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STRUCTURING THE BUNDLE: A UNIVERSAL MORPHOSYNTACTIC FEATURE GEOMETRY*

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1 Introduction

While there is widespread agreement that both syntax and phonology should be represented by a formal hierarchical system which accounts for many cross-linguistic generalizations, morphology has, in general, not received similar treatment until recently. At least since Greenberg's important typological work in the 1960s, it has been recognized that person, number and gender features are systematically organized cross-linguistically. Most morphological theories, however, do not address this fundamental observation. Ritter and Harley (1998) have proposed that morphological features are organized in a feature geometry, and that this explains both the observed regularities, and the possible variations, in the organization of such features. Our assumption that this geometry is provided by Universal Grammar makes strong predictions about both the possible syncretisms in person paradigms and the acquisition of personal pronouns. In the first part of this paper, we outline the basic proposal and briefly discuss how an acquisition study by Hanson (1999) supports the notion of a morphosyntactic feature

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geometry. We then go on to apply the proposal to several relatively complex systems of personal pronouns.

2 A morphosyntactic feature geometry

In phonological theory, phonological feature geometries are used to account for the interdependencies observed among phonological features (c.f., e.g., Sagey (1986), Calabrese (1988), and many others). Phonological rules (or, in more modern terms, optimality-theoretic phonological constraints) can make reference to features that dominate subtrees in the geometry to capture generalizations that apply to all features in the subtree—for instance, to [Sonorant] to refer to the natural class that includes nasals and liquids. Some nodes in a phonological feature geometry correspond to physical elements of the vocal tract, and hence the organization of the vocal tract can be seen as imposing structure on the geometry. Finally, the geometry predicts possible variations in the complexity of phonological systems cross-linguistically. It also predicts a child's phonological acquisition path intralinguistically: less complex, and hence less-marked, geometries are acquired before more marked geometries.

All of the reasons listed above for positing a formal phonological feature geometry obtain in the morphology of pronominal systems as well. Morphological rules make reference to certain classes of features, and not to others. All morphological features are drawn from a limited set of types, which we claim correspond to basic subparts of the human cognitive apparatus; cognition thus imposes structure on the

morphology. Finally, the variations within different morphological systems is constrained in certain ways, and the acquisition path, as far as it is known, shows regularities in order that suggest a universally provided template.

2.1 Cross-linguistic patterns in morphological features

Let us consider, for instance, the claims of Greenberg (1967) about typological universals in the organization of morphosyntactic features, some of which are listed in example (1):

(1) *Universal patterns in morphosyntactic feature organization*:

Universal 32: Whenever the verb agrees with a nominal subject or object in gender it also agrees in number.

Universal 36: If a language has the category of gender, it always has the category of number.

Universal 37: A language never has more gender categories in nonsingular numbers than in the singular.

Universal 45: If there are any gender distinctions in the plural of the pronoun, there are some gender distinctions in the singular also.

Greenberg (1967)

If these universals are accurate, the general approach to morphosyntactic features evident in the literature provides no account of them. The morphosyntactic features characterizing a given form are generally grouped into amorphous bundles, whose potential combinations, if restricted at all, are characterized by constraints external to the representation. (See, e.g. Noyer (1997) for a successful example of this type of approach, employing a Universal Feature Hierarchy).

Other patterns emerge in acquisition and diachronically. Some patterns in acquisition uncovered in Hanson (1999) in a survey of 6 acquisition studies of typologically and historically unrelated languages are listed in (2):

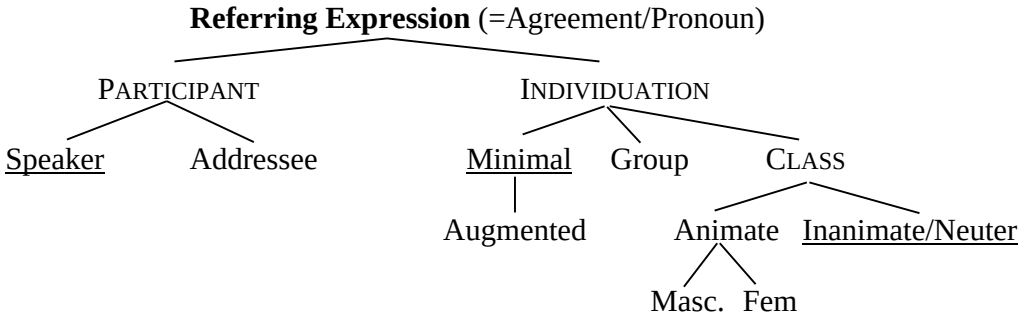
(2) *Patterns in acquisition*: Hanson (1999)
   a. the first pronoun to emerge is either 1st sg. or 3rd sg. neuter/inanimate
   b. the relative order of acquisition of 2nd person and 3rd (non-neuter) and singular and plural, varies considerably

As we will demonstrate in section 2.3 below, these acquisition patterns lend themselves well to a geometric treatment, but pose significant problems for other approaches.

