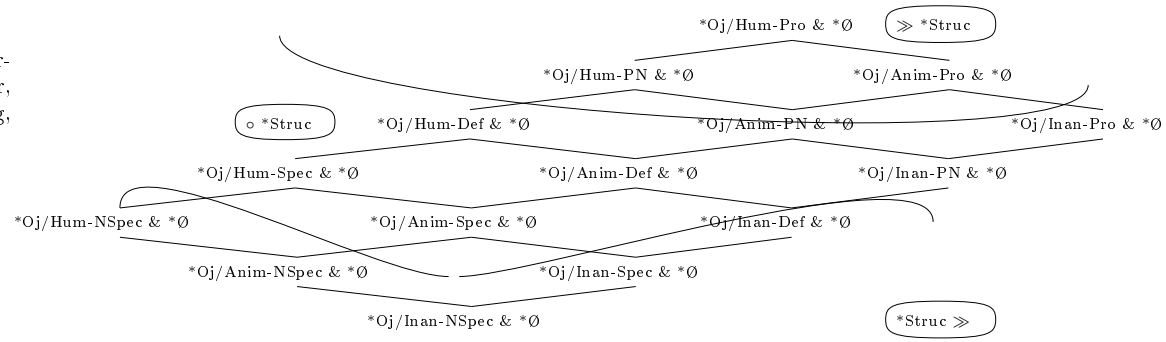
a. *$Ø_C$ (Star-Zero(Case)): (*is conjoined with a hierarchy of constraints*)
"penalizes the absence of a value for the feature CASE"
b. *$\textsc{Struc}_C$ (Star-Structure(Case)): (*is <u>not</u> conjoined with a hierarchy of constraints*)
"penalizes a value for the morphological category CASE"

(4) *A consequence for differential object marking*:

$\leftarrow$ *$\textsc{Struc}_C$ Kalkatungu: no objects case-marked
*Obj/Pro & *$Ø_C$ $\gg$
$\leftarrow$ *$\textsc{Struc}_C$ Catalan: only pronominal objects case-marked
*Obj/PN & *$Ø_C$ $\gg$
$\leftarrow$ *$\textsc{Struc}_C$ Pitjantjatjara: only pronominal and PN objects case-marked
*Obj/Def & *$Ø_C$ $\gg$
$\leftarrow$ *$\textsc{Struc}_C$ Hebrew: only pronominal, PN, and definite objects case-marked
*Obj/Spec & *$Ø_C$ $\gg$
$\leftarrow$ *$\textsc{Struc}_C$ Turkish: all objects case-marked except non-specific objects
*Obj/NSpec & *$Ø_C$
$\leftarrow$ *$\textsc{Struc}_C$ Written Japanese: all objects case-marked

2. Two-Dimensional Differential Object Marking

(5) *DOM in El Cid Spanish*:



3. Problem

Problem:
Aissen's approach only permits yes/no decisions concerning morphological marking. This does not take into account the possibility that there might be *degrees* of morphological marking: iconicity.

Proposal:
Differential argument encoding results from harmonic alignment of scales, but it is a purely *morphological* phenomenon, not a *syntactic* phenomenon (as assumed in Aissen (1999, 2003)).

4. Impoverishment

Impoverishment Rules
(i) Impoverishment rules are a fundamental concept of Distributed Morphology. They are deletion transformations that remove morpho-syntactic features (which need to be realized by morhological 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 is a *retreat to the general case*: a less specific marker is inserted than would otherwise be expected.
(ii) Impoverishment can be viewed as insertion of highly specific zero exponents (see Trommer (1999)).
(iii) Impoverishment can be viewed as being triggered by general filters blocking the co-occurrence of features (Noyer (1992)), or by interacting optimality-theoretic constraints with the same effect (Grimshaw (2001), Kiparsky (2001), Trommer (2001, 2006), Wunderlich (2004), Lahne (2007), Opitz (2007)).

Observation:
Aissen's analyses can be reanalyzed in terms of impoverishment:
(i) As before, impoverishment is a post-syntactic operation that deletes morpho-syntactic features.
(ii) Deletion applies so as to satisfy complex faithfulness constraints created by harmonic alignment of scales.
(iii) On this view, impoverishment is essentially functionally motivated.

