PERSON AND NUMBER IN PRONOUNS: A FEATURE-GEOMETRIC ANALYSIS

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The set of person and number features necessary to characterize the pronominal paradigms of the world's languages is highly constrained, and their interaction is demonstrably systematic. We develop a geometric representation of morphosyntactic features which provides a principled explanation for the observed restrictions on these paradigms. The organization of this geometry represents the grammaticalization of fundamental cognitive categories, such as reference, plurality, and taxonomy. We motivate the geometry through the analysis of pronoun paradigms in a broad range of genetically distinct languages.*

INTRODUCTION. It is generally accepted that syntactic and phonological representations are formal in nature and highly structured. Morphology, however, is often seen as a gray area in which amorphous bundles of features connect phonology with syntax via a series of ad hoc correspondence rules. Yet it is clear from the pronoun and agreement paradigms of the world's languages that Universal Grammar provides a highly constrained set of morphological features, and moreover that these features are systematically and hierarchically organized.[1] In this article we develop a structured representation of person and number features intended to predict the range and types of interactions among them. More specifically, we will motivate the claims in 1.

(1) Claims
   a. The language faculty represents pronominal elements with a geometry of morphological features.
   b. The organization of this geometry is constrained and motivated by conceptual considerations.
   c. Crosslinguistic variation and paradigm-internal gaps and syncretisms are constrained by the hierarchical organization of features in the universal geometry.

* We would like to acknowledge our great debt to the fieldwork done by many linguists that gave us access to the paradigms of a wide range of endangered languages. A number of the languages we cite have fewer than twenty speakers. For extensive comments on earlier versions of this work, thanks especially to Hotze Rullmann, Heike Weise and Horst Simon, Brian Joseph, and two anonymous referees. For other help with the development of these ideas, thanks to Diana Archangeli, Hagit Borer, Andrew Carnie, Eugene Chan, Michael Cysouw, Dan Everett, John Frampton, Diana Green, Ken Hale, Morris Halle, Riny Huybregts, Eloise Jelinek, Kyle Johnson, Mary Laughren, Alec Marantz, Rolf Noyer, Phoevos Panagiotidis, Frans Plank, Harold Popovich, Keren Rice, Leslie Saxon, Margaret Speas, and audiences at the University of Victoria, Ben Gurion University of the Negev, Tel Aviv University, the University of Toronto, the 1997 Annual Meeting of the Canadian Linguistics Association, GLOW 98, and the special session on pronouns at the DGfS 2000 meeting in Marburg. Thanks as well to the research assistants on the University of Calgary Pronoun Database project: Rebecca Hanson, Heather Bliss, Jen Abel, and Sheena van der Mark. The material in §§1, 3, and 4 represents a significantly expanded and revised version of ideas presented in Harley & Ritter 2002. This research was supported by SSHRCC grant #410-98-0328 to Ritter and an NSF Postdoctoral Fellowship to Harley. The ordering of the authors' names is alphabetical; this work represents equal effort on the part of both authors.

[1] Since agreement markers are realizations of the same morphological features, we assume that this set of morphemes will also lend itself to a geometric representation. There are, however, a number of issues to be sorted out before our proposal can be extended to this domain. Notably, we need a better understanding of the nature of the grammatical mechanism involved in agreement (copying vs. checking, for example), as well as a reliable diagnostic for distinguishing between pronominal clitics and verb agreement.

d. The interpretation of subtrees of the geometry may be relativized in tightly constrained ways so that language-specific interpretation of a given feature will depend in part upon the contrasts available within that language.

In order to substantiate these claims we demonstrate that a geometric analysis can shed light on children's acquisition of pronouns and on paradigms that manifest a range of unusual properties. In the course of this demonstration we draw on our own database of 110 languages, as well as descriptions of other exceptional languages discussed in the literature.

1. FEATURE GEOMETRIES. Linguists agree that there are natural classes of morphological features. This is reflected in the universal classificatory use of the terms PERSON, NUMBER, and GENDER, as well as other classes of features not discussed here. At least this much organization is unconditionally assumed, and further organized relationships among these classes of features have often been noted, although not often treated theoretically. For instance, Greenberg (1963) observed a number of crosslinguistic generalizations about the clustering of features, describing, for example, the dependence of gender on number (Universal 32: 'Whenever a verb agrees with a nominal subject or object in gender it also agrees in number.') and the dependence of dual number on plural number (Universal 34: 'No language has a dual [number] unless it has a plural.' Greenberg 1963:94).

Although these dependencies must be the consequence of some aspect of universal grammar, morphological theory has not in general attempted to provide an account of them. It seems to be widely assumed that features are collected in unstructured bundles and that morphological rules may freely refer to any feature or group of features, regardless of whether or not they form a natural class.

1.1. THE PROBLEM WITH UNSTRUCTURED BUNDLES OF FEATURES. Many modern theories of morphology claim that morphosyntactic features are grouped in unstructured bundles and even make a virtue of it—despite the fact that a certain amount of organization is implicit in the very terminology common to all morphological theories. Consider, for example, the discussion of MORPHOSYNTACTIC REPRESENTATIONS (MSRs) in Anderson (1992:92): 'The minimal (and thus the most desirable) theory of MSRs . . . is one that would assign them no internal structure at all.' Yet even given this explicit assertion, Anderson does not assume that MSRs representing agreement features are entirely unstructured. He implicitly assigns attribute-value structure to them: There is at least a PERSON attribute that may bear the values {[± me], [± you]}; a NUMBER attribute that may bear the values {[± pl]}; and a GENDER attribute that may bear a series of familiar values such as {[± masc], [± fem], [± neut]}. This organization, whether implicitly assumed, as in Anderson 1992, or explicitly assumed, as in the LEXICAL FUNCTIONAL GRAMMAR (LFG) or HEAD-DRIVEN PHRASE STRUCTURE GRAMMAR (HPSG) frameworks, is essential to prevent the unmotivated combinatorial explosion of potential cross-classifications. In a system where a single form could bear any combination of the features [1], [2], [sg], [pl], [masc], [fem], there would be 2^6 possible combinations of feature values. Collecting the person, number, and gender features together into mutually exclusive subgroups brings the paradigmatic possibilities down to something much more closely approximating the facts of natural language.[2]

[2] Some systems assume that some features are mutually exclusive, while others are not; so, for example, Dalrymple and Kaplan (2000) make conjoined use of a [Speaker] and [Hearer] feature (as we do, see below) to capture inclusive forms, but assume that it would not be possible to simultaneously bear, for instance, [+ fem] and [+ masc]. This only adds to the general indeterminacy of the system. In approaches that do

Even given these subgroups, usually considered to be so basic as not to merit discussion, the organization across subgroups that is implied by Greenberg's generalizations given above does not fall out of any account of morphosyntactic features that assumes that feature groups are collected in unstructured bundles. Noyer 1992 and 1997 represent an important attempt to provide a theoretical framework that predicts the existence of universals such as those catalogued by Greenberg. In these works, Noyer posits a UNIVERSAL FEATURE HIERARCHY (UFH), which interacts with the unordered bundles of features, to explain regularities captured in Greenberg's generalizations. A partial version of his UFH can be seen in 2.

(2) Noyer's (1992) Universal Feature Hierarchy
person features > number features > gender features > class features

However, under Noyer's treatment the feature groups themselves are still represented as unordered bundles. The UFH is intended as a constraint that determines, for a given bundle, which features may be deleted or otherwise manipulated. For example, a bundle with an incompatible number and gender combination will be amended by deleting the offending gender feature as in 3, since gender is lower on the UFH than number.

(3) Filter: *[2 f]
[2 pl f] → [2 pl]

The formal mechanism of the deletion rules themselves, however, without an additional constraint like the UFH, makes no predictions about possible syncretisms or groupings and is subject to the criticisms noted earlier.

Our goal is to develop representations from which these properties will naturally follow, without recourse to a separate stipulated metric. Borrowing heavily from the phonological model, we propose a morphological feature geometry intended to constrain pronoun and agreement systems, much as phonological feature geometries constrain sound systems. Such geometries have been discussed in detail in Harley 1994 and Ritter 1997. A similar geometry, which also includes syntactic feature information, was developed in Gazdar & Pullum 1982 and discussed in Gazdar et al. 1985.

1.2. STRUCTURING THE REPRESENTATION. Our feature geometry is of the same formal type as the phonological feature geometries originally proposed in Clements 1985 and Sagey 1986. The morphological feature geometry is motivated by the need for the same theoretical mechanisms as its phonological counterpart. The primary goals of a phonological feature geometry, as described by Noyer (1992), are outlined in 4.

(4) a. Subtrees define natural classes of features for phonological rules.
b. (Some) nodes in a feature tree correspond to the anatomy of the vocal tract.
c. The dependency relation encodes contrastiveness. (Noyer 1992:46–47)

Harley 1994 showed that a morphological feature geometry could accomplish 4a and 4c, and also argued that the feature-geometric approach to morphology defines a notion of complexity from which the effects of Noyer's UFH can be derived.

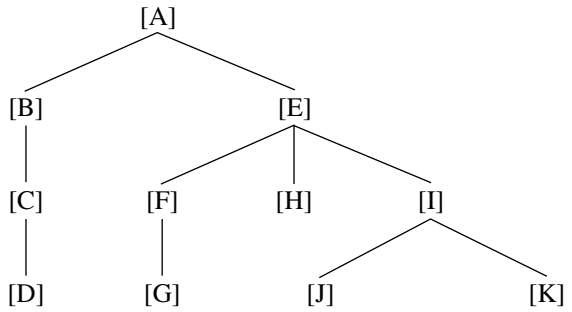
Here, we also wish to maintain that there is a natural morphological analogue to 4b; that is, there are external reasons for the feature groupings which arise. It is undeniable that the organization of the vocal tract both constrains and motivates phonological feature organization. At first glance, it might seem that the groupings of morphological features, independent of physical restrictions, cannot be attributed to external factors.

not make use of attribute-value matrices, the mutual exclusivity of proposed features such as [+sg] and [+dual] is sometimes explicitly treated by appealing to semantic incompatibility (Noyer 1992:55).

Following Ritter 1997, we claim that the external factors that play a role in morphology are conceptual in nature. Specifically, notions such as deixis, countability, and taxonomy constrain and motivate the relationships that are apparent among morphological features and represented in the formal geometry. Subtrees of the geometry represent the grammaticization of natural cognitive categories, accounting for the apparent yet tenuous relationship between grammatical features and meaningful concepts.

1.3. THE FORMAL PROPERTIES OF FEATURE GEOMETRIES. Before discussing the details of our proposal, we briefly review some formal properties of feature geometries. Consider the abstract feature-geometric tree represented in 5.

(5)



Following Harley 1994 we assume that features are monovalent and appear only if they have a positive value. That is, feature [B] will appear in the structure only if feature [B] is active. A feature [−B] does not occur.

In a feature geometry, it is generally the case that if one morphological feature is logically implied by another, this relation is captured through dependence. For instance, in 5, feature [G] entails that feature [F] is present because feature [G] is represented as dependent on feature [F]. Feature [F] may not be eliminated from the geometry without also eliminating feature [G].

It is worth noting, however, that the logical implication produced by the everyday interpretation of a given pair of features need not be represented in the geometry. The 1st person inclusive, for example, is logically nonsingular, as it necessarily includes the speaker and at least one addressee. However, not all languages mark inclusive forms as plural,[3] showing that this logical implication is not morphologically relevant in all languages. (A phonological analogue might be the interdependence of [+sonorant] and [+voice]: although all sonorants are voiced, they are not represented as dependents of the [+voice] node). As we illustrate below, our geometry does not encode the implication between inclusive person and plural number as a dependence relation, and this correctly predicts the existence of rare languages that have an inclusive singular.[4]

Markedness is encoded in a geometry via a node-counting metric. The more marked a given feature combination is, the more nodes will be required to represent it. In the

[3] Brian Joseph has drawn our attention to the existence of first person comitative constructions like the Russian *my s Borisom idjom* 'we with Boris are going' = 'Boris and I are going', where the plurality of the first person pronoun is at logical odds with its apparent referent, although not its containing DP. See the structural proposals in, for example, Camacho 1996 and McNally 1993 for discussion.

