Case splits and the order of elementary operations

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In this paper I propose a unified account for both local and global case splits in terms of local impoverishment. My main claim is that impoverishment takes place within narrow syntax and may thus interact with the operation Agree. This reassessment of the place of impoverishment in the grammar has the immediate consequence that Agree may apply *after* impoverishment. Such 'late' Agree may then percolate the effects of local impoverishment within the structure, giving rise to the impression of non-local mechanisms at work. A second, logically independent, claim is that impoverishment is brought about by harmonic alignment of Silverstein hierarchies.

The paper is structured as follows: Section 1 lays the empirical groundwork by exemplifying local and global case splits and showing that they adhere to the same generalization. Section 2 introduces the theoretical background assumptions and puts forth my proposal. Sections 3 and 4 put the account to work on local and global splits, respectively. Section 5 illustrates an empirical prediction of the proposed system regarding the interaction of local and global splits with verbal agreement. Finally, section 6 draws the conclusion.

1. *Empirical overview*

Differential case marking refers to systematic alternations of case markers triggered by DP-internal properties.[1] Although the typological and theoretical literature has focused mainly on local case splits, 'global' instances of the phenomenon are attested as well (Silverstein 1976).

– If the DP that conditions the marker alternation is also the locus of the alternation, I will refer to the split as *local*. Hence, case marking of an argument can be determined solely on the basis of other properties of that argument.

[1] Case marker alternations may also be conditioned by other features within the clause, such as tense or aspect. In this paper, I will restrict my attention to splits induced by nominal properties. See Keine (to appear) for an application to various other types of alternations.

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– Case splits are considered *global* if the DP hosting the contextual feature and the one containing the affected feature are disjoint. Consequently, case marking of a DP cannot be determined with reference to other properties of that DP alone.[2]

This section provides various examples of local and global splits, which will then serve as the basis for developing and illustrating the analysis pursued here.

1.1. Local case splits

1.1.1. Object case marking in Hindi

Hindi gives a first illustration of a local case split. There exist two object case markers (*-ko* and -∅), the choice among which is conditioned by humanness and specificity: If the object is non-human and non-specific it is zero marked, otherwise *-ko* is attached (cf. (1) and (2)).[3]

(1) DEFINITENESS

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.' (Butt & King 2004:161)

(2) HUMANNESS

a. *ilaa-ne ek bacce-ko / *-∅ uṭ^haayaa*
Ila-ERG one child-**ACC** / -**NOM** lift/carry.PERF
'Ila lifted a child.'

b. *ilaa-ne ek haar-∅ / *-ko uṭ^haayaa*
Ila-ERG one necklace-**NOM** / -**ACC** lift.PERF
'Ila lifted a necklace.' (Mohanan 1994:79)

1.1.2. Object case marking in Trumai

Trumai is a language isolate spoken in the central area of Brazil (Guirardello 1999). There exist three dative markers, all of which are non-zero: *-(V)tl*, *-ki*, *-(V)s*. Their choice is conditioned by the factors *individuation* and *prominence* (see table 1). Examples are given in (3).

(3) a. *ha hu'tsa chï_in kasoro-tl*
I see FOC/TENS dog-**DAT**
'I saw the dog (I know it).'

[2] Despite their relevance for the questions of syntactic locality, global case splits have attracted relatively little attention. Notable treatments include Aissen (1999), de Hoop & Malchukov (2008), Béjar & Rezac (2009), and Georgi (this volume).

[3] The following abbreviations are used in the glosses: ABL 'ablative, ACC 'accusative', ANR 'action nominalizer', DAT 'dative', ERG 'ergative', INV.ERG 'inverse ergative', NOM 'nominative', OBJV 'objective'.

Tab. 1 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 · not individuated, identifiable		· not individuated, not identifiable · not individuated, not prominent

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)

1.2. Global case splits

1.2.1. Yurok

In Yurok (Algic), the object is marked with *-ac* if the subject is 3rd person and the object 1st or 2nd. In all other cases, it is unmarked (Robins 1958; Bickel in press).[4] The alternation qualifies as global since case marking of the object cannot be determined on the basis of properties of the object alone. Instead, some reference to the subject is necessary. See (4) for illustration.

(4) a. *keʔ nek ki newoh-paʔ*
2SG.NOM 1SG.**NOM** FUT see-2>1SG
'You will see me.'

b. *yoʔ nek-ac ki newoh-peʔn*
3SG.NOM 1SG-**OBJV** FUT see-3SG>1SG
'He will see me.' (Robins 1958:21)

1.2.2. Umatilla Sahaptin

In Umatilla Sahaptin (Penutian; Washington, Oregon) the subject is marked with *-nɨm* (the so-called 'inverse ergative') if it is 3rd person singular and the object is 1st or 2nd person. In all other cases the subject is zero marked (Rigsby & Rude 1996; Rude 1997; Zúñiga 2002). Notice that – as far as person is concered – the environment of case marking is identical to Yurok above. Both languages differ, however, with respect to the locus of case marking: While in Yurok object case marking is at stake, it is subject marking in Sahaptin.

(5) a. *ín=aš á-q'inu-ša payúwii-na łmáma-an*
I=1SG 3ABS-see-IMPV sick-OBJV old.woman-OBJV
'I see the sick old woman.' (Rigsby & Rude 1996:674)
b. *i-q'ínu-ša=aš ɨwínš-nɨm*
3NOM-see-IMPV=1SG man-**INV.ERG**
'The man sees me.' (Rude 1997:332)

[4] I am grateful to Juliette Blevins for confirming this distribution to me.

c. *ɨwínš i-tux̣nána yáamaš-na*
man 3NOM-shot mule.deer-OBJV
'The man shot a mule deer.' (Rigsby & Rude 1996:676)

The subject receives *-nɨm* in [3SG>1/2] configurations. In (5a) the subject *ín* 'I' is 1st person, and hence zero marked.[5] Compare this to the [3SG>1SG] configuration in (5b), whose subject *ɨwínš-nɨm* 'man-INV.ERG' is overtly case marked. (5c) makes it clear that object properties play a role in determining the subject's case marking: The subject *ɨwínš* is 3SG, as in (5b), but nevertheless receives no overt marking due to the 3SG object.

1.2.3. Kolyma Yukaghir

The most complex global case split that I know of is found in the Siberian language Kolyma Yukaghir (Maslova 2003).[6] The whole system consists of four object case markers, only one of which is zero. The distribution of these markers is given in (6). Some examples are provided in (7).

(6) a. *-gele:* [3 > 1/2/3.def] b. *-le:* [3 > 3.indef] c. *-ul:* [1/2 > 1/2] d. -∅: [1/2 > 3]

(7) a. *tet kimnī met-**kele** kudede-m*
your whip me-ACC kill-TR:3SG
'Your whip has killed me.'

b. *met-**ul** amde-l-get polde-mek*
me-ACC die-PERF-ANR-ABL save-TR:2SG
'You have saved me from death.'

c. *n'umud'ī-**le** mid'-u-m*
ax-INSTR take-0-TR:3SG
'He took an ax.'

d. *met tudel-∅ juø*
I he see(TR:1SG)
'I saw him.'

(Maslova 2003:93,95,227)

A relevant minimal pair demonstrating that object case marking indeed depends on subject properties is (7a) versus (7b). In both cases the direct object is *met* '1SG'. The subject is however 3rd person in (7a) and 2nd person in (7b). This distinction leads to differences in the case marking of the object.

1.3. Common properties

There are two striking similarities between local and global case splits: First, both instantiate case marker alternations triggered by some properties of verbal arguments.[7] They differ only with regard to whether the conditioning and affected features are distributed over several arguments or present within one. A pervasive property is that the alternation is by no means arbitrary but

[5] The clitic *-aš* '1SG' instantiates agreement.

