Hierarchy-Based Competition

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1 Introduction

In a number of genetically unrelated languages, certain types of verbal agreement are not tied to specific grammatical roles like subject and object. Agreement is instead with the argument which ranks higher on a prominence hierarchy. For example in the Khiranti language Dumi, intransitive verbs consistently show person and number agreement with the subject:[1]

(1)   Dumi Intransitive Verb Forms

      a.   *phɨkh-ɨ*   '**we (two, exc.)** got up' (p. 97)
           get:up-[+1-2+du]

      b.   *a-phɨkh-i*   '**you (two)** got up' (p. 97)
           MS-get:up-[+du]

      c.   *phɨkh-a*   '**he** got up' (p. 97)
           get:up-[-du]

However, in transitive predications agreement is with the argument (subject or object) which is higher on the prominence hierarchy $1 > 2 > 3$. Thus, if one argument is 1st person we find the same agreement suffixes as in intransitive 1st person

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[1] All Dumi data are from van Driem (1993). The "marked scenario affix *a-*, glossed here MS, occurs in "all scenarios involving a first or second person actant except those with a first person agent or subject (van Driem, 1993:123)." See section 3.2 and Trommer (2002b) for discussion. Other abbreviations used in the text and the glosses are: 1(st person), 2(nd person), 3(rd person), agr(eement) an(imate), acc(usative), asp(ect), cl(itic), du(al), d(irection marker), erg(ative), pauc(al), pl(ural), p(erson), per(son), pres(ent tense), nom(inative), num(ber), AgrO = object agreement, AgrS = subject agreement, NPast = Non-Past, sg = singular, SPer = subject person. Boldface is used in examples and glosses to identify relevant agreement affixes and to indicate how arguments correspond to affixes.

forms (2), and if a 2nd and a 3rd person argument cooccur, 2nd person agreement is found ((3), 1→ 2 denotes 1st person subject and 3rd person object):[2]

(2) Dumi Transitive 1→ 2, 2 → 1 Forms

 a. *du:khuts-ɨ*   '**we (two,exc.)** saw you (two)' (p. 107)
  see-[+1-2+du]
 b. *a-du:khuts-ɨ*   'you (two) saw **us (two,exc.)**' (p. 108)
  MS-see-[+1+2+du]

(3) Dumi Transitive 1→ 3, 3 → 1 Forms

 a. *du:khuts-ɨ*   '**we (two,exc.)** saw them (two)' (p. 107)
  see-[+1-2+du]
 b. *a-du:khuts-ɨ*   'they (two) saw **us (two,exc.)**' (p. 108)
  MS-see-[+1+2+du]

(4) Dumi Transitive 2 → 3, 3 → 2 Forms

 a. *a-du:khust-i*   '**you (two)** saw them (two)' (p. 107)
  MS-see-[+du]
 b. *a-du:khust-i*   'they (two) saw **you (two)**' (p. 108)
  MS-see-[+du]

I call this phenomenon "hierarchy-based competition" (HBC) since in these languages there is no general prohibition against agreement with specific types of arguments. Thus, Dumi verbs *do* agree with 3rd person arguments as long as the other argument is not a better competitor (i.e. first or second person) or if there is no other argument, as in intransitive predications. But while each argument competes for agreement, only the one which is highest on the relevant hierarchy wins. Hierarchy-based competition in this sense raises three basic theoretical questions:

- What restricts agreement to one argument, i.e., why is there not simply agreement with both?

- How is HBC related to feature hierarchies and a general theory of feature hierarchy effects?

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[2]Note that the marked scenario affix disambiguates some ((2) and (3)), but not all of these forms (4).

- How can we account for crosslinguistic variation in HBC?

In this paper I will argue that these questions should be answered on the assumption of universal, ranked and violable constraints as in Optimality Theory (OT, Prince and Smolensky, 1993; McCarthy and Prince, 1994, 1995). In section 2, I introduce the theoretical framework I assume. In section 3, I show that the restriction of agreement to one argument can be derived as the effect of an independently motivated family of constraints, which bans index changes in single word forms. In section 4, I introduce a general theory of the relation between prominence hierarchies and the constraints implementing HBC. I show that this account is superior to approaches which invoke feature hierarchies directly (not mediated by constraints) since it allows to account for crosslinguistic variation in the domains of competition as well as in the interaction of different prominence hierarchies, and also extends straightforwardly to cases where the one-argument restriction is violated. Section 5 discusses the interaction of person and number hierarchies, and section 6 treats apparent cases of "reversed hierarchy" effects. Finally, in section 7, I show that the account carries over to other types of hierarchy-based phenomena such as direction marking and case competition in free relative constructions.
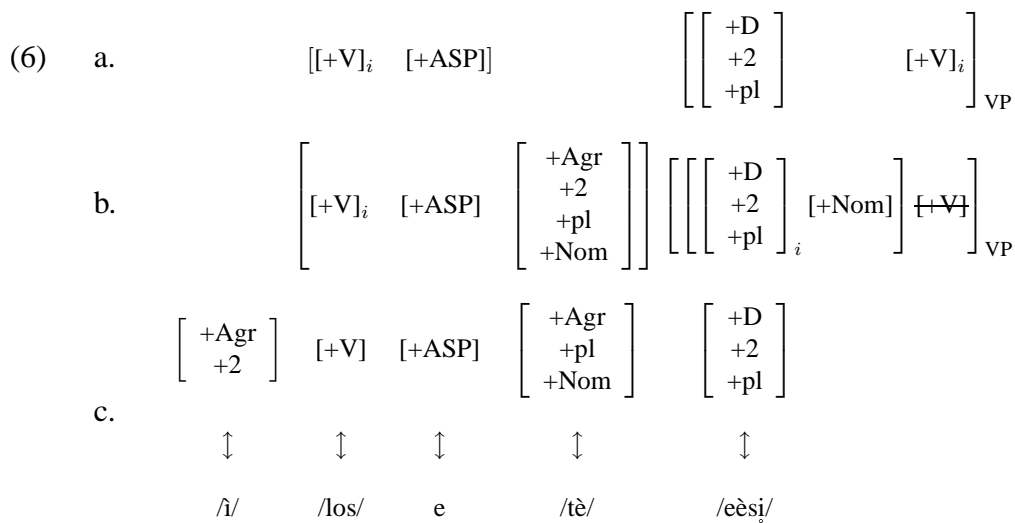
2   The Theoretical Framework

The model I assume in this paper is a constraint-based, modular adaptation of Distributed Morphology (DM, Halle and Marantz, 1993). I call this model *Distributed Optimality* since it is based on the assumption of different morphosyntactic components (see Trommer, 2002d, for details), all mapping specific inputs to outputs according to the principles of Optimality Theory (OT, Prince and Smolensky, 1993; McCarthy and Prince, 1994, 1995). More specifically, I assume that morphosyntax involves the following three modules:

(5)   a.   Syntax (lexical Items $\Rightarrow$ syntactic chains)
       b.   Chain Interpretation (syntactic chains $\Rightarrow$ single heads)
       c.   Head Interpretation (heads $\Rightarrow$ vocabulary items)

The Syntax component creates abstract syntactic representations which contain neither agreement nor case affixes (while chains might be assigned abstract case). Crucially, Syntax creates chains from lexical items.

Chain Interpretation maps chains onto single heads (put another way, traces, i.e., copies produced by movement are eliminated) and adds (abstract) case and agreement heads. This comprises the part of morphology that depends in some way on the structure of chains and non-local parts of phrase structure. As Syntax, this module does not involve phonological features.

Finally, in Head Interpretation, the abstract heads from Chain Interpretation are mapped to Vocabulary Items , This step corresponds to Vocabulary Insertion in DM. (6) illustrates the model for the Turkana sentence *ìlosetè eèsị̀*, 'you (pl.) will go' (p. 122)[3]:

(6) a.
$$[[+V]_i \quad [+ASP]] \qquad \left[\begin{bmatrix} +D \\ +2 \\ +pl \end{bmatrix} \qquad [+V]_i \right]_{VP}$$

b.
$$\left[[+V]_i \quad [+ASP] \quad \begin{bmatrix} +Agr \\ +2 \\ +pl \\ +Nom \end{bmatrix}\right] \left[\left[\left[\begin{bmatrix} +D \\ +2 \\ +pl \end{bmatrix}_i [+Nom]\right] \cancel{[+V]} \right]_{VP}\right]$$

c.
$$\begin{bmatrix} +Agr \\ +2 \end{bmatrix} \quad [+V] \quad [+ASP] \quad \begin{bmatrix} +Agr \\ +pl \\ +Nom \end{bmatrix} \quad \begin{bmatrix} +D \\ +2 \\ +pl \end{bmatrix}$$

$$\updownarrow \qquad \updownarrow \qquad \updownarrow \qquad \updownarrow \qquad \updownarrow$$

/ì/   /los/   e   /tè/   /eèsị̀/

Syntax generates the representation in (6a.). There is a chain comprising the verb ([+V]) adjoined to ASP and its base position in the VP. Chain Interpretation maps this chain onto (6b.), where the chain is reduced to the single head in ASP. A [+Nom] head is added to the subject pronoun, and an agreement head is adjoined to V which copies the features of ([+D]) and the case morpheme. Copying case features to [+Agr] heads is the mechanism I will assume here to differentiate between subject ([+Agr +Nom]) and object agreement ([+Agr +Acc]) (cf. Halle and Marantz, 1993)[4]. Since I will not be concerned here with the structure of case systems, I will use [+Nom] and [+Acc] as shorthands for subject and object agreement, even for languages which show no overt case morphology on DPs (such as Menominee) or ergative case marking (such as Dumi). The case of Warlpiri

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[3]All page numbers for Turkana data refer to Dimmendaal (1983).

[4]Anderson (1992) differentiates subject and object agreement confi gurationally: transitive object agreement is more embedded than subject agreement.

where agreement/pronominal clitics follow a nominative/accusative pattern while case marking itself is ergative/absolutive shows that the assumption of [+Nom] and [+Acc] might ultimately be justified even in ergative languages.

Finally, at Head Interpretation, the heads are interpreted by the vocabulary items $/\hat{} ı/ \leftrightarrow \left[\begin{smallmatrix} +\text{Agr} \\ +2 \end{smallmatrix} \right]$, /los/ $\leftrightarrow$ [+V] , etc., which contain underspecified morphosyntactic feature bundles as "insertion" restrictions and associate these with phonological strings. Note that not all heads are spelled out by vocabulary items, while others are realized by more than one. Thus [+Nom] is simply not realized morphologically, and the agreement head is spelled out discontinuously by $/\hat{} ı/$ and /t`e/. The order of the vocabulary items is only partially determined by the syntactic configuration. The order of agreement affixes is crucially determined by the ranking of universal alignment constraints (Trommer, 2001, 2002c) which require that in subject agreement person features are maximally leftwards (L ↫ [PER]) and number features maximally rightwards ([NUM] ⇨ R).

The application domains of constraint evaluation at Head Interpretation are chunks called *spell-out domains*. These include a lexical head and all of the associated string-adjacent functional heads, and correspond roughly to the traditional notion of a word form. In (6) there are two spell-out domains, the first comprises the verb, Asp and agreement and the second the pronoun and the case head.
(7) illustrates schematically the evaluation process for the slightly simplified verbal complex and some relevant constraints:

(7)   **Input:** $[+V]_1$ $[+I]_2$ $[+2 +pl]_3$

	PARSE [F]	L ↫ [PER]	[NUM] ⇨ R
$[+V]_1$ $[+I]_2$	*!*		
$[+2]_3$ $[+V]_1$ $[+I]_2$	*!		
☞ $[+2]_3$ $[+V]_1$ $[+I]_2$ $[+pl]_3$			
$[+pl]_3$ $[+I]_2$ $[+V]_1$ $[+2]_3$		*!**	***

PARSE [F] is violated by each feature from the input that is not realized in the output (+pl, +2, etc.), and the alignment constraints by each VI that intervenes between the designated feature and the left (L ↫ [PER]) or the right ([NUM] ⇨ R) edge of the spell-out domain. Indices indicate which VI corresponds to which input head. Violations are depicted by stars.