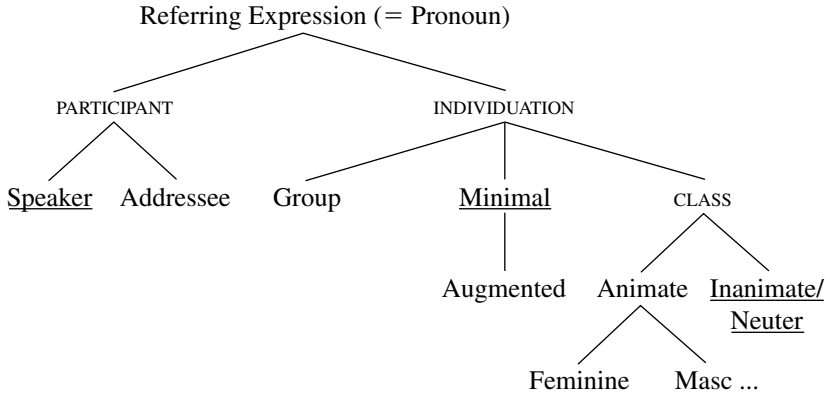
[4] An inclusive singular consists of the speaker and exactly one addressee. For example, Ngandi, an Australian language, has singular, dual, and plural numbers for all persons. In the case of the inclusive, singular, dual, and plural specify the number of addressees included in the reference of the pronoun, rather than the total number of individuals (see Heath 1978). See also the discussion of Kalihna in §2.4

tree in 5, it takes more nodes to represent feature [G] than to represent simply feature [F]; therefore, a tree that includes feature [G] will be more marked than a tree that includes simply feature [F]. For further discussion, see Harley 1994.

Finally, in phonological feature geometries like those of Archangeli 1988 or Avery & Rice 1989, organizing nodes with no dependents receive a default interpretation, usually treated as underspecification: one of the daughter nodes is identified as representing the default interpretation of a bare organizing node. We make use of this notion in our discussion of the acquisition of pronominal paradigms below. In the tree representing our proposed geometry in 6 below, the underlined daughter nodes, Speaker, Minimal, and Inanimate/Neuter, represent the default interpretation of an unmarked organizing node.

2. A MORPHOSYNTACTIC FEATURE GEOMETRY. The geometry that we propose is provided by Universal Grammar is represented in 6. In any given language a subset of the possible features will be active—most languages will only use a portion of the features available.

(6)



In this geometry, all nominal features are dependent upon a root node which we call REFERRING EXPRESSION. We divide these features into three groups, identified by the nodes in small caps in the geometry. The PARTICIPANT node and its dependents, Speaker and Addressee, will be used to represent person, specifically, 1st and 2nd person (3rd person being unmarked). The INDIVIDUATION node and its dependents, Group, Minimal, and Augmented, are used to represent number systems. Finally, the CLASS node encodes gender and other class information. These three groupings represent explicitly via dependency the subgroupings of person, number, and gender that other theories either assume without comment or represent via attribute-value matrices. This, then, is one way in which a feature-geometric representation accomplishes goal 4a for morphosyntactic features, that of defining natural classes of features for the application of morphological rules. In the remainder of this article, we focus on how languages use the Participant and Individuation nodes to represent person and number and the interactions between them. We do not address the content of the Class node here, but see §6.3 for discussion of the dependency relation between number and gender.

2.1. TWO MAJOR CLASSIFICATORY NODES. It has long been recognized that there is a fundamental difference between 1st and 2nd person on the one hand, and 3rd person on the other. Benveniste and Forchheimer offer independent expressions of this insight.

> 'Person' belongs only to *I*/*you*, and is lacking in *he*. (Benveniste 1971:217)
> 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 1953:5–6)

Forchheimer identifies a variety of morphological generalizations which show that languages treat 3rd person differently from 1st and 2nd, and, moreover, indicate that 3rd person is unmarked, relative to the other persons. His generalizations are listed in 7.

(7) a. 3rd person agreement is often zero, 1st/2nd person agreement is overt.
b. Many languages have no 3rd person pronoun—or at least no nominative form.
c. Many languages have distinct 1st & 2nd person pronouns only; for 3rd person they use demonstratives.
d. Closely related languages often have cognate 1st and 2nd person pronouns but 3rd person pronouns which are not obviously related.
e. 1st and 2nd person are often similar in form and inflection but dissimilar from that of 3rd person.
f. 3rd person is much more subject to objective subdivisions such as class, gender, and location. (Forchheimer 1953:6)

We attribute this distinction between 1st and 2nd person, on the one hand, and 3rd person on the other, to the fact that the reference of the former is determined by the changing discourse roles, whereas the reference of the latter is fixed (cf. Jakobson 1971: 131–32).[5] This is illustrated in the simple conversation in 8, where the referent of the pronoun *I* is person A for the first utterance and person B for the second. Similarly, the referent of the pronoun *you* is person B for the first utterance and person A for the second. In contrast, the referent of *he* remains constant across both utterances.

(8) a. A: I_A think he_C wants $your_B$ advice.
b. B: I_B think you_A're nuts. He_C doesn't want anything.

The discourse dependence of 1st and 2nd person pronouns also shows up in binding possibilities for pronouns. In 9 and 10, substitution of a 1st and 2nd person personal pronoun for a reflexive direct object results in a marginally grammatical sentence with the same interpretation as the grammatical sentence with the reflexive. But in 11, substitution of a 3rd person personal pronoun for a reflexive direct object results in a completely ungrammatical sentence if the subject and object are coreferential, and a completely grammatical one if the subject and object have disjoint reference.

(9) a. I love myself
b. ??I love me.
(10) a. We love ourselves.
b. ??We love us.
(11) a. He loves himself.
b. *He_i loves him_i.
c. He_i loves him_j.

The conceptual distinction between discourse dependence and independence is the external factor that determines the shape of the geometry in 6. The Individuation node

[5] Forchheimer (1953:4–7) distinguishes two schools of thought in the literature. One position, espoused by la Grasserie (1888:3), van Ginneken (1907:211), and Boas (1911b:39–40), groups 2nd and 3rd person in opposition to 1st, that is, assumes that the fundamental person dichotomy is between speaker and nonspeaker. The alternative position, which Forchheimer attributes to Wundt (1911:141ff.), Schmidt (1919:203), Jespersen (1924:212f.), Buehler (1934:113), and Bloomfield (1933:252–3), is the one we adopt here, according to which the fundamental person dichotomy is that between participant in the speech act (1st and 2nd persons) and nonparticipants (so-called 3rd person). (This is also the position adopted in Jakobson 1971).

represents those features of a DP which are independent of the discourse, that is, its number and gender. In contrast, the Participant node and its dependents represent those features which depend on the DP's discourse role.[6]

The geometry in 6 also captures the intuition that so-called 3rd person is in fact not a true personal form. As Benveniste emphasizes, 'the ordinary definition of the personal pronouns as containing the three terms, *I*, *you* and *he* simply destroys the notion of ''person'' ' (1971:219). This intuition is encoded in our geometry because the Participant node represents only 1st and 2nd person. When the Participant node is absent, the underspecified Referring Expression node receives a so-called 3rd person interpretation.

We include suggestive paradigms from Maltese, a Semitic language, and Lyélé, a Niger-Congo language of Burkina Faso in Tables 1 and 2, which highlight the split between discourse participants and others. (Here, and throughout, we represent the forms as they appear in our original source document.) In Maltese, gender distinctions are manifested in 3rd person only, as is the case in English and other familiar languages.

	SINGULAR		PLURAL
	MASC	FEM	
1st	jien(a)		aħna
2nd	int(i)		intom
3rd	hu(wa)	hi(ja)	huma

TABLE 1. Nominative pronouns of Maltese (Sutcliffe 1936:171).

The Lyélé paradigm in Table 2 provides even more striking evidence for this split in that formality, a discourse dependent property, is manifested only in 1st and 2nd person forms.[7] And as in Maltese, only 3rd person forms show marking for discourse independent properties, such as animacy, humanness, size, and the count/mass distinction.

	SINGULAR	PLURAL
1st	à	né
1st formal	né	
2nd	ǹ	á
2nd formal	á	
3rd mass	me	
3rd human	ń	be
3rd augmentative	o	re
3rd diminutive	e	se
3rd elsewhere	re	ne

TABLE 2. Nominative pronouns of Lyélé (Showalter 1986:206–7).

2.2. ILLUSTRATING THE GEOMETRY. Before discussing some paradigms with particularly interesting properties for the system we have so far proposed, let us introduce the geometry piece by piece, ultimately illustrating in detail a language that exploits the full range of possibilities allowed by the person/number structure.

[6] Similar assumptions underlie Noyer's theory of person features. He reasons as follows (1992:146):

> The interpretation of person features must recognize certain discourse roles as primitives: these roles are among the deictic markers of a speech-act, situating the speech-act with respect to its place, time and, in the case of person features, its participants. The primary distinction is between participants in the speech-act and non-participants, what Hockett (1966) refers to as 'local' vs. 'non-local' arguments. The speaker and [addressee] are local participants, while other parties, neither speaker nor [addressee], are nonlocal nonparticipants.

[7] Showalter (1986:206) notes that some mass nouns may form plurals, and that the pronoun used to refer to these plural groups is *be*.

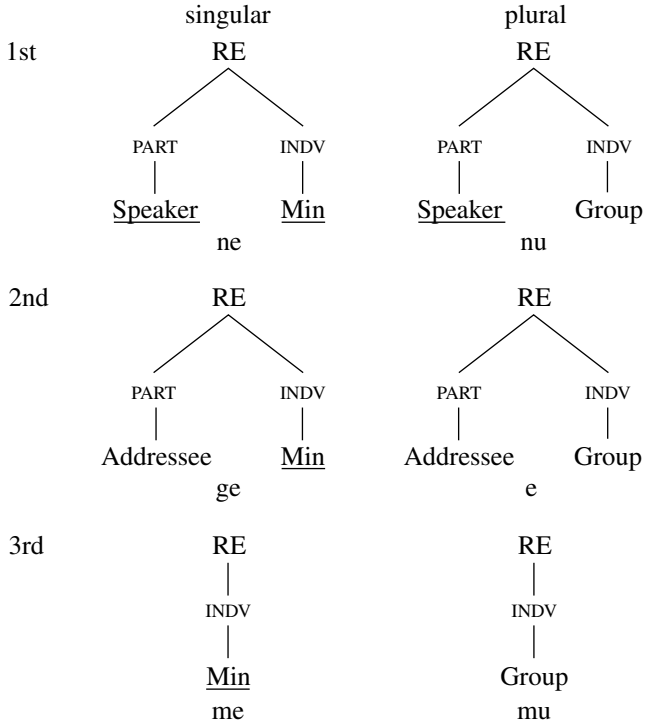
2.3. DAGA. First, let us consider a representative language with a minimum number of distinctions, regularly made. Daga, a language of the Trans-New Guinea family, fills all the paradigm spaces for three persons and two numbers in its emphatic pronouns (Murane 1974).[8] Its pronominal paradigm can be seen in Table 3.

	SINGULAR	PLURAL
1st	ne	nu
2nd	ge	e
3rd	me	mu

TABLE 3. Daga pronouns (Murane 1974:34).

Languages like Daga, which distinguish three persons and two numbers, use the Participant, Addressee, Individuation, and Group nodes of the geometry, as illustrated in 12.

(12) Geometries for Daga pronouns



Person distinctions are made under the Participant (PART) node, number distinctions under the Individuation (INDV) node. We have represented the underspecified values for Participant and Individuation here explicitly, underlining them to indicate their default status. Speaker (1st person) is the default person, Minimal (singular) the default number. These nodes need not be explicitly represented in the geometry for 1st person singular, for example, but may be filled in by default rules (see discussion in §3.1). The 1st person singular pronoun, therefore, is less marked than the 1st person plural,

[8] Many familiar Indo-European languages fit this description as well, with the additional complication of some gender distinctions, usually in the third person.

despite the fact that the geometries for those two pronouns above appear to contain the same number of nodes: the node-counting metric for markedness applies to underspecified representations, without the default features. We must have the nodes for the default features available in the geometry, however, as they play a contrastive role in many languages when activated. Note that third person forms will be the least marked, as they do not require the presence of the Participant node.

Number distinctions are represented by the features which depend on the Individuation node. Intuitively speaking, Individuation sorts entities in the world according to their discourse-independent properties, that is, their quantity and class. Singular entities are represented by the Minimal node, which, like Speaker, is usually a default value for an underspecified organizing node. Group identifies multiple entities, and its presence represents plural number.[9]

2.4. KALIHNA. Next, we consider the geometries active in a language that represents four persons and two numbers; our representative language is Kalihna, a Carib language spoken in French Guiana, Guyana, Suriname, and Venezuela (Hoff 1968), which has a four-person, two-number paradigm of emphatic pronouns. Its paradigm is represented in Table 4. The geometries that represent these pronouns are illustrated in 13.