[6] I am indebted to Lennart Bierkandt for bringing Kolyma Yukaghir to my attention.

[7] Both the global splits in Yurok and Umatilla Sahaptin are triggered by person features. That person features may in principle also condition local splits is exemplified by Marathi, where 3rd person subjects are marked with *-ne* in the perfective, thus contrasting with 1st and 2nd person subjects, which are zero marked (Pandharipande 1997).

systematically conforms to Hale/Silverstein hierarchies (Hale 1972; Silverstein 1976) such as those given in (8).

(8) a. *Grammatical Function (GF) scale*
Subject > Object
b. *Person scale*
1st > 2nd > 3rd person
c. *Prominence scale*
X > x (discourse-prominent argument > non-discourse-prominent argument)
d. *Animacy scale*
Human > Animate > Inanimate
e. *Definiteness scale*
Pronoun > Proper noun > Definite > Indefinite Specific > Non-specific

Markedness of subjects and objects in terms of the scales in (8) is measured along the following lines: Subjects count as unmarked if they have properties high on the scales in (8); marked subjects, on the other hand, are associated with low-ranked properties. Consider the person scale (8b) as an example: Canonical subjects are 1st person; 3rd person subjects, on the other hand, are hierarchically marked. The opposite holds for objects: Canonically, objects have properties low on these scales. While unmarked objects are 3rd person, 1st person objects are highly marked. Upon closer scrunity, it is not just the case that all the splits encountered so far are conditioned by scale features, but furthermore that *hierarchical markedness corresponds to morphological marking*: It is always the hierarchically marked configuration that receives more morphological marking in the sense that it is associated with a phonologically more complex marker if measured against the SONORITY HIERARCHY. By contrast, zero marking always occurs in canonical configurations. To see this, recall that in Hindi, objects with canonical properties (i.e., those that are non-human and non-specific, ranked low on the animacy and definiteness scale) are unmarked morphologically. Hierarchically marked objects bear the overt exponent *-ko*. In Trumai the phonological complexity of the case markers correlates precisely with the relative markedness of the objects that they appear on: The most marked objects bear the most complex marker *-(V)tl*; the least marked objects are least marked morphologically (by *-(V)s*). In Yurok, it is a marked combination of subject and object – comprising a 3rd person subject and a 1st/2nd person object – that receives overt marking. If subject, object or both are unmarked, no morphological marking occurs. The same holds for Umatilla Sahaptin. Finally, in Kolyma Yukaghir the most complex marker morphologically (*-gele*) occurs in the most marked combination of subject and object properties, the less complex markers *-le* and *-ul* in intermediate configurations, and the least complex exponent -∅ shows up in combinations of canonical subjects and objects.

(i) a. *mī / āmhī / tū / tumhī gāṇī mhaṭlī*
I.ABS / we.ABS / you.SG.ABS / you.PL.ABS song.3PL.NEUT.ABS sing.PAST.3PL.NEUT
'I/we/you sang songs.'
b. *tyā-ne / tyā̃n-nī / ti-ne / tyā̃n-nī gāṇī mhaṭlī*
he-ERG / they.MASC-ERG / she-ERG / they.FEM-ERG song.3PL.NEUT.ABS sing.PAST.3PL.NEUT
(Pandharipande 1997:131)

This shows that there is no principled difference as to which features trigger which kind of split. Rather, both local and global splits may be conditioned by identical features.

Second, local and global case splits may either exhibit a zero/non-zero alternation or involve several overt markers. In addition, they may be gradual in the sense that more than two markers may enter the alternation, each associated with a certain range of hierarchical markedness that is reliably correlated with their phonological complexity.

These similarities are summarized in (9).

(9) *Common empirical properties of local and global case splits*
  a. Internal phonological complexity of the exponents correlates with hierarchical markedness of the context that they appear in.
  b. They may involve two or more overt markers.

These common properties strongly suggest a unified approach to local and global case splits, attributing their identical behaviour to the fact that they emerge from the same mechanism. It remains, of course, to be determined what leads to the different loci of the alternation. Specifically in the case of global splits, the relation between the conditioning and the affected elements appears peculiar. As there does not appear to be any evidence that subject and object enter into a direct (Agree) relation with each other, there is no independently motivated dependency between the two arguments that could be used to implement the sensitivity of one element to the other. Given that it is preferable to avoid an entirely *ad hoc* relation between the two arguments – used solely to account for global splits –, I submit that this reasoning entails that an account for global case splits must be indirect in the sense that it involves a third element, which undergoes an Agree operation with both subject and object and thus serves as a link between the properties of the former and the latter.

2. *Proposal*

In order to account for the properties of local and global case splits observed in the previous section I will argue that both are the result of highly local case feature impoverishment triggered by scale features (see Keine & Müller 2008, 2009 for an application of this idea to local case splits). Treating both types of splits as reflexes of the same underlying operation derives without further ado the striking similarities between them. Furthermore, I argue that impoverishment is not an arbitrary rule but the result of an OT-style constraint interaction. The constraint ranking is brought about by harmonic alignment of markedness scales. Restrictions on impoverishment then follow from independent restrictions on possible constraint rankings. This derives the observed influence of markedness scales on the distribution of the case markers.

Given that local and global splits differ in the relation between the DP undergoing the alternation and the one hosting the conditioning features, I will propose that they differ with respect to the ordering between impoverishment and various Agree operations. The account developed below challenges the commonly held position that impoverishment is solely a post-syntactic operation, hence applying after all Agree operations. In contrast, I claim that impoverishment applies within syntax proper and may hence be intermingled with Agree operations, giving rise to various kinds of interaction. Most importantly, Agree may apply *after* impoverishment. Suppose impoverishment affects a fully specified feature α_{+} on a head Γ, yielding the reduced feature

α_-. Subsequent Agree percolates α_- to a second head Σ. On Σ, vocabulary insertion takes place, realizing α_-. In this derivation, Agree has percolated the effects of impoverishment to a second head, giving rise to the impression that vocabulary insertion into Σ was sensitive to features on Γ. The result is a global case split. If, on the other hand, case feature impoverishment takes place *after* case assignment, the impoverished case feature is not percolated to another head, so that the effects of impoverishment show up on the same head that impoverishment has applied to. This leads to a local split. The difference between local and global case splits is thus reduced to a different order of operations. Globality in some sense reduces to an early local operation, the effects of which are subsequently percolated within the structure.

2.1. Distributed Morphology

I presuppose the general grammatical architecture of Distributed Morphology (Halle & Marantz 1993, 1994 and subsequent work). Specifically, vocabulary insertion takes place post-syntactically, is realizational in nature and determined by the Subset Principle (10) and Specificity (11).

(10) 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).

(11) Specificity[8]
A vocabulary item V_1 is more specific than a vocabulary item V_2 iff V_1 contains more morpho-syntactic features than V_2.

In order to capture natural classes of syntactic categories I follow Bierwisch (1967) in assuming that (case) features are made up of more primitive *subfeatures*.

Prior to vocabulary insertion, impoverishment may delete morpho-syntactic features and thereby influence marker insertion (Bonet 1991; Halle & Marantz 1993, 1994; Noyer 1998; Bobaljik 2002; Frampton 2002). After impoverishment has taken place a less specific marker is inserted than would otherwise have been chosen. Impoverishment thus leads to a *retreat to the general case*. Because of decomposition of case features impoverishment does not necessarily yield a total deletion of case features. Rather, only certain subfeatures are deleted. The remaining subfeatures may still be realized by a (less specific) marker.