Following the principles of OT, that candidate is optimal (indicated by ☞) which induces the least serious constraint violations. In (7), this is $[+2]_3$ $[+V]_1$

$[+I]_2$ $[+pl]_3$ because it does not violate any constraints. However, even optimal candidates must not be perfect, as long as they induce less serious constraint violations as all other candidates. Thus in Turkana 1pl forms, such as *kì-los-ì*, 1pl-go-ASP, 'we go', there is no separate 1st person vocabulary item available. Now, positioning the 1pl marker *kì* violates either L ↫ [PER] or [NUM] ↬ R. Since L ↫ [PER] is ranked higher, violation of [NUM] ↬ R is tolerated:

(8) **Input:** $[+V]_1$ $[+I]_2$ $[+1 +pl]_3$

	PARSE [F]	L ↫ [PER]	[NUM] ↬ R
$[+V]_1$ $[+I]_2$	*!*		
☞ $[+1+pl]_3$ $[+V]_1$ $[+I]_2$			**
$[+V]_1$ $[+I]_2$ $[+1+pl]_3$		*!*	

3 Deriving the One-Argument Restriction

Phenomena similar to the one-argument restriction in Dumi play a prominent role in previous approaches to inflectional morphology. Thus Anderson (1982) treats the fact that Potawatomi[5] allows only one agreement prefix for subject and object agreement by disjunctively ordered spell-out rules. Halle and Marantz (1993) treat the same set of facts by assuming a fusion operation which merges the corresponding syntactic heads into one and consequently allows to insert only one vocabulary item.[6] What these mechanisms have in common is that their only motivation is to account for facts similar to the one-argument restriction. What I will do in this section is to derive the same effect by independently motivated constraints. In subsection 3.1 I introduce the family of COHERENCE constraints. In 3.2, I argue that The One-Argument Restriction follows from high ranking of COHERENCE over PARSE constraints. Finally, in subsection 3.3, I show that this analysis is superior to alternative OT-accounts of the One-Argument-Restriction.

3.1 Coherence

Common sense lets us expect that affixes expressing agreement with the same head should occur coherently together. Evidence for this assumption can be found

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[5]See section 5.1 for discussion of similar facts in the related language Menomini.

[6]See Trommer (2002b) for further discussion.

for example in the Australian language Wardaman (Merlan, 1994:127), where agreement markers are ordered according to the hierarchy 1 > 2 > 3, hence the order of affixes does not directly reflect argumental status, but only the person features of the arguments.

(9) a. *nga- n-   nu- / nga- nu- n-*
         [+1]- ACC- [+2]-   [+1]- [+2]- ACC-
         'I → you (nsg.) '/'you (nsg.) → me'
     b. *nga- wu- n-   / nga- n-   wu- rr-*
         [+1]- [+3]- ACC   [+1]- ACC- [+3]- [+Nom+pl]
         'I → them '/'they → me (sg.)'
     c. *yi- wu- n-   / yi- n-   wu- rr-*
         [+2]- [+3]- ACC-   [+2]- ACC- [+3]- [+Nom+pl]-
         'you (sg.) → them '/'they → you (sg.)'

This order can be plausibly derived by a constraint ranking such as L ↪ [+1] ≫ L ↪ [+2] L ↪ [+3]. However the order of the accusative marker *n-* is not determined by the same features. *n-* simply occurs immediately after the person affix corresponding to the object, even if this violates the putative alignment constraints (e.g. L ↪ [+2] is violated twice in (9a) since *n-* intervenes between *nu-* and the left edge.

While coherence is obeyed in many cases, it is not an inviolable constraint, as can be seen in Warlpiri. Here subject normally precede object markers[7]:

(10) *ŋalipa-ḻu ka-**lipa-tjana** wawiri-patu   nja-nji*
      we-ERG PRES-1ipl-3pl kangaroo-PAUC see-NPast
      'We (pl inc.) see the several kangaroos' (p.328)

Where subject agreement is split into person and number marking, the markers of subject person (*-ṇa -npa*) precede, and the markers of subject number (*-lu, -pala*) follow the object marker:

(11) a. *ŋanimpa-ḻu ka-**ṇa**-ŋku-**lu** njuntu nja-nji*
         we-ERG   PRES-1-2-PL you   see-NPast
         'we (pl. exc.) see you (sg.)'

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[7]Similar violations of COHERENCE can be observed in Somali, Menomini and Dumi, where different agreement affi xes can be separated by tense heads (Trommer, 2002b), and in clitic clusters of certain varieties of Spanish (Grimshaw, 1997). All page numbers for Warlpiri data refer to Hale (1973).

b. *njumpala-ḷu ka-**npa**-ntju-**pala** ŋatju nja-nji*
   you-ERG   PRES-2-1-DU   me   see-NPast
   'you (du.) see me' (p. 328)

In OT-terms, COHERENCE cannot be a a part of GEN, it must be a violable constraint. While there are many different possibilities to implement the requirement that affixes referring to the same head should appear together, the simplest way seems to be to penalize local index changes when moving from left to right. Thus the coherent (12b) involves only the change from $_1$ to $_2$, while the discontinuous realization of argument $_1$ in (12c) leads to two index changes:

(12)   a.   **Input:** Agr_1 Agr_2
       b.   **Output$_1$:** VI_1 VI_1 VI_2 $(1 \rightarrow 2)$
       c.   **Output$_2$:** VI_1 VI_2 VI_1 $(1 \rightarrow 2 \rightarrow 1)$

COHERENCE constraints can now be formalized as follows:

(13)   **COHERENCE** ... **:** In an output with more than one VI meeting the constraint description, count a constraint violation for each such VI with index i (immediately) preceded by another one with index j such that $i \neq j$.

"Immediately preceded" here does not refer to the output string, but rather to the string of VIs meeting the constraint description. For example, COHERENCE [+AGR] would be violated by $[+AGR]_1$ $[+AGR]_2$ $[+AGR]_1$ but not by $[+AGR]_1$ $[+STEM]_2$ $[+AGR]_1$. In fact, constellations like the second are rather common in natural languages.[8] Note also that (13) is intended as a scheme for a family of constraints varying according to the constraint description ("..." in (13)). Thus there might be different COHERENCE constraints for tense (COHERENCE [+Tense]) and agreement affixes (COHERENCE [+Agr]). The Wardaman data can now be accounted for as follows. High-ranked COHERENCE [+Agr] excludes all candidates where [+Acc] and [+1] are not adjacent. Since L ↩ [+1] is ranked higher than L ↩ [+2], the [+1] affix appears left-most, and [+Acc] right-adjacent to it:

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[8]One example is the Turkana verb form illustrated in (6).

(14) **Input:** [+Nom +2]₁ [+Acc +1]₂

	COHERENCE [+Agr]	L ↩ [+1]	L ↩ [+2]
☞ [+1]₂ [+Acc]₂ [+2]₁	*		**
[+Acc]₂ [+1]₂ [+2]₁	*	*!	**
[+2]₁ [+1]₂ [+Acc]₂	*	*!	
[+1]₂ [+2]₁ [+Acc]₂	**!		*

Note that even in the optimal candidate COHERENCE [+Agr] is violated once. However there is no candidate that realizes all relevant features (+Acc, +1 and +2) without at least one violation, and if PARSE [F] is ranked higher than COHERENCE, no candidate omitting one of these affixes will be optimal. We will see in subsection 3.2 how a lower ranking of PARSE [F] can lead to forms with no violation of COHERENCE, which allows us to derive the One-Argument restriction. Given an account of affix ordering in terms of alignment constraints (see section 2), we also get a straightforward analysis of the Warlpiri data, where I assume the vocabulary items in (15):

(15)   Warlpiri Vocabulary Items

/pala/	↔	[+Nom +du]
/tjana/	↔	[+Acc +3 +Pl]
/na/	↔	[+Nom +1 -2]
/npa/	↔	[+Nom +2]
/tju/	↔	[+Acc +1]
/lu/	↔	[+Nom -3 +Pl]
/ŋku/	↔	[+Acc +2]

The ranking in (16) derives the correct results:

(16) **Input:** [+Nom +1 -2 +pl]₁ [+Acc +2 +sg]₂

	NUM ⇨ R	L ↩ SPer	COHERENCE
☞ na₁-ŋku₂-lu₁			*
ŋ₂-na₁-lu₁		*!	
na₁-lu₁-ŋku₂	*!		

Note that the ranking of NUM ⇨ R over L ↩ SPer is crucial since /lu/ is also marked for person ([+Nom -3 +Pl]). That COHERENCE is also active in Warlpiri

emerges if a split plural subject combines with an object plural marker (where no split occurs). Subject person and plural marking are now adjacent as required by COHERENCE:

(17)   *njumpala-ḷu ka-**n(pa)-pala**-tjana wawiri-patu   nja-nji*
       you-ERG   PRES-2-DU-3pl   kangaroo-PAUC see-NPast
       'You (du.) see the several kangaroos' (p. 329)

Since both number affixes (-*pala* and -*tjana*) are competing for the rightmost position, COHERENCE gets the decisive constraint:

(18)   **Input:** [+Nom +2 +du]$_1$ [+Acc +3 +pl]$_2$ (18)

	NUM ⇨ R	L ⇦ SPer	COHERENCE
npa$_1$-tjana$_2$-pala$_1$	*		*!
☞ npa$_1$-pala$_1$-tjana$_2$	*		
tjana$_2$-npa$_1$-pala$_1$	**!	*	

3.2   The One-Argument Restriction as Maximal Coherence

As noted above, COHERENCE might lead to "suppression" of affixes if it is ranked higher than PARSE [F]. This basically allows to derive the One-Argument restriction for Dumi, e.g. for the form in (2-a):

(19)   **Input:** [+Nom +2]$_1$ [+Acc +1]$_2$

	COHERENCE [+Agr]	PARSE [F]
[+1]$_2$ [+2]$_1$	*!	
☞ [+1]$_2$		*
☞ [+2]$_1$		*

Note that according to the formal definition of COHERENCE this effect holds even then if agreement is discontinuously broken up by non-agreement categories as in (20):

(20)   *dziː-**k**-t-**a***
       speak-[+1+pl]-NPast-[-Du]
       ' we (pl. excl.) speak' (p. 97)

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Since COHERENCE [+Agr] is "blind" to non-agreement categories, Agr_1-$Tense_2$-Agr_1 reduces to the coherent Agr_1-Agr_1. However, the relevant COHERENCE constraint has to be refined to tolerate forms with portmanteau agreement, as the one in (21):

(21)

    a. ***a**-duːkhus-t-ə*   'he sees me' (p. 108)
        MS-see-NPast-1sg

    b. *doːkhot-**N**-t-a*   'I see you (sg.)' (p. 107)
        see-N-NPast[-du]

-N is a portmanteau marker appearing only in 1s → 2 forms. We might characterize it as (22a). By appropriate indexing we get (22b), and hence a violation of COHERENCE since $1 \neq 2$:

(22)   a. $\begin{bmatrix} \text{[+Nom +1 -pl]} \\ \text{[+Acc +2]} \end{bmatrix}$

        b. $\begin{bmatrix} \text{[+Nom +1 -pl]}_1 \\ \text{[+Acc +2]}_2 \end{bmatrix} Agr_2$

The marked scenario affix *a-*[9] marks certain intransitive and transitive configurations. I assume that it is specified as in (23a). In (21a), [+Nom -1] is coindexed with the subject, and [-3] with the object, hence we get the configuration in (23b), i.e., two agreement markers with differing indices, which should again be excluded by COHERENCE.

(23)   a. $\begin{bmatrix} \text{[+Nom -1]} \\ \text{[-3]} \end{bmatrix}$

        b. $\begin{bmatrix} \text{[+Nom -1]}_1 \\ \text{[-3]}_2 \end{bmatrix} Agr_1$

Since COHERENCE constraints seem to be generally sensitive to the distinction complex/non-complex, I include this as a parameter in the constraint description notated as a subscript to the feature structure:[10]

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[9]See footnote 1.

[10]Note that also other constraint types are sensitive to the (non-)complex distinction. Thus person portmanteau agreement seems to appear generally leftwards from simple person agreement. This is accounted for in Trommer (2002b) by a specific alignment constraint which is restricted to complex agreement.

(24)　　a.　COHERENCE [+Agr]$_{complex}$
　　　　b.　COHERENCE [+Agr]$_{non\text{-}complex}$

Strikingly also (24a) is satisfied in Dumi[11], and we will see more evidence for this constraint in Menomini (section 7.1).