	SINGULAR	PLURAL
1st ex	au	aʔna
1st in	kïxko	kïxka:ro
2nd	amo:ro	amïiyaro
3rd	moxko	moxka:ro

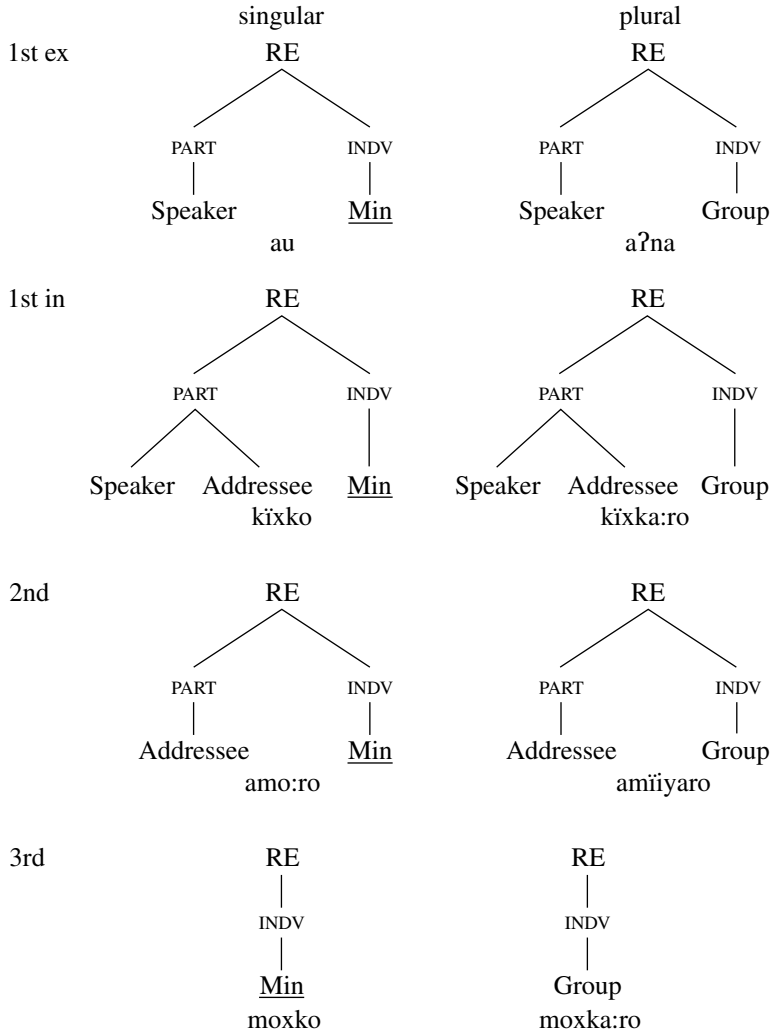
TABLE 4. Kalihna pronouns (Hoff 1968:277).

The significant difference between the geometric possibilities in this language and those in Daga is the contrastive, fully specified availability of the Speaker node (hence it is not underlined in the representations in 13). Like many other theorists, we treat 'inclusive' forms as the conjunction of a Speaker and an Addressee feature (see, for example, Dalrymple & Kaplan 2000:784). The 1st person inclusive forms above have a maximally complex Participant node. 2nd person forms are represented by the projection of the Addressee feature without the Speaker node. First person exclusive forms are represented by the projection of the feature Speaker without the Addressee node. The learner can deduce that Speaker is not underspecified in her language from the presence of this inclusive/exclusive contrast. In this way, we capture the fact that inclusives are more marked than other persons, crosslinguistically, and yet allow for languages that make reference to both Speaker and Addressee features in their morphophonological forms for inclusives. Theories that represent inclusives with a

[9] Note that if Minimal is the default value for Individuation, then plural is always a marked category. This corresponds to Greenberg's universal 35 (1963:94), which states that plurals are always marked in at least some cases. The same obtains for Speaker and Participant above, although languages that lack a plural number are relatively more common than languages without a 2nd person, presumably for external reasons. Note that the two are structurally comparable in that plural number requires activation of the Group node dependent on Individuation, and 2nd person requires activation of the Addressee node dependent on Participant.

[+incl] feature are unable to characterize such forms naturally (see the discussion of Ojibwa in §4.2).

(13) Kalihna geometries



2.5. TONKAWA. For a representative language making three person and three number distinctions, we turn to Tonkawa, a Coahuiltecan language described in Hoijer 1933. Its nominative pronominal paradigm is shown in Table 5.

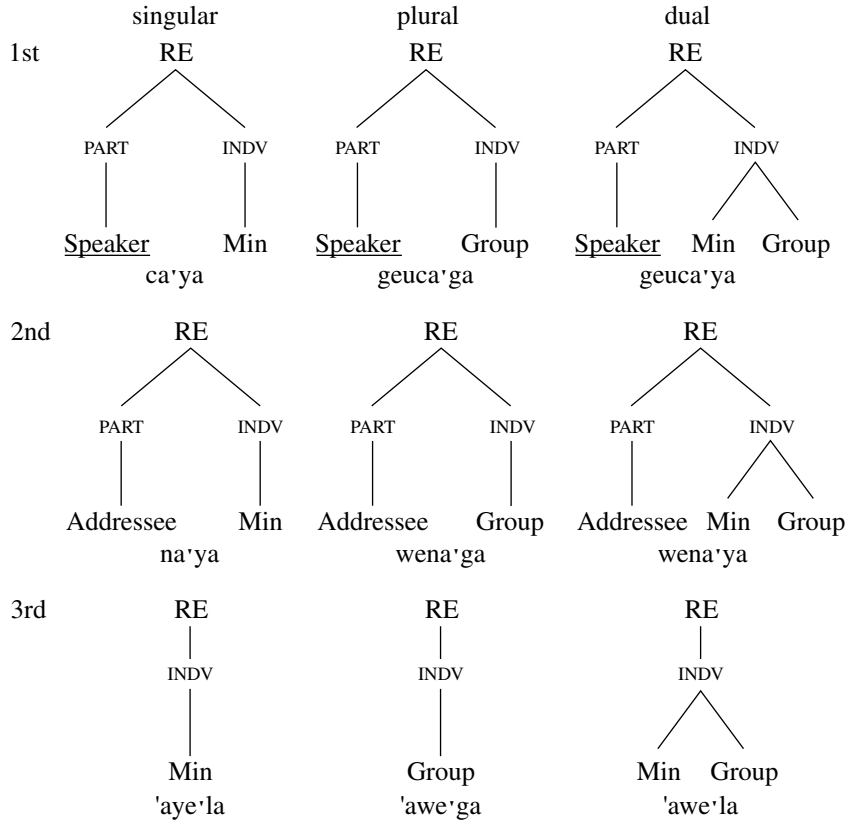
	SINGULAR	DUAL	PLURAL
1st	caʻya	geucaʻya	geucaʻga
2nd	naʻya	wenaʻya	wenaʻga
3rd	'ayeʻla	'aweʻla	'aweʻga

TABLE 5. Tonkawa nominative pronouns (Hoijer 1933:122).

The difference between two numbers and three is accomplished by allowing a fully specified, contrastive Minimal feature as a possibility in the geometry, parallel to the

use of the Speaker node to move from three persons to four above. The geometries corresponding to these pronouns are illustrated in 14.

(14) Tonkawa geometries



The addition of dual to a number system is attributed to the simultaneous activation of Minimal and Group, just as inclusive was represented by Speaker with Addressee above. The combination of Minimal and Group captures the intuition that the smallest possible nonsingleton set contains two entities.[10]

Evidence for this somewhat unorthodox approach to dual number comes from the way in which dual is marked in Hopi, an Uto-Aztecan language of Arizona. In Hopi, dual can be expressed as a combination of minimal (≈ singular) and group (≈ plural) marking on different parts of speech (Ken Hale p.c.).

(15) a. Singular
Pam taaqa wari
that man ran.SG
'That man ran.'

b. Plural
Puma taʔ-taq-t yuʔtu
those PL-man-GRP ran.PL
'Those men ran.'

[10] Leslie Saxon (p.c.) points out that the intended interpretation of the combination of our Minimal and Group features is intersective, or restrictive modification, while the apparent interpretation of the combination of our Speaker and Addressee features is simple conjunction.

c. Dual
Puma taaqa-t wari
those man-GRP ran.SG
'Those 2 men ran.'

When the subject is singular and verbal agreement is singular, singular number is conveyed. When the subject is plural and verbal agreement (suppletive in this case) is plural, plural number is conveyed. However, when the subject is plural and verbal agreement is singular, dual number is conveyed (see 15c).[11] Since in our system, dual consists of a cooccurrence of the usual plural and singular features, morphological reflexes of each are expected to surface in some cases. Note also that the shapes of the Tonkawa pronouns support this analysis: the dual appears to be made up of a prefix from the plural attached to a singular base. See also the discussion of Koasati dual in note 36 below.

Our account of the dual predicts that no language will have a dual number unless it also has a plural number—that is, unless the Group node is independently active in the language. Feature bundle systems do not make this prediction unless it is externally stipulated.

2.6. CHINOOK. Chinook, a language of the Penutian family, makes four person and three number distinctions. Its paradigm, as described by Boas (1911b), is illustrated in Table 6.[12]

	SINGULAR	DUAL	PLURAL
1st ex	naika	ntaika	ntcaika
1st in		tχaika	lχaika
2nd	maika	mtaika	mcaika
3rd	áχka (f.)	ctáχka	táska

TABLE 6. Chinook pronouns (Boas 1911b:626).

The geometries for Chinook will represent a combination of the person geometries of Kalihna and the number geometries of Tonkawa, with the 1st person inclusive dual form having the most complex geometry, consisting of activated Speaker, Addressee, Minimal, and Group nodes.

2.7. YIMAS. We turn now to Yimas, a language with three persons and four numbers. This Sepik-Ramu language of Papua New Guinea, discussed by Foley 1991, includes, in addition to the dual, a fourth number, the paucal, representing a small group. Its paradigm is in Table 7. The 3rd person form included here is a masculine, proximal demonstrative, not a personal pronoun. We include it to fill out the paradigm on the assumption that the same representational constraints hold for the person and number features of demonstratives.

	SINGULAR	DUAL	PAUCAL	PLURAL
1st	ama	kapa	paŋkt	ipa
2nd	mi	kapwa	paŋkt	ipwa
3rd	nak	impak		puk

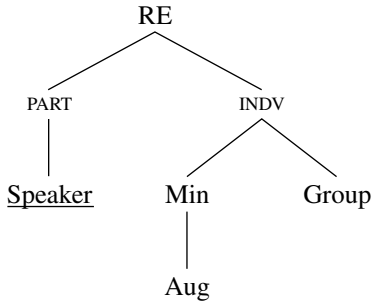
TABLE 7. Yimas pronouns (Foley 1991:111,126).

[11] The reverse pattern is simply ungrammatical (David Shaul and Ken Hill, p.c.).

[12] Chinook makes gender distinctions of masculine, feminine, and neuter only in 3rd person singular; we have included only the feminine form here, since we are not dealing with gender at the moment.

Yimas shows some interesting properties, not least of which is the syncretism between 1st and 2nd person paucal forms, and the absence of a paucal in the demonstrative system. We focus here on how to represent a paucal number at all. Recall from the discussion above that a language never has a dual without also having a plural (captured by the fact that both Group and Minimal must be active to encode dual). Similarly, no language has a paucal without also having a dual.[13] In geometric terms, this entails that the paucal must be represented by the addition of another node (making it more marked) and that that node is dependent on the node that permits the expression of dual—that is, the contrastive Minimal node. We propose a feature Augmented to express the notion that, conceptually, the paucal consists of the smallest possible group (two) plus one (trial) or a few more (paucal).[14] This gives the representation for the 1st person paucal form illustrated in 16.

(16) 1st paucal



2.8. BOUMAA FIJIAN. Finally, we turn to a language that exploits the full range of person/number possibilities. Table 8 shows the paradigm for the cardinal pronouns of Boumaa Fijian.

