How gaps and substitutions can become optimal: the pronominal affix paradigms of Yimas

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Abstract

In order to describe the possible and impossible pronominal prefix combinations in the Yimas verb, a set of partially ordered constraints is proposed within the correspondence format of OT. These constraints simultaneously explain the split in the inventory, the order of prefixes, why gaps appear in some category combinations, and why less specified prefixes substitute for fully specified ones in other combinations. Moreover, I will show that the Yimas inventory of ergative and accusative morphemes is rather stabile under the given constraint ranking. A scenario in which Yimas shifts to a pure accusative system is more imaginable than a scenario in which it shifts to a pure ergative system, contrary to the fact that the ergative morphemes outnumber the accusative ones. Thus, an OT account may result in evaluations of the inventory that differ from more intuitive judgments.

1. Introduction[1]

Paradigmatic gaps and substitutions destroy the ideal picture of a paradigm as a collection of inflected word forms, each minimally contrasting with other word forms in transparent ways. A gap appears if an expected word form does not occur, that is, if either the respective morpheme does not exist or an existing morpheme does not enter the paradigmatic cell under question. A substitution appears if another morpheme than the expected one enters the paradigmatic cell. Both gaps and substitutions constitute major problems for morphological theories.

The notional devices invented to describe the appearance of gaps or substitutions are unsatisfactory because they do not consider whether these infelicities result from a specific rule or rather from the interaction of several conflicting principles. Impoverishment rules, assumed by Distributed Morphology (Bonet 1991, Noyer 1992, 1998, Halle and Marantz 1993), state that a certain category must not be realized in a particular context. However, it might be the case that the occurrence of a gap is forced by a conflict between more general constraints. Rules of referral (Zwicky 1985, Stump 1993, Corbett and Fraser 1993, Evans, Brown and Corbett 2000) state that certain cells of a paradigm are filled by loans from other cells (or paradigms). However, it might be the case that the underspecified morphemes extend their paradigmatic space because the more specific morphemes are blocked. Thus, none of these devices offers an explanation why in a particular language, some category combinations have to be impoverished, and others have to be realized by referral.

One reason for the failure to account for gaps and substitutions was the lack of an adequate framework. The notions of gap and substitution already imply the existence of two levels: at one level certain underlying categories are combined, and at another level the morphological exponents of these categories appear, but need not strictly correspond to the underlying categories. This invites us to explore the appearance of gaps and substitutions in the framework of Correspondence Theory (CT). Following these ideas, I try to describe gaps and substitutions as forced by the workings of more general constraints. A gap appears if the requirement to realize a category is lower ranked than some other constraints that block the realization in this case. A substitution (rather than simply a gap) arises if a less specific morpheme enters the gap without violating the relevant constraints; such an account requires the assumption of morphological underspecification.

The field of exercise in this study is taken from the subject-object paradigms formed by pronominal affixes in Yimas (New Guinea), as described by Foley (1991). In Yimas, the grammatical role of arguments is exclusively marked by affixes on the verb. There is no case-marking on NPs, and the syntactic position of NPs only reflects information structure, but not their grammatical role. Thus, argument linking in Yimas is exhaustively described by the possible combinations of verbal affixes.

The analysis in this paper is based on the following assumptions:

(i)   The pronominal affixes are exclusively specified by means of plus-valued features for person, number, and case. There is no value specified for 3rd person, singular, and nominative; prefixes that instantiate these categories are therefore underspecified.

(ii)   The selection of the pronominal affixes that realize a certain category combination (that is, enter some paradigm cell) is regarded as a correspondence-theoretic problem. The intended information (the input) is represented by the theta structure of a verb, associated with person and number features, and the selection is made out of a set of alternatives formed by all possible sequences of pronominal affixes attached to a verb (the output).

(iii)   There is a (partially) ordered set of violable constraints that determines for each intended feature structure which output candidate is the optimal one, that is, which pronominal affix sequence wins the competition.

In order to set out this program, at least three steps must be performed: (a) the features for representing the individual morphemes (the pronominal affixes) have to be established; (b) every combination of affixes has to be assumed a possible candidate in the competition for a paradigm cell; (c) a minimal set of constraints evaluating these candidates in a uniform ranking has to be motivated.

The next section introduces these prerequisites in more detail. Section 3 presents the data: the inventory of the Yimas pronominal affixes (which shows both an accusative and a dative split), as well as the paradigms of verb forms generated by these affixes, thereby highlighting on instances with gaps and substitutions. The analysis in section 4 is performed in two steps: after the evaluation of the inventory by means of language-independent constraints some additional, language-specific constraint instantiations are introduced by means of which the pronominal affix combinations for transitive and ditransitive verbs are evaluated. Section 5 discusses the results under various perspectives.

2. The theoretical framework

2.1 Minimalist Morphology

Minimalist Morphology (MM, Wunderlich & Fabri 1995, which goes back to a paper in 1992, Wunderlich 1996) is a morpheme-based (rather than syntax-based) theory of inflection, describing the generation of inflected word forms on the basis of a given inventory of affixes ('morphemes'). MM claims minimality in several respects, briefly summarized here:

- 'Minimize the information to be stored': The underlying information associated with stems and affixes should be underspecified, more precisely, only plus-valued features should be stored. (Systematic) syncretism then results from underspecification. Of course, lexical idiosyncrasy (in particular, the existence of morphologically conditioned allomorphs) enlarges the number of items to be stored. But if stem allomorphs are represented by inheritance trees, the amount of information can again be reduced; moreover, these inheritance trees allow predictions for subregularities (for instance, in the set of irregular or 'strong' verbs of German, as shown in Wunderlich & Fabri 1995). No class features referring to paradigms are assumed. Affix allomorphs may have selectional conditions (their 'input'), either phonological or categorical (featural) in nature.

- 'Minimize the number of operations', i.e. all unnecessary operations are avoided. More specifically, no zero affixes are assumed, and all operations beyond concatenation are banned from the theory: no rules of referral, no impoverishment rules, no operations that destroy structure, no affix templates are allowed. Minus-valued features are mainly filled in by default.

- 'Minimize the domain of operations': all morphological operation is local, for instance, the selectional condition of an affix must be locally fulfilled, and no cross-references between non-adjacent parts of a word are admitted.

All these assumptions concern either the resources (the lexical inventory) or the function GEN, which generates the possible inflected word forms. For a correspondence-theoretic version of morphology these ingredients can easily be preserved; everything which constitutes a possible candidate in the evaluation is determined by this restricted ('minimalist') view of GEN.

Furthermore, MM assumes the global operation of paradigm checking: all stem-affix combinations are potential competitors for a paradigm cell, in virtue of the information collected on them, and for each cell of the paradigm an optimal candidate has to be selected (observing constraints such as Specificity and Simplicity). Minus-valued features are filled in relatively to the paradigm, whereby (systematic) syncretism is preserved (see also Blevins 2000 for a similar proposal). Only the optimal forms occupying the cells of a paradigm are projected into syntax.

This program of MM discharges most of the rule types known from syntax-based accounts of inflectional morphology. These accounts start with a syntactic structure, which is enriched by morphological features, and then specify how these feature structures are realized or 'spelled out' in terms of specific types of rules (layered word formation rules in Anderson 1992; merger, fusion and fission, impoverishments and readjustment rules in the Distributed Morphology of Halle & Marantz 1993; morpholexical rules, rules of referral, morpholexical functions and paradigmatic functions in the Realization Morphology of Stump 1993).

2.2 Correspondence -theoretic morphology

With the emergence of optimality-theoretic ideas in several fields of linguistics (Prince and Smolensky 1993) it is time to reconsider inflectional paradigms. The OT perspective allows us to precisize the original program of MM, and also sheds new lights on the lexicalist-syntactic debate. In the correspondence-theoretic (CT) version of OT (McCarthy and Prince 1995), two levels are distinguished, the level of underlying structure (the input), and the level of surface structure (the output). Let us assume that the input of inflectional morphology is an abstract setting (an 'intended reading', e.g., consisting of a verb together with its theta-structure and inflectional ϕ-features), and the output is a set of candidate word forms (modulo phonological alternations).[2]

Then, there arise two related problems in CT-Morphology: (A) Which affix combination is optimal for realizing a given input setting? Under this question, GEN has to generate all morphological concatenations of a stem with affixes as possible candidates. (B) Which interpretation is optimal for a given morphological affix combination? Under this question, GEN has to generate (on the basis of lexical information) all readings for a morphological concatenation of a stem with affixes as possible candidates. These two perspectives are illustrated in (1).

(1)   (A)   input   (B)   input
                   $\Downarrow$ $\Uparrow$
                  output   output
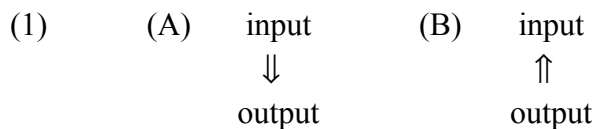
One can easily see that both perspectives are needed. Consider the form (2) of Ayacucho Quechua, which gets the readings 'You (sg/pl) see us', but not the reading 'You (pl) see me' (Lakämper & Wunderlich 1998).
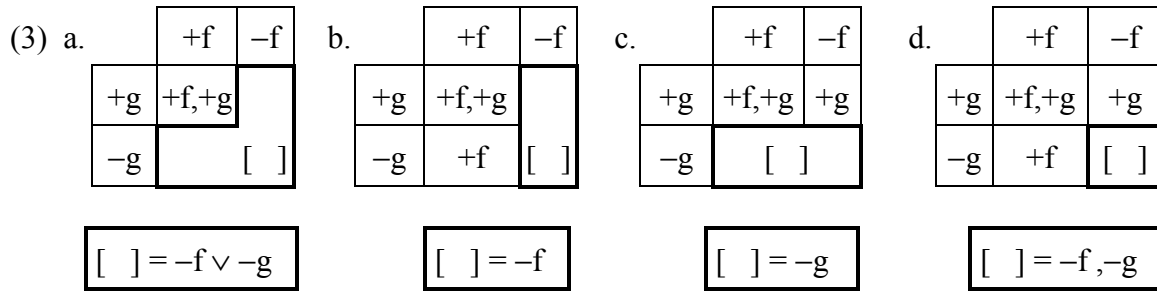
(2)   *riku-wa-nki-ku*
            see-1Obj-2-pl

The fact that the form in (2) cannot express 'You (pl) see me' and therefore does not compete in the evaluation of 2plSubj/1sgObj candidates in the perspective (A) above, cannot be established on the basis of the affixes *wa, nku*, and *ku* alone. One rather has to know that there is another form, namely *riku-wa-nki-chik* (with *-chik* specified as pl/2), which expresses this reading more accurately. Similar observations can be made for many more languages.

The problem that the reading of a form depends on the existence of other affixes can be illustrated by the following hypothetical paradigms, each of them constituted by a different set of affixes bearing the features [+f] or [+g]. The remaining paradigm space may be occupied by an elsewhere affix, unspecified for both features. Clearly, this unspecified affix gets different readings in the four possibilities shown in (3).[3]

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[2] I do not consider here the phonological alternations which are mostly in the focus of OT-based accounts, nor the conditions under which allomorph selection takes place. (See Stiebels & Wunderlich 1999 for an account of the mutual selection between stem and suffix allomorphs in Hungarian.)

[3] There is no need that the unspecified affix occupies a larger space than any of the specified affixes. Wunderlich & Fabri (1995), Steins (1996), and Carstairs-McCarthy (1998) discuss the possibility of disjunctive entries [+f $\vee$ +g], where the positive paradigm space in (3d) is occupied by just one morpheme.