5. Iconicity

Background assumption:
Syncretism is derived by *underspecification* of exponents with respect to morpho-syntactic features (which may be more abstract than is motivated by syntactic considerations – e.g., [±obj], [±obl] as more primitive, decomposed case features whose cross-classification yields the four cases of German, with underspecification capturing natural classes of cases).

Observation (Wiese (1999, 2003, 2004)):
Iconicity holds of inflectional systems.

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

Remarks:
(i) Similarity of form: phonological properties (size of exponents, sonority of exponents)
(ii) Similarity of function: *underspecified* features associated with an exponent (and matched against fully specified feature matrices). (Note: This is where Wiese's proposal involves a radical break with the tradition, where iconicity is measured based on fully specified forms (Plank (1979), Wurzel (1984)) – but then, it does not work.)
(iii) There is a feature hierarchy: [+masc] > [+obl] > [+fem] > [+gov]. Rules that involve [+masc] are more specific than rules that don't; etc.

(7) *Wiese (1999) on 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.)

Conclusion:
This *abstract*, highly theory-dependent concept of iconicity (which only works once underspecification of exponents is postulated) is a recurring feature of inflectional systems (see, e.g., Müller (2004, 2005, 2007), Georgi (2008), Opitz (2006)).

6. Proposal

Suggestion:
(i) Differential marking is not necessarily a categorical yes/no phenomenon; rather, it can be gradient phenomenon.
(ii) Differential marking is brought about by impoverishment. Impoverishment consists of post-syntactic deletion of morpho-syntactic features, triggered by faithfulness constraints derived from harmonic alignment of scales.
(iii) Impoverishment requires insertion of a less specific marker. It may lead to zero exponence winning (/Ø/ is often the elsewhere marker), but it may also lead to a selection of other markers that instantiate a "retreat to the general case", and that are formally closer to zero exponence than the marker that would otherwise be expected (iconicity).

Basic assumptions:
(i) The organization of grammar is as assumed in Distributed Morphology: Syntax precedes inflectional morphology; and syntactic structures can be manipulated before morphological realization ('vocabulary insertion') takes place.
(ii) The only crucial difference is that impoverishment is brought about not by specific rules, but by a system of conflicting constraints (Grimshaw (2001), Kiparsky (2001), Trommer (2001, 2006), Wunderlich (2004), Lahne (2007), Opitz (2007)).

(8) *Late vocabulary insertion* (Halle & Marantz (1993)):
a. Functional morphemes contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material.
b. 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.

(9) *Subset Principle* (Halle (1997)):
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).

(10) *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 F such that (i) and (ii) hold.
(i) V_i bears more features belonging to F than V_j does.
(ii) There is no higher-ranked class of features F′ such that V_i and V_j have a different number of features in F′.

(11) *Impoverishment* (Grimshaw (2001), Kiparsky (2001), Trommer (2001, 2006), Wunderlich (2004), Opitz (2007)):
a. Syntactic structures (inputs) are mapped onto structures that serve as the input to vocabulary insertion (outputs).
b. This mapping is subject to optimization (Prince & Smolensky (2004)).

c. Markedness constraints may force feature deletion, in minimal violation of faithfulness (MAX) constraints.
d. Vocabulary insertion may face an impoverished structure.

7. Case Studies

7.1. Case Study: Differential Encoding of Objects in Mannheim German

Refs.: Behaghel (1911), Karch (1975), Müller (2003), and literature cited there

7.1.1. The Phenomenon

Observation:
(i) In all varieties of German, feminine, neuter, and plural NPs are morphologically indistinguishable in nominative and accusative environments.
(ii) In the variety of German spoken in and around Mannheim (and elsewhere in Palatine and Rhine areas), the same holds for non-pronominal masculine NPs: "Rheinischer Akkusativ" (see Behaghel (1911), Karch (1975)).
(iii) The pattern is not extended to personal pronouns.
(iv) Thus, Hale/Silverstein scales seem to be at work.
(v) This suggests a unified approach; but a unified approach is not available if the theory of differential argument encoding can only account for a difference between zero and non-zero encoding (the nominative forms of German determiner inflection are not zero).