2.2 The proposal: a morphosyntactic feature geometry

The geometric organization of morphosyntactic features we propose can be seen in (3) below:

(3)



In this geometry, all nominal features are dependent upon a root node which we call [Referring Expression]. Very approximately speaking, we divide these morphological features into three groups, identified by the nodes in SMALL CAPS. The PARTICIPANT node

and its dependents are used to represent person, specifically, 1st and 2nd person, (3rd person being unmarked, c.f. the discussion below). The INDIVIDUATION node and its dependents Group and Minimal (as well as Augmented) are used to represent number systems. Finally, the CLASS node encodes gender and other class information. In this paper, we focus on how languages use the PARTICIPANT and INDIVIDUATION nodes to represent person and number and the interactions between them. We will not address the content of the CLASS node here.

Two of the particular formal properties of the feature geometry will be important to us here. First, along the lines of the phonological geometries proposed by Archangeli (1988), Avery and Rice (1989), we represent only positive values for features in the geometry; if a feature is not active, it is not present. Second, nodes may be underspecified, lacking dependents entirely, in which case they receive a default interpretation. Above the default, underspecified interpretation for each of the three major nodes is the underlined dependent. The notion of a default will be important in our discussion of acquisition below.

The primary division of the root Referring Expression (RE) node is into person and number features, corresponding to PARTICIPANT and INDIVIDUATION. It is worth noting that we exclude an explicit feature for 3rd person from the geometry entirely. First and second person, as participants in the discourse, have a status significantly different from that of third person. Some quotations from various researchers who have argued this point are listed in (4) below.

(4) *2 Major Class Nodes* (cf. claim (ii) above)

" 'Person' belongs only to *I/you*, and is lacking in *he*."
Benveniste (1971) p 217

"1st & 2nd persons are *personal*, 3rd person is *definite*."
Bloomfield (1938) p 225-226

"Whoever does not act a rôle in the conversation either as speaker or as addressed remains in the great pool of the impersonal, referred to as "third person."
Forchheimer (1953) p 5-6

3rd person, we claim, is simply the absence of person, and represented by the presence of the INDIVIDUATION node alone. The special status of discourse participants is an example of how the structure of the morphological geometry is at least partially imposed by external factors, in the same way that the physical features of the vocal tract impose some structure on the phonological geometry.

In the person geometry, 1st person is represented by a bare, underspecified PARTICIPANT node, which receives a default interpretation of Speaker. (In more complex systems, the Speaker node may be overtly represented, of course). Second person is represented by a PARTICIPANT node with an Addressee dependent. Inclusive is represented when both Speaker and Addressee nodes appear as dependents on PARTICIPANT.

Number, specified by the INDIVIDUATIONnode and its dependents, is encoded as follows. Singular is encoded by a bare INDIVIDUATION node , which receives its interpretation as if it had a Minimal dependent, or (in a more complex system) by an INDIVIDUATION node with an overt Minimal dependent. Plural is encoded by an INDIVIDUATION node with a Group dependent. Dual occurs when both Group and Minimal are present (2 being the 'minimal group'), and trial or paucal number when Group, Minimal and Augmented are present.

2.3 Accounting for Greenbergian and acquisition universals

Let us consider how the above geometry, if provided by UG, might account for some of the generalizations we saw in section 2.1. We will need to make some additional assumptions about morphological operations, but the general research strategy should be clear.

Greenberg's universal #32, which notes that agreement for gender entails agreement for number, can be understood if we treat agreement as a Copy operation applying to the root node of the feature geometry. Any agreement which includes the CLASS node (distinguishing gender features) must also include the INDIVIDUATION node (distinguishing number features), since CLASS is dependent upon INDIVIDUATION. Universal # 36, according to which the presence of gender categories in a language entails the presence of number categories, is similarly accounted for by the dependence of CLASS upon INDIV.