(3) a.

	+f	−f
+g	+f,+g	
−g		[ ]

[ ] = −f ∨ −g

b.

	+f	−f
+g	+f,+g	
−g	+f	[ ]

[ ] = −f

c.

	+f	−f
+g	+f,+g	+g
−g	[ ]	

[ ] = −g

d.

	+f	−f
+g	+f,+g	+g
−g	+f	[ ]

[ ] = −f ,−g

An OT framework that simultaneously accounts for both perspectives, the input-to-output and the output-to-input perspective, has been proposed by Blutner (1999) and Jäger (2000).[4] In this paper, however, I will only focus on perspective (A) because most pronominal affix combinations of Yimas do not range in their reading in the way as the forms of Quechua do. (There are a few exceptions within the paucal number system of Yimas, to which I will return in 5.7.)

In assuming an underlying setting, perspective (A) takes over aspects of syntactic approaches to inflectional morphology: here, the input-output relationship is framed in a way that is similar to other versions of realizational morphology. However, the candidates that have to be evaluated are generated bottom-up rather than top-down; there are no rules that derive the inflected forms from a feature structure given in the input. Instead, the possible output candidates are generated by a function GEN that, in principle, may generate anything, but (for the sake of finite computation) is restricted to concatenation of stems and affixes. This is very close to the spirit of MM. Hence, CT-Morphology, as I will illustrate it in this paper, integrates features of both syntax-based and morpheme-based accounts. If one takes perspective (B), one follows the morpheme-based approach even more literally: GEN, then, generates inflected word forms that are evaluated for their possible readings; the possible candidates are projections *into* syntax rather spell-outs *from* syntax. In any case, the relationship between morphemes, inflected word forms and clauses headed by these word forms is bidirectional. All derivation is bottom-up (structure-building), but all evaluation is constraint-based, that is, declarative. In its declarative way, CT-Morphology really overcomes the lexicalist-syntactic debate.

Besides theoretical reasons, there are also empirical reasons why CT-Morphology is necessary. Actual paradigms often suffer from infelicities: some cells are not occupied by the most transparent word forms, as expected on the basis of a given inventory of affixes.

(4)   Paradigms may have (partial) gaps, and sometimes these gaps are filled by means of less specific substitutes, even at the risk of ambiguity.

For instance, in a transitive paradigm of pronominal affix-combinations certain cells may lack an exponent of the subject (a gap), and cells for 1st or 2nd person may show only 3rd person forms (substitutes). The original version of MM does not offer any strategy to deal with gaps and substitutions, while the syntax-based approaches have offered special types of rules:

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[4] The original version of MM tried to solve the problem of integrating the perspectives (A) and (B) by means of an algorithm defined over the full set of inflectional forms (Fabri et al. 1996), which was restricted to one level because correspondence theory was not available at that time. However, equipped with this tool, the interaction of underspecification, syncretism, and the selection of optimal word forms can be worked out much more adequately.

impoverishment rules to account for gaps, and rules of referral to account for substitutions. For principled reason, these special types of rules are not accepted in a minimalist approach. The morphological effects they intend to describe often follow from the interaction of independent constraints. In the few instances that are left, violable constraints rather than rules are assumed to be at work.

2.3 Features

It is in the spirit of correspondence theory that input and output are characterized by the same set of features. In morphology, mostly only '+' feature values are relevant, therefore, in an underspecification account only '+' values are specified in the output. In contrast, the input demands are fully specified in terms of both '+' and '−' values.

The features that specify argument roles are taken from Lexical Decomposition Grammar (LDG, Wunderlich 1997). Each transitive verb is characterized by the schema in (5a), and each ditransitive verb by the schema in (5b), where the λ-abstractors represent the theta roles, specified by the role (or abstract case) features [+hr] ('there is a higher role') and [+lr] ('there is a lower role').[5] Moreover, each theta role can be associated with additional features for person and number, abbreviated as ϕ-features. Such a configuration functions as input ('the intended information'):

(5) a. λz^{ϕ} λx^{ϕ} VERB(x,y)   b. λz^{ϕ} λy^{ϕ} λx^{ϕ} VERB(x,z,y)
         +hr   −hr   +hr   +hr   −hr
         −lr   +lr   −lr   +lr   +lr

This view corresponds to the assumption that each argument is specified by the feature structure in (6).[6]

(6) $\begin{bmatrix} \text{arg} & \begin{bmatrix} \text{role} & [\ ] \\ \text{person} & [\ ] \\ \text{number} & [\ ] \end{bmatrix} \end{bmatrix}$

The morphological, i.e. the output-feature values assumed in this study are the following:

(7) a. Person: [+1] for first person, [+2] for second person, and [ ]$_{pers}$ for third person.
     b. Number: [+dl] for dual, [+pc] for paucal, [+pl] for plural, and [ ]$_{num}$ for singular.[7]
     c. Morphological case:
         [+hr,+lr] = D for dative (realizing the medial argument of ditransitive verbs, the
                          Recipient),[8]

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[5] For markedness considerations, these features slightly deviate from those introduced by Kiparsky (1992), namely [+HR] for 'the highest role', and [+LR] for 'the lowest role'. In Kiparsky's system, the most marked case, the dative, is specified as [−HR,−LR], whereas here it is specified as [+hr,+lr].

[6] Gender or nominal class features can be added if they are relevant for the language under question.

[7] There is evidence that in Yimas, both dual and paucal ('a few', between three and seven) imply plural. Some dual prefixes are formed from plural prefixes by adding ŋ- (*kul - ŋkul, kra - ŋkra*). The paucal is sometimes realized by a plural prefix together with an additional paucal suffix on the verb (1pc: *kra*[1pl]-verb-*ŋkt* [pc]).

[8] That the Recipient is the medial argument is predicted from semantic decompositions such as GIVE(x,y,z) = CAUSE(x,BECOME POSS(y,z)), or SHOW(x,y,z) = CAUSE(x,SEE(y,z)) (Wunderlich 1997),

[+hr]   = A for accusative (realizing the lowest argument of transitive or ditransitive verbs, the Patient or Theme),

[+lr]   = E for ergative (realizing the highest argument of transitive or ditransitive verbs, the Agent), and

[ ]$_{role}$ = N for nominative (realizing the subject of intransitive verbs).

These four structural cases form the lattice shown in (8).

(8)   Morphological case in LDG:

> dative D   [+hr,+lr]
>
> accusative A   [+hr]   [+lr]   ergative E
>
> nominative N   [ ]

Consequently, a language with the four cases D, A, E and N exploits the possibilities of the features [hr] and [lr] maximally. Additional structural cases such as genitive and partitive must be variants of one of the four cases introduced.[9]

2.4 Constraints

A first set of constraints concerns faithfulness between input and output. MAX constraints require underlying information to be visible in the output (and thus explicate the notion of specificity), while DEP constraints require all visible information to be already given in the input. The constraints in (9) correspond to the Theta Criterion in syntax-based theories.

(9)   a. MAX(arg): All arguments are realized by pronominal affixes (or clitics).

          b. DEP(arg): Each pronominal affix (clitic) in the output corresponds to a theta role in the input.

In an underspecification account, where only '+' values are specified in the morpheme inventory, MAX(F) and DEP(F) constraints can only relate to positive values. Since all features must belong to an argument, it is not possible to introduce features in the output without introducing an argument. Therefore, IDENT(F) rather than DEP(F) constraints become relevant. Furthermore, MAX(ϕ) constraints can be relativized to the theta role that bears these features. Thus, (10) represents the set of feature-related faithfulness constraints that are needed in the evaluation of argument linking.

(10)   a. MAX(role): Every positive value of abstract case in the input has a correspondent in the output.

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which are consistent with grammatical tests concerning anaphoric binding, multiple questions and weak crossover, among others (Barss & Lasnik 1986). Further evidence is given by the default syntactic ordering of arguments, which is Agent-Recipient-Theme. No particular grammatical evidence is known for Yimas; however, there is no reason to assume that its underlying semantics crucially deviates from other languages.

[9] The genitive is [+hr] for nouns, and the partitive is [+hr] with an additional feature [+part]. Note that both genitive and partitive often compete with accusative.

b. MAX(φ): Every positive φ-value in the input has a correspondent in the output.

c. MAX(φ)/(role α): Each positive φ-value associated with the role α in the input has a correspondent in the output.

d. IDENT(role): All roles have identical values in the input and the output.

e. IDENT(φ): All φ's have identical values in the input and the output.

While the input may have '+' or '−' feature values, the output only contains '+' values. The constellations given in (11) may then turn out. DEP violations (being shaded) do not occur if every underlying theta role is associated with some role and φ-features.

(11)

	Possible violations of			No violation	
	DEP	IDENT	MAX		
input	[ ]	− F	+ F	− F	+ F
	↓	↓	↓	↓	↓
output	+F	+ F	[ ]	[ ]	+ F

The IDENT constraints are generally very high-ranked because a violation entails non-mono-tonicity.[10] One does not expect that the realization of an underlying [−F] by an underspecified morpheme (or by zero) is ever blocked. By contrast, the realization of [+F] can be blocked; in this case one expects the substitution by a less specific morpheme, which then incurs only a MAX violation. Generally, if one of the arguments of a transitive verb is realized by nominative (rather than ergative or accusative), a MAX(role) violation occurs. We will see that this very often happens in Yimas. However, Yimas does not show any MAX(φ) violation, apart from MAX(arg) or MAX(role) violations, whereas other languages do.[11]

It is interesting to note that besides faith*ful*ness also faith*less*ness constraints are possible, although these constraints necessarily force gaps. Such morphological taboos in the expression of certain combinations of 1st and 2nd person are known from many languages (Heath 1998). For instance, Dalabon has the constraint *MAX(2Agent)/1Theme, which forbids any expression of 2nd person Agents in the context of a 1st person Theme (Wunderlich 2000a). As will be seen later, Yimas only has the markedness constraint *2E+1A (in terms of morpho-logical cases), which has similar effects and possibly the same origin in a sociolinguistic context. A markedness constraint, however, operates only at the output, like other constraints of the markedness family, whereas a faithlessness constraint excludes any expression of an underlying feature.[12]

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[10] Rules of referral (or feature-changing rules) correspond to IDENT constraints. As Carstairs-McCarthy (1998) argues, some of the referrals discussed in the literature can be dispensed with if one assumes disjunctive lexical entries.

[11] To be accurate, MAX(person) is violated in Yimas when the paucal morphemes for local person (1st *or* 2nd person) are used, see 5.7. This follows from lexical underspecification rather than from grammatical constraints. By contrast, Dalabon, an Australian language, shows MAX(person) violations (Evans, Brown & Corbett 2000, Wunderlich 2000a), and Quechua shows MAX(number) violations (Lakämper & Wunderlich 1998) on principal grammatical grounds.

[12] Impoverishments (feature-deletion rules) in syntax-based theories (Noyer 1998) correspond to faithlessness constraints, but note that such constraints can be more restricted in a framework with

Besides the constraints considered so far there is another family of constraints that only concern properties of the output: markedness constraints block certain features (or feature combinations) in the output, whereas alignment constraints regulate the order of affixes.

(12) a. *(F): Do not realize the feature F in the output.
      b. ALIGN(F,L,μ): Realize the feature F to the left of the morphological category μ.

The markedness constraints counterbalance the MAX constraints. To express a feature by morphophonological means needs some effort: Max(F) focuses on the expression, while *(F) focuses on the effort.