In the Nilo-Saharan language Turkana, we find roughly the same pattern as in Dumi: only one person marker is allowed but additionally a portmanteau direction affix *k-* appears in certain transitive predications:[12]

(25)

　　　　a.　*ɛ-á-lós-í*　　　　　　'she went' (p. 130)
　　　　　　3-PAST-go-ASP
　　　　b.　*à(*ɛ-)-mɪn-à*　　　　'I love her' (p. 69)
　　　　　　1-(*3-)love-ASP
　　　　c.　***k-à-mɪn-à***　　　　'she loves me' (p. 123)
　　　　　　D-1-love-ASP

Additionally, plural subjects are marked by a plural affix. If it is the object that is realized by person agreement this leads to two arguments that are marked by (simple) affixes:

(26)

　　　　a.　*k-à-ɪlam-e-**té***　　　　　　'they will bewitch me' (p. 123)
　　　　　　D-1$_1$-bewitch-ASP-PL$_2$

Hence what is relevant in Turkana is not the general constraint COHERENCE [+Agr]$_{non\text{-}complex}$ as in Dumi, but a more restricted member of the COHERENCE family, namely COHERENCE [+Agr +Per]$_{non\text{-}complex}$ which only applies to person markers.

The complementary situation can be found in the Western dialect of Warlpiri described in Hale (1973). While dual features of subjects and objects are normally marked by means of separate affixes or fused with person features in a single affix, only one dual is marked if both arguments are dual. According to Hale, the dual which ranks lower on the hierarchy $1 > 2 > 3$ is replaced by plural. For example in (27b), instead of *pala* ([+Nom +du]) which normally expresses the dual of 2nd person subjects (27a) we find *-lu* ([+pl])[13] while the dual feature of the 1st person

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[11] I.e. there are up to five markers for portmanteau agreement, but they never cooccur.

[12] See section 4.1 for discussion of the resolution strategy in Turkana

[13] *-nku* is an allomorph of [+2] *-n* which appears regularly in the context of *-lu*.

object is expressed as in other forms by *tjaraŋku* ([+1 +du]):

(27) a. *njumpala-ḷu ka-n-**pala**-tjana wawiri-patu   nja-nji*
         you-ERG   pres-2-dual-3pl kangaroo-paucal see-nonpast
         '**You two** see the several kangaroos' (p. 329)

   b. *njumpala-ḷu ka-nku-**lu**-tjaraŋku ŋatjara nja-nji*
         you-erg   pres-2-pl-1du   us   see-nonpast
         '**You two** see us two' (p. 331)

Hence here we have COHERENCE [+Agr +du]$_{non-complex}$. The cooccurrence of person- *and* number-based One-Argument-Restrictions within one language is found in the Algonquian language Menomini.[14] In the so-called independent order paradigms of Menomini[15], only one of the person suffixes *-w* [+3] or *-m* [-3] is allowed. In transitive forms with 3rd and non-3rd arguments, where both would be licensed (28a,b) only *-w* appears.

(28)

   a. *ne-na·n-ek-**w** (nena·nek)*   '**he** fetches me' (p. 154)
       1-fetch-D-[+3]

   b. *ne-na·n-a·-**w***   'I fetch **him**' (p. 152)
       1-fetch-D-[+3]

   c. *ke-na·tom-nenɛ-**m**-uaw*   '**I** call **you** (pl.) (p. 157)
       2-call-[-3]-2pl

While these person markers can cooccur with 2pl *-waw* (28c), the latter is blocked by the first plural marker *-enaw*[16]:

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[14]All page numbers for Menomini data refer to Bloomfield (1962).

[15]Order is a category Algonquianists use to differentiate a predicative verb paradigm (independent order) from a second one used in subordinate sentences (conjunct order) which is based in most respect on a different set of agreement affixes.

[16]There is also a plural marker *-ak* (see section 5.1) which occurs only in certain 3pl forms and *can* cooccur with and *-w*. Possibly *-ak* is simply specified [+pl], which – based on the alignment constraints introduced in section 2 – would account for its position to the right of person/number markers such as *-waw* and *-enaw*. If *-ak* is specified [+3 +pl], then the COHERENCE constraint for *-w* and *-m* would have to be restricted further in a way that it only applies to pure person affixes, but not to person/number markers.

(29)

      a.   *ke-na·tom-enenε-m-**enaw**   'we call **you (pl.)**' (p. 157)
          2-call-D-[-3]-1pl

      b.   *ke-nε·w-e-m-**enaw**   '**you (pl.)** see you us' (p. 156)
          2-see-D-[+3]-1pl

Thus we find COHERENCE [+Agr +/-3]$_{\text{non-complex}}$ and COHERENCE [+Agr +/-1 +pl]$_{\text{non-complex}}$ side by side, defining different competition domains in the same language.

3.3 Other Accounts of the One-Argument Restriction

Ellen Woolford has argued in a recent paper (Woolford, 2001) that effects in clitic clusters very similar to the one-argument restrictions observed here can be derived by alternative means namely by alignment constraints. Woolford assumes constraints such as (30):

(30)   CL[$_V$ Align(clitic, Right; V,left)
        The right edge of a clitic must be aligned with the left edge of the verb.

Based on this she states (her constraint XRef corresponds in function here roughly to my PARSE [F]): "But besides placing and ordering clitics, clitic alignment constraints can also result in limiting the number of clitics allowed in a language. [If] the clitic alignment constraint is ranked above XRef, no clitic alignment violation is tolerated, even if that means not crossreferencing all of the arguments. The result is that the number of clitics is limited to one." (Woolford, 2001:12) [17] The tableau in (31) shows schematically how this works technically:

(31)

	CL[$_V$	XRef	*clitic
a. CL CL	*!		**
☞ b. CL		*	*
c.		**!	

While alignment constraints can have effects like this, they are not plausible candidates for the data discussed in this paper. A first problem is that the alignment approach leads not only to one-argument-restrictions but to one-affix restrictions.

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[17]see also Gerlach (1998) and Wunderlich (2000) for similar approaches.

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However, there are languages such as Dumi[18] where multiple agreement affixes are possible as long as they refer to the same argument:

(32)   Competition Domain is bigger than an affix slot

    a. *phɨk-**k-a***   'we (exc.) got up' (p. 97)
        get:up-[+pl]-[-du]

    b. ***ham**-dzeː-t-**a***   'they speak' (p. 97)
        3pl-speak-NPast-[-du]

Even in languages where one-argument-restrictions have the effect of reducing agreement to one affix per word the use of alignment affixes is problematic, since alignment affixes need a fixed edge to refer to. To see this let us return to the Turkana data from (25) which are repeated here as (33):

(33)

    a. *ɛ-á-lós-í*   '**she** went' (p. 130)
        3-PAST-go-ASP

    b. ***à**-(*ɛ-)-mɪn-**à***   '**I** love her' (p. 69)
        1-(*3-)love-ASP

    c. *k-**à**-mɪn-à*   'she loves **me**' (p. 123)
        D-1-love-ASP

Possible Alignment Constraints that could be stipulated under a Woolford-style analysis to account for the non-appearance of ε- in (33b) are Align(Person, Right; V,left) and Align(Person, Left; Word,left), which both would result in the correct result for (33b). However, there can intervene additional affixes for both edges: *k-* in (33c) and *á-* in (33a). Agreement should also be blocked in these cases counter to fact. The alignment account fails since there are no fixed edges to which alignment constraints could refer. A similar argument could be made for Menomini (section 3.2), where different competition domains with varying boundaries are found.

    Finally, the alignment account also does not carry over to the restriction to one dual affix in Warlpiri The data from (27) are repeated in (34):

(34)   a. *njumpala-ḷu ka-n-**pala**-tjana wawiri-patu   nja-nji*
            you-ERG   pres-2-dual-3pl kangaroo-paucal see-nonpast

---

[18]The same seems to be true for Ancash Quechua (see Lakämper and Wunderlich, 1998:119 and the discussion of Quechua in section 4).

'**You two** see the several kangaroos' (p. 329)

    b.   *njumpala-ḷu ka-nku-**lu**-tjaraŋku ŋatjara nja-nji*
         you-erg   pres-2-pl-1du   us   see-nonpast
         '**You two** see us two' (p. 331)

dual *-pala* is "replaced" by plural *-lu* in (34b). But *-pala* in (34b) would be just in the same position with respect to all edges as it is in (34a) (separated by one affix from the auxiliary stem *ka* and by one affix from the right word edge). If any alignment constraint excluded *-pala* in (34b) it should also exclude it in (34a). Crucially the effect of the One-Argument Restriction in Warlpiri is not to limit the overall number of affixes (since the dual affix is "replaced" by a plural affix), but to determine the features encoded by the surfacing affix. This follows naturally from the COHERENCE approach, but cannot be captured by alignment.

    Thus I conclude that alignment might be responsible for some cases of one-argument restrictions, but it is not sufficient for all data of this type.

4   Effects of Hierarchies on Competition

What remains to be done is to explicate the choice for which affix is actually suppressed to satisfy high-ranked COHERENCE. Let us start with Turkana, which is relatively simple in this respect. In this language, verbs agree with the speech act participant (SAP) argument if the other argument is 3rd person (33b,c). But if both arguments are non-third person, agreement is with the subject:

(35)

    a.   *k-**à**-ram-ì*   '**I** will beat you' (p. 122)
         D-1-beat-ASP

    b.   *k-**ì**-ram-e-tè*   '**you (pl.)** beat me' (p. 122)
         D-1-beat-ASP-PL

Given the prominence scales in (36a,b), there is a simple principle behind the affix choice in these cases (36c):

(36)   a.   Subject > Object
         b.   1/2 > 3
         c.   Choose the affix that corresponds to the higher scale position

However, (36c) cannot be maintained in its most general form since it leads to a contradiction for $3 \rightarrow 1$ predications, where (36b) seems to outrank (36a). Thus, I propose to replace (36c) by the scheme in (37a), which gives us the constraints in (37a,b)

(37)   a.   If there is a prominence scale A > B
              there is a PARSE constraint PARSE $[P]^{A/B}$
        b.   PARSE $[P]^{[-3]/[+3]}$
        c.   PARSE $[P]^{[+Nom]/[+Acc]}$

PARSE $[P]^{A/B}$ is to be read as follows: Realize the person features of a syntactic head containing A if this is adjacent to a head containing B. Thus, PARSE $[P]^{[-3]/[+3]}$ requires that the person features of a 1st or 2nd person head are spelled out by an affix, if it is neighbored by a 3rd person head. Now it is crucial how these constraints are ranked, since for the evaluation procedure of OT, optimization for higher constraints is always more important than optimization for lower constraints. For Turkana, I will assume that the ranking is COH(ERENCE) $[P] \gg$ PARSE $[P]^{[-3]/[+3]} \gg$ PARSE $[P]^{[+Nom]/[+Acc]}$. If one argument is $[+3]$ and the other $[-3]$, we get the following tableau:

(38)   **Input:** $[+Nom +3]_1$ $[+Acc +1]_2$

	COH [P]	PARSE $[P]^{[-3]/[+3]}$	PARSE $[P]^{[+Nom]/[+Acc]}$	PARSE [P]
☞ a. $[+1]_2$				*
b. $[+3]_1$		*!		*
c. $[+1]_2[+3]_1$	*!			

Spell-out of both heads would violate COHERENCE, therefore (38c) is discarded (depicted by "!" after the relevant violation mark). Suppression of the $[-3]$ head (38b) would violate PARSE $[P]^{[-3]/[+3]}$, which is also discarded. The only remaining and hence optimal candidate is (38a).

If both arguments are [-3], PARSE $[P]^{[-3]/[+3]}$ becomes irrelevant, and PARSE $[P]^{[+Nom]/[+Acc]}$ favors the appearance of the nominative head:

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(39) **Only SAP Arguments:** [+Nom +2]₁[+Acc +1]₂

	COH [P]	PARSE [P]$^{[-3]/[+3]}$	PARSE [P]$^{[+Nom]/[+Acc]}$	PARSE [P]
☞ a. [+2]₁		*		*
c. [+1]₂		*	*!	*
b. [+2]₁[+1]₂	*!			