Finally, Universals #37 and #45 can be accounted for if we treat the notion of markedness as a node-counting or degree-of-embedding metric (c.f. Harley (1994)). Any singular representation will be less marked than a plural representation, given the geometry above, since plural requires an additional Group node in its representation. Hence, if a CLASS node may cooccur with Group, it follows that it may occur without Group, since a representation without Group is less marked[1].

[1] Horst Simon (p.c.) draws our attention to work which attacks the validity of these last two Greenbergian universals, Plank and Schellinger (1997). To our shame (and that of our libraries') we have been unable to acquire a copy of the article before the deadline, and so cannot comment on specifics. As things stand, however, our geometry makes clear predictions about a situation in which a language has, for instance,

To conclude this section, let us consider how the geometry proposed above allows Hanson (1999) to account for the universals of pronoun acquisition which she enumerates. Building on the work on the acquisition of the phonological feature geometry by Rice and Avery (1995), Brown (1997), she adopts general constraints listed in (5) below:

(5) a. *The Structure Building Hypothesis*
UG provides a minimal initial structure, which is added to in response to contrasts detected in the input.

b. *Constrained general learning path*
Acquisition proceeds from the top down; a given node must be acquired before its dependents. In this way the geometry captures the *global uniformity* apparent in acquisition.

c. *Free specific learning path*
The available paths may be elaborated in any order. In this way the geometry captures the *local variability* in acquisition.

UG provides the root RE node, and, in response to positive evidence, children build structure incrementally. Consider the initial pronoun acquired by the child. In Hanson's study, 1 singular *or* 3 singular inanimate is the first pronoun to appear in a child's inventory (see example (2a)). Whichever of these pronouns comes first, the other follows immediately after. Now, consider our geometry. If UG provides a default of [Speaker] for PARTICIPANT, a default of [Minimal] for INDIVIDUATION and a default of [Inanimate] for CLASS, the acquisition pattern above falls out. Any other pronoun will be more marked and hence acquired later by elaboration of structure, with the appropriate triggers.

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more genders in the plural than the singular. Such a situation should be unstable, representing a transition state from which the language should move towards a system with either fewer genders (through loss of the marked plural genders) or a system with more gender distinctions in the singular (through innovation or,

In particular, it is worth noting that other approaches to morphological universals cannot account for the early acquisition of 3 singular inanimate pronouns. Noyer (1997)'s Feature Hierarchy, for instance, places 1st and 2nd person pronouns above 3rd, and masculine and feminine above neuter. If the early emergence of 1st person pronouns indicates the acquisition of pronouns higher in the hierarchy, 3 singular inanimate should be among the last to be acquired. Only a geometric approach like that outlined here can provide a principled account of the early appearance of these two pronouns. (For further discussion, see [Hanson, 2000 #1767]).

2.4 Exploiting the full person/number geometry: Boumaa Fijian

Before going on to discuss some paradigms with particularly interesting properties for the system we have so far proposed, let us illustrate a language which exploits the full person/number feature geometry to familiarize the reader with the workings of the goemetry. In (6) below is the paradigm for the cardinal pronouns of Boumaa Fijian:

(6) Boumaa Fijian cardinal pronouns

	singular	plural	dual	paucal
1ex	yau	'eimami	'eirau	'eitou
1in	--	'eta	'eetaru	'etatou
2	i'o	'emunuu	'emudrau	'emudou
3	'ea	(i)ra	(i)rau	(i)ratou