	SINGULAR	PLURAL	DUAL	PAUCAL
1st ex	yau	'eimami	'eirau	'eitou
1st in	–	'eta	'eetaru	'etatou
2nd	i'o	'emunuu	'emudrau	'emudou
3rd	'ea	(i)ra	(i)rau	(i)ratou

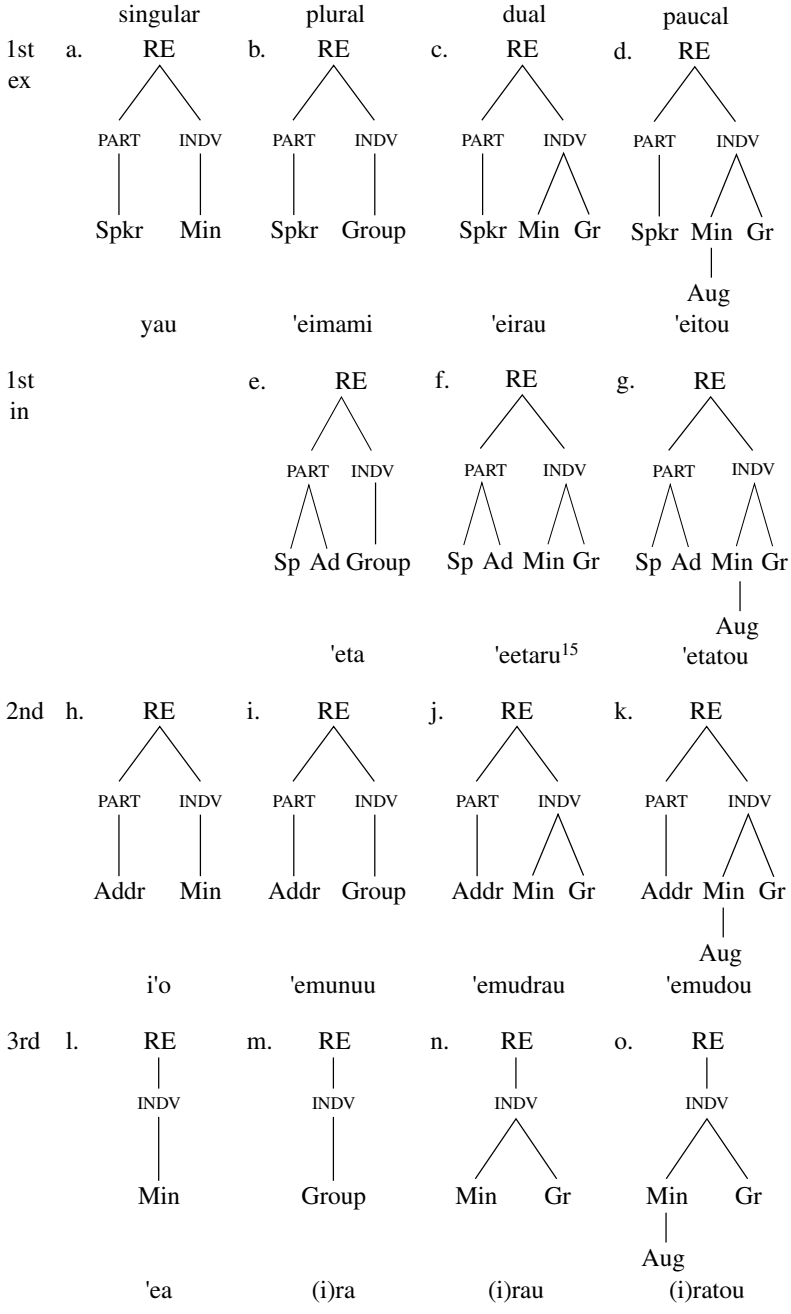
TABLE 8. Boumaa Fijian cardinal pronouns (Dixon 1988:54–55).

[13] Corbett (2000:39) makes a distinction between determinate and indeterminate numbers. Singular, dual, and trial denoting exactly one, two, or three individuals, respectively, are determinate numbers; paucal and plural are indeterminate ones. We have not explicitly encoded this distinction in the geometry, with the advantage that it enables us to deal straightforwardly with languages that allegedly have a paucal without a dual, such as Bayso (Cushitic) or Walapai (Yuman); see Corbett 2000:22 and references cited therein. In these languages, the paucal denotes between two and six individuals, rather than the usual case of three to six. We propose that a dual is simply a determinate minimal group, and that the paucal in Bayso or Walapai is an indeterminate one, represented by the same Minimal Group geometry as the dual.

[14] Note that we predict that no language has both a trial AND a paucal number; they are in complementary distribution, representing determinate and indeterminate interpretations of the same geometric configuration, as for the Bayso or Walapai dual/paucal in n. 13 above. The languages we surveyed have maximally four distinct numbers (singular, dual, trial/paucal, and plural); see §1.3 and the appendix for details. See also Foley 1986 and Croft 1990 for a similar claim. Corbett (2000:22–50) also discusses some Oceanic languages, including Sursurunga, Lihir, and Mele-Fila, which reportedly have a fifth number, either a greater paucal or a greater plural. The existence of such systems could be accommodated in our framework by the addition of a node, probably as a dependent of Group. We leave this issue open to future research.

Note especially that Boumaa Fijian makes an inclusive/exclusive distinction and exhibits four numbers: a singular, a plural, a dual, and a paucal (a small group). In 17,

(17) Boumaa Fijian geometries



[15] In n. 4 above, we noted the existence of rare languages with a singular, or more accurately, minimal inclusive pronoun referring to the speaker and exactly one addressee. In §2.4, we presented the analysis of one such language, Kalihna. More commonly we find that there is simply a gap in the singular cell of the inclusive pronoun paradigm. For example, all nine languages in our database that have both an inclusive person and dual number have a dual inclusive pronoun. In eight of these languages, there is not also a

we illustrate each pronominal form with its associated geometry. Notice that the most geometrically complex, and hence most marked form, intra- and crosslinguistically, is the 1st inclusive paucal pronoun, which uses all eight nodes of the geometry.

No language has more than four numbers, and so the geometry permits all and exactly the attested person and number distinctions in the world's languages.

From the above, it should be clear how languages with straightforward pronominal paradigms distinguishing from six to fifteen person/number combinations will represent each pronoun geometrically.

2.9. TYPOLOGY OF PERSON AND NUMBER IN PRONOMINAL SYSTEMS. We close this section by noting that the relative complexity of the different kinds of pronominal systems illustrated above corresponds roughly to their frequency crosslinguistically, as documented in a pronominal database of 110 languages representing over ninety distinct families or subfamilies, four isolates, and three creoles.[16] In compiling the figures below, languages from the same subfamily were grouped together and counted as one; so, for instance, the Germanic languages of Indo-European count as one language, the Romance languages of Indo-European as another.[17] See the full listing in the Appendix, broken down by system complexity, for details.

First, breaking down languages by person system and number system, we see in Tables 9 and 10 that frequency correlates fairly well with the predictions of the geometry.[18] Systems with inclusive persons are rarer than systems without, systems with dual number are rarer than systems without, and systems with paucal number are very rare indeed.

PERSON SYSTEM	NO. OF LANGS.	% OF LANGS.	EXAMPLES
1st, 2nd, 3rd	52	57	English, Hebrew
1in, 1ex, 2nd, 3rd	32	35	Ojibwa, Palauan
1st, 2nd (demonstratives used for 3rd)	5	5	Ainu, Balochi
1in, 1ex, 2nd (demonstratives for 3rd)	2	2	Halh, Mongolian, Telugu

TABLE 9. Person systems in 91 genetically distinct languages and subfamilies.

singular/minimal inclusive, and the dual refers to exactly two individuals, one of whom happens to be the speaker and the other the addressee. Thus, the treatment of an inclusive pronoun referring to exactly two individuals varies across languages, and choice between treating it as a singular/minimal or a dual seems to depend on the presence or absence of other forms in the paradigm, and on morphological composition. Given that the morphological shape of the Boumaa Fijian 1st inclusive form shares elements with the other duals, and that there is a gap in this paradigm, we treat it as dual, rather than singular/minimal.

[16] In compiling the database, an attempt was made to represent every major language family and/or branch in the world, where 'major' meant a family or branch of over twenty languages. Data for the Chibchan, Panoan, East Papuan, and Geelvink Bay families, and the Tungus (Altaic), Formosan (Austronesian), Armenian (Indo-European), Kordofanian (Niger-Congo), and Northeast Caucasian (North Caucasian) branches of their respective families, has not yet been gathered due to unavailability of source material.

[17] We have not reported our findings on Japanese, Thai, and Vietnamese in the tables in the Appendix, as it is unclear whether the sources are describing personal pronouns or noun substitutes; see §§5.2 and 6.2 for discussion. The only other language that has been omitted is Wichita (Caddoan). According to Rood (1976:10), Wichita has no independent pronouns, and inflected participles of the verb 'be' are used for this purpose.

[18] For the purposes of the tables here and below, we have combined figures for languages with personal and demonstrative pronouns, using 3 for both. We also analyzed the languages that do not express number on pronouns but do express it elsewhere (e.g. on nouns or verbs) as having number distinctions, for reasons that we elaborate in §4.

NUMBER SYSTEM	NO. OF LANGS.	% OF LANGS.	EXAMPLES
none	1	1	Pirahã
none (except in 1st person)	3	3	Maxakalí
singular, plural	66	73	English, Hebrew
singular, plural, dual	18	20	Chinook, Wappo
singular, plural, dual, trial/paucal	3	3	Yimas, Fijian

TABLE 10. Number systems in 91 genetically distinct languages and subfamilies.

Setting aside for the moment the question of numberless systems (see §4), let us consider the results for the geometry of the intersection of person and number, as outlined above; those results are summarized in Table 11. By far the most common pattern is three persons and two numbers (forty-five languages); the next most common is four persons and two numbers (twenty-five languages), then three persons and three numbers and four persons and three numbers (eleven and seven languages, respectively), followed by the extremely rare three persons/four numbers and four persons/four numbers (one and two languages, respectively).

PERSON/NUMBER SYSTEM	NO. OF LANGS.	% OF LANGS.	EXAMPLES
1, 2, (3) / sg, pl	45	49	Daga
1ex, 1in, 2, (3) / sg, pl.	25	27	Kalihna
1, 2, 3 / sg, pl, du	11	12	Tonkawa
1ex, 1in, 2, 3 / sg, pl, du	7	8	Chinook
1, 2, 3 / sg, pl, du, paucal	1	1	Yimas
1ex, 1in, 2, 3 / sg, pl, du, paucal	2	2	Fijian

TABLE 11. Person/number systems considered together.

In general, then, the overall pattern evident in frequency of occurrence is consistent with the theory of feature representation presented here.[19]

2.10. ACCOUNTING FOR GREENBERG'S UNIVERSALS. The treatment above makes strong predictions about cooccurrence of distinctions. They are enumerated in 18.

(18) a. A language will not have a dual number if it does not have a plural number.
b. A language will not have a paucal/trial number if it does not have a dual number.[20]
c. A language will not have an inclusive person if it does not have a 2nd person.

Depending on the specific inventory of features employed in a feature-bundle approach, some of these predictions are made by those approaches as well. For instance, the [Speaker] and [Hearer] features of Dalrymple & Kaplan 2000 can capture 18c. But

[19] While the figures are generally as we predict, there is one perhaps surprising result. Given the discussion of markedness as node-counting in §1.3, it seems that the geometry predicts that systems with dual numbers (three persons, three numbers) should be roughly as frequent as systems with inclusive persons (four persons, two numbers), because both systems require the same number of nodes in their most complex representation. However, dual number appears to be less frequent than inclusive person (twenty-one languages with dual number compared to thirty-four languages with inclusive person). This is consistent with an overall pattern that may reflect other influences: for example, person is more salient than number. While there are languages, albeit few, with no number distinctions, it is not obvious that there are languages with no person distinctions. See discussion in §§4.1, 4.2, and especially 6.2 below.

[20] But see discussion in n. 13.

the predictions 18a,b are not captured by any approach that employs a [dual] feature and/or a [trial] feature as feature-bundle alternatives to or cooccuring with [pl]; their mutual dependence must be externally stipulated.

In §6 we return to the question of universals and discuss possible treatments of some problematic pronominal systems. We now move on to discuss the acquisition of pronouns, and how it motivates both the overall geometry and the underspecification for Speaker and Minimal alluded to above.

3. ACQUISITION EVIDENCE FOR A FEATURE GEOMETRY. Our assumption that this geometry is provided by Universal Grammar (UG) makes strong predictions about the acquisition of personal pronouns. In this section we demonstrate that the morphological feature geometry allows us to predict the observed uniformity and variability in the order of emergence of personal pronouns observed in ten studies spanning six different languages. These facts not only provide independent support for this geometry but also motivate universal defaults for major organizing nodes, specifically 1st person for Participant and 3rd person singular (inanimate) for Individuation. The analysis in this section was developed by Rebecca Hanson; see Hanson 2000 for additional discussion.

3.1. ACQUISITION OF THE FEATURE GEOMETRY. The acquisition of pronouns, specifically, their order of emergence, has received only sporadic attention in the literature, and there has been no previous attempt to approach the process using a feature geometry. There is, however, a good deal of research in phonology dedicated to the acquisition of a feature geometry, focusing on the emergence of segments and contrasts. We draw especially on Rice & Avery 1995 and Brown 1997 in our approach to the acquisition of a morphological feature geometry.

Rice and Avery develop a model of phoneme acquisition that attempts to capture both the global uniformity and local variability in the acquisition of sounds. 'Global uniformity' refers to the observation that all children 'acquire roughly the same set of basic sounds in roughly the same order' (Rice & Avery 1995:25). 'Local variability' refers to the fact that different children will acquire sounds from this basic set in different orders. Assuming that UG includes a phonological feature geometry, they propose essentially that language acquisition is a structure building, rather than structure pruning, process. UG provides a minimal initial structure which is elaborated in a deterministic fashion in response to contrasts detected in the input. Acquisition proceeds from the top down (i.e. from the root node): a given node must be acquired before its dependents. In this way, the geometry captures the global uniformity apparent in child language. However, different organizing nodes may be elaborated in any order, thus allowing for local variability.

Rice and Avery (1995) and Brown (1997) further assume that redundant information is absent from underlying representations. Both works assume MINIMAL CONTRASTIVE UNDERSPECIFICATION: If a node is filled in by a default rule provided by UG, it does not appear in the underlying representation. We assume, however, that if a node has, or can have, dependents, or if its presence is contrastive in the language, it must be represented in the underlying representation, and no default fill-in rules for that node apply.