The same is true if both agreement heads are [+3]. While subject and object agreement do not differ in morphological expression, the account predicts that the surfacing marker is coindexed with the subject.

Strikingly, exactly the same pattern as in Turkana is found in the unrelated Hokan language Chimariko (Conathan, 2002 following Dixon, 1910):[19]

(40)   Agreement in Chimariko transitive forms (Conathan, 2002:15)

		Subject					
		1s	2s	3s	1p	2p	3p
Object	1s		*mi- (me-)*	*tcu- (tca-)*		*qo-*	*tcu- (tca-)*
	2s	*i- (ye-)*		*mi-*	*ya-*		*mi-*
	3s	*i-*	*mi-*	*hi-*	*ya-*	*qo-*	*ha-*
	1p		*mi-*	*tca-,ya-*		*qo-*	*tca-*
	2p	*i-atci-*		*qo-,qa-*	*ya-*		*mi-*
	3p	*i-*	*mi-*	–	*ya-*	–	–

This reflects the fact that the hierarchies invoked here are not language-specific stipulations, but reflect general properties of Universal Grammar. In the next section, we will see that HBC in languages which apparently exhibit different hierarchies also follow from a slightly revised version of these hierarchies and the proposed OT-framework.

According to the principles of OT, all possible rankings of constraints should yield an attested or at least plausible language type. In the following, I will show that this indeed holds for the proposed constraints. If PARSE [P] is ranked above COH [P], both Agr$_S$ and Agr$_O$ are realized:

(41)   PARSE [P] ≫ COH [P]

Otherwise, there are three possibilities: If PARSE [P]$^{[+Nom]/[+Acc]}$ and COH [P] are ranked above PARSE [P]$^{[-3]/[+3]}$ (42a), only subject agreement is realized. This

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[19]Dashes indicate forms which are not attested in Dixon (1910)

can be observed in standard Indo-European languages such as English. If PARSE $[P]^{[-3]/[+3]}$ and COH $[P]$ are above PARSE $[P]^{[+Nom]/[+Acc]}$, we get the distribution of Turkana (42b). The third possibility is that PARSE $[P]^{[-3]/[+3]}$ and PARSE $[P]^{[+Nom]/[+Acc]}$ both dominate COH $[P]$ (42c) (PARSE constraints are abbreviated in (42) by the respective superscripts, the "{,}" brackets enclose constraints whose ranking with respect to each other is irrelevant, "&" is used to combine different subrankings, i.e., each of the rankings in a.,b. and c. must be combined separately with COH $[P] \gg$ PARSE $[P]$):

(42)   **[COH $[P] \gg$ PARSE $[P]$] &**

    a. $\left\{ \begin{array}{c} [+\text{Nom}]/[+\text{Acc}] \\ \text{COH } [P] \end{array} \right\} \gg [+3]/[-3]$

    b. $\left\{ \begin{array}{c} [-3]/[+3] \\ \text{COH } [P] \end{array} \right\} \gg [+\text{Nom}]/[+\text{Acc}]$

    c. $\left\{ \begin{array}{c} [-3]/[+3] \\ [+\text{Nom}]/[+\text{Acc}] \end{array} \right\} \gg \text{COH } [P]$

In languages of the type of (42c), subject agreement should always be realized, but object agreement should be suppressed, unless the object is higher on the person hierarchy than the subject. This seems to be true for Ancash Quechua, for which Lakämper and Wunderlich (1998) propose the following constraint:

(43)   a.   Object-Subject Constraint (OSC): The object may be marked separately from the subject only if it refers to person that is higher on the hierarchy of person than the person to which the subject refers

    b.   Hierarchy of person: $1 > 2 > 3$ (Lakämper and Wunderlich, 1998:127)

In most cases this amounts to the following statements:

(44)   a.   The verb agrees always with the subject

    b.   The verb always agrees with the argument that is higher on the person hierarchy

Thus, $1 \rightarrow 3$ agreement is realized by an underspecified vowel segment just as intransitive 1st person forms[20] while in $3 \rightarrow 1$ forms there are affixes for subject *and* object agreement[21]:

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[20]Lakämper and Wunderlich (1998) give no actual word form for this feature combination.

[21]All page numbers for data from Quechua refer to Lakämper and Wunderlich (1998).

(45)

    a.   *rika-ma-n*   '(s)he sees you' (p. 121)
         see-O1-[+Nom+3]

The only point where (43) and (44) diverge for Quechua are forms that involve 3rd and 2nd person arguments. While $2 \rightarrow 3$ (as intransitive 2nd person forms) is expressed by the suffix *-nki*, $3 \rightarrow 2$ has again two suffixes:

(46)

    a.   *rika-shu-nki*   '(s)he sees you' (p. 121)
         see-O2-2

Actually, Lakämper and Wunderlich analyze *-shu* as "underspecified, so it does not explicitly refer to a person" (p. 127), and *-nki* as a 2nd person marker. However, a more plausible analysis would treat *-shu* as a 2nd person object marker ([+2 +Acc]) and *-nki* as a subject marker for 2nd and 3rd person ([+Nom -1]) which expresses in (46) the relevant features of the subject.[22] This avoids the stipulation of a featurally empty affix and relates to the fact that object markers in Ancash seem generally to precede subject markers.

Taking for granted that (44) is empirically correct for Ancash Quechua, what distinguishes Ancash from (42-c) is only the relevant hierarchy ($1 > 2 > 3$ instead of $1/2 > 3$). Since the latter type of hierarchy is also well-documented, (42-c) is also a plausible language type. I will call the phenomenon that different prominence relations ([+Nom] > [+Acc] and $\left\{ \begin{array}{c} [+1] \\ [+2] \end{array} \right\} > [+3]$) "conspire" to effect agreement with two arguments in a language which otherwise conforms to the One-Argument Restriction *Emergence of Two-Argument Agreement* (ETA). This is expected in a theory based on violable constraints, but odd in an approach where fixed affix slots are filled according to feature hierarchies. ETA thus provides substantial evidence in favor of the constraint-based analysis of HBC. A further case of ETA involving slightly fifferent hierarchies in Dumi, will be discussed in section 5.2.

In the next section I will show how the Quechua data can be accounted for in detail and, more generally, how the effects of different hierarchies can be captured.

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[22]The appearance of *-nki* ([+Nom -1]) instead of *-n* ([+Nom -1 -2]) would thus be a case of IMPOVERISHMENT, suppression of a specific feature (here: [-2]) in a marked context (here: 2nd person object) induced by specific constraints. See Trommer (2002b) for discussion.

In effect, I will argue that there is only one, universal feature hierarchy, but that the language-dependent ranking of the corresponding PARSE constraints results in the appearance of different hierarchies in different languages.

4.1 Capturing different Hierarchies

In a line with the data from Quechua, there are a number of further languages which exhibit similar blocking phenomena as Turkana, but according to slightly different hierarchies:

(47) a. **Turkana, Chimariko:** $1/2 > 3 \gg$ Nom > Acc
     b. **Dumi:**[23] $1 > 2 > 3$
     c. **Menomini Prefixes:**[24] $2 > 1 > 3$

In contrast to Turkana and Chimariko, Menomini and Dumi resolve the competition between different person features exclusively with reference to the person features themselves.[25] However, in some cases, 2nd person agreement wins over 1st person, and in others it is the other way around. This can be integrated in the proposed account by assuming the more elaborated hierarchy in (48a) and replacing (9a) by (48b):

(48) a. $\left\{ \begin{array}{c} [+1] \\ [+2] \end{array} \right\} > [+3]$

     b. If A is distinct from B, and A $\geq$ B on a prominence scale S then there is a PARSE constraint PARSE $[P]^{A/B}$

This licenses the PARSE constraints in (49):

(49) a. PARSE $[P]^{[+1]/[+3]}$
     b. PARSE $[P]^{[+2]/[+3]}$
     c. PARSE $[P]^{[+1]/[+2]}$
     d. PARSE $[P]^{[+2]/[+1]}$

---

[23]The same ranking as in Dumi is found in Nocte (Gupta, 1971) and in Warlpiri (section 4.2).

[24]For data see section 4.2. Dechaine (1999) shows that this ranking is quite stable among different Algonquian languages. Silverstein (1976) cites cases of split-ergativity effects deriving from the same ranking. Other (suffixal) affixes in Menomini show different rankings. See sections 5.1 and 6.2

[25]See section 5.2 for a discussion of cases where Dumi departs from this pattern.

Assuming that PARSE [P]$^{[+Nom]/[+Acc]}$ is dominated by COH [P], we can now account for all the patterns in (48). Turkana (50a), Dumi (50b), Menomini prefixes (50c) and Quechua (50d):

(50)   **[COH [P] ≫ PARSE [P]]** &

a. $\left\{ \begin{array}{c} [+1]/[+3] \\ [+2]/[+3] \\ \text{COH [P]} \end{array} \right\}$ ≫ [+Nom]/[+Acc] ≫ $\left\{ \begin{array}{c} [+1]/[+2] \\ [+2]/[+1] \end{array} \right\}$

b. $\left\{ \begin{array}{c} [+1]/[+3] \\ [+2]/[+3] \\ [+1]/[+2] \\ \text{COH [P]} \end{array} \right\}$ ≫ $\left\{ \begin{array}{c} [+2]/[+1] \\ [+\text{Nom}]/[+\text{Acc}] \end{array} \right\}$

c. $\left\{ \begin{array}{c} [+1]/[+3] \\ [+2]/[+3] \\ [+2]/[+1] \\ \text{COH [P]} \end{array} \right\}$ ≫ $\left\{ \begin{array}{c} [+1]/[+2] \\ [+\text{Nom}]/[+\text{Acc}] \end{array} \right\}$

d. $\left\{ \begin{array}{c} [+1]/[+3] \\ [+2]/[+3] \\ [+1]/[+2] \\ [+\text{Nom}]/[+\text{Acc}] \end{array} \right\}$ ≫ COH [P] ≫ [+2]/[+1]

The dissociation of the 2 > 3 and 1 > 3 contrast lets us expect further language types where only one PARSE constraint related to these is ranked higher than the case-based constraint while the other gets irrelevant. This is what we find for the agreement prefixes in the Hokan language Shasta which Conathan (2002:16) describes as instantiating the prominence hierarchy "2 > 3 with 1 being unranked". This means that agreement is with the subject (51), except for the case that one argument is 2nd and the other 3rd person, where agreement is with the 2nd person argument (52):[26]

(51)

　　　a. ***kw-àuy-ik***　　　'**he** gives one to him'
　　　　　3-give-SUFF

　　　b. ***kw-àuy-ika***　　　'**he** gives one to me'
　　　　　3-give-SUFF

---

[26]Suffixes are are also involved in the agreement system, in a way that is unclear at this point (Lisa Conathat, p.c.).

(52)

    a. ***skw-àuy-ik***   '**thou** givest one to him'
       2-give-SUFF

    b. ***skw-àuy-innuka***   'they give one to **thee**'
       2-give-SUFF

This follows straightforwardly from the ranking in (53):

(53)   PARSE $[P]^{[+2]/[+3]} \gg$ PARSE $[P]^{[+Nom]/[+Acc]} \gg$ PARSE $[P]^{[+1]/[+3]}$

In a $3 \rightarrow 2$ predication we get now object agreement:

(54)   **Shasta Input:** $[+Nom +3]_1[+Acc +2]_2$

	COH [P]	PARSE $[P]^{[+2]/[+3]}$	PARSE $[P]^{[+Nom]/[+Acc]}$	PARSE $[P]^{[+1]/[+3]}$	PARSE [P]
☞ a. $[+2]_2$			*		*
b. $[+3]_1$		*!			*
c. $[+3]_1 [+2]_2$	*!				

For $3 \rightarrow 1$ however we get emergence of subject agreement since PARSE $[P]^{[+1]/[+3]}$ is ranked lower than PARSE $[P]^{[+Nom]/[+Acc]}$:

(55)   **Shasta Input:** $[+Nom +3]_1[+Acc +1]_2$

	COH [P]	PARSE $[P]^{[+2]/[+3]}$	PARSE $[P]^{[+Nom]/[+Acc]}$	PARSE $[P]^{[+1]/[+3]}$	PARSE [P]
a. $[+1]_2$			*!		*
☞ b. $[+3]_1$					*
c. $[+3]_1 [+1]_2$	*!				