2.5 Optimal linkers for transitive and ditransitive verbs

This section briefly illustrates the input-output relation in argument linking by considering transitive and ditransitive theta structures. (13a) repeats the structures shown in (5), this time neglecting the φ-features. In the remainder of this paper, the underlying feature combinations are abbreviated as Ag, Th and Rec for mnemotechnic reasons.[13] (13b) represents the optimal outputs; one can easily see that no MAX violation occurs because only '−' values of the input are ignored. Only a few languages provide such outputs, even if they have A, E, and D in their morphological inventory. (13c-i) represents the canonical ergative patterns (with one violation of Max(+hr), because accusative is lacking), while (13c-ii) represents the canonical accusative patterns (with one violation of Max(+lr), because ergative is lacking). Notice that the appearance of the nominative in transitive or ditransitive verb patterns always entails a MAX violation. Many languages do not have both A and E morphemes in their inventory, in such a case the MAX violation is forced by the inventory. But if the language has both A and E morphemes, the occurrence of N instead of A or E counts as a substitution. It must be forced by constraints that differ from those that force a gap in the inventory. Finally, (13c-iii) shows a ditransitive verb pattern with two violations.

(13) The theta structure of transitive and ditransitive verbs in possible linking scenarios

		Transitive verbs		Ditransitive verbs		
a. Input:		λz	λy VERB(x,y)	λz	λy	λx VERB(x,y,z)
		+hr	−hr	+hr	+hr	−hr
		−lr	+lr	−lr	+lr	+lr
		[=Th]	[=Ag]	[=Th]	[=Rec]	[=Ag]
b. Optimal linking:		A	E	A	D	E
		[+hr]	[+lr]	[+hr]	[+hr,+lr]	[+lr]
c. Less optimal:	(i)	N	E	N	D	E
		[ ]	[+lr]	[ ]	[+hr,+lr]	[+lr]
		violation of MAX(+hr): ergative pattern				

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conflicting constraints. As we will see below, many gaps observed in paradigms follow from the interaction of constraints, and there is no need to postulate separate impoverishments..

[13] They correspond to the notions A, O, and D, used by Foley (1991) and other authors (e.g. Dixon and Aikhenvald 2000), respectively.

(ii) A   N   A   D   N
   [+hr] [   ]   [+hr] [+hr,+lr] [   ]
   violation of MAX(+lr): accusative pattern

(iii)   N   A   E
                      [   ]   [+hr]   [+lr]
                  violation of both MAX(+hr) and MAX(+lr)

As will be seen in the following, the optimal case shown in (13b) is not attested in Yimas, whereas the less optimal cases shown in (13c) are attested, with the exception of the ditransitive pattern A, D, N.

3. The data

3.1 The inventory of linkers in Yimas

Yimas exhibits several sets of pronominal affixes (agreement morphemes) that are attached to the verb. Foley (1991) lists these sets in terms of A(ctor), O(bject or theme), S(ubject of intransitive verbs) and D(ative). In order to avoid any confusion between underlying roles and morphological features, I will instead use the notions Ag, Th and Rec for the underlying roles, and E (ergative), A (accusative), D (dative) and N (nominative) for the pronominal affixes themselves.[14] Free pronouns only exist for 1st and 2nd person. All pronominal affixes are prefixed to the verb, except elements of D, which are suffixed after aspect/tense. Free pronouns differ from affixes due to several phonological criteria (Foley 1991:80ff).

(14)   Inventory of pronominal affixes for the first and second person

	E = [+lr]	A = [+hr]	N = [ ]$_{role}$	free pronoun
1sg	ka-	ŋa-	ama-	ama
1dl	ŋkra-	ŋkra-	kapa-	kapa
1pc				paŋkt
1pl	kay-	kra-	ipa-	ipa
2sg	n-	nan-	ma-	mi
2dl	ŋkran-	ŋkul-	kapwa-	kapwa
2pc			paŋ-	paŋkt
2pl	nan-	kul-	ipwa-	ipwa

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[14] Correspondingly, all glosses in the examples taken from Foley are changed. If Foley had called the A-prefixes 'ergative', the O-prefixes 'accusative', and the S-Prefixes 'nominative', he probably had avoided to gloss accusative prefixes that relate to Recipients as 'D', nominative prefixes that relate to Agents as 'A', and nominative prefixes that relate to Themes as 'O'.

(15)   Inventory of pronominal affixes for the third person

	E = [+lr]	N = [ ]role	D = [+hr,+lr] word final	otherwise
3sg	n-	na-	-(n)akn	-(n)ak
3dl	mpi̵-	impa-	-mpn	-rmpan
3pc	ŋkl-	kra-		-ŋkan
3pl	mpu-	pu-	-mpun	-mpan

These tables reveal one syncretism that can be captured by underspecification (namely /n-/, which contrasts only with /ka-/ [+1] in the E singulars). Two other contingent identities of morphemes cannot be captured in this way (namely /nan-/, which is either [+hr,+2] or [+lr,+2,+pl], and /kra-/, which is either [+hr,+1,+pl] or [[ ]pers,+pc]). However, these facts are totally irrelevant for the analysis. As (14) shows, the paucal is defective for 1st and 2nd person, and the free pronoun *paŋkt* is underspecified as [+local] (1st or 2nd person). In the following, I will disregard the paucal; some more general points regarding the paucal system of Yimas will be addressed in 5.7.

As will be seen later, E- and A-prefixes normally do not cooccur. The E-prefixes are restricted to human beings or animals, or inanimates that function as the force or instrument causing a change, and the D-suffixes mostly refer to human beings. Likewise, the N-prefixes for 3rd person cited here are restricted to nominal classes I and II (human beings). There are other sets of N-prefixes for the other nominal classes.

In addition, there is one fused morpheme (Portmanteau), not listed above:

(16)   (ka)mpan-   1E/2sgA   = <[+lr,+1]; [+hr,+2,−pl]>
        (*kampan* word-initial, otherwise *mpan*)

The existence of such a morpheme cannot be just a lexical accident, but should rather follow from more general constraints. One may furthermore ask why there is no separate set of A-morphemes for the 3rd person, but why such a set exists for the 1st and the 2nd person. In a constraint-based analysis, the actual inventory of morphemes should turn out optimal in view of a given constraint ranking (Grimshaw 1997, Bresnan 1998).

The use of the affixes in (14) and (15) is illustrated in (17) by some examples taken from Foley (1991).

(17)   a. al   pu- n- kra- t.
           machete (V.sg)   3plN-3sgE-cut-PERF
           'The machete cut them'
        b. impa-ŋkul-cay.
           3dlN-2dlA-see
           'They two saw you two'
        c. uraŋ   k-   mpu- ŋa- tkam-t
           coconut.VIsg   VIsg-3plE-1sgA- show-PERF
           'They showed me the coconut'

    d. k-   ka- tkam- tuk-   nakn.
        VIsg-1sgE-show-REMOTE.PAST-3sgD
        'I showed him (the coconut) long ago'

    e. irpm   mu- ŋkul-tkam-t.
        coconut palm.IVsg   IVsg-2dlA-show-PERF
        '(I) showed you two a coconut palm'

3.2   Affix combinations in Yimas

The actual affix combinations of Yimas are often less than optimal, given the inventory of pronominal prefixes. Regarding the lack of 3A-affixes, one expects a MAX(+hr) violation only for settings with a 3rd person Theme; these settings can best be expressed by the ergative patterns exemplified in (18).

(18)   Ergative pattern with 3Th:

    a. na-   mpu- tay   b. pu-   ka-   tay
       3sgN- 3plE- saw   3plN- 1sgE- saw
       'They saw him'   'I saw them'

However, given the inventories in (14) and (15) above, one would expect forms such as those in (19b) or (19c) with no MAX-violations, but these forms are ungrammatical. The only possible form with the intended reading is that in (19a), which incurs a MAX(+lr) violation. Why are the forms in (19b,c) excluded?

(19)   Accusative pattern

    a. pu-   ŋa-   tay   b. *mpu-ŋa-tay   c. *ŋa-mpu-tay
       3plN- 1sgA- saw   3plE-1sgA-saw   1sgA-3plE-saw
       'They saw me'

A similar pattern is shown in (20): only (20a) is grammatical, whereas the expected forms (20b) or (20c) are ungrammatical.

(20)   a. ma-   ŋa-   tay   b. *n-ŋa-tay   c. *ŋa-n-tay
       2sgN- 1sgA- saw   2sgE-1sgA-saw   1sgA-2sgE-saw
       'You saw me'

If an A-affix is available, the actual forms always show a pure accusative pattern. Not only the ergative-accusative patterns in (19b,c) and (20b,c) are excluded, but also the ergative pattern illustrated in (21), which is similar to the structure realized in (18). One can conclude from these examples that MAX(+hr) ranks above MAX(+lr) in Yimas, so that a violation of the latter can more easily be tolerated.

(21)   a. *ama-mpu-tay   b. *ama-n-tay
                            1sgN-3plE-saw   1sgN-2sgE-saw
        intended reading: 'They saw me'   'You saw me'

If one considers the reverse setting of (20), namely 1Ag/2Th, none of the preceding patterns is possible.

(22)   Fused morpheme:
    a. ipa kampan- tay   b. *ipa-nan-tay   c. *ma-kay-tay
       1pl 1E/2sgA-saw   1plN-2sgA-saw   2sgN-1plE-saw
       'We saw you(sg)'
(23)   Gap:
    a. ipa kul- tay   b. *ipa-kul-tay   c. *ipwa-kay-tay
       1pl 2plA-saw   1plN-2plA-saw   2plN-1plE-saw
       'We saw you(pl)'

In (22), the Agent is realized partly by the fused morpheme *kampan*, partly by a free pronoun, whereas in (23) only the free pronoun is possible: every form with two prefixes is excluded here. Thus, the expectations based on the given inventories are more than often not fulfilled.

A subparadigm of the actual pronominal prefix combinations in transitive verbs is given in (24) (a fragment of the whole paradigm in Foley's table 6, p.217); the stem and all material following the stem is omitted. The rows represent person-number of the Agent, whereas the columns represent person-number of the Theme. Since dual forms do not behave differently from plural forms, these forms are omitted.

(24)   Pronominal prefixes (and free pronouns) with transitive verbs; only sg and pl forms.

	1sgTh	1pl	2sg	2pl	3sg	3pl
1sgAg			kampan- 1E/2sgA-	ama kul- 1sg 2plA-	na-ka- 3N-1sgE-	pu-ka- 3plN-1sgE-
1pl			ipa kampan- 1pl 1E/2sgA	ipa kul- 1pl 2plA-	na-kay- 3N-1plE-	pu-kay- 3plN-1plE-
2sg	ma-ŋa- 2sgN-1sgA-	ma-kra- 2sgN-1plA-			na-n- 3N-2sgE-	pu-n- 3plN-2sgE-
2pl	ipwa-ŋa- 2plN-1sgA-	ipwa-kra- 2plN-1plA-			na-nan- 3N-2plE-	pu-nan- 3plN-2plE-
3sg	na-ŋa- 3N-1sgA-	na-kra- 3N-1plA-	na-nan- 3N-2sgA-	na-kul- 3N-2plA-	na-n- 3N-3E-	pu-n- 3plN-3E-
3pl	pu-ŋa- 3plN-1sgA-	pu-kra- 3plN-1plA-	pu-nan- 3plN-2sgA-	pu-kul- 3plN-2plA-	na-mpu- 3N-3plA	pu-mpu- 3plN-3plE-

This distribution of prefix combinations is schematically summarized in (25).