In short, following Rice & Avery 1995 and Brown 1997, we make the assumptions about the acquisition predictions of feature geometries listed in 19.

(19) 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.

3.2. THE ACQUISITION OF PRONOUNS: EVIDENCE FOR UNIVERSAL DEFAULTS. The studies from which we draw our data are summarized in Table 12. In all cases, the first pronouns acquired, as recorded in the study, are placed in column 1, the second in column 2, and so on. Note that entries in the same column of the table do not necessarily correspond to the same age or even the same stage of acquisition—instead, they reflect the relative order in which the different pronouns are acquired.

LANGUAGE (Source)	1	2	3	4	5	6
A. Mohawk (Feuer 1980)	1st person	2nd person	3rd person	–	–	–
B. English (Chiat 1978)	1sg	3rd person	2nd person	–	–	–
C. French (Clark 1985)	1sg	2sg; 3sgm	2pl; 3plm	1pl	3plf	–
D. Kaluli (Schieffelin 1985)	1st, 2nd person	others	–	–	–	–
E. ASL (Petitto 1987)	inanimate	1sg	2sg	3sg	plurals	–
F. English (Huxley 1970: D)	3sgn	1sg	3pl	1pl	3sgm; 3sgf	2sg
G. Hebrew (Berman 1985)	3sgn (*ze*)	1sg; 3sgm	3sgf	2sg; all plurals	–	–
H. Mohawk (Mithun 1989)	singular pronouns	3pl	1pl	dual	–	–
I. English (Huxley 1970: K)	1sg; 3sgm; 3sgf; 3sgn	2sg	3pl	1pl	–	–
J. English (Brown 1973)	1sg; 2sg; 3sgn	others	–	–	–	–

TABLE 12. Order of emergence of personal pronouns in ten acquisition studies.

Table 12 is arranged in three blocks. The first block includes studies A to D, which recorded 1st person as the initial pronoun. The second block, rows E, F, and G, includes the studies that recorded 3rd person as the initial pronoun. Rows H, I, and J constitute the third block, which includes the studies that began at a point where more than one pronoun was already acquired; thus, it is not clear which pronoun emerged first. Note, however, that in all studies in block 3, the children always had both 1st singular and 3rd singular neuter from the initial session.

A comparison of the observations reported in the different studies reveals significant variability across children in the order of emergence of specific personal pronouns. Of the ten studies considered, no two report the same order of acquisition. But there are

some discernible patterns in both the uniformity and the variation observed; these are summarized in 20.

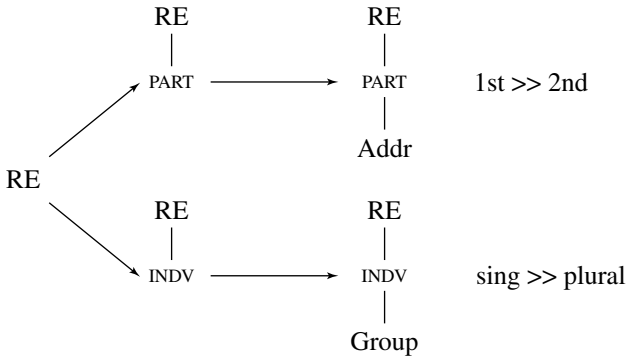
(20) a. UNIFORMITY (i) initially 1st person singular or 3rd singular neuter/inanimate
(ii) 2nd person after 1st person
(iii) singular before plural
b. VARIABILITY (i) 2nd person relative to 3rd person (animate)
(ii) 2nd person relative to plurals

These patterns, particularly those in 20a, strongly suggest that there are default interpretations for each of the organizing nodes in the geometry. The consistency in the initial pronoun as either 1st singular or 3rd singular inanimate conforms to the generalization that defaults are acquired first. Overall, the acquisition data indicates that the defaults are the following:

(21) Proposed UG-supplied defaults
a. Speaker for Participant—therefore '1st person' acquired early
b. Minimal for Individuation—therefore 'singular' acquired early
c. Inanimate for Class—therefore 'neuter/inanimate' acquired early

A Speaker default at the Participant node is consistent with the early acquisition of 1st person; likewise, a Minimal default at the Individuation node allows us to predict that singular should also emerge early on. These two acquisition paths, illustrated schematically in 22, are predicted by the fact that Participant and Individuation have equal status in the geometry.

(22)



Because both Participant and Individuation are immediate dependents of the root RE node, 1st and 3rd person are equally likely to appear as the first pronoun. Likewise, since Addressee, Group, and Class are all equally embedded in the geometry, it is also predicted that they should be acquired later and that the relative order among them should vary, as seen in Table 12.

3.2. AGAINST THE ACQUISITION OF A FEATURE BUNDLE. Both the consistency and the variation in the data are problematic for a model that assumes that features are represented in unordered bundles. Compare, for example, the feature bundles in 23a and 23b, representing 1pl and 2pl respectively. If the features for '1st person', '2nd person', and 'plural' are unordered, we would expect to see very little consistency in their relative order of acquisition. In particular, the feature bundle model does not make any

predictions about why 1st person comes before 2nd person; a similar problem arises with the acquisition of number.

(23) a. $\begin{bmatrix} +1 \\ -2 \\ \text{pl} \end{bmatrix}$ (1pl) b. $\begin{bmatrix} -1 \\ +2 \\ \text{pl} \end{bmatrix}$ (2pl)

We might therefore be led to assume a hierarchy of person and/or number features to account for the consistent early emergence of 1st person and singular pronouns. As noted above, this kind of hierarchy has been independently proposed, and there are several versions of it. For illustration, consider the one proposed in Noyer 1992, discussed above in broad form in ex. 2 and in more specific form reproduced as 24.

(24) Noyer's hierarchy: $1 > 2 >$ PL $>$ DUAL $>$ F

This model is able to account for only some of the acquisition data. For example, the French study in row C of Table 12 conforms to its predictions, but the Hebrew study in row G poses a problem because the feminine 3rd person pronoun was acquired before both 2nd person and plural.

Specifically to account for the acquisition data, Chiat (1986) proposed a different hierarchy, involving only person features, in which the order was 1st person >> 2nd person >> 3rd person. This model also proved inadequate, however. The most obvious difficulty, as Chiat noted, is that the 3rd person inanimate pronoun consistently emerges alongside 1st person, rather than with the other 3rd person pronouns as expected.

In summary, it is not clear how previous models of feature organization can account for the acquisition facts. A model of unordered feature bundles, with or without a supplementary hierarchy, has particular difficulty with the variation: if features are unordered, there should be more variation than there is; and if they are ordered in a simple hierarchy, there should be less. In contrast, the feature geometry, with the proposed defaults, correctly predicts where there should be uniformity and where there should be variability in the acquisition data.

4. VARIABILITY OF INTERPRETATION: THE EFFECT OF EMPTY PARADIGM SPACE. In theory, a language with an elaborate set of person distinctions and no number distinctions whatsoever could exist, given that person, represented by activation of the Participant node and its dependents, and number, represented by activation of the Individuation node and its dependents, are structurally equivalent but distinct kinds of features.[21] Pirahã, an Amazonian language, seems to instantiate such a system. It has just three true personal pronouns, as shown in Table 13.

1st	ti
2nd	gi / gia
3rd	hi

TABLE 13. Pirahã pronouns (Thomason & Everett 2002).

This paradigm is represented in feature-geometric terms in 25. Notice, in particular, that it does not require an Individuation node at all.

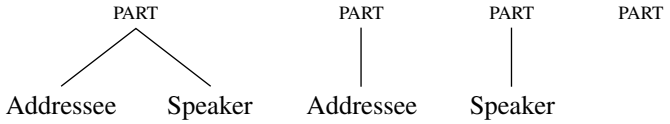
[21] Presumably, the reverse situation could not exist, for reasons having nothing to do with feature geometry: a pronoun system cannot exist without 1st or 2nd person paradigms. However, see discussion of Thai and Japanese in §6.2.

(25)

1st person	2nd person	3rd person
RE	RE	RE
|	|	
PART	PART	
	|	
	Addressee	
ti	gi / gia	hi

This does not exhaust the geometric possibilities available to languages that lack an Individuation node, however. Restricting our attention to representations activating all or part of the Participant subgeometry, there are four possibilities (including the unmarked Participant node, available when Speaker is contrastive), as illustrated in 26.

(26) Person: 4 logical possibilities



In this section we discuss the analysis of languages that appear to make number distinctions, but only in the 1st person. We argue that these rare languages are in fact without 'true' number distinctions, and that their paradigms are constructed using only the four distinctions made available by the Participant node, illustrated above. These languages are to be distinguished from languages that do not express number distinctions in pronouns but have such distinctions elsewhere, typically on common nouns or in verbal agreement. (See, for example, our approach to Koasati, §6.1.) Our proposal involves co-opting the interpretation of the restricted available geometries to fill out the semantic paradigm space, within limits imposed by the nature of the features themselves.[22]

4.1. FOUR PERSON GEOMETRIES: MAXAKALÍ AND KWAKIUTL. In previous work (Harley & Ritter 2002, Ritter & Harley 1998), we discussed the facts of Maxakalí and Kwakiutl, both of which have inclusive pronouns. These languages, whose paradigms are reproduced in Tables 14 and 15 respectively, are notable in that they appear to manifest number distinctions in 1st person only. Both languages, however, have three 1st person pronouns: a singular, an exclusive plural, and an inclusive.

	SINGULAR	PLURAL
1st ex	(ˈũ)g /(ˈũ)k	yũmũg
1st in		(ˈũ)mũg
2nd	ˈã	
3rd	ˈ(ũ)	

TABLE 14. Absolutive pronouns of Maxakalí (Popovich 1986:352).

[22] Diana Archangeli pointed out to us 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. Simpler systems will take advantage of the empty phonetic space in varying directions, resulting in different phonetic realizations of the same geometry.

1st ex sg	-ɛn(ʟ)
1st ex pl	-ɛnuᵋx̣ᵘ
1st in	-ɛns
2nd	-ɛs
3rd	–

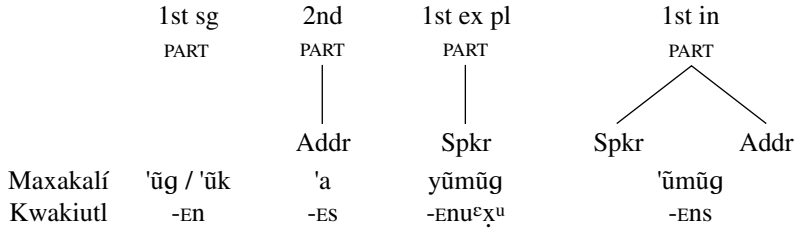
TABLE 15. Nominative pronouns of Kwakiutl (Boas 1911a:529).

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

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 Pirahã, normally make no morphological number or gender distinctions on nouns or verbs.

We propose that Maxakalí and Kwakiutl make full use of the four different Participant subgeometries available in the system. These subgeometries are depicted in 27.

(27)



The fact that these languages make no 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.

On this proposal, the geometries for first person singular, second person, and first person inclusive are entirely conventional. The activation of the Speaker node as contrastive (via the evidence provided by the inclusive form), however, makes another potential geometry available to the language: Participant with a lone dependent Speaker node. These languages exploit that representation to add an additional contrast to their paradigm space: the 1st exclusive plural is represented with a dependent Speaker node and is interpreted as referring to a group that includes the speaker—a first person plural. (Of course, in the absence of an Individuation node in these languages, 3rd person is represented as a bare RE node, as for Pirahã above.)

This analysis makes a prediction that no language that uses person distinctions as substitutes for number distinctions also has dual or trial/paucal numbers. This is certainly borne out in the languages discussed above, and in Aceh, the only other language of this type in our database (see Durie 1985). More generally, we predict that no language that uses person distinctions as substitutes for number distinctions will have more than four distinct 1st and/or 2nd person pronouns, as there are only four possible

geometries available to a language using only the Participant node.[23] See §6.1 for further discussion.

4.2. OVERRIDING THE DEFAULTS: 2ND PERSON INCLUSIVE. Finally, we turn to a much-discussed question: whether an inclusive pronoun is ever truly a 2nd person rather than a 1st person form. That is, since both the Speaker and Addressee nodes are active in an inclusive form, one might expect that the morphological shape or other properties of the inclusive pronoun pattern with 2nd person, rather than 1st person forms. In our geometry, 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 salient. Given our approach to universal defaults, according to which 1st person forms in general are less marked than 2nd, a 2nd inclusive would presumably be rare, requiring robust morphological evidence for acquisition. Nonetheless, it is a possibility in the system presented here, but not in a system that identifies the 2nd person merely as [−Speaker, +Participant]. We argue that robust morphological evidence for a 2nd person inclusive exists in three distinct languages. Consider the paradigms in Tables 16, 17, and 18, from Yokuts (Penutian), Ojibwa (Algonquian), and Nama (Koisan).