(12) *Case marking of non-pronominal objects in Mannheim German*:
a. Ich wünsch Ihnen [$_{NP}$ ein-Ø schön-er Tag] noch
I wish you$_{dat}$ a-NOM nice-NOM day PRT
b. Wir haben [$_{NP}$ pädagogisch-er Planungstag]
we have pedagocial-NOM planning day
c. Ich hab auch [$_{NP}$ ein-Ø schön-er Ball], meinst du, bloß du hast [$_{NP}$ ein-er] ?
I have also a-NOM nice-NOM ball, think you, just you have a-NOM
d. Man müsste mal wieder so richtig [$_{NP}$ 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 [$_{NP}$ der Eimer]
fetch me PRT the-NOM bucket

(13) *Case marking of pronominal objects in Mannheim German*:
Hol en/*er mir mal her
fetch he-ACC/*he-NOM me-DAT PRT PRT

7.1.2. Analysis

Recall Wiese's (1999) underspecification analysis of determiner inflection in Standard German (see Bierwisch (1967), Blevins (1995), Wunderlich (1997), Wiese (1999), Trommer (2005) for alternative suggestions, most of which could just as well be adopted for present purposes).

(14)

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]

(15) *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.)

(16) *Scales*
a. *GF scale* (basic):
Subject > object
b. *Definiteness scale*:
Pro(noun) > Name (PN) > Def(inite) > Indefinite Specific (Spec) > NonSpecific (NSpec)

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

Note:
(i) *Obj/Pro & Max-C is violated if a case feature of a VP-internal pronoun is deleted post-syntactically (before morphological realization).
(ii) *Obj/PN & Max-C is violated if a case feature of a VP-internal proper name NP is deleted post-syntactically (before morphological realization).

(18) *A conflicting constraint that triggers case feature deletion* (a special version of *STRUC$_C$):
*[+gov]

(19) *Ranking*:
a. *Obj/Pro & Max-C ≫
b. *[+gov] ≫
c. *Obj/PN & Max-C ≫ *Obj/Def & Max-C ≫ *Obj/Spec & Max-C ≫ *Obj/NSpec & Max-C

Consequences:
(i) [+gov] is maintained with object pronouns. (Personal pronouns follow essentially the same system of inflection as determiners: *e-r–ih-n/e-n* parallels *dies-er-dies-en*; see Wiese (2001), Fischer (2006).)
(ii) [+gov] is deleted with all other (structurally case marked) objects. Here, /n/ cannot be inserted anymore, and the more general marker /r/ must be chosen.

Question:
Why does this not lead to deletion of [+gov] in dative contexts? (It doesn't because masculine/neuter /m/ is not replaced with less specific /s/ with non-pronominal NPs, and plural /n/ is not replaced with /r/ either: **Ich danke dieses Mann*, **Ich danke dieser Männer*.)

Answer:
"Obj" means Comp(V), but dative arguments show up as Spec(V). The *Spec(V)/X & Max-C constraints are all higher-ranked than *[gov].

7.2. Differential Encoding of Objects in Finnish

Refs.: Kiparsky (1998, 2001), Wunderlich (2000)

7.2.1. *The Phenomenon*

Observation:
(i) Finnish objects can be structurally case-marked by *four* different exponents, only one of which is zero: /t/, /n/, /a/, /Ø/.
(ii) The principles that determine choice of the correct exponents are exactly the ones that Aissen (1999, 2003) shows to underlie zero/non-zero alternations in differential argument encoding.
(iii) This strongly suggests a unified approach; but a unified approach is not available if the theory of differential argument encoding can only account for a difference between zero and non-zero encoding.

Conclusion:
Differential case marking of objects in Finnish is best treated as a morphological phenomenon.
(Note: To some extent, suggestions along these lines can already be found in Kiparsky (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.)

(20) *Case marking of objects in Finnish* (Kiparsky (2001)):

a. Tuo-n häne-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.'

(21) *Structural case markers (singular)* (traditional grammar):

	nouns: 'bear'	pronouns: 'you'
NOM	/Ø/	/Ø/
ACC	/Ø/, /n/	/t/
GEN	/n/	/n/
PART	/a/	/a/

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

	nouns: 'bear'	pronouns: 'you'
NOM	/Ø/	/Ø/
ACC	–	/t/
GEN	/n/	/n/
PART	/a/	/a/

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 NP takes the nominative marker.

Conclusion:
(i) Pronouns are marked differently from other NPs.
(ii) Non-specific NPs are marked differently from other NPs.
(iii) This suggests harmonic alignment with the definiteness scale.