Dixon (1988) p 54-55

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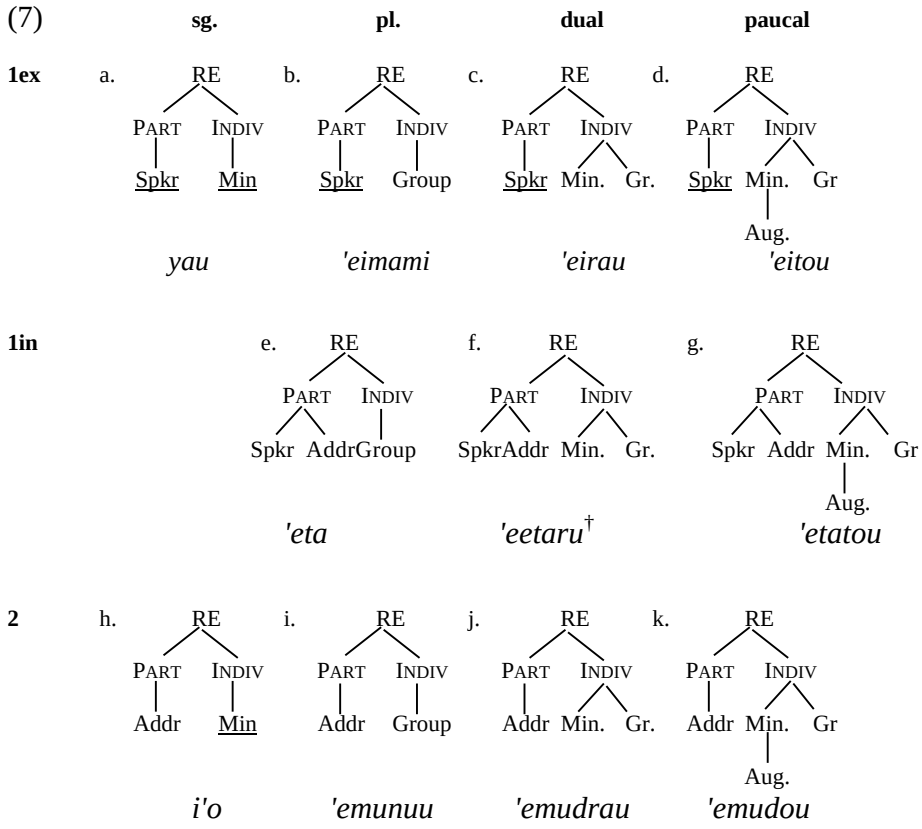
more likely, through syncretism with the marked plural form). We intend to consider the situation in much greater detail in work in the very near future.

In (7), we illustrate each pronominal form with its associated geometry. Person distinctions are made under the PARTICIPANT node, number distinctions under the INDIVIDUATION node. Notice that the most geometrically complex, and hence most marked form, intra- and cross-linguistically, is the 1st inclusive paucal pronoun.

(7)



† Note that an interesting issue arises with the 1st inclusive dual. Many traditional grammar writers automatically label the 1st inclusive a "dual" form—even without morphological evidence—as it must minimally refer to 2 persons. However, in the present treatment, it is conceivable that a 1st inclusive singular form could exist, as the person and number markings are not interdependent. Such a form, while referring to a group of two, can be associated with the singular ('minimal') number geometry. Here, however, given that the morphological shape of this particular 1st inclusive form shares elements with the other duals, we will treat it as having an explicit morphological dual marking. Cf. the discussion in Cysouw (2000), this volume, and for an example of a singular inclusive, [Hanson, 2000 #1767].

3 l. RE — INDIV — Min — *'ea*

m. RE — INDIV — Group — *(i)ra*

n. RE — INDIV — Min. Gr. — *(i)rau*

o. RE — INDIV — Min. Gr — Aug. — *(i)ratou*

3. Person without number: the effect of empty paradigm space

In theory, a language with a full set of distinctions in the person geometry and none in the number geometry could exist, given that person and number are independent and equal nodes under RE.[2] Exploiting just the features which are dependent on the person geometry, there are four logical geometric possibilities (including the unmarked PARTICIPANT node), illustrated in (8):

(8) *Person*: 4 logical possibilities

PARTICIPANT — Addressee, Speaker

PARTICIPANT — Addressee

PARTICIPANT — Speaker

PARTICIPANT

It is our claim that such languages, without an INDIVIDUATION node, may use these person geometries to represent number in the first person only.

3.1 3 person geometries: Berik

First lest us consider the case of Berik, a language which contains no number marking on most pronouns, full nouns, or in the agreement system. This we take to indicate that the

INDIVIDUATION node is not active in this language; hence the lack of number contrasts. However, it does show number marking in the first person only. If we put aside the 3rd person pronoun, which we assume is represented by a bare RE node, the paradigm contains just three forms: 1st sg, 1st pl, and 2nd person. The paradigm is illustrated in (9).