	SINGULAR	DUAL	PLURAL
1st	na'	na'ak'	na'an
2nd in	*	mak'	may
2nd ex	ma'	ma'ak'	ma'an
3rd	'ama'	'amak'	'aman

TABLE 16. Yokuts nominative pronouns (Yawelmani dialect) (Newman 1944:231–32).

	SINGULAR	PLURAL
1st	niin	niinawint
2nd in	*	kiinawint
2nd ex	kiin	kiinawaa
3rd	wiin	wiinawaa

TABLE 17. Ojibwa pronouns (Schwartz & Dunnigan 1986:296).

	SINGULAR		DUAL		PLURAL	
	FEM	MASC	FEM	MASC	FEM	MASC
1st	tiíta	tiíta	siím̀	siíkxm̀	siíse	siíke
2nd in	*	*	saám	saákxm̀	saáse	saáke
2nd ex	saás	saáts	saárò	saákxò	saáso	saáko
3rd	//'iīs	// iīp	// iīrà	// iīkxà	// iīti	// iīku

TABLE 18. Nama pronouns (Hagman 1977:44).[24]

Note that in each case, the inclusive form patterns morphologically in the prefix with the 2nd person forms. Despite the shape of these pronouns, some theorists, including

[23] In earlier work (Harley & Ritter 2002, Ritter & Harley 1998), we argued that Berik was a numberless language that used the Speaker node for 1st plural in the absence of an inclusive/exclusive distinction. But Corbett (2000:65), citing Westrum & Weisemann 1986, claims that while Berik does not mark number on its pronouns, it does mark agreement for number and gender on the verb. If this is indeed the case, our treatment of its pronominal system will need to include these contrasts; an approach like that we take to Koasati (§6.1), where Individuation is present but not realized by the independent pronouns, appears to be indicated.

[24] In this paradigm, // denotes a lateral click.

Zwicky (1977) and Noyer (1997), have argued that this similarity is not evidence that the inclusive form is 2nd person. However, Déchaine (1999) gives two convincing syntactic arguments that, in fact, the inclusive forms for Ojibwa in Table 17 should be analyzed as 2nd person. First, the 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 Ojibwa 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 Table 19. 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.[25]

	1ST SUBJECT	2ND SUBJECT
1ST OBJECT	~	direct
2ND OBJECT	inverse	~

TABLE 19. Verb forms in Ojibwa.

In at least these two respects, then, it is the Addressee node, and not the Speaker node, that is the component of the pronoun crucial to the morphosyntax. We consider these facts to constitute robust evidence for a separate Addressee feature.

5. DELIMITING THE APPLICABILITY OF THE GEOMETRY. It is obvious that there are many morphosyntactic features and feature distinctions we have not touched on in the above discussion. Some of them bear directly on the predictions made by a feature-geometric approach; others were excluded from consideration because we feel there are principled reasons to set them aside temporarily. In this section we outline the reasons why we set aside some putative counterexamples to the geometry and analyses we propose and discuss some phenomena we excluded from the geometry.

5.1. CONSTRAINING THE FEATURE CONTENT OF A SINGLE GRAMMATICAL MORPHEME. First, it is worth noting that the geometry is designed to represent the feature composition of a single pronoun morpheme; polymorphemic pronoun words, which are produced by the juxtaposition of two or more feature bundles, may allow for combinations of features that might otherwise be unexpected. In Spanish, for example, as seen in Table 20, the nominative and prepositional case forms of 1st and 2nd plural pronouns are marked for gender while all other 1st and 2nd person pronouns are unspecified for gender. This constitutes a violation of Greenberg's universal 45: 'If there are any gender

	SINGULAR			PLURAL	
	MASC	FEM	NEUT	MASC	FEM
1st	yo/mi			nosotros	nosotras
2nd	tú/ti			vosotros	vosotras
3rd	el	ella	ello	ellos	ellas

TABLE 20. Spanish subject and disjunctive pronouns (Plank & Schellinger 1997:70, table 13).

[25] Moreover, neither the direct nor the inverse agreement form is acceptable when the noninclusive argument is 2nd person. We attribute this ungrammaticality to a constraint against the overlapping syntactic reference of the 2nd person (excl) and the inclusive form, along the lines of Guéron's (1984:44) NONDISTINCTNESS CONSTRAINT.

distinctions in the plural of the pronoun, there are some gender distinctions in the singular also' (1963:96).[26]

On closer inspection we find that, unlike other members of the paradigm, these pronouns are bimorphemic, *nos* + *otros*/*otras* and *vos* + *otros*/*otras* 'we + others(m/f)' and 'you + others(m/f)' respectively. Thus, these pronouns consist of one morpheme expressing person and number, but not gender (*nos* or *vos*), and a second morpheme expressing number and gender, but not person (*otros* or *otras*). It is the combination of these two morphemes that gives rise to this unexpected feature specification.[27] Crucially, these Spanish pronouns do not contain a morpheme whose feature content consists of 1st or 2nd person and gender, but not number. In §6 below we consider languages that are more problematic in this respect.

5.2. RESTRICTION TO CLOSED-CLASS, CONTEXT-FREE FEATURES. A second restriction in the applicability of this geometry is that it is designed to represent the distinctions in functional or grammatical morphemes, specifically pronouns. What distinguishes pronouns from substantive nouns is that their shared semantic content can be reduced to a closed set of features, including person, number, and in some languages, gender. For languages such as Thai or Vietnamese, which may have both an open class of noun substitutes and a closed class of pronouns, we restrict our attention to the latter. Noun substitutes are typically kinship terms or titles, and in some cases they function as nouns. *Tua*, for example, a Thai 2nd person pronoun used to address an intimate also functions as a noun meaning 'body' (Uri Tadmor, p.c.). Thus, unlike pronouns, noun substitutes have morphosemantic content that is primarily lexical in nature. In fact, in Thai, interpersonal relationships, rather than person or number, seem to be the major consideration in choice among competing forms (see Cooke 1968 and Campbell 1969 for details).[28]

[26] In his discussion of universal 45, Greenberg (1963:96) does not specify any categorial restrictions. It is worth noting, however, that gender distinctions in the 1st singular are extremely rare. In a survey of 110 languages, we found only four that have any gender distinctions in the 1st singular, a fact we return to below.

[27] Plank and Schellinger (1997:72) note that similar exceptions are found in Lithuanian where 1st and 2nd person dual pronouns are marked for gender but singular and plural are not. On closer inspection, we see that the Lithuanian dual pronouns are also bimorphemic, consisting of a pronominal stem morpheme specifying person, and the numeral two, which is inflected for gender.

(i) Lithuanian (Plank and Schellinger 1997:71).

	SINGULAR	DUAL		PLURAL
		masc	fem	
1st	àš	mù-du	mù-dvi	mẽs
2nd	tù	jù-du	jù-dvi	jũs

Plank and Schellinger discuss other violations of Greenberg's universal 45 that are more problematic for our analysis. We return to these in §6.3 below.

Given analyses of morphological splitting like those of Noyer (1997) and Halle (1997), who treat the Afro-Asiatic Imperfect conjungation with a combination of Fission and Impoverishment mechanisms, it is perhaps possible to view bi-morphemic realizations of agreement features as instances of tree-splitting, perhaps motivated as a way to repair feature geometries that violate a universal or language-specific constraint.

[28] It is not an easy task to distinguish between items that belong to the closed class of pronouns and those that belong to the open class of noun substitutes in these languages. For example, Cole (1987:603), citing Pingkarawat 1985, provides the following examples, which show that *khaw* 'he' has the binding properties of a pronoun, rather than a noun.

(i) Chart$_i$ bɔɔk waa *khaw*$_i$ hen Nuan
Chart speak say *he* see Nuan
'Chart$_i$ said that he$_i$ saw Nuan.'

Similarly, it has been observed that in particular discourse situations, speakers occasionally use pronouns whose grammatical person, number, and/or gender specification is incompatible with the properties of the referent. Some English examples are provided in 28.

(28) (Individual speaking to a close friend/spouse who is clearly not in a good mood)
a. Uh-oh, *she's/we're* in a good mood!
Cf. Uh-oh, *you're* in a good mood!
(Nurse talking to patient)
b. How are *we* feeling today, Mr. Smith?
Cf. How are *you* feeling today, Mr. Smith?

In such situations, power or solidarity considerations override grammatical ones. For example, in 28a, the speaker may be distancing him/herself from the situation, and in 28b, the speaker may be expressing solidarity with the addressee (see Brown & Levinson 1987). What is important here is that these atypical uses trigger the same formal agreement on the predicate as does the canonical use of these pronouns.[29]

This geometry is not designed to capture formality distinctions, which are determined by the social context, or case distinctions, which are determined by the syntactic context, despite the fact that both form part of the pronominal paradigms of the world's languages. Formality distinctions, like the discourse-licensed atypical usages described above, express such things as relative status of the speaker and addressee or other, and the speaker's attitude to the addressee or other. In languages with formality distinctions in the pronominal system, these factors—part of the social context—are normally taken into consideration in determining the choice of pronoun. Ultimately, of course, one would want to include at least case features in the geometry, since they are obviously grammatically relevant properties of the pronoun, but they will no doubt require the addition of another organizing node, for a couple of reasons. First, case differs from person, number, and gender in that it is not reflected in external (verb) agreement (Lehmann 1988).[30] Second, Greenberg's universal 39, reproduced in 29, suggests that case is not necessarily in the same natural class as the other features considered here.

(29) Universal 39: Where morphemes of both number and case are present and

(ii) **Khaw*$_i$ bɔɔk waa Chart$_i$ hen Nuan
he speak say Chart see Nuan
'He$_i$ said that Chart$_i$ saw Nuan.'

Tadmor (p.c.) observes that *khaw* is only used pronominally. Nevertheless, one might argue that this is a noun substitute because it also seems to contain a significant amount of extra-grammatical semantic content. According to Cooke (1968), *khaw* is used as a 1st person singular pronoun, in an intimate situation, if the speaker is a young woman or child or if the addressee has a slightly inferior status relative to the speaker. It is used as a 3rd person singular pronoun if the individual referred to has a status similar to that of the speaker in a relatively formal situation, or more generally in a neutral (neither formal nor intimate) situation. See also Thomason & Everett 2002 for discussion of the difference in borrowing possibilities for pronouns in open vs. closed systems.

[29] Actually, in some such cases, the realization of agreement is dependent on both the formal features and the actual intended referent of the form, as Joseph (1979:520) illustrates for the reflexive form of the 'nursely' *we*. In examples like 'We seem a bit displeased with ourself/*ourselves, don't we?' the *self*-morpheme agrees in number with the addressee, that is, the patient, although the pronominal morpheme's features match those of *we*.

[30] Lehmann (1988:56–58) distinguishes between internal and external agreement. The former is expressed on specifiers and modifiers inside the noun phrase, and never includes person. The latter is expressed outside the noun phrase, on governing verbs, nouns, and adpositions, and never includes case.

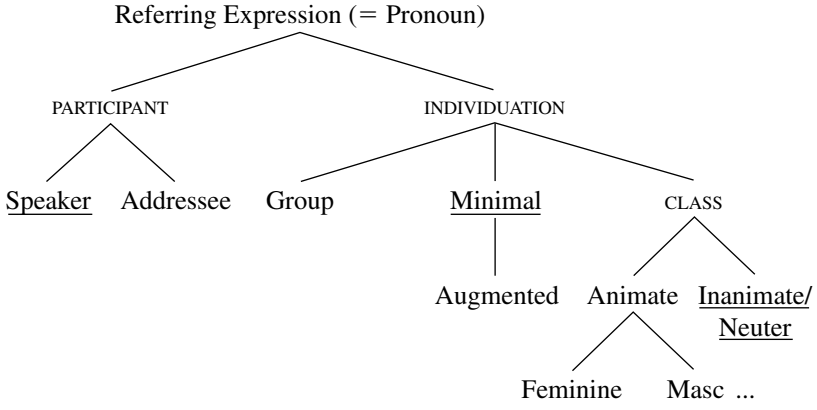
> both follow or both precede the noun base, the expression of number always comes between the noun base and the expression of case. (Greenberg 1963: 95)

If case is either not expressed in this geometry or if it is expressed by means of a separate node inserted or constructed by the syntax, we can account for its separation from the morphological realization of these other features.[31] Finally, given that we assume that the nodes in the geometry are constrained and motivated by conceptual considerations, an investigation of the conceptual foundations of case systems would be necessary to incorporate them into the geometry. Such an investigation is beyond the scope of this article.[32]

6. PREDICTIONS AND PROBLEMS. In this section we explore the limitations of the proposed geometry, identifying theoretically possible and impossible combinations of person, number, and gender features. We then look at some actual pronoun systems that appear to defy our predictions and explain why they are in fact not as problematic as they first appear.