(25)   Distribution of prefix combinations in transitive verbs

	1sgTh	1pl	2sg	2pl	3sg	3pl
1sgAg			fused	gap		
1pl					ERG- pattern	
2sg						
2pl	ACC- pattern					
3sg						
3pl						

This schematic paradigm reveals two important facts of Yimas, which will be in the center of the following analysis:

1. The existence of gaps: In all 1Ag/2Th settings, the expected transparent combination of prefixes is blocked. There exists a fused morpheme for 1Ag/2sgTh (namely *kampan-*); in the other instances, 2Th is expressed by a prefix, while 1Ag can only be expressed by a free pronoun (cf. (22, 23)).

2. The existence of substitutions: In all 2Ag/1Th settings, an (unspecified) N-affix appears instead of the expected E-affix; the same holds for all 3Ag/1Th and 3Ag/2Th settings (cf. (19, 20)). All these settings are realized by an accusative pattern, although ergative morphemes exist. An ergative pattern only shows up with 3rd person Themes; in fact, these combinations are the only ones that are expected on the basis of the inventory of prefixes (cf. (18)).

With ditransitive verbs, maximally three prefixes can be realized. But in most cases there are only two. Since 3rd person Recipients are marked by a D-suffix, in such a case only two theta roles are left to be matched by a prefix, as illustrated in (26a). In contrast, 1st and 2nd person Recipients must be realized by one of the less specific prefixes, as in (26b,c). It is always an A-prefix that realizes the Recipient, although an E-prefix would match as well. The theme is always realized by an N-prefix. (26c) shows an instance in which the Agent can only be realized by a free pronoun, and (26d) an instance with a fused morpheme.[15]

(26)   a. Ergative pattern plus D:

        uraŋ   k-   ka-   tkam-r-   mpun
        coconut.VIsg VIsg- 1sgE- show-PERF-3plD
        'I showed them the coconut'

    b. Three-partite pattern N-E-A:

        uraŋ   k-   mpu-   ŋa-   tkam-t
        coconut.VIsg VIsg- 3plE- 1sgA- show-PERF
        'They showed me the coconut'

    c. Gap:

        ipwa uraŋ   k-   ŋa-   tkam-t   (*k- nan- ŋa- tkam-t)
        2pl   coconut.VIsg VIsg- 1sgA- show-PERF   VIsg-2plE-1sgA- show-PERF
        'You(pl) showed me the coconut'

    d. Fused morpheme:

        uraŋ   k-   mpan - tkam-t   (*k- ka-   nan- tkam-t)
        coconut.VIsg VIsg- 1E/2sgA- show-PERF   VIsg-1sgE-2sgA-show-PERF
        'I showed you(sg) the coconut'

According to Foley, the Theme of ditransitive verbs must be 3rd person. Table (27) (adapted from Foley 1991:218) only lists prefix combinations for 3sg human Themes – all other forms (dual and plural Theme) are fully parallel to these. The rows in this subparadigm again represent person-number of the Agent, while the columns represent person-number of the Recipient.

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[15] The fact that *-mpan* relates here to 1Ag/2Rec (rather than to 1Ag/2Th, as in (22) above) shows that the appearance of this morpheme is structurally conditioned, and not by semantic roles.

(27) Pronominal affixes (and free pronouns) with ditransitive verbs, only singular and plural forms with Theme = 3sg human.

	1sgRec	1pl	2sg	2pl	3sg
1sgAg			na-mpan- 3N-1E/2sgA-	ama na-kul- 1sg 3N-2plA-	na-ka- V-ak 3N-1E-V-3D
1pl			ipa na-mpan- 1pl 3N-1E/2sgA	ipa na-kul- 1pl 3N-2plA-	na-kay- V-ak 3N-1plE- V-3D
2sg	na-ŋa- 3N-1A-	na-kra- 3N-1plA-			na-n- V-ak 3N-2E- V-3D
2pl	ipwa na-ŋa- 2pl 3N-1A	ipwa na-kra- 2pl 3N-1plA			na-nan- V-ak 3N-2plE- V-3D
3sg	na-ŋa- 3N-1A-	na-kra- 3N-1plA-	na-nan- 3N-2A-	na-kul- 3N-2plA-	na-n- V-ak 3N-3E- V-3D
3pl	na-mpu-ŋa- 3N-3plE-1A-	na-mpu-kra- 3N-3plE-1plA-	na-mpu-nan- 3N-3plE-2A-	na-mpu-kul- 3N-3plE-2plA-	na-mpu- V-ak 3N-3plE- V-3D

(28) schematically summarizes the possible affix combinations.

(28)   Distribution of prefix combinations in ditransitive verbs

	1sgRec	1pl	2sg	2pl	3sg	3pl
1sgAg			fused	ACC-pattern with gap	ERG- pattern plus DAT	
1pl						
2sg	ACC-pattern with gap					
2pl						
3sg	phonologically conditioned gap (?)					
3pl	three-partite pattern N-E-A					

The full inventory of affixes is exploited only in the rightmost column (with D-suffixes for 3Rec) and in the lowest row (3plAg). All other settings leave an Agent gap. More specifically, three types of gaps can be distinguished:

a) The same gap as with 1Ag/2Th settings above, this time with 1Ag/2Rec settings. For 1Ag/2sgRec the fused morpheme *mpan-* is used, while for the other settings only a 1st person free pronoun can be used.

b) In all 2Ag/1Rec settings, the 2nd person Agent can only be realized by a free pronoun. Although in some instances this gap might be phonologically conditioned by a medial 2sgE-prefix /n-/ (see below), there are no obvious phonological reasons why /nan-/ and /ŋkran-/ should not appear as medial prefixes. Therefore I regard this gap as forced by a non-phonological constraint.

c) In all settings with 3sgAg and 1Rec or 2Rec, the 3rd person Agent cannot be realized by a prefix, which would have to be /n-/ in these cases. One might suspect that this is due to phonological reasons: the prefix /n-/ is reduced before a following /ŋ/, or nasalizes a following /k/ to /ŋ/; as a result, a form identical to the dual forms *-ŋkra* or *-ŋkul* would appear, which is blocked because of homophony. However, non-homorganic nasal + stop/nasal clusters are common in Yimas, hence a homophony explanation for the gap is

not feasible. Note that the prefix /n-/ would have to be inserted between the first and the second prefix, analogously to the last row in (27). It is conceivable that this prefix is restricted to occur immediately before the stem. Because more than one explanation is possible, I do not discuss this type of gap any further.

Foley (1991) did not consider these gaps, and he also ignored the fact that some theta roles are matched by a less specific affix than available; he mainly considered the ordering of prefixes in the Yimas verb. In order to account for the ordering, he proposed two, sometimes conflicting, principles (Foley 1991:202):[16]

(29)   1. Person Hierarchy: 1 > 2 > 3
          2. a. For 1st and 2nd person: A > E
              b. For 3rd person: E > A
          (An affix that relates to a person (or a grammatical role) that is higher in the hierarchy is attached first to the verb.)

In his second principle, Foley assumed different rankings for different values of person. However, a grammar in which different constraint rankings occur, depending on the value of person, is undesirable. Fortunately, Foley's principle 2b is empty because 3A affixes simply don't exist; what Foley meant is the way in which 3Themes are realized. In the following analysis, Foley's principles 1 and 2a play an important role, too. However, further constraints are needed to account for gaps and substitutions.

    In order to establish the patterns shown by the pronominal affixes in Yimas, I will proceed in three steps. First, I discuss the constraint ranking that guarantees the particular inventory of Yimas affixes shown in (14) and (15). These constraints also explain the selection of affixes in the paradigms shown in (25) and (28): under what conditions do either {E,N} or {A,N} appear with transitive verbs, and either {E,D,N} or {E,A,N} with ditransitive verbs? Subsequently, I introduce the language-specific constraints that are responsible for the linear order of affixes and the appearance of gaps in Yimas. Finally, in section 5 I discuss, among others, how the Yimas system reacts under simplification: what happens when 3A morphemes are introduced?

4. The analysis

4.1 Constraint evaluation of the inventory

In this section, I consider why the inventory of Yimas is optimal under the assumption that universally available constraints are ranked in a certain way in Yimas. Besides the MAX and IDENT constraints already introduced above, there are three general constraints that play an important role in the typology of linking by case or pronominal affixes (Stiebels 2000, Wunderlich 2000b). These constraints are given in (30).

(30)   a. UNIQ(UENESS): Each linker applies only once in a domain. (That is, all cooccurring pronominal affixes are distinct in their role specification.)

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[16] Recall that Foley used 'A' for ergative E and 'O' for accusative A.

    b. Def(ault): Every linking domain displays the default linker (nominative).

    c. Max(+hr,+lr): Every feature combination [+hr,+lr] in the input has a correspondent in the output.

Uniqueness serves to avoid ambiguity: If two positions in a case pattern (or pronominal affix pattern) are realized identically, it is hard to distinguish the arguments, unless the sortal restrictions imposed by the verb or the positions of the arguments function as discriminating factors. Default is motivated by the assumption of economy: Every case pattern (or pronominal affix pattern) should be realized by minimal effort, so it should include the default form of a pronominal affix. Finally, Max(+hr,+lr), a local conjunction in the sense of Smolensky (1995), reflects the requirement that all maximally marked theta roles should be visible. For logical reasons, this constraint must rank above both Max(+hr) and Max(+lr).

    Furthermore, the following contextualized markedness constraints are needed to account for the splits in the A and D inventories (see Stiebels 2000).

(31)   a. *[+hr]/3: Avoid the feature value [+hr] in the context of 3rd person (−local).

        b. *[+hr,+lr]/loc: Avoid the feature combination [+hr,+lr] in the context of local person (1st or 2nd).

These constraints can be derived via Harmonic Alignment (Prince & Smolensky 1993, Aissen 1999) of the two scales given in (32): the role hierarchy in (32a), which expresses that [+hr] is preferred, and the salience scale in (32b), which expresses a universally valid preference. Harmonic Alignment yields the scales in (33), from which, then, the ranking of the markedness constraints expressed in (34) follows.[17]

(32)   a. [+hr] > [+hr,+lr]   ('It is better to mark a non-highest role by accusative than by dative.')

        b. local > 3rd person

(33)   a. [+hr]/loc   > [+hr]/3
        b. [+hr,+lr]/3   > [+hr,+lr]/loc

(34)   a. *[+hr]/3   » *[+hr]/loc
        b. *[+hr,+lr]/loc » *[+hr,+lr]/3

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[17] Universally, there are two other role hierarchies, namely those in (i) and (ii) (where the latter follows by transitivity):
    (i)   [+hr,+lr] > [+lr]   'It is better to mark a non-lowest role by dative than by ergative'
    (ii)   [+hr]   > [+lr]   'It is better to mark the lowest role than the highest role'
                             (Subjects should be unmarked)
From (i) we can derive via Harmonic Alignment both (iii) and (iv).
    (iii)   *[+lr]/loc   »   *[+lr]/3
    (iv)   *[+hr,+lr]/3   »   *[+hr,+lr]/loc
The fact that (iv) is the reverse of (34b) shows that the markedness constraints for dative can be in either order, depending on the particular language. Yimas just happens to follow the ranking given in (34b).

(33a) expresses that accusative is preferred for local person, while (34a) states that it is better to avoid accusative for a 3rd person than for a local person. The reverse holds for dative, according to (33b) and (34b).