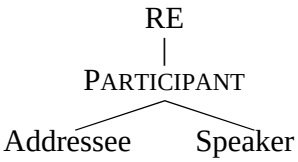
(9) Berik (Nominative)

	singular	plural
1st	ai (ajam)	ne (nejam)
2nd	aame (ijam)	
3rd	je (jam)	

Westrum (1986) p 37-45

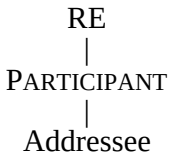
We claim that, in the absence of an INDIVIDUATION node, a 1st person singular/plural contrast can be represented by the geometry usually reserved for 1st person inclusive forms. The geometries we propose to capture the Berik 1st and 2nd forms are illustrated in (10):

(10) a. 1st person pl.



b. 1st person sg.

c. 2nd person



How can such an interpretation arise? Harley and Ritter (1999) argue that this is another instance in which the external nature of the group represented may influence the interpretation of a geometry. They observe of 1st person plural forms in general that they denote a mixed group consisting of the speaker and other individuals. This is in marked contrast to 2nd and 3rd person plural forms, which may denote a group of addressees or a

[2] Presumably, the reverse situation could not exist, for reasons having nothing to do with feature geometry:

group of other individuals, respectively. In natural language, there is no genuine 1st person plural—we never speak in choruses.

The inclusive geometry denotes such a mixed group, consisting of the speaker and another entity. In the more usual situation, where this geometry co-occurs with features indicating number, this geometry gets its usual inclusive interpretation. In the absence of number features, a language may resolve the interpretation of the more complex geometry in an unusual direction, taking advantage of the empty paradigm space.[3]

3.2 4 person geometries: Maxakalí and Kwakiutl

In previous work, we discussed the facts of Maxakali and Kwakiutl, both of which have inclusive pronouns. These languages, whose paradigms are reproduced in (11) and (12), are notable, like Berik, in that they appear to manifest number distinctions in 1st person only. Unlike Berik, however, both languages have a 1st singular pronoun as well as a 1st person inclusive plural pronoun and a 1st person exclusive one.

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(11) Maxakalí (Absolutive)

	singular	plural
1st excl	’ũg / ’ũk	yũmũg
1st incl		’ũmũg
2nd	’ã	
3rd	’ũ	

Popovich (1986: 352)

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a language cannot exist without speakers and hearers

[3] Diana Archangeli (p.c.) points out that there is a natural analogue to this situation in the phonological literature. Consider the case of a phoneme that is specified for [+low] and [+front] features simultaneously. The [+low] feature pushes the tongue body back, meaning that it conflicts somewhat with the [+front] feature. Depending on the structure of the rest of the phonological inventory, different languages will resolve this conflict in different ways, resulting in different phonetic realizations of the same geometry.

(12) Kwakiutl (Nominative)

	singular	plural
1st excl	-En	-Enu$^{\grave{e}}$x^{u}
1st incl	-Ents	
2nd	-Es	
3rd	--	

Forchheimer (1953: 119) citing Boas (1911a)

Again exploiting the fact that 1st person plurals do not refer to a group of speakers, but rather to one speaker and either one or more addressees, or a speaker and one or more other individuals, we argue that the pronouns in these languages contrast only in person, and that in fact they do not express number at all. Support for this approach comes from the observation that these languages, like Berik, normally make no morphological number or gender distinctions on nouns or verbs.

In order to account for the facts, we propose that Maxakali and Kwakiutl make full use of the four different PARTICIPANT subgeometries available in the system. These sub-geometries are depicted in (13):

(13)

	1st sg	**2nd**	**1st excl pl**	**1st incl**
	PART	PART | Addr	PART | Spkr	PART Spkr Addr
Maxakali	’ũg / ’ũk	’a	yũmũg	’ũmũg
Kwakiutl	*-En*	*-Es*	*-Enu^{e}x^{u}*	*-Ents*

The fact that these languages make no use of number distinctions elsewhere in the grammar strongly suggests that number features are simply not present in their feature inventories. Thus, the only way to capture the contrasts among the four distinct 1st and 2nd person pronouns is by means of person features. In order to distinguish it from the

1st person singular, the 1st exclusive plural must be represented with a dependent speaker node.[4]