6.1. COMPLEX PRONOUNS IMPLY SIMPLER ONES. The feature geometry, reproduced for the reader's convenience as 30, appears to permit almost any combination of person, number, and gender features. For example, 1st or 2nd person features should combine freely with any of the number and gender features, since the latter are dependents of a separate organizing node.

(30)



[31] Bejar (2000) proposes that not just case but the entire geometry is constructed by the syntax, which moves and merges features to construct well-formed structures defined by the geometry we provide here.

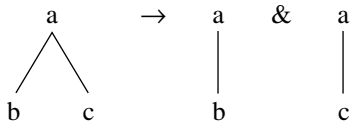
[32] It will likely turn out that the case node will need to distinguish between structural cases, which are assigned to subjects and direct objects, and local or oblique cases, which are assigned to other noun phrases, that is, between nominative, accusative, absolutive, and ergative cases on the one hand, and oblique cases on the other. Silverstein (1985) notes that languages with nominal-based ergative splits assign ergative/absolutive or nominative/accusative case on the basis of properties of the argument itself. More specifically, he argues that choice among these cases for agents and patients in such languages can be predicted with the hierarchy in (i).

(i) (1&2)non-Sg. > (1&2)Sg > 3 > Proper Names > Human > Animate > Inanimate

The University of Konstanz Universals Archive, a comprehensive archive of statements of linguistic universals, lists a number of counterexamples to Silverstein's hierarchy, but significantly, they all involve reranking of the different classes of DPs he originally identified. As for local cases, it has been argued that these often evolve from nouns, verbs, or adverbs; see Blake 1994. The spatio-temporal specification of the source could provide the conceptual content necessary for inclusion of these cases in a feature geometry.

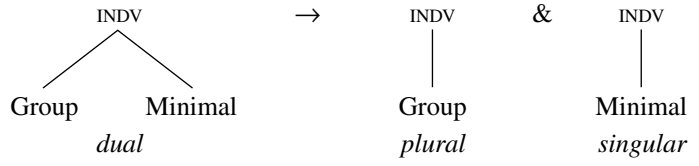
Assuming a model of feature acquisition along the lines of Rice & Avery 1995 or Brown 1997, we expect that if a language has a pronoun with a complex geometry, the simpler geometries that form the subconstituents of the complex geometry are also available in the language, as illustrated schematically in 31.

(31)

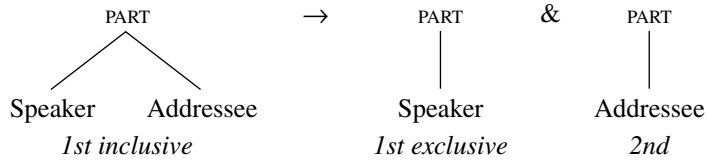


This constraint appears to shed light on a number of crosslinguistic generalizations about pronoun inventories. For example, dual never occurs unless the language also has singular and plural numbers, because dual requires the activation of both Minimal and Group nodes, and separately these nodes are used to express singular and plural, respectively. Similarly, inclusive pronouns occur only in addition to 1st person (exclusive) and 2nd person pronouns, because the inclusive person requires the activation of both Speaker and Addressee nodes, and separately these nodes are used to express 1st and 2nd person pronouns, respectively. These implicational relationships are illustrated in 32.

(32) a.

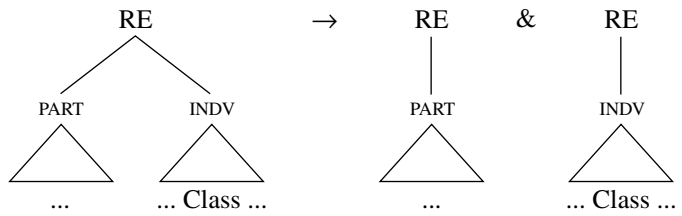


b.



Extending this generalization would also allow us to account for the observation that only a minority of languages have any gender distinctions in 1st or 2nd person pronouns, and when they do, the 1st and 2nd person pronouns never have any gender distinctions that are not also found in 3rd person pronouns. This is due to the fact that a gendered 1st or 2nd person pronoun involves elaboration of both major organizing nodes but a gendered 3rd person pronoun involves only elaboration of the Individuation node.[33]

(33)



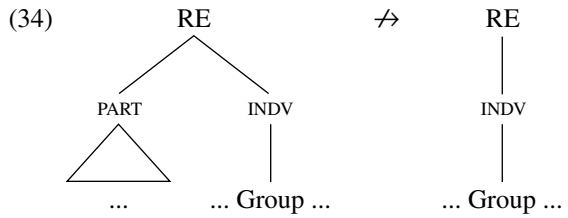
[33] In our database of 110 languages, 63 languages have some gender distinctions in 3rd person (and/or demonstratives). Of these, twelve also have some gender distinctions in both 1st and 2nd person, and seven also have some gender distinctions in 2nd person only.

If the generalization holds for Participant and Class nodes, it ought to hold also for the Participant and Individuation nodes: there should never be more numbers in 1st and 2nd person than in 3rd. But this implication fails for Guarani (Tupi) and Koasati (Muskogean), which have separate singular and plural pronouns for 1st and 2nd person, but only one 3rd person pronoun, unspecified for number (and gender).[34] For purposes of illustration, the Koasati paradigm is given in Table 21; the Guarani paradigm has a similar structure.

	SINGULAR		PLURAL
1st	anó		kosnó
2nd	isnó		hasnó
3rd		ibisnó	

TABLE 21. Koasati pronouns (Kimball 1991:417).

For these languages, it appears as though the Individuation node has dependent nodes marking number, but only in the 1st and 2nd person—that is, when the Participant node is activated.[35]



Given an interpretive theory of morphology like that of Anderson 1992 or Halle & Marantz 1993, where morphemes interpret the morphosyntactic features provided by the syntax, rather than contribute them, an account of this type of paradigm is possible in terms of syncretism: the different geometries are in fact present in the 3rd person, but the morphological inventory of the language does not provide distinct forms to realize them. For Koasati, at least, this appears to be the correct approach. Although number on 3rd person pronouns is not marked, number agreement with 3rd person nominal or pronominal arguments is remarkably robust in the language—in fact, it is quite complex (Kimball 1991). In 35, we illustrate one subcase of number marking in Koasati; we assume that the presence of number agreement with 3rd person arguments signifies the activation of the Individuation node generally.

(35) Koasati singular, dual, plural (Kimball 1991:446)

a. okipófka-k o:w-á:y
whale-SUBJ LOC-go.about.SG/DU
'A whale is swimming about.'

[34] These are the only languages in our database of 110 languages with this property.

[35] The opposite system, with number only in the 3rd person, is also attested, but is completely unproblematic for our model. In Mohawk 1st and 2nd person pronouns lack a number specification, but most 3rd person pronouns consist of a set of items that are specified for both number (singular or plural) and gender (masculine, feminine, or zoic) (Mark Baker, p.c.). In our framework the 1st and 2nd person pronouns would require activation of only the Participant node, and the 3rd person pronouns would require activation of only the Individuation node.

b. okipófka-k o:w-a:yá-:c
whale-SUBJ LOC-go.about.SG/DU-3NON.SG[36]
'Two whales are swimming about.'
c. okipófka-k o:-yomáhl
whale-SUBJ LOC-go.about.PL
'Some whales are swimming about.'

In Guarani, however, there is no obvious evidence that this is the right way to proceed; there is no number marking on nouns and number agreement on verbs is restricted to the 1st and 2nd persons. In the context of a plural 3rd person subject, an independent word, *hikwáái*, is used, but only if there is no other 'word indicating plurality in construction with the verbal phrases' (Gregores & Suárez 1967:155).

(36) pe mita h-asẽ̀-má hikwáái (Gregores & Suárez 1967:155)
that boy he-cry-all plural
'Those boys are all crying'.

The singular/plural distinction in both 1st and 2nd person pronouns confirms that the Group dependent of the Individuation node must be active in this portion of the paradigm. As for 3rd person, it is unclear whether the independent plural word is a form of agreement, licensed by an active Group node in the representation of the 3rd person subject. If it turns out that *hikwáái* is in fact an agreement morpheme, then the account proposed above for Koasati can be extended to Guarani.[37]

6.2. THE LOWER BOUND ON GEOMETRIC COMPLEXITY. This framework further predicts that we might find a system that is relatively less complex than those we have discussed to this point. In particular, we might expect to find a language that failed to activate one of the major organizing nodes. In §4 we proposed that Pirahã, Maxakalí, and Kwakiutl are examples of languages that do not have an activated Individuation node. Many languages lack gender distinctions, including Acholi (Nilo Saharan), Brahui (Northern Dravidian), and Tonkawa (Coahuiltecan); we interpret this straightforwardly as a failure to activate the Class node.

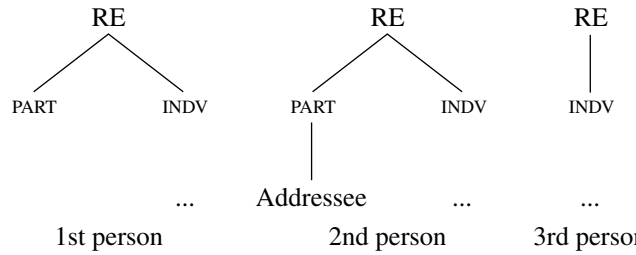
Greenberg's universal 42 (1963: 96) states that 'all languages have pronominal categories involving at least three persons and two numbers'. With respect to person distinc-

[36] Note that the Koasati dual marking here could be interpreted as additional support for our treatment of dual number as the combination of two features, Group and Minimal: the suppletive singular verb stem *a:y(a)* is supplemented by the addition of a marker that Kimball glosses as 'non-singular'; we interpret this added marker as a realization of the Group node.

[37] An analogous problem appears to arise in the pronominal systems of Arapesh, a Torricelli language, and Yidiŋ, an Australian language, which have a 1st person dual pronoun, but no 3rd person dual, again counter to the geometric prediction schematized in 31. These are the only two languages with this system that we know of. Dixon (1977:166), discussing Yidiŋ, makes special mention of the fact that the dual 1st person pronoun *ŋali* is extremely rare, and that the 1st plural form is normally used to denote groups of two, one of whom is the speaker. Such a system is not impossible to acquire, given that the learner would have positive evidence for the dual 1st person form. However, he or she would then 'expect' to hear a third person dual, which would not be forthcoming in the input. While the pronominal inventory of a language like Arapesh or Yidiŋ may be learnable, we predict that systems of this type, which do not instantiate a regular geometric progression of complexity, will be rare crosslinguistically and unstable over time. The fact that the Yidiŋ 1st dual pronoun is very rarely used, together with the fact that closely related languages of the Pama-Nyungan subfamily do not have a 1st dual pronoun, is at least consistent with this prediction.

tions, this can be represented as the claim that every language has at least the following set of distinctions in its inventory:

(37)



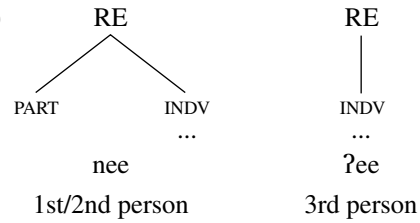
However, without external stipulation and assuming the geometric analysis, we might expect to find languages that are exceptions to Greenberg's universal because they fail to activate the Participant node altogether, or they fail to activate the Addressee node dependent on it. In other words, there might be a language that lacks 1st and 2nd person pronouns altogether, or has a single pronoun or set of pronouns for all discourse participants. We conjecture that a language with no 1st or 2nd person pronouns is a language with no personal pronouns. In fact, this has been suggested of Japanese, Thai, and other Southeast Asian languages, which use titles, kinship terms, names, and so on in place of pronouns.[38] If this is indeed the case, then these languages make no use of person features. We would expect that such languages would also lack verb agreement for person (as well as number and gender). This is certainly true of Japanese and Thai.

Are there languages that have a single pronoun or set of pronouns, used to refer alternatively to the speaker or the hearer? Noyer (1992), citing Lipkind (1945) and Ken Hale (p.c.), claims that the Winnebago (Siouan) singular pronoun *nee* has exactly this range of interpretations.

(38) 'I' or 'you' nee (Noyer 1992:151)
'he/she' ʔee

Such a language would have only two person geometries as in 39.

(39)



Noyer, however, notes that verb agreement is used to disambiguate between 1st and 2nd person interpretations of *nee*. If this is the case, then this, like Koasati number, can be reduced to syncretism in a paradigm that contains distinct 1st and 2nd person representations.

[38] Kuroda (1965) argues that Japanese pronouns are better analyzed as nouns rather than functional or closed class items. Noguchi (1995) qualifies this claim, in that he argues that this is true of personal pronouns, but the language has a distal demonstrative (*sore*) which functions pronominally in that it can be used as a bound pronoun with inanimate reference. See also discussion of Thai in §5.2.