The case of Shasta makes it especially clear that the constraint-based approach to HBC is not simply a reformulation of the claim that person hierarchies can determine affix choice. Crucially, person-hierarchies are only one aspect of prominence driven agreement which interact in a complex way with other hierarchies such as the argument hierarchy ($[+Nom] > [+Acc]$). Thus, a feature hierarchy capturing competition in Shasta would have to include the subhierarchies $[+2] > [+3]$ and $[+Nom] > [+Acc]$, but these scales cannot be integrated in one hierarchy: $[+Nom]$ would have to be ranked lower than $[+2]$ to ensure appearance of $[+2]$ in $3 \rightarrow 2$ predications, but at the same time, it would have to be ranked higher than $[+2]$ to

ensure subject agreement in $1 \rightarrow 2$ configurations. This ranking paradox shows that HBC does not follow from a total order on features, but from preference relations among binary contrasts such as $2 \rightarrow 3$ which can be ranked according to the logic of Optimality Theory.

4.2 Competition Parameters and Levels of Representation

For implementing the effect of the person hierarchy in Turkana, I have assumed constraints such as (56a), but equally well we could take the slightly different (56b):

(56)   a.   PARSE [P]$^{[+1]/[+3]}$
           Realize **person agreement of a [+1] head** in the context of a [+3] head

       b.   PARSE [+1]/[+3]
           Realize **[+1] agreement of a head** in the context of a [+3] head

The outcome is identical in both cases, but it is not in others. Thus, to account for the fact that person agreement is with the nominative argument, we have to choose (57b) not (57a) since the agreement marker itself can realize person features of subjects and objects, and hence cannot be marked for a case feature:

(57)   a.   PARSE [P]$^{[+\text{Nom}]/[+\text{Acc}]}$
           Realize **person agreement of a [+Nom] head** in the context of a [+Acc] head

       b.   PARSE [+Nom]/[+Acc]
           Realize **[+Nom] agreement of a head** in the context of a [+Acc] head

A similar point can be made for dual marking in Warlpiri. Recall from section 3.2 that only one argument can spell out its dual feature due to high-ranked CO-HERENCE [+dual], and that the dual feature is marked which corresponds to the higher argument on the hierarchy $1 > 2 > 3$. Thus in a 2du $\rightarrow$ 1du configuration, the dual subject is not spelled-out by a dual affix, but by the affix sequence *nku-lu* ([+2]-[+pl]). PARSE [+1]/[+2] obviously has not the correct effect because it would also be satisfied if the [+1] argument would be realized by the [+1 +pl] object marker -*ŋanpa*:

(58)   **Input:** [+Nom +2 + du +pl]₁[+Acc +1 +du +pl]₂

	COH [+du]	PARSE [+1]/[+2]	PARSE [+2]/[+1]	PARSE [+pl]
☞ a. [+2]₁ [+pl]₁[+1 +du +pl]₂				
b. [+1 +dl +pl]₂			*!	*
☞ c. [+1 +pl]₂[+2 +du +pl]₁				
d. [+1 +du +pl]₂[+2 +du +pl]₁	*!			

What we need here is not constraints about realizing the features [+1] and [+2], but constraints about realizing the dual feature *of underlying* [+1] or [+2] heads, hence PARSE [+du]$^{[+1]/[+2]}$ and PARSE [+du]$^{[+2]/[+1]}$. The tableau in (59) shows how this constraint type leads to the correct result:

(59)   **Input:** [+Nom +2 + du +pl]₁[+Acc +1 +du +pl]₂

	COH [+du]	PARSE [+du]$^{[+1]/[+2]}$	PARSE [+du]$^{[+2]/[+1]}$	PARSE [+pl]
☞ a. [+2]₁ [+pl]₁[+1 +du +pl]₂			*	
b. [+1 +dl +pl]₂			*	*!
c. [+1 +pl]₂[+2 +du +pl]₁		*!		
d. [+1 +du +pl]₂[+2 +du +pl]₁	*!			

The null assumption is now that constraints for person as in (56) work in the same way, i.e., the correct formulation is (56-a) not (56-b). However, there is strong evidence against this assumption from the Menomini person prefixes[27] *ne-* ([+1]) and *ke-* ([+2]). If there is a [+2] argument (and no [+1] argument), *ke-* appears: In a parallel fashion, *ne-* appears if one of the arguments is [+1] (and none [+2]). Now, there are two situations where both items would be licensed. In transitive forms where one argument is 2nd and the other 1st person (60a,b) and in forms with an inclusive ([+1 +2]) plural (60c). In both cases, *ke-* appears:

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[27]I leave it open here which is the COHERENCE constraint inducing competition among prefixes. Algonquian prefixes have been analyzed by a number of people as pronominal clitics (Halle and Marantz, 1993; Fabri, 1996; Dechaine, 1999) and thus would form an independent spell-out domain from the verb stem and the person suffixes. Under this analysis COHERENCE [+AGR] or COHERENCE [+3] would give the right result. Interestingly, the [+3] prefix *o-* only appears in negated forms where the [+3] suffix *w-* does not. Thus even under the assumption of one spell-out domain including person prefixes and suffixes, COHERENCE [+/-3] would hold.

(60)

    a.   ***ke-**na·tom-enenϵ-m-uaw*   'I call **you (pl.)** ' (p. 157)
        2-call-D-[-3]-2pl

    b.   ***ke-**nϵ·w-e-m*   '**you (sg.)** see me' (p. 156)
        2-see-D-[+3]

    c.   ***ke-**po·se-q*   '**we (inc.)** embark' (pg. 150)
        2-embark-1pl

However, for (60c) (61b) will not lead to the correct results since for [+1 +2] *ke-* as well as *ne-* realize agreement with an underlying [+1] head. The requirement that actually [+1] (and hence *ne-*) appears is only captured by (61a):

(61)   a.   PARSE [+2]/[+1]
        b.   PARSE [P]$^{[+2]/[+1]}$

Thus I conclude that different features of prominence hierarchies involve slightly different types of PARSE constraints and (16b) has to be formulated more liberally:

(62)   If A is distinct from B, and A $\geq$ B on a prominence scale S, then there are the PARSE constraints PARSE A/B and PARSE [F] (for each agreement feature F)

Crucially, feature hierarchy effects apply at two levels: the level of the underlying heads and the "surface level" of the vocabulary items. The virtue of the constraint-based analysis is that it captures this important formal differentiation which has remained unnoticed in earlier work on hierarchy effects (e.g. Noyer, 1992).

5   The Interaction of Person and Number

More traditional approaches to feature hierarchies tend to construct complex single hierarchies for single languages. The analysis proposed here amounts to capturing the effects of binary scale positions by single universal constraints, and to capture all further differences and interactions by the possibility of free reranking supplied by Optimality Theory. In this section, I explore some further consequences of this approach, and show that it is superior to single-hierarchy accounts.

5.1 Different Feature Hierarchies in the same Language

Recall from section 3.2 that Menomini, apart from the person prefixes, has a second class of agreement affixes, suffixes encoding person *and* number:

(63)   Menomini Person/Number Suffixes

     a.   *ne-po·se-m-**enaw***   'we (exc.) embark' (p. 150)
         1-embark-[-3]-[+1+pl]
     b.   *ke-pu·se-m-**waw***   'ye embark' (p. 150)
         2-embark-[-3]-[-1+pl]

The characterization of these markers as [+1+pl] and [-1+pl] is due to the fact that *-waw* in certain contexts also marks plurality of 3rd person arguments, while these are normally pluralized by the 3pl affix *-ak*:[28]

(64)   Distribution of Person/Number Suffixes

	Independent	Negated Independent
1	*-enaw*	
2	*-waw*	
3	*-ak*	

Under the assumption that competition in Menomini is governed by one single prominence hierarchy, we would expect that *-enaw* wins over *-waw*. However the situation is just the other way around (65a,b). Interestingly, also there is no blocking between *-enaw* or *-waw* and *-ak* (65c,d):

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[28]Dechaine (1999:36) analyzes markers corresponding to *-waw* in other Algonquian languages by assuming that they are pure number markers, i.e., do not specify any person features. This does not explain why *-waw* replaces the 3pl marker *-ak* in certain contexts, but never *-enaw*. Moreover pure number agreement markers tend to occur to the right of person/number markers due to the corresponding alignment constraints (see section 2 and Trommer, 2001), but *-waw* is always on the left of *-ak*.

(65)   Competition of Person/Number Suffixes

      a.   *ke-na·tom-enenε-m-**enaw***   '**we** call you (pl.)' (p. 157)
            2-call-D-[-3]-[+1+pl]

      b.   *ke-nεw-e-m-**enaw***   'you (pl.) see **us**' (p. 156)
            2-see-D-[-3]–[+1+pl]

      c.   *ne-na·n-ek-w-**enaw-ak***   'they fetch us (exc.)' (p. 154)
            1-fetch-D-[+3]-1pl-3pl

      d.   *ke-na·n-ek-w-**waw-ak***   'they fetch you (exc.)' (p. 154)
            2-fetch-D-[+3]-[-1+pl]-3pl

Competition can be adduced to the high-ranked constraint COHERENCE [+/-1 +pl] which excludes cooccurrence of *-waw* and *-enaw*, but does not involve *-ak*. The resolution between *-waw* and *-enaw* follows now from a simple application of the scheme in (62) to the feature [+pl] and the ranking PARSE $[+pl]^{[+1]/[+2]} \gg$ PARSE $[+pl]^{[+2]/[+1]}$. The tableau in (66) shows how this works for (65b):

(66)   **Input:** $[+Nom +2 -1 +pl]_1 [+Acc +1 -2 +pl]_2$

	COH [+/-1 +pl]	PARSE $[+pl]^{[+1]/[+2]}$	PARSE $[+pl]^{[+2]/[+1]}$	PARSE [pl]
☞ a. $[+1+pl]_2$			*	*
b. $[-1+pl]_1$		*!		*
c. $[-1+pl]_2[+1+pl]_1$	*!			

The interesting point is that the ranking $[+pl]^{[+1]/[+2]} \gg$ PARSE $[+pl]^{[+2]/[+1]}$ is perfectly compatible with the ranking PARSE [+2]/[+1] $\gg$ PARSE [+1]/[+2] which is responsible for the distribution of person prefixes. Both sub-hierarchies correspond to the same universal hierarchy, instantiated by different, independently rankable constraints. Theories which assume that languages establish general feature hierarchies on their own (e.g. Wunderlich, 1996b) have no principled account for such hierarchy splits. Stump (2001:86) argues – based on similar data from Potawatomi – that the hierarchy effects in Algonquian are due to basically arbitrary stipulation in rule specifications. The constraint-based approach developed here shows that this conclusion is far from necessary.

5.2 The Interaction of Person and Number Hierarchies in Dumi

Recall from section 1 that in Dumi competition is normally resolved by the hierarchy $1 > 2 > 3$. Obviously this hierarchy is of no use if both arguments of the verb are 3rd person (cases where both arguments would be 1st or second are obligatorily expressed by – intransitive – reflexive forms). While other languages such as Turkana resolve similar indeterminacies through reference to the argument hierarchy (Subject > Object), Dumi resorts to a number hierarchy. Agreement is with the plural argument if there is one (67a,b), otherwise with the dual if there is one (67c), and agreement with a singular argument only occurs if there are no dual or plural arguments, i.e. in intransitive forms (67d):

(67)　　Effects of Number Hierarchy in Dumi 3rd person forms

　　　　a.　*doːkhot-t-ini*　　　　'**they (pl.)** see them (du.)/they (du.) see **them (pl.)**'
　　　　　　see-NPast-[-1 +pl]
　　　　b.　*doːkhot-t-ini*　　　　'he sees **them(pl.)**/**they (pl.)** see him' (p. 108)
　　　　　　see-NPast-[-1 +pl]
　　　　c.　*doːkhos-t-i*　　　　'he sees **them (du.)**/**they (du.)** see him' (p. 107)
　　　　　　see-NPast-[+du]
　　　　d.　*phɨkh-a*　　　　'**he** got up' (p. 97)
　　　　　　get:up-[-du]

In traditional terms, we have a hierarchy $pl > du > sg$, which would then lead to the overall hierarchy in (68a). In the constraint-based account we could say that we have the ranking (68b). These constraints would then be ranked below the relevant PARSE constraints for the person values 1,2 and 3.