3.3 Over-riding the defaults: 2nd person inclusive

Finally, we turn to a much-discussed question: that of whether or not an inclusive pronoun is ever truly a second person form, rather than a first person form. That is, since both the Speaker and Addressee nodes are active in an inclusive form, one might expect to see the possibility that the morphological shape or other properties of the inclusive pattern with second person forms rather than first person forms. In our geometry, however, the Speaker and Addressee nodes are sisters, meaning that when they are both active as in an inclusive form, it is at least theoretically possible for either to be morphologically salient. Given our approach to universal defaults, according to which first person forms in general are less marked than second, this situation would presumably be rare, requiring robust morphological evidence for acqusition. Nonetheless, it is a possibility in a system like that presented here, but not in a system which identifies the Addresee merely as [-Spkr, +Part]. We argue that robust morphological evidence for a second person inclusive exists, however, in three distinct languages. Consider the paradigms in (14) below, from Yokuts, Ojibwe and Nama:

[4] This system makes a prediction that no language which makes a *five*-way distinction in 1st and 2nd person but yet has no number marking in the 3rd person should not exist, as there are only 4 possible geometries available using only the PARTICIPANT node. Unfortunately, this prediction appears to be problematic. The description of Guaraní pronouns given by Croft (1990) p. 111 is exactly that: five personal pronouns including 1sg, 1in, 1expl, 2sg and 2pl, exist in the language, but number marking is otherwise absent. In future research we will undertake a more detailed study of Guaraní to determine whether or not it is possible that number marking is genuinely absent in the language.

(14) *The marked 2nd person inclusive/exclusive distinction*:

a. Yokuts pronouns

	Singular	Dual	Plural
1	na'	na'ak'	na'an
2incl	*	mak'	may
2excl	ma'	ma'ak'	ma'an
3	'ama'	'amak' '	aman

Newman (1944) p 127

b. Ojibwe pronouns

	Singular	Plural
1	n-iin	n-iin-awint
2incl	*	k-iin-awint
2excl	k-iin	k-iin-awaa
3	w-iin	w-iin-awaa

Schwartz and Dunnigan (1986) p 296

c. Nama pronouns

	Singular		Dual		Plural	
	fem	masc	fem	masc	fem	masc
1	tita	tita	si-m	si-kho-m	si-se	si-ge
2incl	*	*	sa-m	sa-kho-m	sa-se	sa-ge
2excl	sas	sats	sa-ro	sa-kho	sa-so	sa-go
3	//îs†	//îb	//î-ra	//î-kha	//î-di	//î-gu

Note that in each case, the dual form patterns morphologically in the prefix with the 2nd person forms. Despite the shape of these pronouns, some theorists, including Zwicky (1977) and Noyer (1997), have argued that this similarity is not evidence that the inclusive form is 2nd person. However, Déchaine (1996) gives two convincing syntactic arguments that, in fact, the inclusive forms for Ojibwe in (14b) should be analyzed as 2nd person. First, the 2nd inclusive form may be used in the imperative, which is otherwise restricted to 2nd person forms. Second, there are two types of argument agreement on the Ojibwe verb, direct and inverse. The direct form occurs when the subject is 2nd person and the object is 1st person, and the inverse form occurs when the grammatical relations of these persons are reversed. The pattern is laid out in the table in (15). Crucially, the

inclusive pronoun triggers the same agreement pattern as the 2nd person (exclusive), rather than the 1st person. That is, when the subject is an inclusive form, the marking is direct, and when the inclusive is the object, the inverse form occurs.[5]

(15) Verb forms in Ojibwe

	1st Subject	2nd Subject
1st object	~	**direct**
2nd object	**inverse**	~

In at least these two respects, then, it is the active Addressee node that is the crucial element of the pronoun to the morphosyntax, rather than the Speaker node. We consider that these paradigms constitute robust evidence for a separate Addressee feature, an aspect of our analysis which distinguishes it from several other current proposals.

4 Conclusions

Evidently, this proposal represents a research program barely past the beginning stages. However, we hope to have demonstrated at least that generalizations about morphosyntactic feature groupings may be treated in a principled formal system, and that a deeper level of explanation for such phenomena than is usually presented is possible. With respect to the specifics of our proposal, we argued for the following points:

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† // denotes a lateral click in these examples.

[5] Moreover, neither the direct nor the inverse agreement form is acceptable when the non-inclusive argument is 2nd person. We attribute this ungrammaticality to a constraint against the overlapping syntactic

1. Morphosyntactic features are arranged in a formal geometry whose shape is partially constrained by their conceptual content.
2. The structure of the geometry constrains acquisition.
3. Some variation is allowed in that particular geometries may be mapped onto different subparts of conceptual space in different languages, as long as a) the mapping does not conflict with the conceptual content of the geometries, and b) the overall paradigm space allows it.
4. Both a Speaker feature and an Addressee feature are necessary to capture the range of variation in person paradigms cross-linguistically.