7.2.2. *Analysis*

Claim:
(i) There is only one kind of object case in (20): accusative.
(ii) Marker variation is a morphological phenomenon resulting from impoverishment.

(23) *Structural cases in Finnish* (see Bierwisch (1967), Levin (1986), Alsina (1996), Wiese (1999) for the primitive case features adopted here):

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

(24) *Scales*

a. *GF scale* (basic):
Subject > object
(Spec(v) > Comp(V))

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

c. *Boundedness scale*:
Bounded > unbounded (Bd > NBd)

(25) *Constraint alignments*:

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

Local conjuction of members of the two constraint hierarchies preserves order. It ultimately yields two-dimensional differential argument encoding.

(26) *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

(27) *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

(28) *Order-preserving local conjunction with* MAX-CASE *(formerly *$Ø_C$)*:

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

Note:
(i) *Obj/Pro/Bd & Max-C is violated if a case feature of a VP-internal pronoun in a clause with

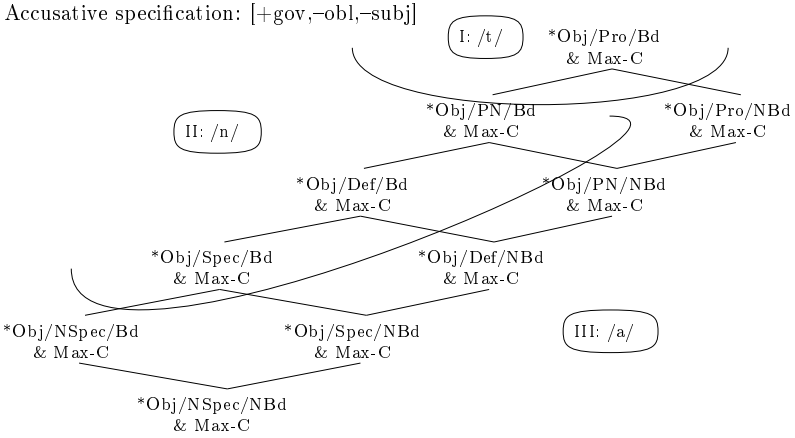
a bounded interpretation of the predicate is deleted post-syntactically (before morphological realization).
(ii) *Obj/NSpec/NBd & Max-C is violated if a case feature of a VP-internal indefinite non-specific NP in a clause with an unbounded interpretation of the predicate is deleted post-syntactically (before morphological realization).
(iii) Constraints of this type are *gradient* – multiple violations add up.

(29) *Conflicting constraints that trigger case feature deletion* (versions of *STRUC$_C$):
a. *[–obl]
b. *[+gov]
c. *[–subj]

(30) *Ranking*:
a. I: *Obj/Pro/Bd & Max-C ≫
b. *[–obl] ≫
c. II: *Obj/PN/Bd & Max-C ≫ *Obj/Def/Bd & Max-C ≫ Obj/Spec/Bd & Max-C ≫
d. *[+gov] ≫
e. III: *Obj/NSpec/Bd & Max-C, { *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
f. *[–subj]

(31) *The overall picture*:

Accusative specification: [+gov,–obl,–subj]



(32) *Impoverishment effects with object case derived*:
a. [–obl] → Ø/__[¬(Pro,Bd)]
b. [+gov] → Ø/__[Nbd∨(NSpec,Bd)]

Note:
(32) reveals that, in a canonical impoverishment approach (that does not rely on optimization), it would be difficult to characterize the relevant environments as *natural classes* – negation and disjunction are needed (at least this holds as long one does not postulate a more fine-grained feature structure underlying the various categories).

(33) *Vocabulary items*:
a. /t/ ↔ [+gov,–obl,–subj]
b. /n/ ↔ [+gov]
c. /a/ ↔ [–subj]
d. /Ø/ ↔ [ ]

Note:
(i) Assuming that the genitive is defined as [+gov,+obl,+subj], /n/ cannot be characterized by [+gov,–subj] (because then the syncretism cannot be captured).
(ii) Under this assumption, a partial hierarchy of features [+gov] > [–subj] must then be assumed to ensure the correct choice of exponent in II contexts.

(34) *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: [ ]	*!**					

Consequence:
Output O_1: [+gov,–obl,–subj] is optimal; there is no impoverishment. Therefore, /t/ is the most specific vocabulary item that fits, and it is inserted.