Impoverishment is strictly local in that both the contextual as well as the affected features must reside on single head, as formulated in (12). As for the timing of operations, impoverishment takes priority. Thus, if the context of impoverishment is met, it has to apply immediately, even if other operations, such as Agree, could take place as well.

[8] Cf. Halle (1997); specificity of vocabulary items may in principle also be defined with reference to an explicit ordering stipulation (Halle & Marantz 1993) or a feature hierarchy which has priority over mere set cardinality (cf., e.g., Lumsden 1992; Noyer 1992; Müller 2004b). I will stick to this arguably simpler definition here.

(12) LOCALITY CONDITION ON IMPOVERISHMENT[9]
Impoverishment may only be sensitive to features within a single syntactic head and its structural configuration.

2.2. *Impoverishment by harmonic alignment of markedness scales*

Contrary to the widely held position, I assume that impoverishment is *not* stated as an arbitrary rule that applies as soon as its context is brought about by an optimality-theoretic interaction between faithfulness and markedness constraints (cf. Keine & Müller 2008, 2009, based on Aissen 1999, 2003). The ranking is not free but systematically restricted by HARMONIC ALIGNMENT of the markedness scales in (8) above. Harmonic alignment is defined in (13).

(13) HARMONIC ALIGNMENT (Prince & Smolensky 2004:161)
Suppose given a binary dimension D_1 with the 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 ≻ X/b ≻ ... ≻ X/z
b. H_Y: Y/z ≻ ... ≻ Y/b ≻ Y/a

The *constraint alignment* is the pair of constraint hierarchies C_X, C_Y:

a. C_X: *X/z ≫ ... ≫ *X/b ≫ *X/a
b. C_Y: *Y/a ≫ *Y/b ≫ ... ≫ *Y/z

The resulting ranking is locally conjoined with the faithfulness constraint MAX-CASE, which penalizes case feature deletion, yielding a ranking of faithfulness constraints. The crucial property of this ranking is that canonical arguments are associated with a low-ranked faithfulness constraint; non-canonical ones have a high-ranked constraint. Into this ranking is inserted a markedness constraint against a case subfeature, which triggers deletion of this subfeature in the output. Configurations associated with a faithfulness constraint ranked lower than the markedness constraint are impoverished, all others are not. Because of their low-ranked faithfulness constraint canonical arguments are impoverished more easily than non-canonical ones. The effect of this conception of impoverishment is the implication in (14).

(14) If impoverishment applies to a given type of argument, it also applies to all less marked ones.

[9] As mentioned in the main text, the purpose of (12) is to disallow global impoverishment. Specifically, impoverishment of nominal features triggered by features in the verbal domain or vice versa is ruled out. The restriction embodied in (12) may ultimately turn out to be too strong. Consider the nominal domain. Under the plausible assumption that humanness and specificity features reside on different heads, a problem arises. As we have seen for Hindi in section 1.1.1, case exponence depends on both types of features, apparently in violation of (12). Various solutions seem tenable. First, one may stick to (12) and assume some sort of nominal concord for these features. Second, if reprojection is involved within the nominal domain (see Georgi & Müller 2010 and references cited there), the number of distinct heads is severly cut down, thus making (12) a viable option again. Finally, (12) may be relaxed to refer only to extended projections (Grimshaw 2000) or to phasal domains. Since I will ignore here the internal structures of DPs, I will stick to (12), merely noting that further refinements may prove necessary.

As a consequence of (14), the alternation pattern derived by impoverishment is not arbitrary but corresponds to markedness in terms of Hale/Silverstein hierarchies. A concrete derivation for the constraint ranking will be given for Hindi in section 3.1.

2.3. Iconicity

To ensure that it is a smaller marker that is inserted after impoverishment has taken place, I assume the meta-grammatical principle of Iconicity.

(15) Iconicity (Wiese 1999, 2003, 2004)
Similarity of form implies similarity of function (within a certain domain, and unless there is evidence to the contrary).

Function in (15) refers to a marker's morpho-syntactic complexity; *form* denotes its phonological complexity as measured against the sonority hierarchy. (15) states that both properties are correlated. After impoverishment has taken place a marker with fewer morpho-syntactic features has to be inserted due to the Subset Principle (10). By iconicity, this marker is phonologically less complex and hence 'smaller' than the marker otherwise attached. Impoverishment thus leads to a retreat to a phonologically 'smaller' marker, possibly the zero marker. Combined with the restrictions on impoverishment above, this system captures the unifying property of local and global case splits: Morphological marking and hierarchical markedness coincide.

2.4. Agree

Apart from impoverishment, the second crucial operation employed is Agree as defined in (16). I take Agree to be a maximally general operation that copies a feature value from one head to another (based on, but deviating somewhat from, Chomsky 2000, 2001, 2004; see fn. 10).

(16) Agree[10]
Agree is a function that maps an unordered pair $([F : \underline{\quad}], [F : \delta])$ into $([F : \delta], [F : \delta])$ iff (a)–(d) hold.
(a) $[F : \underline{\quad}]$ and $[F : \delta]$ are features of separate heads Σ and Γ,
(b) Σ c-commands Γ,
(c) Γ is *transparent* for probes on Σ, and
(d) locality is respected.

[10] Some remarks are in order concerning (16). As defined, Agree does not require the unvalued feature to c-command its valued counterpart. (16) specifies that Σ c-commands Γ and that both features are distributed over these two heads; it does not, however, determine which head comprises which feature. An immediate consequence is that Agree is symmetrical: Probes on Σ may be valued by goals on Γ and vice versa. While I will base the technical considerations in the remainder of this paper on the definition in (16) it is important to notice that it is not mandatory. The present account can equally well be made to work with an asymmetric conception of Agree, as long as additional movement steps are assumed. Since, however, such movement steps only complicate the derivations, I will adopt (16), allowing me to concentrate on the main proposal. The *locality* requirement in (d) refers

I will term Agree applied to φ-features ‘φ-AGREE’ and use ‘κ-AGREE’ to refer to Agree applied to case features.[11] Both φ- and κ-Agree are instantiations of the general operation Agree.

A result of the locality restriction on impoverishment in (12) is that under certain conditions impoverishment depends on prior Agree. To see this, suppose that an impoverishment operation is sensitive to features α and β, distributed over two domains Δ and Ω. Because of (12) impoverishment may not take place. Now suppose that an Agree operation percolates β from Ω to Δ. As a result, both α and β are now present within Δ, rendering impoverishment possible. Thus, Agree may feed impoverishment, delaying it until Agree has taken place.

The account developed below crucially relies on impoverishment taking place in between κ- and φ-Agree and vice versa. It is thus mandatory that these are two *disjoint* Agree operations (*contra*, e.g., Chomsky 2000, 2001, who treats case and φ-agreement as reflexes of a single operation Agree).

2.5. *The order of operations*

I follow Heck & Müller (2007) and Müller (2009) in assuming that the syntactic derivation is subject to *extremely local optimization*, where every derivational step is evaluated in an optimality-theoretic fashion. Deletion of unvalued features is triggered by markedness constraints against unvalued φ- and case features, respectively, cf. (17). I assume these two constraints to be universal. One of the tenets of OT is to reduce variation among languages to differences in constraint rankings. Accordingly, I will argue below that the difference between local and global splits can ultimately be traced back to different constraint rankings.