Considerably more extensive investigation is needed to test the particular geometry we have argued for here. However, we hope to have demonstrated that the project of developing a robust morphosyntactic feature geometry is both feasible and explanatorily useful.

References

Archangeli, D. 1988. "Underspecification in phonology." *Phonology* 5(2): 183-207.

Avery, P. and Rice, K. 1989. "Segment structure and coronal underspecification." *Phonology* 6: 179-200.

Benveniste, E. 1971. *Problems in General Linguistics*. Miami: University of Miami Press.

Bloomfield, L. 1938. *Language*. New York: Holt, Rinehart and Winston.

---

reference of the 2nd person (excl) and the inclusive form, along the lines of Guéron's (1984:44) Nondistinctness Constraint.

Brown, C. 1997. *Acquisition of segmental structure: Consequences for speech perception*. Ph.D., McGill University, Montreal

Calabrese, A. 1988. *Towards a Theory of Phonological Alphabets*. Ph.D., Massachusetts Institute of Technology, Cambridge, MA

Croft, W. 1990. *Typology and universals*. Cambridge: Cambridge University Press.

Cysouw, M. 2000. "'We' rules." In *(This volume)*, H. Simon and H. Weise, (eds). Amsterdam: John Benjamins.

Déchaine, R. 1996. "What Algonquin morphology is really like: Hockett revisited". In Proceedings of the Workshop on Structure and Constituency in Native American Languages, University of Manitoba, Winnipeg.

Dixon, R. M. W. 1988. *A Grammar of Boumaa Fijian*. Chicago: University of Chicago Press.

Forchheimer, P. 1953. *The Category of Person in Language*. Berlin: Walter de Gruyter.

Greenberg, J. H. 1967. "Some universals of grammar with particular reference to the order of meaningful elements." In *Universals of Language*, J. H. Greenberg (ed), 73-113. Cambridge, MA: MIT Press.

Hanson, R. 1999. Pronoun acquisition and the morphological feature geometry, ms. University of Calgary.

Harley, H. 1994. "Hug a tree: Deriving the morphosyntactic feature hierarchy." In *Papers on Phonology and Morphology*, A. Carnie, H. Harley and T. Bures (eds), 289-320. Cambridge, MA: MIT Working Papers in Linguistics.

Harley, H. and Ritter, E. 1999. Meaning in morphology: Motivating a feature-geometric analysis of person and number, ms. University of Arizona, University of Calgary.

Newman, S. 1944. *The Yokuts Language of California*. New York: The Viking Fund.

Noyer, R. 1997. *Features, Positions, and Affixes in Autonomous Morphological Structure*. New York: Garland.

Plank, F. and Schellinger, W. 1997. "The uneven distribution of genders over numbers: Greenberg nos. 37 and 45." *Linguistic Typology* 1: 53-101.

Rice, K. and Avery, P. 1995. "Variability in a deterministic model of language acquisition: A theory of segmental elaboration." In *Phonological Acquisition and Phonological Theory*, J. Archibald (ed), 1-22. Hillsdale, N.J.: Lawrence Erlbaum.

Ritter, E. and Harley, H. 1998. "Meaning in morphology: A feature-geometric analysis of person, number and gender". Presentation given at the annual meeting of the Generative Linguists of the Old World, University of Tilburg, Tilburg, the Netherlands.

Sagey, E. C. 1986. *The Representation of Features and Relations in Non-linear Phonology*. Ph.D., Massachusetts Institute of Technology, Cambridge, MA

Schwartz, L. J. and Dunnigan, T. 1986. "Pronouns and pronominal categories in Southwestern Ojibwe." In *Pronominal Systems*, U. Wiesemann (ed), 285-307. Tubingen: Gunter Nar Verlag.

Westrum, P. N. 1986. "Berkik Pronouns." In *Pronominal Systems*, U. Wiesemann (ed), 37-45. Tubingen: Gunter Narr Verlag.

Zwicky, A. 1977. "Hierarchies of person". In Proceedings of the Chicago Linguistics Society, Chicago: Chicago Linguistics Society.