(68)　　a.　$1 > 2 > 3pl > 3du > 3sg$

　　　　b.　$\left\{ \begin{array}{l} \text{PARSE } [+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]} \\ \text{PARSE } [+\text{Agr}]^{[+\text{pl}]/[+\text{du}]} \end{array} \right\} \gg \text{PARSE } [+\text{Agr}]^{[+\text{du}]/[+\text{sg}]}$

While both approaches fare well for the data discussed so far effects of the number hierarchy also emerge in two other places in the Dumi verb paradigm, and strongly favor a constraint-based account. First, if the subject is 2sg, and the object dual or plural, agreement is with the non-singular argument:

(69)   pl > sg outranks 1 > 2 > 3

    a. *a-doːkhot-t-**ini***   'you (sg.) see **them (pl.)**' (p. 107)
        MS-see-NPast-[-1+pl]

    b. *a-doːkhos-t-**i***   'you (sg.) **see them (du.)**' (p. 107)
        MS-see-NPast-[+du]

While we could further split up the hierarchy in (68a) into (70a), this seems to be a completely arbitrary move. In the constraint-based account all we have to do is to assume a slightly different ranking (70b):

(70)   a. $1 > \left\{ \begin{array}{c} 2\text{pl} \\ 2\text{du} \end{array} \right\} > 3\text{pl} > 3\text{du} > 3\text{sg} > 2\text{sg}$

       b. $[+1]/[+3] \gg \left\{ \begin{array}{c} [+\text{pl}]/[+\text{sg}] \\ [+\text{du}]/[+\text{sg}] \end{array} \right\} \gg \left\{ \begin{array}{c} [+2]/[+3] \\ [+1]/[+2] \end{array} \right\} \gg \left\{ \begin{array}{c} [+\text{pl}]/[+\text{du}] \\ [+2]/[+1] \end{array} \right\}$

For reasons that will become clear below I assume that COHERENCE is ranked above PARSE $[+\text{Agr}]^{[+2]/[+3]}$, but below PARSE $[+\text{Agr}]^{[+1]/[+3]}$ and PARSE $[+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]}$. Now for 2pl(du) → 3 we still get the 2nd person argument as the winning argument:

(71) $[+\text{Nom} +2 +\text{pl}]_1[+\text{Acc} +3 +\text{sg}]_2$

	PARSE $[+\text{Agr}]^{[+1]/[+3]}$	PARSE $[+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]}$	COH $[+\text{Agr}]$	PARSE $[+\text{Agr}]^{[+2]/[+3]}$
a. $[+\text{Agr}]_2$		*!		
☞ b. $[+\text{Agr}]_1$				*
c. $[+\text{Agr}]_2[+\text{Agr}]_1$			*!	

However, for 2sg → 3pl(du) the non-singular argument prevails:

(72) $[+\text{Nom} +2 +\text{sg}]_1[+\text{Acc} +3 +\text{pl}]_2$

	PARSE $[+\text{Agr}]^{[+1]/[+3]}$	PARSE $[+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]}$	COH $[+\text{Agr}]$	PARSE $[+\text{Agr}]^{[+2]/[+3]}$
☞ a. $[+\text{Agr}]_2$				*
b. $[+\text{Agr}]_1$		*!		
c. $[+\text{Agr}]_2[+\text{Agr}]_1$			*!	

Thus the same number hierarchy that is decisive for agreement competition among 3rd person arguments, accounts for the special status of 2sg subjects in the context

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of 3rd person objects.[29] This seems clearly preferable to duplicating the higher prominence of nonsingular over singular for 2nd and 3rd person arguments, as in (70-a).

There is a second occasion where the number hierarchy emerges outside of 3 → 3 predications This is with combinations of 1st singular and 2nd or 3rd nonsingular arguments. In these cases both arguments are expressed by simple agreement (note however the difference in portmanteau agreement and stem allomorphy):

(73)   Conspiracy of pl > sg and 1 > 2 > 3

    a.   *doːkhot-t-ə-nɨ*   'I see them' (p. 107)
       see-NPast-[+1-pl]-[-1+pl]
    b.   *a-duːkhus-t-ə-nɨ*   'They see me' (p. 107)
       D-see-NPast-[+1-pl]-[-1+pl]

This effect is completely unexpected in accounts where feature hierarchies determine affix choice for a templatic slot. They are however to expected in a constraint-based approach, where constraints are violable. Indeed the Dumi data can be analyzed as an other case of *Emergence of Two-Argument Agreement* in parallell with the facts from Quechua discussed in section 4. If PARSE $[+\text{Agr}]^{[+1]/[+3]}$ and PARSE $[+\text{Agr}]^{[+pl]/[+sg]}$ are both ranked above COH $[+\text{Agr}]$, the effect of the latter is suppressed and we get eventually double agreement:

$$(74) \quad [+1]/[+3] \gg \left\{ \begin{array}{c} [+pl]/[+sg] \\ [+du]/[+sg] \end{array} \right\} \gg \text{COH} \gg \left\{ \begin{array}{c} [+2]/[+3] \\ [+1]/[+2] \end{array} \right\} \gg \left\{ \begin{array}{c} [+pl]/[+du] \\ [+2]/[+1] \end{array} \right\}$$

Of course this only holds if one argument is 1sg and the other 3pl/du:

(75) $[+\text{Nom} +1 +\text{sg}]_1[+\text{Acc} +3 +\text{pl}]_2$

	PARSE $[+\text{Agr}]^{[+1]/[+3]}$	PARSE $[+\text{Agr}]^{[+pl]/[+sg]}$	COH $[+\text{Agr}]$	PARSE $[+\text{Agr}]^{[+2]/[+3]}$
a. $[+\text{Agr}]_2$	*!			
b. $[+\text{Agr}]_1$		*!		
☞ c. $[+\text{Agr}]_2[+\text{Agr}]_1$			*	

[29]Note that agreement is with the 2nd person argument if the object is 2sg and the subject 3rd dual or plural. This is the only point in the Dumi paradigm where the forms for Subject$_i$ → Object$_j$ and Subject$_j$ → Object$_i$ differ in the realization of simple agreement (apart from portmanteau agreement). I leave the question of the special status of 2sg → 3 to future research.

In case of a 1pl/du vs. a 3sg argument we still get single argument agreement with the first person argument which is ranked higher on the person *and* the number hierarchy:

(76) $[+\text{Nom} +1 +\text{pl}]_1[+\text{Acc} +3 +\text{sg}]_2$

	PARSE $[+\text{Agr}]^{[+1]/[+3]}$	PARSE $[+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]}$	COH $[+\text{Agr}]$	PARSE $[+\text{Agr}]^{[+2]/[+3]}$
a. $[+\text{Agr}]_2$	*!	*		
☞ b. $[+\text{Agr}]_1$				
c. $[+\text{Agr}]_2[+\text{Agr}]_1$			*!	

Note finally that other person number-combinations still show the effects of the hierarchy $1 > 2 > 3$, as established in section 1, e.g. for 3du → 2du:

(77) $[+\text{Nom} +3 +\text{du}]_1[+\text{Acc} +2 +\text{du}]_2$

	PARSE $[+\text{Agr}]^{[+1]/[+3]}$	PARSE $[+\text{Agr}]^{[+\text{pl}]/[+\text{sg}]}$	COH $[+\text{Agr}]$	PARSE $[+\text{Agr}]^{[+2]/[+3]}$
☞ a. $[+\text{Agr}]_2$				
b. $[+\text{Agr}]_1$				*!
c. $[+\text{Agr}]_2[+\text{Agr}]_1$			*!	

6   Anti-Hierarchy Effects

The account developed in this paper predicts that hierarchy effects in most cases[30] are universally asymmetric, i.e., if a category A is systematically favored over a category B in one language then we should not find the opposite preference in other languages. In this section I will discuss two cases which seem to be instances of such anti-hierarchy effects.

6.1   Tangut

Kepping (1979) describes verbal agreement in the extinct Tibeto-Burman language Tangut as follows: "(a) the verb agrees only with SAPs, (b) it is optional,

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[30]with the exception of 1st and 2nd person which are not ranked with respect to each other. See section 4.1 above.

and (c) agreement is not related to semantic role unless there are SAPs in both the A[31] and the P roles, in which case agreement is with the SAP in the P role" (LaPolla, 1992:302). Given that there are no 3rd person markers in Tangut, this seems to indicate that competion is resolved by the hierarchy Object > Subject, which would be just the reversal of the hierarchy that seems to be relevant in Turkana, Chimariko, Quechua, and standard subject-agreement languages. However, Tangut seems to have a rather non-standard type of agreement which is indicated by the fact that it is not obligatory. More crucially, Ahrens (1990) from her own study of Tangut texts finds that "(a) verb agreement only occurs in quoted speech; (b) agreement is usually with the A and S arguments, not with the P argument; (c) when there are two SAPs involved in a clause, agreement is not necessarily with the P argument. There does not seem to be a regular correspondence between participant role and agreement marking"(LaPolla, 1992:302/303). I conclude that the factors determining agreement in Tangut, while far from clear, do not provide evidence for the hierarchy Object > Subject.

6.2 Menomini [+/-3] Competition

The Menomini agreement suffixes introduced in section 3.2 seem to provide direct counterevidence to the claim that non-third person agreement affixes always win over third person affixes, which follows from the the schemata in (62) and the hierarchy $\left\{ \begin{array}{c} [+1] \\ [+2] \end{array} \right\} > [+3]$. Recall that we find the affixes *-w* and *-m* appearing in exactly the same positions. *-m* occurs with 1st and 2nd person, and *-w* with 3rd person intransitives. However, in forms with third *and* non-third person arguments, *-w* appears, not *-m*:[32]

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[31]A = subject of a transitive sentence, P = object of a transitive sentence, S = subject of an intransitive sentence

[32]Similar affixes seem also to exist in other Algonquian languages such as *-n* and *-w* in Plains Cree (Dahlstrom, 1986).

(78)   Menomini [+/-3] Person Suffixes (Independent order)

    a.   *ne-(ke-)po·se-**m**   'I (you,sg.) embark'
        1-(2-)embark-[-3]

    b.   *po·se-**w**   '**he** embarks'
        embark-[+3]

    c.   *ne-na·n-ek-**w**   '**he** fetches me' (p. 154)
        1-fetch-D-[+3]

Note that these affixes are not only problematic for their behavior under competition, but also in light of most current theories of person features, which assume only the features [+/-1] and [+/-2] which suffice to derive most feature inventories in the languages of the world (cf. e.g. Anderson, 1992; Noyer, 1992; Dechaine, 1999; Harley and Ritter, 2001).[33] In such systems 3rd person affixes can be characterized as [-1 -2], but SAP affixes such as Menomini *-m* cannot be characterized without disjunction (1st **or** 2nd person). Since most of the same theories also reject disjunctive specifications of morphosyntactic features characterizing affixes (but see Wunderlich, 1997 and Carstairs-McCarthy, 1998) there is a genuine aporia for the correct analysis of *-m*

Since I do not hope to resolve the issue here, I choose the analysis which leads to the most straightforward account of the Menomini data. Since *-m* and *-w* form a natural class in most respects (competition domain and position in the morphological word), it is convenient to give them minimally distinctive feature values, namely [+3] and [-3]. As argued in section 3.2, blocking of their cooccurrence can then be achieved by COHERENCE [+Agr +/-3]$_{non-complex}$. But this still leaves us with the problem that a [+3] affix wins over a [-3] one while things work the other way around in all similar cases in other languages as well as within Menomini.

One might want to connect this atypical behavior to the fact that the features [+1] and [+2] are already expressed by the prefixes *ne-* and *ke-*. But the same phenomenon can also be observed in the conjunct order where third person is marked by *-t*[34] non-third person by *-yan* and generally no agreement prefixes appear:

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[33]Halle (1997) assumes that all languages have only two person features, but that it is parametrized whether these are 1,3 or 1,2. See also Wunderlich's analysis of Georgian (Wunderlich, 1996a as cited in Lakämper and Wunderlich, 1998:125).

[34]Bloomfield (1962:175) analyzes a second marker *-k* as also denoting [+3]. I assume that this has rather the function of the independent order *-n* (see below), but also *-k* blocks *-yan*, as expected if this is analyzed as an allomorph for [+3].