(35) *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: [ ]			**!*			

Consequence:
Output O_3: [+gov,–subj] is optimal; there is impoverishment (post-syntactic deletion of [–obl]) Therefore, /t/ cannot be inserted anymore (because of the Subset Principle), and there is a (minimal) retreat to the more general case: The next-specific marker /n/ is inserted.

(36) *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: [ ]					***!	

Consequence:
Output O_7: [–subj] is optimal; impoverishment deletes [+gov] and [-obl], but no more than that. Therefore, /a/ is the most specific marker that fits (blocking /Ø/).

Note:
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; the first one is adopted here for the sake of simplicity. (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.)
(i) 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.
(ii) 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.

(37) *Sample optimizations 4*: /Ø/

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: [ ]						

Consequence:
Output O_8: [ ] is optimal; impoverishment deletes all case features. Therefore, /Ø/ is the only remaining marker that fits – a full retreat to the general case.

Final remark:
The system reveals iconicity, as argued by Wiese (1999) for German: /t/ is less sonorous than /n/, which is less sonorous than /a/ (assuming the initial *t* that shows up with *a* in certain morphophonologically defined contexts to be truly epenthetic, and irrelevant to the abstract system as

such); /Ø/ is least marked. This corresponds to the exponents' degree of specificity.

7.3. Differential Encoding of Objects in Trumai

Ref.: Guirardello (1999, 269-282) (Trumai: spoken in central area of Brazil, isolate, 51 speakers)

7.3.1. The Phenomenon

Observation:
There are *three* dative markers: *-(V)tl*, *-ki*, *-(V)s*. Their choice is conditioned by the factors *individuation* and *prominence*.

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

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

(39) *Dative markers in Trumai, 1*:

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)

(40) *Dative markers in Trumai, 2*:

a. hi fa-tke-a hai-**tl**?
1 kill/hit-DES-QUEST 1-DAT
'Do you want to kill me?' (Guirardello 1999: 271)

b. ha fa fa chï_in ine-**tl**
1 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**
1 kill/hit kill/hit FOC/TENS 3 YI-DAT
'I beat him (somebody that I do not know; he is a stranger).' (Guirardello 1999: 272)

(41) *Dative markers in Trumai, 3*:

a. ha sone-tke misu-**ki**
1 drink-DES water-DAT
'I want to drink water (a little/a glass).'

b. ha sone-tke misu-**s**
1 drink-DES water-DAT
'I want to drink some water.' (Guirardello 1999: 277)

7.3.2. Analysis

Suggestion:
Assume the scales in (42). Local conjunction, conversion into a constraint ranking and local conjunction with the constraint Max-C yields the ranking in (43).

(42) a. *Individuation scale*
Ind(ividuated) $\succ$ Non-ind(ividuated)

b. *Prominence scale*:
X > x (discourse-prominent argument > non-discourse-prominent argument)

c. *GF scale*
Subject $\succ$ Object

(43) *Ranking of faithfulness constraints*

a. *Obj/Ind/X & Max-C $\gg$ *Obj/Ind/x & Max-C

b. *Obj/Non-ind/X & Max-C $\gg$ *Obj/Non-ind/x & Max-C

Note:
Analysing the dative as consisting of the subfeatures in (44), we can consider the three dative markers as being specified as in (45). Note that these feature specifications conform to iconicity.

(44) DATIVE: [+obl, –subj, +gov]

(45) *Marker specification*

a. /-(V)tl/ $\leftrightarrow$ [+obl, –subj, +gov]

b. /-ki/ $\leftrightarrow$ [–subj,+gov]

c. /-(V)s/ $\leftrightarrow$ [–subj]

Note:
The two markedness constraints *[+obl] and *[+gov] are then inserted into the ranking (43), yielding impoverishment of case features for canonical objects. Due to the underlying principle of iconicity every impoverishment step is associated with insertion of a phonologically less marked dative exponent. This gives rise to the patterns in (39) to (41): Prominent and individuated objects are marked with *-(V)tl*, less marked objects with *-ki* and canonical objects—non-prominent and not individuated—with the exponent *-(V)s*.