These constraints can explain both the accusative and the dative split in Yimas. Consider first the evaluation of transitive settings in (35). (As usually, the constraint ranking has to be read from left to right, with the higher constraints to the left. A full line indicates dominance, whereas a dotted line indicates co-ranking. A star indicates that the candidate violates a constraint, an exclamation mark signals a fatal violation, the shaded area is irrelevant to the decision, and a hand gives the affix selection that best satisfies the constraints.)

(35)   Evaluation of transitive settings

Input	Output candidates		UNIQ	*[+hr,+lr] /loc	DEF	*[+hr]/3	MAX (+hr,+lr)	MAX (+hr)	MAX (+lr)
a. 1Ag, 3Th	1E, 3A				*!	*			
	1E, 3N	☞						*	
	1N, 3A					*!			*
	1N, 3N		*!					*	*
b. 3Ag, 1Th	3E, 1A			*!					
	3E, 1N							*!	
	3N, 1A	☞							*
	3N, 1N		*!					*	*
c. 1Ag, 2Th	1E, 2A			*!					
	1E, 2N							*!	
	1N, 2A	☞							*
	1N, 2N		*!					*	*
d. 3Ag, 3Th	3E, 3A				*!	*			
	3E, 3N	☞						*	
	3N, 3A					*!			*
	3N, 3N		*!					*	*

(35a) shows that *[+hr]/3 must rank above MAX(+hr) in order to establish the ERG-pattern {1E,3N} as optimal. (35a) and (35b) show that DEFAULT, which excludes the ERG-ACC combinations, must rank at least above MAX(+lr).[18] Furthermore, MAX(+hr) must rank above MAX(+lr) in order to establish the ACC-pattern {3N,1A} in (35b) as optimal. With these rankings, then, the combinations of local person (1st and 2nd) yield an ACC-pattern, while the

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[18] Foley (1991:198) notes one exception where E and A can be combined: the 3plE-prefix /mpu/ can optionally appear before 1sgA /-ŋa/ (*mpu-ŋa-tay* 'they saw me'). E- and A-prefixes can also be combined if a modal prefix occurs, as in (i) from Foley (1991:266). See the discussion in section 4.4.

(i) ka-   mpu-   ŋa-   tput-n
    LIKE- 3plE- 1sgA- hit- PRES
    'They are going to hit me'

combinations of 3rd person yield an ERG-pattern, as shown in (35c) and (35d). These results already verify the distribution of prefixes shown in (25), except the order of prefixes and the occurrence of a fused morpheme or gap in 1Ag/2Th settings. Moreover, the existence of a 3A-affix is excluded because it could never surface.

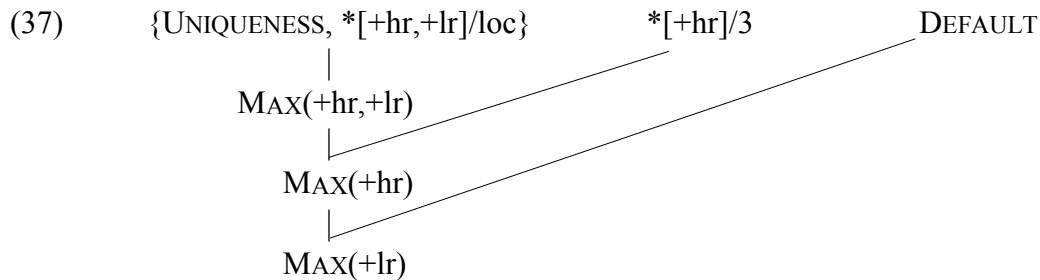Further properties of the constraint ranking can be found from the evaluation of ditransitive verbs, as given in (36).

(36) Evaluation of ditransitive settings with 3Th realized by N

Input	Output candidates	UNIQ	*[+hr,+lr] /loc	DEF	*[+hr]/3	MAX (+hr,+lr)	MAX (+hr)	MAX (+lr)
a. 1Ag,3Rec,3Th	☞ 1E, 3D, 3N				*		*	
	1E, 3A, 3N				*	*!	*	*
	1E, 3E, 3N	*				*!	**	
	1N, 3D, 3N	*			*!		*	*
b. 3Ag,1Rec,3Th	3E, 1D, 3N		*!				*	
	☞ 3E, 1A, 3N					*	*	*
	3E, 1E, 3N	*!				*	**	
	3N, 1D, 3N	*!	*				*	*
c. 1Ag,2Rec,3Th	1E, 2D, 3N		*!				*	
	☞ 1E, 2A, 3N					*	*	*
d. 3Ag,3Rec,3Th	☞ 3E, 3D, 3N				*		*	
	3E, 3A, 3N				*	*!	*	*

(36a) shows that MAX(+hr,+lr) must rank above MAX(+hr), which already is implied by the logics of constraint conjunction; the optimal pattern is ERG+DAT. However, as (36b) shows, MAX(+hr,+lr) must rank below both UNIQUENESS and *[+hr,+lr]/loc, the latter already enforced by logical reasons. In this case, the optimal pattern is ERG+ACC. The remaining two evaluations, (36c) and (36d), complete the analysis for both Agent and Recipient being either local person or 3rd person. Furthermore, the existence of 1D- and 2D-morphemes is excluded.

These results verify the distribution of affix combinations in ditransitive verbs shown in (28), although none of the various gaps is predicted. Moreover, the order of prefixes still has to be determined.

I assume that the universal constraints are generally high-ranked. Only if there are data showing that a constraint is violated, this constraint is demoted. Therefore, the order of constraints in Yimas is that given in (37).

(37)   {UNIQUENESS, *[+hr,+lr]/loc}   *[+hr]/3   DEFAULT
                          |
              MAX(+hr,+lr)
                          |
                  MAX(+hr)
                          |
                  MAX(+lr)

4.2 Language-specific constraints

Input-output constraints are necessary for the evaluation of gaps and substitutions: each gap is a violation of MAX(arg), and each substitution by nominative is a violation of MAX(+hr) or MAX(+lr). Up to now we only know the optimal distribution of E, A, D, and N; nothing so far has determined the actual forms that enter the paradigm cells for transitive and ditransitive verbs. There must be language-specific output constraints that regulate the order of affixes and force the appearance of gaps. More precisely, we are looking for language-specific instantiations of constraints that are based on more general properties.

Regarding the order of prefixes in the Yimas verb, most important is the hierarchy of person, as already observed by Foley (1991).[19]

(38)   PERSON: The linear order of prefixes respects the hierarchy of person (3 < 2 < 1); the higher person attaches first to the verb. ([   ]$_{pers}$ ≺ [+2] ≺ [+1] ≺ verb stem)

This constraint forbids, among others, the order *1N-2A-stem; it is not violated if a single morpheme encodes both 1E and 2A. Note that in fact no violation of PERSON occurs in Yimas. Cross-linguistically, the salience hierarchy underlying PERSON is well-motivated − it is part of what is known as Silverstein hierarchy (Silverstein 1976). What is specific for Yimas is the way in which this hierarchy is used for the ordering of affixes.[20]

Another important constraint is ROLE, which is similar in nature to PERSON but makes the order of prefixes dependent on their role features.[21]

(39)   ROLE: The linear order of prefixes respects the hierarchy of roles (N < E < A); the higher role attaches first to the verb. ([   ]$_{role}$ ≺ [+lr] ≺ [+hr] ≺ verb stem)

ROLE forbids, among others, the order *2A-1N-stem, which in fact never occurs. Again, ROLE is not violated by a single morpheme that encodes both 1E and 2A.

PERSON and ROLE together exclude any transparent realization of the setting 1Ag/2Th. PERSON requires the order *2A-1N-stem, which, however, violates ROLE, while the alternative order *1N-2A-stem would yield a PERSON violation. These constraints thus motivate why the fused morphem *kampan* has appeared. If such a morpheme is not available, the interaction with other constraints gives the way out of the dilemma, leaving a gap in the expression of

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[19] Technically, this constraint can be reformulated by two alignment constraints with the following ranking: ALIGN(+1,L,stem) » ALIGN(+2,L,stem). I desist from this for three reasons: (i) Constraints such as UNIQUENESS and DEFAULT require to consider every generated candidate globally rather than individual elements of the candidate. (ii) If PERSON is decomposed into more atomic constraints, ALIGN(+2,L,stem) would be violated even in the optimal order 2 ≺ 1, and some other constraints must be reordered to counterbalance this violation. (iii) The decomposition into two constraints is arbitrary: Instead of ALIGN(+2,L,stem) one could also state the restriction *$_\omega$[local 'Word-initially, no morpheme specified for 1st or 2nd person is allowed'. The choice between an alignment requirement or an alignment restriction cannot be motivated from the data.

[20] It is interesting to note that Maung, a language from Australia, exploits the person hierarchy in the reverse order; that is, the lower person attaches to the verb first. See section 5.6.

[21] Again, the constraint can be decomposed as follows: ALIGN[+hr,L,stem] » ALIGN[+lr,L,stem] (or *$_\omega$[role). The arguments for not doing so are the same as in the preceding footnote.

Agent. The two alignment constraints together also ensure that word-initially, 3N-prefixes are preferred.

A further constraint that takes part in the evaluation is IDENT(person).

(40)   IDENT(person). All person features have identical values in the input and the output.

One might suggest that the restriction against *1N-2A-stem can be circumvented by realizing the 1st person by a 3rd person prefix (3N-2A-stem would be grammatical), which is possible in other languages.[22] Since Yimas does not allow such a substitution, one has to assume that IDENT(person) prevents any neutralization of person features.

Furthermore, the fact that the combination *3N-2E-1A-verb for ditransitive verbs is forbidden has to be explained. None of the constraints considered so far excludes this combination; it is consistent with both PERSON and ROLE. In order to exclude it, the following markedness constraint is stipulated:

(41)   *2E+1A. No affix combination expressing a 2nd person ergative and a 1st person accusative is allowed.

This constraint is vacuously satisfied in the transitive settings 2Ag/1Th discussed above, because here DEFAULT already blocks the ergative morpheme. It is crucial only in 2Ag/1Rec settings where the Theme is realized by nominative and thus DEFAULT is satisfied. How is such a constraint motivated? Two possible explanations come into mind, a sociolinguistic and a structural one. As to the former, Yimas may have been subject to morphological taboos in the domain of speaker-addressee relations; these taboos, in their essence being politeness strategies, often restrict faithfulness with respect to 1st or 2nd person. Taboos like these have been described in the literature for many languages (Heath 1991, 1998, Bickel et al. 1999, Evans et al. 2000). These taboos may then have been integrated into the grammar, for instance in that other constraints such as PERSON take over their task, at least partially. All that is left in Yimas is a markedness constraint that still is relevant for ditransitive verbs. The structural explanation focuses on the resources of the language. If under some circumstances 1st and 2nd person are not distinguished by morphemes, the reverse settings 1Ag/2Th and 2Ag/1Th should be marked differently in terms of structure such as case, order, presence or lack or morphemes. For Yimas, it is unclear which type of explanation is to be preferred.[23]
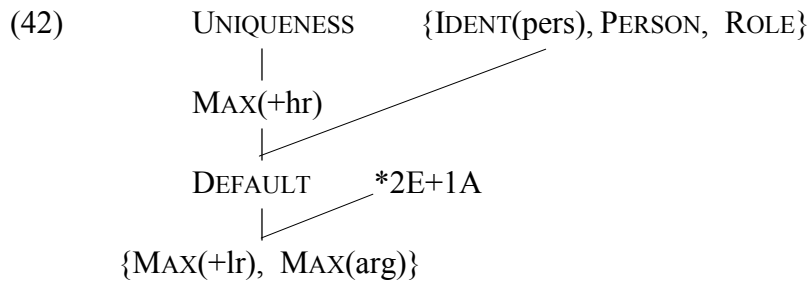
If one only regards the pronominal affixes that exist, the constraint ranking in (42) is able to explain all the prefix combinations in Yimas,[24] as it will be shown below.