(79)   Menomini [+/-3] Person Suffixes (Conjunct Order)

      a. *po·se-**yan***   'when **I/you(sg.)** embark'
          embark-[-3]

      b. *po·se-**t***   'when **he** embarks'
          embark-[+3]

      c. *nε·w-e-**t***   'when **he** sees me'
          see-D-[+3]

That the same selection mechanism is at work in both paradigms, regardless from the phonological shape of the concrete affix, also millitates against any attempt to ascribe these data to idiosyncratic properties of single affixes. A further possible escape hatch to a hierarchy like [+3] > [-3] would be the assumption that *-m* and *-yan* are not marked for specific person features, but are a type of highly underspecified affixes, maybe only marking the feature person (+per) itself without further differentiation.

This idea is problematic in face of the fact that the contrast between the affixes is neutralized in a number of marked contexts. Thus the marker *-n* appears in "indefinite actor forms" (80a), certain forms with inanimate objects (80b) and negative forms (80c) instead of *-w* and *-m*:

(80)   Neutralization of Person (Independent Order)

      a. *po·se-**n***   'there is embarking' (p. 148)
          embark-PER

      b. *ne-po·na·-**n***   'I put it in the pot' (p. 159)
          1-pot:put-D-PER

      c. *ne-nε·wa·-**n**-an*   'I do not see him' (p. 169)
          1-see-D-PER-NEG

In the conjunct order there is also similar neutralization although obscured by many idiosyncrasies. Since neutralization usually means occurence of a less specified affix, *-n*, if any should be the underspecified person marker. Hence this cannot be the role of *-w*.

Thus, the anti-hierarchy effect in Menomini seems to be quite real. However the situation in Menomini is also special in other respects: First, there are other types of affixes in the same language which evidence standard hierarchies (cf. sections 4.1 and 5.1). This might "justify" a reversed hierarchy elsewhere to guarantee realization of third person agreement since SAP agreement is already expressed by other affix types. However, it is problematic to capture this intuition

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formally in the assumed framework since this would amount to appeal directly to feature hierarchies and is not compatible with independent free ranking of all constraints. Second, competition usually involves affixes expressing 1st or 2nd person, but not *generalized* SAP affixes. Hence, Menomini is not really the mirror case of say Turkana. Thus I propose to complement the schemata in (62) by the following:

(81)   For each person feature F there is a PARSE constraint PARSE [+F]/[-F]

This implies that [+1] should be parsed over [-1], and [+2] over [-2] which is in complete accordance with the standard hierarchies. The only case where the scheme in (81) departs from these is the [+3] over [-3] case in Menomini, which is actually attested. Note that this scheme does not license constraints of the form PARSE $[P]^{[+F]/[-F]}$ which would allow that a [+3] affix wins over a [+1] affix (which is underlyingly [-3]).

7   Further Hierarchy Effects

In this section I show that the account of hierarchy-based competition straightforwardly extends to two further domains where prominence hierarchies are crucially involved: direction marking and case conflict in free relative constructions.

7.1   Direction Marking

Direction marking is one of the classical domains that illustrate the effects of prominence hierarchies (cf. Comrie, 1980; Klaiman, 1992). Since hierarchy-based competition is usually linked with such systems (e.g. in Menomini and Turkana), we might expect that the account given so far also extends to this domain.

Direction markers according to the typological literature (e.g. Comrie, 1980) mark the (un-)naturalness of predication types with respect to prominence hierarchies by special affixes. For example, in Menomini, verbs mark predications which involve 1st or 2nd person subjects and third person objects by the affix *-a·* and predications with 3rd person subjects and 1st/2nd person objects by *-eko*:

(82)   a.   *ke-na·n-**a**·-w-a·w*   *(kena·na·wa·w)*
               2-fetch-D-[+3]-[−1+pl]

'you (pl.) fetch him' (p. 153)

b. *ke-na·n-**eko**-w-a·w*   *(kena·nekowaw)*
2-fetch-D-[+3]-[−1+pl]
'he fetches you (pl.)' (p. 154)

In this section, I show that the distribution of direct and inverse markers in Menomini follows directly from hierarchy-based competition under plausible assumptions about the formal representation of these affixes. For reasons of space, I will only treat two of the five direction markers in Menomini, but the analysis extends straightforwardly to the missing markers (see Trommer, 2002b for details).

The first question is now how to represent direction markers. Recall from section 2 that affixes in DO encode a subset of the syntactic features they interpret. Since the typical distribution of direction markers is in transitive verb forms with person/number affixes that are not specified for case, it is natural to assume that direction markers express just the case features left unexpressed by other affixes and have roughly the form in (83):

(83) $\left[\begin{array}{l} \text{[+Nom \dots]} \\ \text{[+Acc \dots]} \end{array} \right]$

Given the general constraint PARSE [F], this explains why direction affixes must appear. The presence of [+Acc] also ensures that they only appear in transitive contexts. The second question is why there always appears only one direction marker. Recall the definition of COHERENCE from section 3.1:

(84) **COHERENCE** … **:** In an output with more than one VI meeting the constraint description, count a constraint violation for each such VI with index i (immediately) preceded by another one with index j such that $i \neq j$.

Now consider a schematic example of two cooccurring direction markers:

(85) $\left[\begin{array}{l} \text{[+Nom \dots]}_i \\ \text{[+Acc \dots]}_j \end{array} \right] \left[\begin{array}{l} \text{[+Nom \dots]}_i \\ \text{[+Acc \dots]}_j \end{array} \right]$

Even though these have identical indices, this constitutes a violation of COHERENCE since there are ordered pairs of distinct indices $\langle i, j \rangle$ and $\langle j, i \rangle$ such that the first occcurs in one VI and the second in the preceding one. Hence the following constraint accounts naturally for the restriction to only one direction marker in a

given spell-out domain:

(86) COHERENCE $\begin{bmatrix} [\text{+Nom} \dots] \\ [\text{+Acc} \dots] \end{bmatrix}$

A further problem is how to characterize different direction markers such as *-a·* and *-eko* in Menomini. Note first that the distribution of these markers is actually much more complex than stated above, as shown in (87). Both markers appear in combinations with an "unspecified actor"[35] ([3 −spec +an]), and in combinations of inanimates ([3 −an]) with other 3rd person arguments. Further, if both arguments of the verb are 3rd person animate, direction marking is sensitive to the contrast between proximate ([3 -obv +an]) and obviative ([3 +obv +an]) NPs, where "proximate" corresponds roughly to NPs referring to topic information and "obviative" to NPs introducing new discourse referents. In transitive predications, either the subject or the object (but not both) are obviative. Apart from the unspecified actor case, which has no corresponding patient category, *-a·* represents the mirror image of *-eko*.

(87) Distribution of *-a·* vs. *-eko*

-a·			*-eko*		
[1/2 +**an**]	→	[3]	[3]	→	[1/2 +**an**]
[3 −spec +**an**]	→	[3 +spec]	[3 −spec +an]	→	[1/+2 +**an**]
[3 -obv +**an**]	→	[3 +obv +an]	[3 +obv +an]	→	[3 +obv +**an**]
[3 -obv +**an**]	→	[3 −an]	[3 −an]	→	[3 -obv +**an**]
[3 +obv +**an**]	→	[3 −an]	[3 −an]	→	[3 +obv +**an**]

A crucial generalization emerges from (87): Whenever *-a·* is used, the subject is [+an]; if *-eko* appears, the object is [+an]. Since this feature is not realized by any other agreement affix in Menomini, it is plausible that it is also part of the specification of the direction markers as in (88):

(88)   *-a·*   ↔   [+Nom +an] [+Acc]
         -eko   ↔   [+Nom] [+Acc +an]

This still does not account completely for the distribution of *-a·* and *-eko* since for many cases both markers would be licensed. For example, if one argument is 1st

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[35]In "unspecified actor forms", the subject is unspecified in a passive like-manner. Bloomfield indeed calls these forms passives, and I will follow him here in the translations.

person and the other proximate animate, both arguments are animate; hence, both markers should be possible for the inputs in (89):

(89)   a.   [+Nom +1 +an] [+Acc +3 -obv +an]
       b.   [+Nom +3 -obv +an] [+Acc +1 +an]

But recall that the feature [+an] is only realized by the direction markers. Hence, PARSE constraints referring to this feature will have an immediate effect on the distribution of these markers. The basic idea is now that for certain categories the feature [+an] is more typical than for others. For example, non-third person arguments are typically animate, while this is only true to a much more restricted degree for 3rd person arguments. To translate this observation in terms of constraints, we can assume the following PARSE constraint:

(90)   PARSE [+an]$^{[+1]/[+3]}$

This ranking has the effect to favor *-a·* for (89a), and *-eko* for (89b). Note that the case features of the feature structures in the direction markers do not allow for any other coindexing than the ones in the depicted candidates:

(91)   Input: [+Nom +1 **an**]$_1$ [+Acc +3 -obv +an]$_2$

		PARSE [+an]$^{[+1]/[+3]}$
☞	a. *-a·* [+Nom **+an**]$_1$ [+Acc]$_2$	
	b. *-eko* [+Nom]$_1$ [+Acc +an]$_2$	*!

(92)   Input: [+Nom +3 -obv +an]$_1$ [+Acc +1 **an**]$_2$

		PARSE [+an]$^{[+1]/[+3]}$
	a. *-a·* [+Nom +an]$_1$ [+Acc]$_2$	*!
☞	b. *-eko* [+Nom]$_1$ [+Acc **+an**]$_2$	

Now, (90) reflects a prominence hierarchy for [+an] in the same way as the constraints in (48) do for person. Since the other cases in (87) where both markers would be licensed can be treated in a completely parallel fashion, given the hierarchies in (93), the distribution of direction markers emerges as a further subcase of the second scheme in (62) repeated here as (94), where F = [+an]:

(93)   a. $\left\{ \begin{array}{c} [+1] \\ [+2] \end{array} \right\} > [+3]$

b.   [-spec] > [+spec]
c.   [+an] > [−an]
d.   [-obv] > [+obv]

(94)   If A is distinct from B, and A $\geq$ B on a prominence scale S, then there are the PARSE constraints PARSE A/B and PARSE [F] (for each agreement feature F)

This leads among others to the PARSE constraint PARSE [+an]$^{[-\text{spec}]/[+\text{spec}]}$ which together with PARSE [+an]$^{[+1]/[+3]}$ ensures that *-a·* is chosen in unspecified actor constructions with another 3$^{\text{rd}}$ person argument, but *-eko*, if the other argument is 1$^{\text{st}}$ person.[36]

7.2   Case Conflict in German Free Relatives

Pittner (1991) argues that the grammaticality of German Free Relative (FR) constructions crucially depends on a case hierarchy. In this section I show that this apparently unrelated effect can be handled by the same formal machinery as hierarchy-based competition in agreement morphology, lending further support to the general approach to hierarchy effects proposed in this paper.

While the FR pronoun In German always bears the case assigned to it inside the relative clause (r-case), the construction is only grammatical if r-case is higher than the case assigned to the FR sentence by the matrix clause (m-case) on the hierarchy in (95):[37]

(95)   dative/prepositional > accusative > nominative case

This is illustrated by the sentences in (96) for the case of nominative and accusative. In (96a), r-case is hierarchically higher ([+Acc] > [+Nom]), hence the sentence is grammatical. In (96b), r-case is lower than m-case, hence no grammatical FR is possible:

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[36]Note that 1 → 2 and 2 → 1 predicates have different direction markers. See Trommer (2002b) for discussion.

[37]The hierarchy in (95) emerges in a different way in Gothic FRs, where all FRs surface with the higher-ranked case. See Trommer (2002d) and Vogel (2002) for analyses.

(96) a. *weil   uns besucht, ***wer/wen** der   Peter mag*
       because us   visits   who-ACC Maria likes
       'because (the person) whom Peter likes visits us'
    b. *Ich   zerstöre   ***wer/*wen** mich ärgert.*
       I destroy who:NOM/ACC me   upsets
       'I destroy who upsets me'

In Trommer (2002d), I argue in detail that the ungrammaticality of FR construc-
tions in many instances is due to an interface condition between Chain Interpreta-
tion and Head Interpretation, which disallows FR-pronouns with two case speci-
fications (e.g. *[+Nom +Acc]). If the constraints at Chain Interpretation result in
such a configuration, the structure gets non-interpretable, hence ungrammatical.
On the other hand, if the constraints applying at Chain Interpretation force sup-
pression of one of the case features, a licit structure results exhibiting m-case or
r-case according to specific PARSE constraints.