(17) a. *[φ: __]
‘penalizes the presence of unvalued φ-features’

b. *[CASE: __]
‘penalizes the presence of unvalued case features’

If a stage in the derivation comprises both unvalued φ- and case features it is not *a priori* clear which features undergo Agree first. In such a situation the ranking between the markedness constraints in (17) is decisive.[12]

As detailed in the next two sections, it is precisely these ranking differences and their distinct interaction with impoverishment that accounts for the distinctions between local and global case splits. In a nutshell, the ranking *[CASE: __] $\gg$ *[φ: __] will result in a local case split; the inverse ranking *[φ: __] $\gg$ *[CASE: __] will give rise to a global case split.

to the standard constraints on Agree, namely phase boundedness (Chomsky 2000, 2001, 2008) and Relativized Minimality/Minimal Link Condition (Rizzi 1990; Chomsky 1995).

[11] This notation is used to highlight the claim that both case assignment and φ-agreement are instances of Agree. It is hence of expository purpose only.

[12] See Müller (2004a) and Müller (2009) for an analoguous argument based on the interaction of Merge and Agree.

$$\begin{array}{lll}
\mathrm{T}\ [\text{CASE}: \Omega,\ \ \phi: \underline{\ \ \ }\ ] & \mathrm{DP}\ [\text{CASE}: \underline{\ \ \ },\ \ \phi: \xi] & \xrightarrow{\kappa\text{-Agree}} \\
\mathrm{T}\ [\text{CASE}: \Omega,\ \ \phi: \underline{\ \ \ }\ ] & \mathrm{DP}\ [\text{CASE}: \Omega,\ \ \phi: \xi] & \xrightarrow{\text{(impoverishment)}} \\
\mathrm{T}\ [\text{CASE}: \Omega,\ \ \phi: \underline{\ \ \ }\ ] & \mathrm{DP}\ [\text{CASE}: \Omega',\ \ \phi: \xi] & \xrightarrow{\phi\text{-Agree}} \\
\mathrm{T}\ [\text{CASE}: \Omega,\ \ \phi: \xi] & \mathrm{DP}\ [\text{CASE}: \Omega',\ \ \phi: \xi] & \\
 & \Downarrow & \\
 & \text{VOCABULARY} & \\
 & \text{INSERTION} &
\end{array}$$

Fig. 1 – General derivation for local case splits

3. *Derivation of local case splits*

This section shows how the system proposed in the previous section accounts for local case splits in Hindi and Trumai.

3.1. *Hindi object marking*

3.1.1. *Deriving the case marker alternation*

As exemplified by (1) and (2) above, objects in Hindi may bear either -*ko* or -∅. Highly canonical objects – i.e., being both non-specific and non-human – bear the zero marker, to all others -*ko* is attached (Mahajan 1990; Mohanan 1994; Woolford 2001; Stiebels 2002; Lee 2003; Butt & King 2004; Anand & Nevins 2006; Keine 2007). To derive this empirical pattern, I will first illustrate how impoverishment may lead to case marking alternations by invoking a standard – viz., stipulated – impoverishment rule. I will then go on to show how impoverishment construed as the effect of constraint interaction yields a more elegant and more restrictive account of the same phenomenon.

As the point of departure, consider the system in (18). As a result of the constraint ranking in (18a), whenever a structure comprises both unvalued case and ϕ-features, case feature valuation takes place first. For the sake of exposition, suppose that T in Hindi contains both unvalued ϕ-features and the case to be assigned to the object (called 'accusative' here), which contains the subfeature [+obj] (cf. (18b)).[13] Two markers (-*ko* and -∅) compete for insertion. -*ko* outranks -∅ due to specificity. In the case of non-human, non-specific objects the impoverishment rule in (18d) applies, deleting the subfeature [+obj] and thereby bleeding insertion of -*ko*. As a result, only the elsewhere zero marker can be attached. This derivation is schematized in figure 1.[14]

[13] Nothing hinges on that particular assumption. It is, however, necessary that the case assigning head comes no later into the structure than the ϕ-probing one, as case has to be assigned first. Thus, the accusative could equally well be assigned by, e.g., *v*. There is independent evidence that the ϕ-probe in Hindi resides on T. If both subject and object are accessible (i.e., zero-marked), only the subject may control agreement, which appears to be a minimality effect.

[14] The role of ϕ-Agree in the derivation in figure 1 will become relevant in section 5.

(18) a. *Ranking*
*[CASE: ___] ≫ *[ϕ: ___]
b. *Case decomposition*
ACCUSATIVE: [+obj]
c. *Vocabulary items*
/-ko/ ↔ [+obj]
/-∅/ ↔ [ ]
d. *Impoverishment rule for objects*
[+obj] → ∅ / [–def, –hum]

Since in Hindi κ-Agree takes place before ϕ-Agree, the structural description of the impoverishment rule (18d) is met within the object domain. Impoverishment and subsequent vocabulary insertion into the case feature thus apply to the same head (the object). Consequently, the effects of impoverishment are morphologically visible on the same head that impoverishment has applied to. Therefore, the effect is *local*, giving rise to a local case split.[15]

The system in (18) derives the correct empirical pattern. However, it arguably suffers from a lack of restrictiveness. If impoverishment is stated as an explicit rule as in (18d), there is no principled reason why it should be restricted to hierarchically unmarked configurations. Thus, in the system proposed above, impoverishment may in principle equally well apply to highly marked objects alone. As a consequence, impoverishment stated as an arbitrary rule faces the considerable drawback that it does not capture the recurring generalization of virtually all case splits: Hierarchical markedness and morphological marking coincide. To derive this strong correlation, impoverishment has to be restricted in a principled fashion so as to apply to unmarked configurations alone. This is achieved if impoverishment is restricted by harmonic alignment of markedness scales, as illustrated below.

Consider the scales in (19). Harmonic alignment (13) applied to the GF and the animacy scale yields the harmony scales in (20a); application to the GF and the definiteness scales results in (20b). What, e.g., (20ai) states is that subjects are typically human and non-human subjects are marked. These markedness relations can be transformed into constraint alignments against the relevant configurations (cf. (21)). Note that the order is reversed because (21) instantiates *prohibitions* against certain configurations.

(19) a. *Animacy Scale*
$\text{Human} > \overbrace{\text{Animate} > \text{Inanimate}}^{\text{Non-Human}}$
b. *Definiteness Scale*
. . . > Specific > Non-Specific
c. *GF Scale*[16]
Subject > Object

(20) HARMONY SCALES
a. (i) Subj/Hum ≻ Subj/NHum
(ii) Obj/NHum ≻ Obj/Hum
b. (i) Subj/Spec ≻ Subj/NSpec
(ii) Obj/NSpec ≻ Obj/Spec

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

[15] An analoguous treatment can be given for the aspect-driven alternation between *-ne* and -∅ on subjects. See Keine (2007, to appear) for discussion.

[16] One might wonder how the notions ‘subject’ and ‘object’ are represented. There are several ways to accomplish that. I will assume that it is the phrase-structural environment which encodes the information about grammatical function (Chomsky 1965). ‘Subject’ can then be defined as “Spec-*v*P” and ‘direct object’ as “Comp-VP” (Chomsky 2001).

Take (21ai) as an example: There is one constraint against non-human subjects and another against human subjects. Because human subjects are less marked than non-human ones, the constraint penalizing this type of subject is ranked lower than the constraint against non-human subjects. The differences in hierarchical markedness of certain types of arguments is thus represented via different positions in constraint rankings.

LOCAL CONJUNCTION[17] applied to the constraint rankings in (21) combines the humanness and specificity properties of the objects (the subject constraints are neglected from here on as they are irrelevant for the question of object marking). This yields two-dimensional argument encoding as these constraints are specified for two properties of the object (namely, humanness and specificity). The result is the ranking in (22).

(22) 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

(22a) is a ranking of two markedness constraints. The first penalizes objects which are human and specific, the second is violated if an object is human and non-specific. Crucially, the former is ranked higher than the latter, corresponding to the difference in hierarchical markedness between the two: human and specific objects are more marked than human, non-specific ones and correspondingly violate a higher ranked constraint. The ranking in (22) can be notationally simplified as in (23).