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[22] In Dalabon, 1st person objects can be realized by a 3rd person prefix (Evans et al. 2000, Wunderlich 2000a). Note also that 2nd person can be realized by a 3rd personal pronoun in the polite speech register of languages such as German or Hungarian.

[23] One reviewer finds the sociolinguistic explanation highly unlikely given the ethnolinguistic features of the culture, based on patriclans and moeities. Some structural evidence for a constraint of this type comes from the paucal system in Yimas, which I will discuss briefly in 5.7.

[24] With the exception of some gaps in the ditransitive paradigm which may be due to a further alignment constraint or provoked by phonological conditions, as discussed above.

(42)   UNIQUENESS   {IDENT(pers), PERSON, ROLE}
                    |
          MAX(+hr)
                    |
          DEFAULT   *2E+1A
                    |
          {MAX(+lr), MAX(arg)}

All Yimas prefix combinations are faithful to number; therefore, number constraints can be ignored.

4.3 Evaluations of the pronominal affix patterns

The following tableaus illustrate the evaluation of some representative settings, constituting cells of the transitive or ditransitive paradigm. Each input setting is specified by the argument roles required by the verb and possible values for person and number. A value for number is only assumed if this is relevant for the selection of prefixes. (The expected prefix combination (obeying PERSON) is indicated by '✪'.)

First we consider transitive settings with 3rd person, where the 1st person is a representative of 1st or 2nd person.

(43)   Evaluation of transitive settings with third person

Input	Output candidates	UNIQ	ID (pers)	PERS	ROLE	MAX (+hr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. 3Ag, 3Th	✪ ☞ 3N-3E					*				
	3E-3N				*!	*				
	3E					*		*!		*
	3N					*			*!	*
b. 1Ag, 3Th	✪ ☞ 3N-1E					*				
	1E-3N			*!	*	*				
	3N-1N	*!				*			*	
	1E					*		*!		*
	1N					*			*!	*
c. 3Ag, 1Th	☞ 3N-1A								*	
	✪ 3E-1A							*!		
	1A-3E			*!	*			*		
	1A							*!	*	*
	1N					*!			*	*

All results are the same as in (35), with additional information of ordering. Since in (43a,b) all other candidates lead to more violations than the winner, no crucial information follows for the constraint ranking. (43c) only gives the information that DEFAULT dominates MAX(+lr), which we already know from (35b).

So let us consider transitive settings with 1st and 2nd person exclusively.

(44)   Evaluation of transitive settings with 1st and 2nd person

Input	Output candidates	UNIQ	ID (pers)	PERS	ROLE	MAX (+hr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. 2Ag,1Th	☞ 2N-1A								*	
	✪ 2E-1A						*!	*		
	1A-2E			*!	*		*	*		
	1N-2E			*!		*				
b. 1Ag,2plTh	☞ 2plA							*	*	*
	2plN-1E					*!				
	3N-2plA		*!						*	
	1N-2plA			*!					*	
	✪ 2plA-1E				*!			*		
	1E					*!		*		*
	2plN					*!			*	*
c. 1Ag,2sgTh	2A							*	*!	*
	✪ 2A-1E				*!			*		
	2N-1E					*!				
	1N-2A			*!					*	
	☞ 1E/2sgA							*		

Tableau (44a) shows a similar result as (43c); the constraint *2E+1A is redundant here. Most revealing is (44b), where the optimal candidate, one in which a gap occurs, shows three violations, whereas many other candidates only show two. We gain the crucial information that IDENT(person), PERSON, ROLE, and MAX(+hr) must all dominate DEFAULT. In other words, the occurrence of a gap is a consequence of various constraints that are motivated independently. The ranking Max(+hr) » DEFAULT can also be seen from (44c). Note that the fused 1E/2sgA-morpheme escapes both PERSON and ROLE, and shows less violations than a gap. The fact that such a fused morpheme only exists for the combination with 2sgTh could be explained by the lower frequency of plural than singular addressees.

The evaluation of ditransitive settings is shown in (45). UNIQUENESS is omitted here because all relevant candidates obey this constraint.

(45)   Evaluation of ditransitive settings

Input	Output Candidates	ID (per)	PERS	ROLE	MAX (+hr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. 3plAg, 1Rec, 3Th	☞ 3N-3E-1A				*			*	
	3N-1A-3E	*!	*		*			*	
	3N-1A				*			**!	*
	3N-3E				**!			*	*
b. 1Ag, 2plRec, 3Th	3N-1E-2A	*!			*			*	
	✪ 3N-2A-1E		*!		*			*	
	☞ 3N-2A				*			**	*
	3N-1E				**!			*	*
	3N-3E-2A	*!			*			*	
c. 1Ag, 2sgRec, 3Th	☞ 3N-1E/2A				*			*	
	✪ 3N-2A-1E			*!	*			*	
	3N-2A				*			**!	*
	3N-1E				**!			*	*
d. 2Ag, 1Rec, 3Th	✪ 3N-2E-1A				*	*!		*	
	3N-1A-2E	*!	*		*	*		*	
	☞ 3N-1A				*			**	*
	3N-2E				**!			*	*

The Recipient (i.e., the medial argument designated as [+hr,+lr]) is always realized by an A-prefix ([+hr]), such that a MAX(+lr) violation results. The first tableau (45a) confirms the result of (36b), whereas the results of the other tableaus deviate from those in (36). The situation in (45b,c) is similar to that in (44b,c): The optimal candidate either has an Agent gap or exhibits the fused morpheme -mpan-. Recall that this morpheme is specified as <[+lr,+1]; [+hr,+2,−pl]> in (16) − so it is general enough to satisfy both 1Ag/2sgTh and 1Ag/2sgRec. (An analysis of the morphemes in terms of semantic roles could not express this generalization.)

Tableau (45d) illustrates the brute force of *2E+1A. None of the other constraints is able to exclude the candidate 3N-2E-1A. One can further see that *2E+1A must at least dominate both MAX(+lr) and MAX(arg).

4.4 Patterns with modal prefixes

As Foley (1991: 251-265) has clearly documented, the modal prefixes, in particular the negation prefix ta- and the potential prefix ant-, trigger certain changes in the pronominal prefixes. The most interesting changes are illustrated in (46) and (47). where the (a) examples show the pattern without a modal prefix, and the (b) examples the pattern with a modal prefix.

(46)   a. ama-tmuk-t   b. ant-ka-tmuk-t
           1sgN-fall-PERF   POT-1sgE-fall-PERF
           'I fell down'   'I almost fell down.'

(47) a. ma-ŋa-tpul   b. ta-ŋa-tpul
          2sgN-1sgA-hit   NEG-1sgA-hit
          'You hit me.'   'You/he didn't hit me.'

After the potential prefix in (46b), the argument of an intransitive verb is shifted to ergative, and after the negation in (47b), an agent gap appears, similar to that discussed in the preceding section; the form therefore becomes ambiguous. Another difference between the simple form and the negated form is illustrated in (48a,b); here, negation affects the realization of 3rd person in such a way that it can only be represented by a number suffix. Another modal prefix, the 'likely' form, turns the nominative to an ergative, see (48c).

(48) a. pu-ŋa-tpul   b. ta-ŋa-tpul-s-um   c. ka-mpu-ŋa-tput-n
          3plN-1sgA-hit   NEG-1sgA-hit-PERF-pl   LIKE-3plE-1sgA-hit-PRES
          'They hit me.'   'They didn't hit me.'   'They are going to hit me.'

Under negation, the prefix *pu-* (homophonic to the 3plN prefix) is used to identify a person not further specified. This can also happen with 2nd person, as shown in (49b).

(49) a. a-pu-tmuk-r-um   b. ta-pu-n-wa-t
          POT-PERS-fall-PERF-pl   NEG-PERS-2sgE-go-PERF
          'They almost fell down.'   'You didn't go.'

I will not discuss the rather complex distribution of *pu-* here, and neither will I comment on the conditions for the number suffixes at the end of the verb.[25] The main effect of a modal prefix is that it forbids a following nominative form. This can be captured by the following two alignment constraints, which are high-ranked but conflict with each other.

(50) a. INITIAL(mod,V). Modal prefixes must be initial in the Verb.
      b. INITIAL(nom,V). Nominative prefixes must be initial in the verb.

As far as local person (1st or 2nd) is concerned, INITIAL(nom,V) is motivated by the fact that the nominative prefixes are nearly identical to the free pronouns and may originate from cliticization; this constraint, then, is generalized to 3rd person with the undeterminate form *pu-*.

   If both the modal prefix and the nominative prefix have to be initial, it is likely that the nominative prefix will not be realized. Recall that DEFAULT, which requires a nominative form to be present, is violable in Yimas. All the changes observed in (46) to (49) are effects from avoiding nominative forms. The respective argument is marked by ergative, is gapped, or is represented only by its number, or *pu-* appears. With intransitive verbs, the argument is marked by ergative (rather than accusative), thus violating IDENT(lr). Therefore, one has to assume the ranking IDENT(hr) » IDENT(lr), which conforms with the ranking MAX(+hr) » MAX(+lr) as established above.

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[25] Every plus-valued number for an argument that is realized in the verb form is accounted for by a number affix, according to the high ranking of MAX(number); this is also true of the paucal. The unspecified number suffixes can appear with either argument, as far as its number is not specified by another affix. Interestingly, there exists also a singular suffix (*-ak*), which, however, can only identify a 3rd person Agent.

The tableaus in (51) capture the selection of forms in (46b) and (47b). Some irrelevant constraints of the preceding tableaus are replaced by the constraints that are relevant here. (51a) shows that the violation of IDENT(lr) is tolerable in a context in which even higher-ranked constraints would otherwise be violated. (51b) shows that the choice of ergative is preferred with transitive verbs, thereby showing no violation of IDENT(lr). In this particular instance, however, *2E+1A would be violated; the only way out is the occurrence of a gap.

(51)   Evaluation of settings with modal input

Input	Output candidates	ID (hr)	INIT (mod)	INIT (nom)	MAX (+hr)	ID (lr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. Pot, 1S	☞ pot-1E					*		*		
	✪ pot-1N			*!						
	pot-1A	*!						*		
	1N-pot		*!							
b. Neg, 2Ag,1Th	☞ neg-1A							*	*	*
	✪ neg-2E-1A						*!	*		
	neg-2N-1A			*!					*	
	2N-neg-1A		*!						*	

This demonstrates that the even more complex patterns found with modal prefixes can be captured by the same constraint ranking that has been assumed so far, with only a few additional constraints. Note that the analysis given in section 4.3 remains consistent under this extension.

5. Discussion

5.1 The constraints

The partial order of constraints for Yimas, involving those from (37) and (42) – neglecting the additional constraints in (51), is summarized in (52). From the language-independent constraints, DEFAULT is demoted such that it is now dominated by MAX(+hr).