   In the case of German we can now assume a high-ranked constraint PARSE
r-case, which enforces realization of r-case in all FR-constructions. *CaseCase
prohibits realization of two cases inside of one head, but is ranked relatively low.
The effects of the hierarchy in (95) are again implemented by contextually re-
stricted PARSE constraints, namely PARSE +Obl/-Obl and PARSE +Acc/+Nom.
PARSE r-case and PARSE +Acc/+Nom both favor realization of r-case, i.e. if
r-case is accusative,then *CaseCase is obeyed, and accusative case emerges as in
(96a):

(97)   Input: $[+Nom]_{m\text{-}case} \rightarrow Chain_i \leftarrow [+Acc]_{r\text{-}case}$

	PARSE r-case	PARSE +Obl/-Obl	PARSE +Acc/+Nom	*CaseCase
DP_i [+Acc +Nom]				*!
☞ DP_i [+Acc]				
DP_i [+Nom]	*!		*	

However, if m-case is accusative as in (96b), then realization of r-case will be
forced by PARSE r-case, and realization of m-case by PARSE +Acc/+Nom. The
resulting structure [+Acc +Nom] leads to ungrammaticality which is indicated by
the cemetery sign ✝:

(98)   Input: $[+\text{Acc}]_{\text{m-case}} \rightarrow \text{Chain}_i \leftarrow [+\text{Nom}]_{\text{r-case}}$

	PARSE r-case	PARSE +Obl/-Obl	PARSE +Acc/+Nom	*CaseCase
☞ DP_i [+Acc +Nom] ✝				*
DP_i [+Acc]	*!			
DP_i [+Nom]			*!	

A similar account holds for the contrast in (99) (Vogel, 2002:10), where *begegnen*. 'to meet' assigns dative case:

(99)   a.   *Er   zerstörte, **wem**   er begegnete*
             he:NOM destroyed who:DAT he met

             'He destroyed who he met'

        b.   *Er   begegnete, ***wen/*wem**   er zerstörenwollte*
             he:NOM met   who:ACC/who:DAT he destroy   wanted

             'He met who he wanted to destroy'

If r-case is dative (99a), this case is realized, since it is favored by PARSE r-case and PARSE +Obl/-Obl while PARSE +Acc/+Nom is irrelevant, and *CaseCase blocks appearance of m-case. If m-case is dative (99b), r-case is required by the corresponding constraint, m-case by PARSE +Obl/-Obl and the ungrammatical [+Nom +Dat] results.

   While the contrast in (99) seems to be found in all varieties of German, Vogel (2002) observes that there is one variety of German where (96-b) is grammatical with nominative case of the relative pronoun. This follows if in this variety PARSE +Acc/+Nom is ranked below *CaseCase:

(100)   Input: $[+\text{Acc}]_{\text{m-case}} \rightarrow \text{Chain}_i \leftarrow [+\text{Nom}]_{\text{r-case}}$

	PARSE r-case	PARSE +Obl/-Obl	*CaseCase	PARSE +Acc/+Nom
DP_i [+Acc +Nom]			*!	
DP_i [+Acc]	*!			
☞ DP_i [+Nom]				*

It is easy to see that PARSE +Obl/-Obl and PARSE +Acc/+Nom follow from the basic scheme in (62) and the hierarchy in (95).[38] Thus it is clear that the approach

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[38]Actually we get something more finely grained, namely: PARSE +Acc/+Nom, PARSE

to hierarchy effects in agreement morphology extends also to other morphosyntactic domains.

8 Other Approaches to HBC

Hierarchy-driven competition has only scarcely been treated in the literature. The typological literature only notes the phenomenon in passing. For example Croft (1990:113) writes: "In a number of languages found scattered around the world, the transitive verb agrees not with the subject (A), or the absolutive (P), but whichever of A and P is higher on the person hierarchy."[39]. Most formal accounts such as Wunderlich (1996b) and Stump (2001) for the Potawatomi prefixes[40], rely heavily on stipulations in lexical entries or rule formats.

8.1 Noyer (1992)

The only detailed account of hierarchy effects in generative morphology I am aware of is Noyer (1992). He assumes that universal grammar involves a universally fixed feature hierarchy $(1 > 2 > 3 \ldots)$ and a set of morphosyntactic filters prohibiting the cooccurrence of certain morphosyntactic features, e.g. *[+1 +2]. Filters can either be switched on or off resulting in different morphological grammars for single languages. If a filter holds for a given language, the feature hierarchy determines which affixes are suppressed.

Noyer's approach is problematic in several respects: *First* it does not capture the variation in hierarchy effects that can be observed. Thus for the case of Algonquian prefix agreement[41], he would predict that [+1] affixes prevail over [+2] affixes. He tries to escape this consequence (Noyer, 1992:169) by claiming that this is not systematic preference for [+2] but the effect of a more specified VI for *ne-* as [+1 -2], as opposed to [+2] for *ke-*. However, this only works for intransitive cases. since in $1 \rightarrow 2$ and $2 \rightarrow 1$ predications again both items are licensed, and *ne-* should be chosen counter to fact.[42] It is also unclear how complex interac-

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+Obl/+Acc and PARSE +Obl/+Nom. I use PARSE +Obl/-Obl here as an abbreviation for the two basic constraints involving oblique case.

[39] with reference to Tangut. See section 6.1 for discussion.

[40] which function similar as the Menomini prefi xes discussed here.

[41] Noyer discusses Potawatomi, which behaves identical as Menomini in all crucial respects.

[42] Dechaine (1999:13) proposes an account of feature hierarchies that allows language-dependent parameterization with regard to the status of [+1] and [+2]. However her account is restricted to person features and subject to most other objections against Noyer's approach.

tions of different hierarchies as in Shasta and Dumi could be accounted for under the assumption of a universally fixed feature hierarchy. *Second*, the constraint-based account relates languages showing hierarchy-based competition to more common systems. Both agreement types simply emerge from different constraint rankings. It is unclear how this could be achieved under Noyer's assumptions. *Finally*, systems that show emergence of Two-Argument agreement and are neatly accounted for under the constraint-based approach should be impossible under Noyer's system since filters which hold in a specific language can by definition never be violated

8.2   Standard OT-approaches to Hierarchy Effects

In many applications of Optimality Theory (e.g. Prince and Smolensky, 1993; Aissen, 1999), feature hierarchies are implemented by fixed rankings of markedness constraints. Thus the preference for 1st over second person agreement could be captured by the hierarchy in (101a), and the preference for subject agreement by (101b):[43]

(101)   a. *Agr/[+3] $\gg$ *Agr/[+1]
         b. *Agr/[+Acc] $\gg$ *Agr/[+Nom]

By itself these constraints would predict that say in a $1 \rightarrow 3$ predication neither the [+1] nor the [+3] argument induce agreement. Hence we need some constraint like !Agree which requires agreement with at least one argument. The Turkana data in tableau (37) could then be derived as in (102):

(102)   **Input:** $[+Nom +3]_1 [+Acc +1]_2$

	!Agree	*Agr/[+3]	*Agr/[+1]
☞ a. $[+1]_2$			*
b. $[+3]_1$		*!	
c. $[+1]_2[+3]_1$		*!	*
d.	*!		

However, stipulating a fixed order of constraints – while common practice in the OT literature – goes against the spirit of OT, where constraints are supposed to be

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[43](101) could be derived by a technique called "harmonic alignment" (Prince and Smolensky, 1993:136), but this is not crucial to the discussion.

freely rankable. Moreover, markedness constraints in OT are surface-oriented, but in section 4.2 we saw that constraints on feature hierarchies must refer to features of underlying heads. Thus, (101b) would not give the right result in Turkana, since the case features are not realized by vocabulary items. The fixed-hierarchy approach seems also incapable to derive Emergence of Two-Argument agreement effects. Presupposing the ranking in (102), any other feature hierarchy, i.e. any other set of similar markedness constraint could have three possible effects: (1) favor a different agreement target (if ranked between !Agree and *Agr/[+3]), (2) suppress completely the expression of agreement (if ranked above !Agree) (3) have no effect at all (if ranked below the constraints in (102)). Under no option we two-argument agreement is obtained.

Note finally that the fixed-hierarchy approach does not extend neatly to the other phenomena captured by the account proposed in this paper. Thus Vogel (2002) concludes that the effects of case hierarchies in German FRs cannot be captured by constraint ranking alone[44], and (Aissen, 1999) admits that her account of direction marking does not extend to direction marking in Algonquian.[45]

8.3 Woolford (2001)

Woolford (2001) treats cases where crossreferencing of arguments alternates according to feature hierarchies between clitics and agreement morphemes. Thus, in Yimas transitive predications the argument that is ranked higher on the hierarchy $1 > 2 > 3$ occurs as agreement and the other one as a clitic, as in the case of $2 \rightarrow 1$ sentences (Woolford, 2001:23):

(103)   **Input: 2nd subject 1st object**

	CL[$_V$	*agree	*clitic	1st[$_{Vstem}$	2nd[$_{Vstem}$
a. 2nd AgrS 1st AgrO Vstem		**!			*
b. 1st CL 2nd AgrS Vstem		*	*	*!	
☞ c. 2nd CL 1st AgrO Vstem		*	*		*
d. 2nd CL 1st CL Vstem	*!		**		

The constraint CL[$_V$ was already discussed as (30) in section 3.3 and has the effect of restricting the number of clitics to one. The ranking of the markedness con-

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[44]Vogel assumes that constraints refer to hierarchies fixed in a language-specific manner in an independent module of the grammar.

[45]See Trommer (2002a)for a detailed critique of Aissen's approach.

straints *agree and *clitic excludes expression of all arguments by agreement[46]
The choice between (103b) (2nd person agreement) and (103c) (1st person agreement) is now determined by the corresponding alignment constraints which demand aligning 1st and 2nd person affixes to the verb stem. Since $1^{st}[_{Vstem}$ is ranked higher, this is 1st person and the 2nd person argument must be expressed by a clitic.

Thus the ranking of alignment constraints crucially derives the hierarchy effect in Yimas. While this works neatly for the cases Woolford discusses, it seems to be restricted to cases where agreement alternates with clitics (otherwise the effects in (103) would just involve positioning of agreement affixes).[47] Problems with the alignment-based account of the one-argument restriction were already discussed in section 3.3. Moreover, all of the objections against approaches based on markedness constraints (section 8.2) also carry over to this analysis: It relies on universally fixed constraint ranking, alignment constraints allow only reference to surface features, and it is unclear how it could capture ETA effects.

9 Summary

In this article I have shown how a restricted set of freely rankable constraints can account for a big number of diverse effects of prominence hierarchies on agreement morphology.

The restriction of agreement to one argument was derived from a more general constraint against coindexing changes, the hierarchy effects themselves from binary preference constraints favoring hierarchically higher categories. This account proves to be superior to the traditional assumption that prominence hierarchies directly govern aspects of agreement in allowing more empirically necessary differentiations (reference to the surface level and the level of the underlying heads), and in extending to cases where different hierarchies interact to give complex patterns of competition or emergence of two-argument agreement.

This approach also departs from most other OT-approaches to prominence hierarchies in taking serious the claim that all constraints are freely rankable. This

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[46]XRef (see section 3.3) which is higher ranked than all depicted constraints ensures that all arguments are expressed either as clitics or as agreement.

[47]Since labels such as "word", "clitic" and "affix" usually refer to or correspond to the phonological shape of the involved items, it seems to be desirable to get rid of these these purely theory-internal constructs, and to derive such effects by interface conditions between syntax and phonology. See Trommer (2002d) for a discussion how this can be done for the alternating expression of negation in English by affixes and words.

theoretically desirable assumption was not only shown to be tenable, but proved also empirically superior to accounts in terms of universally fixed constraint hierarchies (Aissen, 1999). This fits nicely with evidence from phonology which independently favors approaches that implement hierarchies without recourse to fixed ranking (de Lacy, 2001).

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