(23) NOTATIONAL SIMPLIFICATION OF (22)
   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

Note that all the constraints in (23) are markedness constraints that penalize certain types of objects. Since I am only concerned with case marking here, (23) has to be restricted to case features. This is achieved by local conjunction with the faithfulness constraint MAX-CASE, which is violated if a case (sub)feature is deleted from input to output. This then gives the ranking of faithfulness constraints in (24).

(24) LOCAL CONJUNCTION WITH MAX-CASE
   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

---

[17] The LOCAL CONJUNCTION of C_1 and C_2 in domain D, C_1 & C_2, is violated when there is some domain of type D in which both C_1 and C_2 are violated. Universally, C_1 & $C_2 \gg C_1$, C_2 (Smolensky 1995:4).

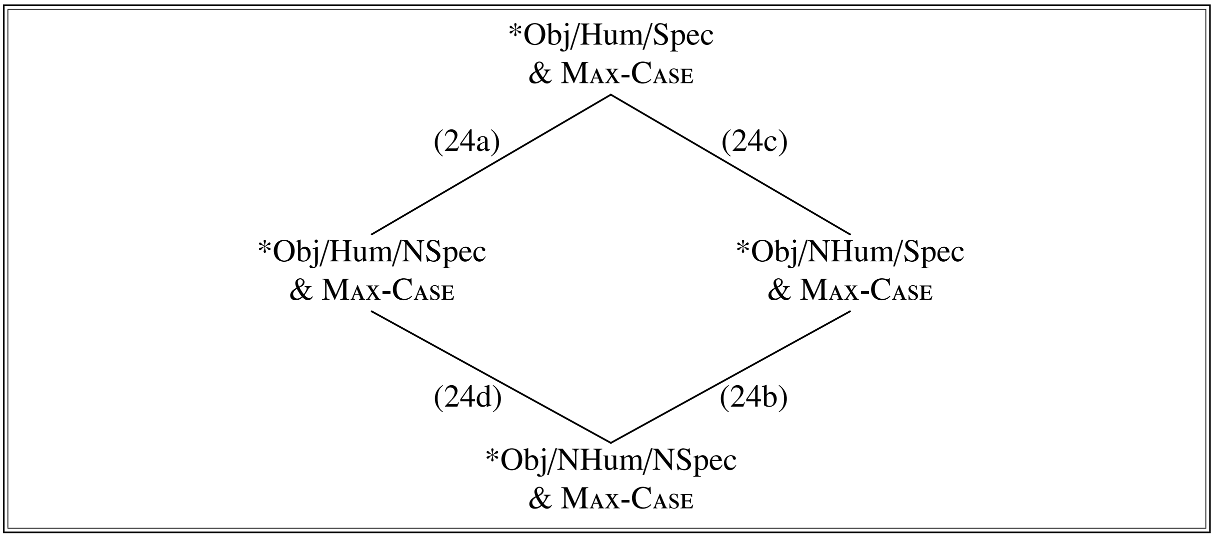

Fig. 2 – Inherent ranking of the faithfulness constraints in (24)

The ranking between these constraints is not arbitrary but fixed to a large extent. It was arrived at by general means and follows from the algorithms of harmonic alignment and local conjunction themselves. The inherent ranking relations are illustrated in figure 2, where top-down order corresponds to ranking relations. This ranking is *not* subject to cross-linguistic variation, because the mechanisms by which it is derived by their very definition impose severe restrictions on the ranking relations.

The topmost constraint in figure 2 is violated if any case feature of a human, specific object is deleted from input to output. It is crucial to note that the inherent ranking between these constraints corresponds to hierarchical markedness: Because human, specific objects are the most marked type their faithfulness constraint is ranked the highest. Conversely, since non-human, non-specific objects are the most canonical objects they have the lowest ranked constraint. **Obj/Hum/NSpec & Max-Case* and **Obj/NHum/Spec & Max-Case* are ranked between the former two constraints but not ranked with respect to each other.

In order to trigger case feature deletion (and thereby yield the effects of impoverishment) the markedness constraint (25) is inserted into the ranking in figure 2. (25) penalizes the presence of the case subfeature [+obj] within the output. The final ranking for Hindi is given in (26).

(25) *Markedness constraint triggering case feature deletion*
*[+obj]

(26) *Final ranking for Hindi*

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

The ranking in (26) has the same effect as the impoverishment rule in (18d): Non-human, non-specific objects are impoverished. However, (26) derives the fact that only canonical objects undergo impoverishment. Insertion of the markedness constraint *[+obj] establishes a cut-off point. Every object whose faithfulness constraint is ranked lower than this point is impoverished;

objects with a higher ranked faithfulness constraint remain unaltered. As noted above, the inherent ranking of the faithfulness constraints in (26) corresponds to hierarchical markedness. While the concrete insertion point of the markedness constraint *[+obj] is language-specific, the following implication is universal: If impoverishment applies to a certain type of object (i.e., if there is a markedness constraint ranked higher than the faithfulness constraint for that type of object), it also applies to all less marked types, as these types have even lower ranked faithfulness constraints (cf. (14)). The ranking in (26) thus captures the generalization that there is a strong correspondence between morphological markedness and hierarchical marking. Impoverishment of marked objects alone is impossible in this system, as desired.[18]

The competition for (1a) and (1b) is provided in (27) and (28), respectively.

(27) *Tableau for (1a)*

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

(28) *Tableau for (1b)*

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

As a consequence of (27), non-human, non-specific objects are impoverished. As outlined above, deletion of [+obj] bleeds the insertion of *-ko*, leading to zero case exponence.

To summarize, in this section I have illustrated on the basis of Hindi how the system proposed here accounts for local case splits. The proposal identifies impoverishment as the source of the case marker alternation. Impoverishment is viewed as being triggered by the interaction of faithfulness and markedness constraints. Restrictions on impoverishment are imposed as restrictions on possible constraint rankings. Harmonic alignment of markedness scales provides a general means to limit constraint rankings and is therefore capable of confining impoverishment to adhere to (14). Impoverishment thus conceived derives the empirical observation (9a). Local splits are the result of κ-Agree taking place before ϕ-Agree due to the ranking in (18a). Hence, impoverishment affects the object, into which, at a later stage in the derivation, the case marker is inserted. Case feature impoverishment therefore has local effects in Hindi.

3.2. *Differential object marking in Trumai*

The present analysis attributes differential case marking to impoverishment rather than a total deletion of a DP's case (as, e.g., in Aissen's 1999, 2003 approach). Given the independently motivated assumption that case features are composed of smaller subfeatures, impoverishment

[18] One might rightfully object that this pattern *could* be derived after all if (23) is conjoined with the markedness constraint (25) and MAX-CASE is inserted into this ranking. The present analysis inherits this problem from Aissen (1999, 2003), who is forced to rule it out by stipulation. I have nothing illuminating to say about this puzzle.

may in principle only delete some of the subfeatures, leaving others intact for vocabulary insertion. Under this view, instead of being restricted to zero/non-zero alternations, we expect differential case marking to also involve two *overt* markers. In addition, if impoverishment is brought about by markedness constraints against certain case subfeatures, several such markedness constraints may be inserted into one ranking of faithfulness constraints, leading to several impoverishment steps. The result is a system with more than two alternants. As I will demonstrate on the basis of Trumai, these properties of the analysis account for generalization (9b).

The scales conditioning object case marking in the Trumai data in (3) are the ones in (29).