(52)   {UNIQENESS, *[+hr,+lr]/loc}   *[+hr]/3   {IDENT(pers), PERSON, ROLE}
                           |
               MAX(+hr,+lr)
                           |
                   MAX(+hr)
                           |
               DEFAULT   *2E+1A
                           |
               {MAX(+lr), MAX(arg)}
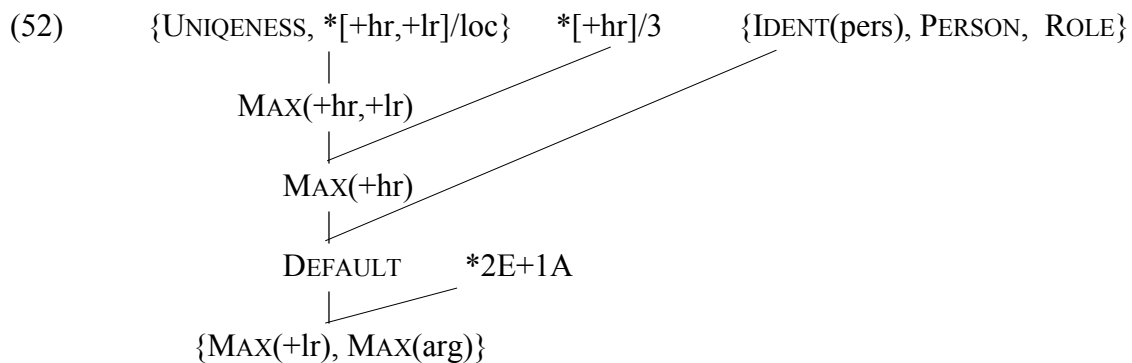
One may argue that this is a rather large number of constraints for explaining the simple facts of pronominal affix paradigms. Recall that most of these constraints are motivated independently. They are conceived to be universal also because they have proved to be necessary in

many typologically distinct languages (see Stiebels 2000, Wunderlich 2000b). All what is specific for Yimas is the particular ordering of these constraints.

Not many languages exhibit an accusative and a dative split. However, as shown in 4.1, the constraints that account for these splits (*[+hr,+lr]/loc and*[+hr]/3) can be derived from the simple preference statement [+hr] > [+hr,+lr] ('Accusative is better than dative').

PERSON and ROLE are language-specific instantiations of Yimas only insofar as they determine the order of affixes. The hierarchy of person to which PERSON refers plays an important role in many languages; it is known since Silverstein (1976). The hierarchy of roles to which ROLE refers is also universally attested. Note that [+hr] > [+lr] > [ ] is not only compatible with the above-mentioned preference statement, but also with the universal distribution of ACC- vs. ERG-systems. Moreover, ROLE incorporates the fact that the lowest argument (the Theme) is nearer to the verb than all other arguments. [26]

The only language-specific constraint is *2E+1A, which, as I have argued, may either have left from a sociolinguistic taboo of a kind that is recognized for many languages, or is conditioned by the requirement that reverse settings must be realized differently.

5.2 Gaps

The proposed analysis has shown that two different types of gaps show up in Yimas, gaps that are conditioned by the interaction of alignment constraints, and gaps that are due to a specific markedness constraint. These two types of gaps are briefly summarized in (53), where the most relevant candidates are compared once again.

(53)   Gaps in transitive and intransitive verbs

Input	Output Candidates	UNIQ	PERS	ROLE	MAX (+hr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. 1Ag, 2Th	2A-1E			*!			*		
	1N-2A		*!					*	
	☞ 2A						*	*	*
b. 1Ag, 2Rec, 3Th	3N-2A-1E			*!				*	
	3N-1E-2A		*!					*	
	☞ 3N-2A							**	*
c. 2Ag, 1Rec, 3Th	3N-2E-1A					*!		*	
	3N-1A-2E		*!	*		*		*	
	☞ 3N-1A							**	*

(53c) shows that the Agent gap in the realization of a 2Ag/1Rec/3Th setting solely follows from the brute constraint *2E+1A. The result of (53c) can be improved only if this constraint is demoted. Such a constraint could as well be described by the impoverishment rule in (54).

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[26] Note that alignment constraints often represent language-specific parameters. The additional constraints in (50) are of this sort in different ways: INITIAL(mod,V) corresponds to the parameter that the functional head precedes the stem, while INITIAL(nom,V), which conforms with Role (unmarked case precedes marked case) corresponds to the principle that item that originate from cliticization are peripheric.

(54)   2Ag → ∅ /1Rec

There is, however, some difference between the surface markedness constraint *2E+1A and the rule in (54). In the framework advocated here, the impoverishment rule would correspond to the contraint *Max(+hr,+2)/[+hr,+lr,+1], which belongs to the type of contextualized faith*less*ness constraints, or taboos, that call for some sociolinguistic motivation. Although *2E+1A is quite an arbitrary constraint, there is no immediate need to motivate it on external grounds - while a faithlessness constraint needs such a motivation.

In contrast to the gap just considered, the gaps in (53a,b) are forced by the conflicting alignment constraints, PERSON and ROLE, given that they are co-ranked. The first candidate violates ROLE, while the second candidate violates PERSON. This dilemma is resolved by leaving a gap.[27] The fact that Ag rather than Th is gapped follows from the ranking MAX(+hr) » MAX(+lr). The assumption of an impoverishment rule in such a situation would be redundant; it adds nothing to the grammar of Yimas, constituted by a set of lexical entries and a partially ordered set of constraints. Moreover, such a rule would have to state two different contexts (see (55)), while the constraint ranking in (53) is context-independent.

(55)   1Ag → ∅ /2Th ∨ 2Rec

From the tableaus in (53) one can also derive how a gap of this second kind might be avoided: either PERSON or ROLE must be demoted. If PERSON is demoted, the optimal candidate would be the accusative pattern 1N-2A in the transitive 1Ag/2Th setting, and 3N-1E-2A in the ditransitive 1Ag/2Rec/3Th setting. If ROLE is demoted, the optimal candidate would be 2A-1E in the transitive and 3N-2A-1E in the ditransitive case. In view of the other constraints of Yimas, only the demotion of ROLE can lead to an ERG-ACC pattern of transitive verbs.

5.3 The lack of 3rd person accusative affixes

One of the most remarkable features of the Yimas inventory is the lack of 3A pronominal affixes. The absence of these affixes has been captured by the markedness constraint *[+hr]/3. Only if this constraint is demoted, there will be the chance that 3A affixes come into existence. The tableaus in (56) show what happens in such a case. '☺' indicates the winning candidate in the absence of 3A.

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[27] Gerlach (1998) analyses gaps occurring in the clitic sequences of Modern Greek and Romance in a similar way, namely by the use of conflicting alignment constraints that are co-ranked. See also Donohue (1998) and Curnow (1999), who follow the same strategy.

(56)   Evaluation under the assumption that 3A affixes come into existence.

Input	Output candidates		UNIQ	ID (pers)	PERS	ROLE	MAX (+hr)	*2E +1A	DEF	MAX (+lr)	MAX (arg)
a. 3Ag, 3Th		3E-3A							*!		
	☞	3N-3A								*	
	☺	3N-3E					*!				
		3N-3N	*!				*			*	
		3A							*!	*	*
b. 1Ag, 3Th		1E-3A			*!				*		
		3A-1E				*!			*		
	☺	3N-1E					*!				
		1E					*!		*		*
	☞	3A							*	*	*

As the evaluations in (56) show, the optimal candidate will be 3N-3A in the 3Ag/3Th settings (56a), but simply 3A in the 1Ag/3Th and 2Ag/3Th settings (56b), that is, a further instance of an Ag gap will occur. This result is interesting not only for the grammar of Yimas but also for theoretical reasons.

First, as one can see from (56b), the Ag gap leads to a better result in terms of constraint ranking than the 3N-1E (or 3N-2E) patterns of actual Yimas. Why does Yimas not develop in this direction? A possible answer is that a transitive verb form with only one 3A affix is ambiguous with respect to the subject (which can be either 1st or 2nd person). However, the input-to-output perspective in the evaluation of morphological forms cannot capture the amount of syncretism in the paradigms; this could only be done in the reverse perspective. Even without any precise evalution at hand, one can see that a single 3A morpheme would be worse than a biaffixal pattern with respect to ambiguity, although it is the better result for realizing each individual 1Ag/3Th or 2Ag/3Th setting.

Second, the only contexts in which 1E and 2E were used are now better realized without these morphemes. That is, as soon as 3A affixes appear, the 1E and 2E affixes will disappear. This results from the constraint ranking of current Yimas. (As discussed in 5.1, if either PERSON or ROLE is demoted along with the appearance of 3A, no gap will appear, and all the ergative affixes will still be in use.) Obviously, the markedness constraints used for evaluating the vocabulary are not independent of each other. If nothing is changed in the constraint ranking, except that *[+hr]/3 is demoted, all the ergative affixes (except for 3rd person) become useless, a fact that can also be captured by generalizing the constraint *[+hr,+lr]/loc to *[+lr]/loc, which then blocks 1st and 2nd person ergative as well as dative. Yimas would then become a language with a full accusative system with a residual of 3E affixes in ditransitive verbs.

5.4 How much ergative is Yimas?

Given that in the current inventory the ergative affixes outrank the accusative ones in terms of number, could Yimas turn to a pure ergative language? Since the present ranking MAX(+hr) »

MAX(+lr) disfavors ergative, MAX(+hr) must be demoted such that it becomes dominated by MAX(+lr). Indeed, the inventory evaluations in 4.1 predict that in such a case a pure ergative system will be established.[28]

However, the present language-specific constraints of Yimas prevent such a change. If MAX(+hr) and MAX(+lr) become co-ranked or reversed in their ranking, and this is the only change in the ranking of constraints, only settings in which 1Ag and 2Th (or 2Rec) are involved can be shifted to another realization. This is illustrated in (57). (57b) shows that the 1Ag gap disappears in the transitive settings with 2Th in favor of a 2N-1E pattern, as soon as MAX(+hr) and MAX(+lr) become co-ranked. (57c) shows that the Ag gap in the ditransitive verbs with 1Ag/2Rec/3Th is replaced by a Rec gap, that is, 3N-1A shifts to 3N-1E if MAX(+lr) >> MAX(+hr). However, nothing changes if the lower person is Agent and the higher person is Theme, as illustrated in (57a). '☺' indicates the winning candidate in the original constraint ranking.

(57)   Transitive and intransitive verbs with a different ranking of MAX(+hr)

Input	Output Candidates	UNIQ	PERS	ROLE	*2E +1A	DEF	MAX (+lr)	MAX (arg)	MAX (+hr)
a. 3Ag, 1Th	☺ ☞ 3N-1A						*		
	1N-3E		*!						*
	1N						*	*!	*
b. 1Ag, 2Th	2A-1E			*!		*			
	☞ 2N-1E								*
	☺ 2A					*!	*	*	
c. 1Ag, 2Rec, 3Th	3N-2A-1E			*!			*		
	3N-1E-2A		*!				*		
	☺ ☞ 3N-2A						**	*	*
	☞ 3N-1E						*	*	**

Why does so little change evolve from the demotion of Max(+hr)? It is mainly the PERSON and ROLE constraints that make Yimas inert against major changes. Like the fact that ergative affixes survived with the ranking Max(+hr) » (Max(+lr), some accusative suffixes will survive with the reverse ranking Max(+lr) » (Max(+hr). Consequently, Yimas remains an ERG-ACC language.

As a theoretical result one can state that the inventory of a language cannot conclusively be evaluated unless one also takes surface (alignment) constraints into consideration.