(46) *Markedness constraints*

a. *[+obl]

b. *[+gov]

(47) *Obj/Ind/X & Max-C $\gg$ *[+obl]

$$\gg \left\{ \begin{array}{l} \text{*Obj/Ind/x \& Max-C,} \\ \text{*Obj/Non-ind/X \& Max-C} \end{array} \right\} \gg \text{*[+gov]}$$

$$\gg \text{*Object/Non-ind/x \& Max-C}$$

Observation:
Aissen's approach is silent on the Trumai data since they do not involve a zero/non-zero alternation; however, the same principles are at work as in other cases of treated by harmonic alignment in her approach.

7.4. Differential Encoding of Objects in Cavineña

Ref.: Guillaume (2008, 569ff., 603f.) (Bolivia, Tacanan family, <1,200 speakers)

7.4.1. The Phenomenon

Observation:
Two dative/genitive markers can appear: *-kwe* and *-ja*. The choice depends on person and number features of the stem—*-kwe* can only be attached to local persons (i. e., first or second person) in the singular. All other combinations select *-ja*.
This constitutes a case of differential object marking since singular first or second person objects are highly marked. All other combinations are marked less in terms of Hale/Silverstein scales. We argue that it is not a coincidence that for such highly marked objects a phonologically more complex case exponent is chosen. Phonological complexity of markers and hierarchical markedness are again correlated.[1]

(48) *Distribution of markers*:

Person	SG	DL	PL
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**

(49) *Dative/genitive markers in Cavineña*:

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).'
(Guillaume 2008: 603)

c. Tume =tuna-**ja** =tu-ke =∅$_A$ 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.' (Guillaume 2008: 575)

(50) a. *Person scale*
Loc(al) (1/2) $\succ$ N(on)loc(al)

b. *Number scale*
Sg $\succ$ Non-sg

c. *GF scale*
Subj $\succ$ Obj

(51) *Ranking*:

a. *Obj/Loc/Sg & Max-C $\gg$ *Obj/Loc/Non-sg & Max-C

[1] 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.

b. *Obj/Nloc/Sg & Max-C ≫*Obj/Nloc/Non-sg & Max-C

Note:
We assume that the dative consists of the subfeature in (52). The relevant markers *-kwe* and *-ja* are analysed as in (53). The phonological markedness of these exponents correlates with their morpho-syntactic markedness; they thus obey iconicity.

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

(53) *Marker specification*
a. /-kwe/ ↔ [+obl, +obj]
b. /-ja/ ↔ [+obj]

Analysis:
A markedness constraint penalizing the presence of a case feature [+obl] is then inserted into the ranking (51), triggering case feature deletion for all but highly marked objects (i.e. those high on both the person and the number scale). After this case feature is deleted, insertion of *-kwe* is no longer possible. The system therefore falls back to a more general marker (*-ja*).

(54) *Markedness constraint*
*[+obl]

(55) *Ranking*:

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

Note:
As in Finnish, an explicit statement of the context of the impoverishment rule would involve a disjunction: The case feature [+obl] has to be deleted if the object is *either* non-singular *or* non-local. Since these two contexts arguably do not form a natural class, two impoverishment rules are effectively needed in standard approaches. If, however, the context in which impoverishment applies is derived by local conjunction of scales, the case feature is deleted in all environments that are dominated by the markedness constraint *[+obl]. (55) shows that this comprises exactly the context that proved problematic for an approach employing explicit statements of contexts—i. e. if the object is either non-singular or non-local or both. The approach developed here is therefore preferable 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.

8. Outlook and Conclusion

Outlook:
The same kind of analyses can be given for various other cases of scale-driven non-zero/non-zero alternations with structural cases:

- differential encoding of subjects and objects in Dyirbal (Carnie (2005), Haspelmath (2007), based on Dixon (1972, 1994))
- differential encoding of subjects and objects in Djapu (Legate (2008), Morphy (1983))
- differential encoding of subjects in Kambera (Klamer (1998a,b), Georgi (2008))
- direct-inverse Marking (Blake (1994), Macaulay (2005))

- differential encoding of objects in Russian (Comrie (1978))
- differential encoding of objects in Proto-Indo-European (Filimonova (2005))

Consequences for the modelling of interfaces:

- Impoverishment rules are ultimately *functionally motivated* and implemented via harmonic alignment of scales.
- Optimality Theory emerges as a theory of the morphology-syntax interface, much as in Pesetsky (1998); syntax and morphology as such can be assumed to work without violable and ranked constraints.

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