(29) a. *Individuation scale*
Ind(ividuated) > Non-ind(ividuated)
b. *Prominence scale*
X > x
c. *GF scale*
Subject > Object

The general derivation of the ranking for Trumai proceeds along the same lines as in Hindi above. Harmonic alignment plus local conjunction with Max-Case yields an inherent ranking of faithfulness constraints into which *two* markedness constraints (*[+obl] and *[+obj]) are inserted, conforming to the two alternation steps in (3). The final ranking is given in (30).

(30) *Ranking for Trumai*

$$\text{*Obj/Ind/X \& M{\scriptsize AX}-C{\scriptsize ASE}} \gg \text{*[+obl]} \gg \left\{ \begin{array}{l} \text{*Obj/Ind/x \& M{\scriptsize AX}-C{\scriptsize ASE},} \\ \text{*Obj/Non-ind/X \& M{\scriptsize AX}-C{\scriptsize ASE}} \end{array} \right\}$$
$$\gg \text{*[+obj]} \gg \text{*Obj/Non-ind/x \& M{\scriptsize AX}-C{\scriptsize ASE}}$$

The decomposed dative is provided in (31); the three markers under consideration are specified as in (32).

(31) *Case decomposition*

$$\text{D{\scriptsize ATIVE}:} \begin{bmatrix} \text{+obl} \\ \text{–subj} \\ \text{+obj} \end{bmatrix}$$

(32) *Marker specification*

/-(V)tl/ ↔ [+obl, –subj, +obj]
/-ki/ ↔ [–subj, +obj]
/-(V)s/ ↔ [–subj]

This system has the following effect: Highly non-canonical objects have a high ranked faithfulness constraint that outranks both markedness constraints. Hence, the full dative case is retained and subsequently realized by the most specific marker *-(V)tl*. Less marked but still non-canonical objects have a lower ranked faithfulness constraint which is ranked lower than *[+obl] but still higher than *[+obj]. Consequently, *-(V)tl* cannot be inserted. Rather, the more general *-ki* is attached to these objects. Lastly, the faithfulness constraint of highly canonical objects is ranked in the lowermost position, i.e. below both markedness constraints. Therefore, impoverishment of two subfeatures takes place, leaving only the still more general marker *-(V)s* to be attached.

In this section I have shown that an approach to case splits based on impoverishment derives observation (9b), i.e., the fact that more than two markers may enter into the alternation.[19]

[19] For additional argumentation as well as an application of this idea to various other local case splits, the reader is referred to Keine & Müller (2008, 2009).

The next section will show how local impoverishment accounts for global case splits by merely changing the order of the Agree operations.

4. Derivation of global case splits

The empirical considerations in section 1 led to the conclusion that global and local case splits adhere to the same empirical generalizations. Given that an account based on impoverishment derives these properties (section 3), it is desirable to extend the analysis to global splits as well.

Global splits, at first glance, seem to make necessary global impoverishment, operating on larger chunks of (possibly non-adjacent) structure. To take Yurok as an example, the subject's ϕ-features are never present on the object (there is no independently motivated Agree operation between the two arguments, these ϕ-features are never overtly realized on the object, etc.), impoverishment appears to affect the object's case features in the presence of subject properties. Such a global characterization of impoverishment would, however, tremendously increase its power. Furthermore, it messes up the whole system as *any* feature in the structure could lead to impoverishment of *any* other feature in the structure, predicting a whole range of interaction that is not attested. To escape this undesirable conclusion I will stick to (12), which entails that impoverishment takes place on a head other than the object, comprising all the relevant features. This head, I will assume, is T. As the morphological effect of this impoverishment operation shows up on the object, some mechanism is called for that percolates the information that impoverishment has taken place (i.e. the impoverished features matrix) to another head. This mechanism, I submit, will be ϕ-Agree.

In a nutshell, the account for global splits to be elaborated in this section makes the followings claims. Local and global splits involve the same operations (Agree and impoverishment) but a different order between them: While in the case of local splits impoverishment *follows* case assignment, it *precedes* case assignment in global splits. This difference in the application of operations is not directly stated but follows from a ranking difference between the markedness constraints against unvalued case features on the one hand and unvalued ϕ-features on the other.

Thus, from the present perspective a strictly local impoverishment operation may appear to apply to a much larger domain if its interaction with Agree leads to *spreading* of its effects. As a consequence of such spreading, the morphological effects of impoverishment may show up on another head than impoverishment has applied to. In a nutshell, an apparent global operation reduces to the effects of an early local one.

4.1. Yurok

As illustrated by (4) above, objects in Yurok bear the marker *-ac* if they are 1^{st} or 2^{nd} person and the subject is 3^{rd} person. Otherwise, they receive no overt case marking. Verbal agreement in (4) makes it clear that the verb agrees with both subject and object for ϕ-features. There is thus evidence that the person feature of the subject is represented within the verbal domain, by assumption on T. It can hence trigger case feature impoverishment on T, in conformity with the locality condition (12).

$$\mathrm{DP}_1\begin{bmatrix}\text{CASE}: \_\_ \\ \phi:\xi\end{bmatrix}\quad \mathrm{T}\left[\begin{bmatrix}\text{CASE}_1:\Psi\\ \phi_1: \_\_\end{bmatrix}\begin{bmatrix}\text{CASE}_2:\Omega\\ \phi_2:\_\_\end{bmatrix}\right]\quad \mathrm{DP}_2\begin{bmatrix}\text{CASE}: \_\_\\ \phi:\eta\end{bmatrix} \xrightarrow{\phi\text{-Agree}}$$

$$\mathrm{DP}_1\begin{bmatrix}\text{CASE}: \_\_ \\ \phi:\xi\end{bmatrix}\quad \mathrm{T}\left[\begin{bmatrix}\text{CASE}_1:\Psi\\ \phi_1: \xi\end{bmatrix}\begin{bmatrix}\text{CASE}_2:\Omega\\ \phi_2:\eta\end{bmatrix}\right]\quad \mathrm{DP}_2\begin{bmatrix}\text{CASE}: \_\_\\ \phi:\eta\end{bmatrix} \xrightarrow{\text{(impoverishment)}}$$

$$\mathrm{DP}_1\begin{bmatrix}\text{CASE}: \_\_ \\ \phi:\xi\end{bmatrix}\quad \mathrm{T}\left[\begin{bmatrix}\text{CASE}_1:\Psi'\\ \phi_1: \xi\end{bmatrix}\begin{bmatrix}\text{CASE}_2:\Omega'\\ \phi_2:\eta\end{bmatrix}\right]\quad \mathrm{DP}_2\begin{bmatrix}\text{CASE}: \_\_\\ \phi:\eta\end{bmatrix} \xrightarrow{\kappa\text{-Agree}}$$

$$\begin{array}{c}\mathrm{DP}_1\begin{bmatrix}\text{CASE}: \Psi' \\ \phi:\xi\end{bmatrix}\\ \Downarrow \\ \text{VOCABULARY}\\ \text{INSERTION}\end{array}\quad \mathrm{T}\left[\begin{bmatrix}\text{CASE}_1:\Psi'\\ \phi_1: \xi\end{bmatrix}\begin{bmatrix}\text{CASE}_2:\Omega'\\ \phi_2:\eta\end{bmatrix}\right]\quad \begin{array}{c}\mathrm{DP}_2\begin{bmatrix}\text{CASE}: \Omega'\\ \phi:\eta\end{bmatrix}\\ \Downarrow \\ \text{VOCABULARY}\\ \text{INSERTION}\end{array}$$

Fig. 3 – General derivation for global case splits

The crucial assumption is that the ranking between the constraints *[CASE: __] and *[ϕ: __] in Yurok differs from Hindi – the latter constraint is ranked higher than the former (cf. (33)).