5.5 Substitutions

Yimas has a full set of ergative affixes and lacks accusative affixes only in the 3rd person. Nevertheless, these affixes mostly do not cooccur. In many instances, a nominative affix is found as substitute for either ergative or accusative. This fact results from the constraint hier-

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[28] Note that the A-affixes, still appearing in the ditransitive settings (see (45a)), would then be reinterpreted as 'dative',

archy in our account. By contrast, we never find a substitution of person or number values because both IDENT(person) and IDENT(number) rank high in Yimas.

Recall that substitutions are described by means of rules of referral in other accounts. Consider again the schematic overview of the transitive paradigm in (25), repeated here (slightly simplified) as (58).

(58) Distribution of prefix combinations in transitive verbs

	1 Th	2 Th	3 Th
1 Ag		fused / gap	
2 Ag			ERG- pattern
3 Ag	ACC- pattern		

Nominative occurs in the fields marked as erg-pattern or acc-pattern, which entails the rules of referral given in (59).

(59) a. Realize 3Th by nominative.
      b. If the Agent ranks below the Theme on the person hierarchy (1 > 2 > 3), realize the Agent by nominative.

These rules, however, are purely descriptive. They miss the generalization that only affixes with an underspecified role feature can replace forms with a marked role feature. Moreover, all the other aspects of the grammar of Yimas put forth by the present analysis still need to be accounted for. In the account given here, the rules in (59) are redundant because the distribution of the pronominal affixes already follows from the evaluation of the inventory in 4.1.

5.6 Other OT accounts to pronominal affix paradigms

The only OT accounts that address similar problems to those in Yimas have been presented by Donohue (1998) and Curnow (1999). Both authors deal with the Australian language Maung, which exhibits an accusative-ergative split. 1st and 2nd person have A- and N-prefixes, 3rd animates and nonanimates have E- and N-prefixes, whereas 3pl.human has A-, E- and N-variants. This distribution is predicted by the Silverstein Hierarchy, as illustrated in (60) (see also Dixon 1994, Stiebels 2000).

(60) Schematic representation of the prefix inventory of Maung

local (1,2) > 3pl.human > 3.anim > 3.inanim

| ACC |
| ERG |
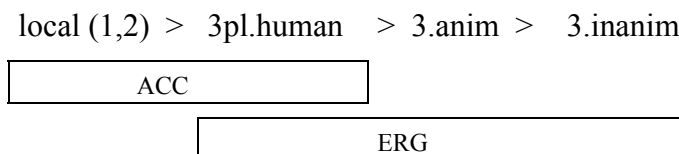
Like in Yimas, the pronominal prefixes fully determine argument linking. 3rd person prefixes are coindexed with free nominals with respect to class but not with respect to role features. The possible combinations of prefixes in transitive verbs are shown in (61). All four combinations {N,N}, {N.E}, {N,A}, and {A,E} are possible. Maung has a more restricted inventory

than Yimas; consequently, no substitutions with respect to role occur. But Maung shows gaps similar to those in Yimas, which, however, are symmetric for 1st and 2nd person. as shown in (61e,f).

(61) a. 1Ag/3Th   1N- 3N-stem
      b. 3Ag/1Th   1A- 3E-stem
      c. 3Ag/3Th   3N- 3E-stem
      d. 3Ag/3pl.humanTh   3plA- 3N-stem
      e. 1Ag/2Th   2A-stem
      f. 2Ag/1Th   1A-stem

Donohue and Curnow account for the prefix ordering by means of alignment constraints, and propose that the gap in (61e,f) is forced by conflicting constraints that are equally ranked. Donohue argues that A and N must occur in the initial prefix position, while E must occur in a noninitial position. This proposal explains the gap in (61e,f) as being forced by the conflict between ALIGN(ACC,L,word) and ALIGN(NOM,L,word). However, Donohue's account fails to explain the form in (61d) (where it also predicts a gap), a fact which induced Curnow to propose an alternative analysis. Curnow assumes the constraints ALIGN(1,L,word), ALIGN (2,L,word) and ALIGN(O,L,word). In this account, it is the conflict between the two person alignments that forces the gap in (61e,f). However, the third constraint is not acceptable in CT-Morphology because it requires an underlying notion like O(bject) to be aligned at the surface. Objects can be realized by an A-prefix, as in (61b,d), or by a N-prefix, as in (61a,c), that is, Curnow's third constraint has to be split off into just the two constraints assumed by Donohue.

    The best account to the Maung system of pronominal prefixation takes features from both analyses. As (60) already indicates, the Silverstein hierarchy plays a role in the inventory of Maung. One can expect that this hierarchy also determines the ordering of prefixes, like in Yimas. Furthermore, (61c) suggests that E-prefixes should be realized next to the stem. The constraints in (62) then suffice as language-specific constraints. Notice that the second constraint in a way enforces the first one because ergative is realized on the lower end of the scale.

(62)   Alignment constraints in Maung
        a   PERSON. The order of prefixes respects the hierarchy of person; the lower person attaches first to the verb. (local (1,2) $\prec$ [+pl,+human] $\prec$ [   ]$_{pers}$ $\prec$ verb stem)
        b. ALIGN(ERG,L,stem). Every E-prefix is realized next to the stem.

It is assumed here that PERSON entails *1-2 and *2-1 because both orders violate the symmetry of 1st and 2nd person. The constraints in (62) differ from those of Donohue and Curnow in one important aspect: they designate the prefix next to the stem rather than the word-initial prefix, a move which is clearly preferred from the point of view of affixation.

    All other constraints needed to account for the system of Maung are already known from Yimas. One has to assume MAX(+hr) » MAX(+lr), and furthermore that DEFAULT and

UNIQUENESS rank low, whereas *[+lr]/loc and *[+hr]/[−human] rank high. However, I detain here from a more detailled analysis.[29]

Comparing Maung with Yimas, one can state the following major differences: (i) a symmetry of 1st and 2nd person (and therefore symmetric gaps), (ii) another use of the person hierarchy for prefix ordering (the lowest person rather than the highest person is first attached to the verb). This indicates (i) that sociolinguistic restrictions are absent from Maung, and (ii) that the hierarchy of person is an extra-linguistic device that can enter the ordering constraints of a grammar in various ways. From the theoretical point of view one can state that no additional tools beyond those explicated for Yimas must be introduced in order to account for the facts of Maung exhaustively.

5.7 The limits of the present account: a look on the paucal in Yimas.

The paucal system of Yimas differs in many respects from other parts of the number system. Note first that the free paucal pronoun *paŋkt* receives a context-dependent interpretation, that is, 1pc in (63a), but 2pc in (63b).

(63) a. paŋkt kul-cpul   b. paŋkt kra-tpul
          pc   2plA-hit   pc   1plA-hit
          'We few hit you all'   'You few hit us.'

Although each occurrence of *paŋkt* violates either MAX(1) or MAX(2), its interpretation is always uniquely determined. Similarly, the paucal suffix -*ŋkt* is interpreted context-dependently: it restricts 1plE in (64a), while it restricts 2plE in (64b). In this case, however, no MAX(person) violation arises because the paucal suffix is always related to a corresponding plural prefix.

(64) a. pu-kay-cay-c-ŋkt   b. pu-nan-tay-c-ŋkt
          3plN-1plE-see-perf-pc   3plN-2plE-see-perf-pc
          'We few saw them'   'You few saw them'

(65a) is an example which seems to allow for two readings, but it has only one reading because there is a different form for 'You few hit us' (see (66b) below). (65b) shows that the paucal suffix may redundantly apply in the presence of a 2pc prefix. (Recall that 1st person cannot be realized morphologically in the 1Ag/2Th setting.)

(65) a. ipwa-kra-tpul-c-ŋkt   b. ipa paŋ-kul-cpul-c-ŋkt
          2plN-1plA-hit-perf-pc   1pl 2pcN-2plA-hit-perf-pc
          'You all hit us few'   'We hit you few'

These examples show that -*ŋkt* is restricted to 1st or 2nd person, irrespective of the grammatical function.

Given the meaning of the individual morphemes, the verb form in (66a) may have two readings, but none of them exists. The first reading is realized by (66b) instead, and the

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[29] Curnow (1999) deals with another interesting fact of Maung: the plural feature of the [+lr] role can be realized on the output correspondent of the [+hr]-role, which he captures by the ranking MAX(+pl) » IDENT(pl).

second reading by (66c), both forms being unexpected. As Foley (1991:225) has already argued, a possible explanation for this fact is that (66a) is homophonous with (66d), a verb form that does exist, although it is segmented differently.

(66) a. * paŋ-kra-tpul-c-ŋkt
             2pcN-1plA-hit-perf-pc
           'You few hit us', 'You few hit us few'
      b. paŋkt kra-tpul   c. paŋkt kra-tpul-c-ŋkt
          pc   1plA-hit   pc   1plA-hit-perf-pc
          'You few hit us'   'You few hit us few'
      d. pa-ŋkra-tpul-c-ŋkt
          2pcN-1dlA-hit-perf-pc
          'You few hit us two'

In the OT framework used here one can account for the fact that (66a) is blocked only by means of an idiosyncratic markedness constraint, namely *2pcN+1plA. Similar to the more general constraint *2E+1A, this constraint forces the occurrence of a free pronoun in order to satisfy MAX(number). However, such an account is conceptually unsatisfying because it does not reflect the source of why *2pcN+1plA might be necessary.

In section 4.2, I discussed the question of whether *2E+1A results from a taboo of sociolinguistic origin. It is highly unlikely that the similar constraint *2pcN+1plA has any sociolinguistic background, in particular if one acknowledges that it serves to avoid homophony with the form in (66d). Thus, it could equally be the case that *2E+1A originally had a similar function. The paucal system of Yimas seems to be a relic of an older state of the language, in which 1st and 2nd person are not distinguished by morphemes. In such a situation, the asymmetry between 1Ag/2Th and 2Ag/1Th may have been realized by different structural means.

Within the present OT account it is not possible to assume a constraint like *HOMOPHONY, by which the possible readings of a complex form would be restricted, simply because the readings are given as input. *HOMOPHONY is more relevant from the perspective of the hearer than that of the speaker. One possibility to include a constraint such as *HOMOPHONY is to make the optimal candidate not only dependent from the input but also from the optimal outputs of other inputs. Several such surface-surface CT variants have been proposed in the literature (Benua 1995, Kager 1999), albeit for different purposes. Most promising is the bidirectional OT by Blutner (1999) and Jäger (2000), who propose an algorithm that evaluates <form, meaning> pairs as possible candidates, rather than simply forms. However, the adaptation of this framework for the analysis of morphological paradigms such as the paucal system of Yimas must be left to future work.

6. Conclusions

This study has shown that CT-Morphology is a successful tool. On the basis of general assumptions, the proposed set of partially ordered constraints explains many facts of the pro-nominal paradigms of Yimas:

- both the accusative and the dative split in the inventory of affixes,
- the order of prefixes on the verb,
- the appearance of morphological gaps (except those that are phonologically conditioned),
- the substitutions by less specified prefixes, and
- the stability of the lexical inventory.

These theoretical tools are therefore a good starting point in developing a typology of morphological argument linking (see also Stiebels 2000). Furthermore, they allow us to speculate reasonably about probable and improbable historical shifts in argument linking systems.

This study was restricted to the perspective input-to-output. It remains to be complemented by work that advocates the reverse perspective output-to-input, for instance, in order to explain the systematic ambiguity of forms.

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