(33) *Ranking for global case splits*
*[ϕ: __] $\gg$ *[CASE: __]

This ranking leads to the general derivation in figure 3, which is identical for all instances of global case splits. For reasons to be discussed immediately, I assume that the verbal ϕ-probes and the case features to be assigned to subject and object all reside on a single head, T.
The derivation in figure 3 proceeds as follows: If a stage in the derivation comprises both unvalued ϕ- and case features, ϕ-Agree takes place first due to the ranking in (33). As a consequence, T contains both the (still unassigned) case features and the ϕ-features of the verb's arguments. ϕ-feature driven impoverishment of case features may then apply locally on T, affecting the case feature in certain configurations. Crucially, since both the subject's and the object's ϕ- and case features are present on a single head, nothing prevents impoverishment from affecting the *subject's* case feature in the context of the *object's* ϕ-features (or the reverse). Subsequently, the case features are assigned (via Agree) to the verbal arguments and realized by marker insertion. Since vocabulary insertion is sensitive to whether impoverishment has taken place or not, impoverishment on the verb may indirectly influence marker insertion into the verbal argument. The result is an apparently global case split. Under the present account, however, the mechanisms leading to this type of split are as local as the 'standard' splits observed in Hindi above.

To illustrate this abstract derivation for the Yurok examples in (4), suppose the system in (35). Based on the scales in (34), harmonic alignment and local conjunction along the lines illustrated for Hindi above give rise to the ranking in (35c), the complex constraints of which make reference to subject and object properties. Into this ranking the markedness constraint *[–subj] is inserted, yielding deletion in all configurations associated with a lower ranked faithfulness constraint.

Notice incidentally that the impoverishment operation (35c) has to apply if the object is 3rd person *or* the subject is 1st/2nd. These contexts arguably do not form a natural class. What they have in common is that they constitute canonical configurations. If stated as an arbitrary rule, impoverishment would have to involve a disjunction or negation, which is generally considered undesirable. By contrast, if impoverishment follows from harmonic alignment of markedness scales, no disjunction needs to be employed: Impoverishment applies to all configurations that are less marked than a certain point established by insertion of a markedness constraint.

(34) a. *Person Scale*[20]

$$\overbrace{1 > 2}^{\text{Local}} > \overbrace{3}^{\text{Non-local}}$$

b. *Grammatical Function Scale*
Subject > Object

(35) a. *Case subfeatures*

NOMINATIVE: $\begin{bmatrix} -\text{obl} \\ +\text{subj} \end{bmatrix}$ OBJECTIVE: $\begin{bmatrix} -\text{obl} \\ -\text{subj} \end{bmatrix}$

b. *Markers*
/-ac/ ↔ [–obl,–subj] /-∅/ ↔ [ ]

c. *Ranking for Yurok*
*Subj/NLoc & *Obj/Loc & MAX-CASE ≫ *[–subj]

$$\gg \left\{ \begin{array}{l} \text{*Subj/NLoc \& *Obj/NLoc \& Max-Case} \\ \text{*Subj/Loc \& *Obj/Loc \& Max-Case} \\ \text{*Subj/Loc \& *Obj/NLoc \& Max-Case} \end{array} \right\}$$

$$\left(\rightsquigarrow \begin{array}{l} \text{Rule-based notation:} \\ [-\text{subj}] \rightarrow \varnothing / \ [\text{Subj: Loc}] \vee [\text{Obj: NLoc}] \end{array} \right)$$

This system gives rise to the following derivations:[21] Consider (4a) first. As soon as T is merged, the structure comprises unvalued ϕ-probes and case features that can be assigned to the verbal arguments. Because of the ranking in (33), ϕ-Agree applies first. As a consequence, the subject's 2nd person feature is represented on T, allowing (35c) to apply, and thus yielding impoverishment of the objective case from $\begin{bmatrix} -\text{obl} \\ -\text{subj} \end{bmatrix}$ to [–obl]. At the next step, κ-Agree applies, furnishing the object with [–obl]. Since the case marker *-ac* does not fulfill the Subset Principle, the object is zero marked.

In contrast, recall (4b). Again, ϕ-agreement copies the subject's person feature onto T. But since in this case it is 3rd rather than 2nd person, the context of impoverishment (35c) is not met. This yields assignment of the full case feature $\begin{bmatrix} -\text{obl} \\ -\text{subj} \end{bmatrix}$ to the object, where the marker *-ac* is inserted.

Notice that this system only works properly if the subject contributes its ϕ-features *before* case is assigned to the object. To ensure that this is always the case, I have made the assumption

[20] For the sake of simplicity, I assume that 1st and 2nd person form a natural class. However, nothing hinges on that assumption.

[21] In order for impoverishment to apply correctly, the ϕ-features of subject and object have to be distinguished on the verb. This is uncontroversial as marker insertion is sensitive to this distinction as well. To take an example, the marker for 3SG>1SG configurations is *-peʔn*. 1SG>3SG configurations, on the other hand, are marked with *-sek'* (Robins 1958:70). There is thus independent evidence that this association is represented on the verb in any case.

that case features and ϕ-probes are contained on T, which is merged only after the subject is brought into the structure.[22]

4.2. Umatilla Sahaptin

The global split in Umatilla Sahaptin, exemplified by (5), may be reduced to the general derivation in figure 3 as well. Recall that in Umatilla Sahaptin the subject is marked with *-nɨm* if it is 3rd person singular and the object is 1st or 2nd person. In all other cases, the subject is zero marked. This distribution is schematized in (36).

(36) *Conditions for subject case markers*

a. /-nɨm/ ↔ [SUBJ=3SG] ∧ [OBJ=1/2]

b. $/\text{-}\varnothing/ \leftrightarrow \left\{ \begin{array}{c} [\textsc{obj}=3] \\ \vee \\ [\textsc{subj}=1/2] \\ \vee \\ [\textsc{subj}=\textsc{pl}] \end{array} \right.$

As in Yurok, in transitive clauses the verb agrees with both the subject and the object: 3rd person subject and object agreement is instantiated as a verbal prefix, 1st/2nd person agreement as a second position enclitic. I assume that both instances of agreement are local enough to trigger case feature impoverishment on the verb, i.e. that both are within the verbal domain.

As in Yurok, it is verbal ϕ-agreement rather than the DP's ϕ-features themselves that lead to impoverishment. Ditransitives in Umatilla Sahaptin provide evidence that this is correct, cf. (37).

(37) *x̣ʷɨsaat-nɨm=naš i-ní-ya ináy k'úsi*
old.man-INV.ERG=1SG 3NOM-give-PST me horse
'The old man gave me a horse.' (Rigsby & Rude 1996:674)

There are two objects present in (37). Only one of them – the indirect object *ináy* 'me' – triggers verbal agreement. Strikingly, it is only this object that matters with regard to the case marker on the subject. If *k'úsi* 'horse' was relevant we would expect zero case marking on the subject (this being a [3>3] configuration). The present analysis thus straightforwardly correlates the asymmetry between both objects with respect to the subject's case marking to the independently observed fact that there exists an asymmetry regarding ϕ-agreement. This suggests that it is indeed the ϕ-features on the verb that lead to impoverishment.

Because 3rd person subjects and 1st/2nd person objects are hierarchically marked it is no coincidence that this configuration receives morphological marking. However, there seems to

[22] Other possibilities exist as well: First, if reprojection is assumed within the verbal domain and features are ordered on the verb (Müller 2010), they may only be accessible after V has reached a position c-commanding the subject. Second, one might adhere to the claim that Agree and impoverishment take place post-syntactically (see Bobaljik 2008 for a recent proposal along these lines). Since merging the subject is a syntactic operation, Agree takes then place after the subject has been integrated. Since nothing hinges on a choice, I will stick to the view that T is all-powerful here.

be one inconsistency: the number condition in (36). Plural subjects are generally treated as *more* marked than singular subjects (the number scale being 'SINGULAR > PLURAL'). It is therefore unclear why 3SG subjects can be marked with *-nɨm* but (hierarchically more marked) 3PL subjects cannot. To solve this apparent paradox, I assume that the number property is not derived by scales but that the marker *-nɨm* is idiosyncratically specified for [NUM: –PL] and can thus never be attached to plural subjects. This is supported by the observation that only number of the *subject* is relevant (which can be locally determined), thus contrasting with the person features (where both subject and object matter).

Having thus excluded the relevance of the number property, the final ranking for Umatilla Sahaptin is basically identical to that of Yurok above. The only difference between the two languages is that in Yurok the case to be assigned to the object is impoverished while in Umatilla Sahaptin it is the subject's case feature.

(38) a. *Case subfeatures*

$$\text{ERGATIVE: } \begin{bmatrix} \text{–obl} \\ \text{+subj} \end{bmatrix}$$

b. *Markers*

$$\text{/-nɨm/} \leftrightarrow \begin{bmatrix} \begin{bmatrix} \text{–obl} \\ \text{+subj} \end{bmatrix} \\ [\text{NUM: –PL}] \end{bmatrix} \qquad\qquad \text{/-}\varnothing\text{/} \leftrightarrow [\quad]$$

c. *Ranking for Umatilla Sahaptin*

$$\text{*Subj/NLoc \& *Obj/Loc \& Max-Case} \gg \text{*[+subj]}$$
$$\gg \left\{ \begin{array}{l} \text{*Subj/NLoc \& *Obj/NLoc \& Max-Case} \\ \text{*Subj/Loc \& *Obj/Loc \& Max-Case} \\ \text{*Subj/Loc \& *Obj/NLoc \& Max-Case} \end{array} \right\}$$

$$\left(\rightsquigarrow \begin{array}{l} \text{Rule-based notation:} \\ \text{[+subj]} \rightarrow \varnothing\text{/ [Subj: Loc]} \vee \text{[Obj: NLoc]} \end{array} \right)$$

The relevant derivations for Umatilla Sahaptin are identical to Yurok above: As a first step, ϕ-Agree applies. As a result, the context of case feature impoverishment (38c) is met on T. Next, the case features are assigned to the respective arguments and vocabulary insertion takes place. Depending on whether impoverishment has applied on the verb, a different case marker is attached. Again, the crucial point of the analysis is that Agree and impoverishment may interact. Due to subsequent Agree, local impoverishment may manifest itself in an apparently global way. In summary, I have proposed a local account for an apparently global case alternation in Yurok and Umatilla Sahaptin. Under this analysis, impoverishment applies strictly locally; the only operation involving more than one head is Agree, which is independently needed.

For reasons of space, I will refrain from an implementation of the more complex data found in Kolyma Yukaghir although they are fully in line with the principles and mechanisms adopted here. For an application of the present theory to Kolyma Yukaghir, see Keine (to appear).

5. A prediction: Case splits and verbal agreement

The system presented here – unequivocally reducing case splits to impoverishment and asserting that only the order of operations may differ – makes an interesting prediction concerning the sensitivity of verbal ϕ-agreement to the two types of splits.

Consider local splits first. As shown in figure 1, ϕ-Agree takes place *after* case feature impoverishment on the object. This order of operations gives rise to the possibility that impoverishment indirectly affects ϕ-agreement: Since the information whether impoverishment has applied or not is represented on the object at this point of the derivation, ϕ-Agree might in principle be sensitive to it. This prediction is indeed borne out for Hindi. As illustrated in (39a), zero marked objects may trigger verbal agreement. Objects bearing *-ko*, on the other hand, never control verbal agreement. This is shown in (39b).

(39) a. *ravii-ne roṭii k^haayii*
Ravi.MASC-ERG bread.FEM.NOM eat.PERF.FEM.SG
'Ravi ate bread.'
b. *ila-ne roṭii-ko uṭ^haayaa*
Ila.FEM-ERG bread.FEM-ACC lift.PERF.MASC
'Ila picked up the bread.' (Mohanan 1994:90,103)

To see how the present analysis might account for the sensitivity of ϕ-agreement to impoverishment, suppose that, at least in Hindi, [+obj] constitutes a case shell, thereby insulating the DP's ϕ-features from a ϕ-probe. This is formulated in (40).

(40) CASE OPACITY[23]
The case subfeature [+obj] shields a DP from triggering verbal agreement.

If impoverishment has not applied the DP contains the case feature $\begin{bmatrix}-\text{obl}\\+\text{obj}\end{bmatrix}$. Due to the presence of [+obj] this DP is inaccessible to a verbal ϕ-probe. By contrast, objects to which impoverishment has applied bear the case feature [–obl]. Since [+obj] has been deleted, the DP is transparent for verbal ϕ-probing and may hence control agreement.[24]

Turning to global splits, it is an essential property of the derivation depicted in figure 3 that impoverishment takes place *after* ϕ-Agree. Consequently, ϕ-agreement may not be sensitive to a distinction that is only later introduced into the structure. The present account therefore makes the falsifiable prediction that for global splits verbal agreement may *not* distinguish between zero and non-zero marked arguments.

The prediction cannot be tested for Yurok, which has portmanteau agreement morphemes. It is borne out for Umatilla Sahaptin and Kolyma Yukaghir: In Sahaptin, the subject *ɨwínš(-nɨm)* 'man(-INV.ERG)' in (5) triggers the same type of agreement (*i-* '3NOM'), regardless of its case

[23] Schütze (1997) and Rezac (2006, 2008) make similar proposals for θ-related case. Also see Sigurðsson (2004).

[24] Under this perspective, it is neither abstract case nor m-case (i.e. the morphological exponent) that is relevant for verbal agreement (cf. Bobaljik 2008 for a proposal based on m-case and Legate 2008 for a recent defense of the abstract case view). Rather, (potentially) impoverished feature matrices constitute the input for agreement. This view is of course only tenable under the present assumption that Agree and impoverishment may interact.

marking. Likewise, in (7) from Yukaghir, the object never controls verbal agreement, regardless of the case marker it bears.

It is an interesting state of affairs that, although the present analysis attributes local and global case splits to the same mechanism, it nevertheless predicts these splits to systematically differ with regard to verbal agreement.

6. Conclusion and outlook

In this article I have proposed a unified account of local and global case splits. The crucial ingredient of the analysis is that impoverishment and Agree are not extrinsically ordered but may affect each other. Specifically, Agree may percolate the effects of strictly local case-impoverishment operations, leading to a seemingly global operation. Differences between local and global case splits reduce to differences in constraint ranking. A second component of this analysis is that impoverishment is systematically constrained by harmonic alignment of markedness scales. These principled restrictions on impoverishment capture the striking similarity of both local and global splits: morphological marking corresponds to hierarchical markedness. Impoverishment is thus considered functionally motivated and constrained.

The present account is empirically motivated by the observation that, cross-linguistically, local and global case splits exhibit the same properties, which are fairly straightforwardly captured in an impoverishment-based system. The two hallmark features of case splits are that, first, the morphological markedness of the exponents taking part in the alternation correlates with hierarchical markedness and, second, alternations may involve more than one overt marker and a principally arbitrary number of exponents.

It is worth bearing in mind that the two main claims advocated here – (i) impoverishment and Agree interact, and (ii) impoverishment results from harmonic alignment of scales – are not logically connected and thus largely independent. The matter is an empirical one, with case splits serving as a rather direct argument for this particular combination of assumptions.

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