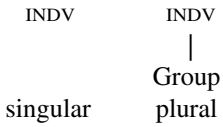
Michael Cysouw suggested to us that a more common scenario is exemplified by Awa (East New Guinea Highlands).[39] As shown in Table 22, the independent pronoun paradigm for this language includes distinct singular pronouns for 1st person and 2nd person, but only one plural pronoun, which may be used for either person. Again, on an interpretive morphological model, this is essentially the same phenomenon as that discussed above for Koasati 3rd person number: person distinctions undergo syncretism in the plural. The form *ite* spells out any geometry with a Participant node and a Group node and is not sensitive to the presence or absence of any features dependent on the Participant node.

	SINGULAR	PLURAL
1st	ne	
		ite
2nd	ade	
3rd	we	se

TABLE 22. Awa pronouns (Cysouw 2001:117, table 4.25, citing Loving 1973:85).

With respect to number, Greenberg's universal 42 can be converted into a claim that every language has at least the following set of distinctions in its inventory.

(40)



As already noted in our discussion of Kwakiutl, Maxakalí, and especially Pirahã, there seem to be languages that fail to make any number distinctions, although they do make a plethora of person distinctions. There are even languages like Pirahã that have a single pronoun for each person.[40] Given the absence of any grammaticalized number distinctions in the pronouns or elsewhere in the language (Everett 1986), Pirahã can be treated as not activating the Individuation node at all.[41]

In short, Greenberg's claim that all languages have pronoun systems with at least three persons and two numbers is subject to exceptions, and the exceptions attested are in fact expected, given the geometry proposed here. What we predict NOT to exist are languages that use the same pronoun (or in a language with cases, the same set of pronouns) for both 1st and 3rd or both 2nd and 3rd persons. In fact, none of the languages we looked at has such a pronoun or set of pronouns in its inventory.[42]

[39] Cysouw 2001 provides a comprehensive survey of person and number marking in pronoun and agreement paradigms, but makes no distinction between agreement and pronouns in its treatment. Cysouw does, however, acknowledge that they may exhibit different characteristics. See also n. 42.

[40] Corbett (2000:51) also cites Kawi (Old Javanese) and Classical Chinese as languages that have been reported to lack number.

[41] The notion of plurality is expressed in other ways, notably by conjunction or by the addition of an associative/comitative PP. Everett (1986:281) tentatively lists, in addition to a 3rd person pronoun unspecified for number and gender, one that is specified as feminine (*xi*) and another that is nonhuman (*xís*). However, Thomason and Everett (2002) argue that these are not true pronouns, as they may appear only when attached to another word, and are used only contrastively, to emphatically distinguish the feminine or nonhuman status of the referent. The true free 3rd person pronoun *hi* has specifically masculine reference only in contrast with the *xí* affix.

[42] Michael Cysouw informs us that Kawesqar (Alcalufan) has a pronoun *caw* for 2nd and 3rd person. We predict that either the persons are disambiguated by verb agreement, or that this is an accidental homophony, occurring in one case of the paradigm, but not elsewhere. Cysouw (2001) notes that syncretism in agreement paradigms is quite common, and that such syncretisms may involve any combination of persons. Notably, however, syncretisms of person are virtually unattested in paradigms of (overt) pronouns.

6.3. CONSTRAINTS ON THE EXPRESSION OF GENDER. Until now we have avoided discussion of questions of gender. We assume that gender is included in the feature composition of a pronoun when the representation includes an activated Class node. We assume that Class is a dependent of Individuation, but we have not discussed the internal structure of this major organizing node. The reason for this is that gender (or class) features vary more widely in the world's languages than either person or number. For example, while all languages seem to have at most four persons and four numbers, the set of gender/class systems seems much less constrained. Some languages have no gender marking whatsoever; these include Acholi, a Nilo Saharan language, Brahui, a Northern Dravidian language, and Tonkawa, a Coahuiltecan language. Other languages have two or three genders. The limiting case is probably represented by the Bantu languages, which have upwards of ten distinct genders or classes of nouns (see Corbett 1991). It may turn out that some systems involve an open-ended set of lexically determined classes while others involve a closed set of grammatically determined classes. The former would of course be beyond the scope of our geometry. Consequently, we leave the problem of identifying the dependents of the Class node open for future research.

DEPENDENCY OF GENDER ON NUMBER. We assume that the Class node is a dependent of Individuation because this captures Greenberg's universal 36, which states that '[i]f a language has the category of gender, it always has the category of number' (1963: 95). To the best of our knowledge this universal is absolute.[43] At first glance, it is not obvious that our proposal DOES in fact capture this universal dependency of gender on number. In particular, how do we eliminate the possibility of a pronoun system that manifests gender distinctions, but not number distinctions? Such a system would require activation of the nodes Individuation, Class, and at least one dependent of Class, but it would crucially not activate either the Minimal or Group nodes, as schematized in 41.

(41)

We suggest that the reason such a system could not exist is that complex geometries imply simpler ones (see §6.1). More specifically, a language with the geometries in 41 would also have a geometry consisting of a bare Individuation node in its inventory, and the latter would be uninterpretable in a system with gender, but not number.

INTERACTIONS OF GENDER AND NUMBER. The dependence of gender on number is also expressed in Greenberg's universals 37 and 45, reproduced below.

(42) Universal 37: A language never has more gender categories in nonsingular numbers than in the singular. (1963:95)

(43) Universal 45: If there are any gender distinctions in the plural of the pronoun, there are some gender distinctions in the singular also. (1963: 96)

[43] The University of Konstanz Universals Archive lists no exceptions to this claim.

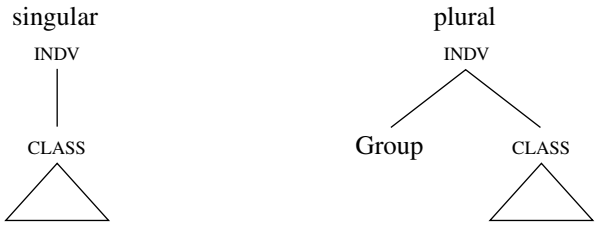
These observations are precisely what we expect to find given the geometric implications of complex representations. If a Class node may cooccur with Group, it follows that it may alternatively occur without Group, since a representation without Group is less marked.

Most commonly we find systems like those schematized in 44, where gender features are present in the singular, and perhaps also in the plural. The system in 44a is one where the singular pronouns are specified for gender (via activation of the Class node), and the plural pronouns are not. The representation of the singular pronouns includes a Class node dependent on Individuation but no Group node; that of the plural pronouns includes a Group node dependent on Individuation, but no Class node. The system in 44b is one where both singular and plural pronouns are specified for gender (via activation of the Class node), and the plural pronoun requires activation of both the Group and Class nodes. Since this plural in 44b has an extra node compared to that in 44a, it is more complex and hence more marked, and we would expect this type of system to be relatively less common.

(44) Gender in singular, but not in plural

a.

b. Gender in singular and plural



Note that the representations in 44 are of course incomplete, as they lack the root Referring Expression, and in the case of 1st and 2nd person pronouns, the Participant node and its dependents. Once we incorporate these subgeometries into representations that also include the nodes specifying person features, the set of possibilities for a single language expands. In particular, a language might have both gendered and ungendered singular pronouns, and both gendered and ungendered plural ones, in different persons. In terms of our geometric representations, such a language would only have a Class node present in a subset of person-number combinations. And in fact, most commonly, we find gender distinctions restricted to 3rd person singular pronouns (e.g. Dieri (Australian) and Eastern Pomo (Hokan)), or to 3rd person singular and nonsingular pronouns (e.g. Kaingáng (Macro-Gé) and Kannada (Dravidian)). Both kinds of systems are consistent with universals 37 and 45.

Until recently it was thought that these universals were absolute, but Plank and Schellinger (1997) demonstrate that there are a significant number of exceptions in a range of genetically distinct languages. Most of the exceptions they have found are marked, but not impossible systems in our framework. Some of the examples involve

polymorphemic pronouns, like the Spanish 1st and 2nd person forms treated in §5.1. For example, the Windesi and Wandamen dialects of Central-Western Yapen (Austronesian) have two genders in the 3rd person plural, but not elsewhere (see Table 23). However, as Plank and Schellinger point out, 'it is the suffix *-at* which distinguishes the human gender from the non-human one for 3rd person plural; and this same suffix is obligatorily present in 1st and 2nd person plurals' (1997:63). In other words, human gender is expressed by a suffix on a pronominal stem that itself expresses person and number.

	SINGULAR	DUAL	PLURAL
1st ex	jau	amun	amat
1st in	*	nandu	tatat
2nd	au	mandu	miat
3rd human	i	sandu	siat
3rd nonhuman	''	''	si

TABLE 23. Independent personal pronouns in Windesi (Plank & Schellinger 1997:63, table 3, citing Cowan 1955:48).

We suggest that exceptions of this type are amenable to the treatment for Spanish outlined in §5.1: the polymorphemic pronouns are analyzed as the result of the juxtaposition of two or more feature bundles. (See also the discussion of Lithuanian in n. 27.)

Plank and Schellinger also discuss a type of exception, exemplified by Katu (Katuic, Mon-Khmer) and Palau (Austronesian) which, in their words, 'involves partial syncretism' (1997:64). In these languages, a 3rd person singular animate or human pronoun is syncretic with an inanimate or nonhuman one, but the latter is unspecified for number, leading to a paradigm such as that in Table 24.

	SINGULAR	DUAL	PLURAL
1st ex	ku ~ dai	yu'a	yi
1st in	*	nhang	he
2nd	mai	nhu'a	pe
3rd animate	dó	nhi (dó)	pi (dó)
3rd inanimate	dó	dó	dó

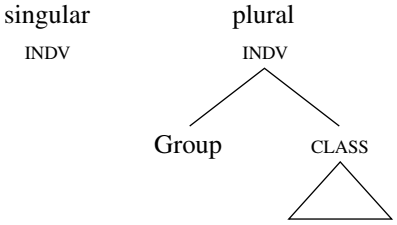
TABLE 24. Personal pronouns in Katu (Plank & Schellinger 1997:64, table 4, citing Wallace 1966).

This class of exceptions is amenable to the treatment outlined in §6.1 for Koasati and Guarani. Given its *L*-shaped pattern of realization in the paradigm above, *dó* is clearly an elsewhere form, realizing a 3rd person geometry when no more fully specified form is available. We claim that Katu 3rd person forms do have distinct geometries for animate and inanimate in the singular, but that there is no pronoun in the inventory to realize the distinct 3rd person singular animate geometry, which is hence realized by the elsewhere form *dó*.

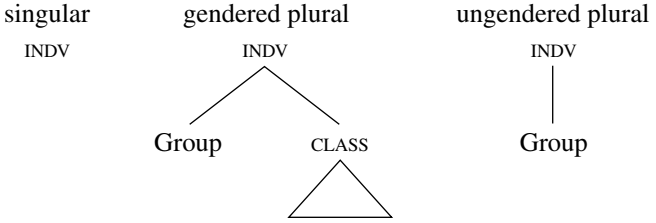
A third type of exception, exemplified by members of the Berber family, has gender distinctions in singular and plural numbers of some persons, and in plural number only of other persons. As Plank and Schellinger point out, this type of language would be permitted on a generous reading of universals 37 and 45 that requires only that some singular pronoun be specified for gender. Such languages pose no problem for our model.

What we predict to be impossible are the systems schematized in 45 consisting of a more complex gendered plural together with a completely unmarked singular, realized as a bare Individuation node. Such a system contains singular pronouns that are only ungendered, and gendered pronouns that are only nonsingular.

(45) a. Gender in plural, but not in singular



b. Gender in some plurals, but not in singular



Plank and Schellinger do list one language of this type: Biak, a language closely related to Wandamen and Windesi. The facts of this language are provided in Table 25.

	SINGULAR	DUAL	TRIAL	PLURAL
1st ex	aiá	nu	n'o	
1st in	*	'u	'o	
2nd	áu	mu	m'o	
3rd animate	i	su	s'o	si
3rd inanimate	i	su	s'o	na

TABLE 25. Independent personal pronouns in Biak (Plank & Schellinger 1997:63, table 2, citing Steinhauer 1985:470, 475).

The problem is that Biak appears to make an animate/inanimate distinction only in the third person plural, not in the singular, which has its own separate form. The gender distinctions appear only in the plural number, not in the dual or trial numbers. There are two different approaches that we could adopt here. On the one hand, we could assert that Biak is also exhibiting syncretism of underlyingly distinct geometries in the singular, and that *i* is a default, elsewhere form. This approach would need to be substantiated by independent evidence, perhaps from verb agreement, that the genders are indeed distinct in the singular. On the other hand, in a different, somewhat more radical approach, we could claim that Biak is a language that has overridden the UG-supplied default singular interpretation for the Individuation node. In Biak, the bare Individuation node would receive a plural interpretation; singular number would be represented by activation of the Minimal node, dependent on Individuation. In that situation, the least geometrically marked number would be plural, not singular, and therefore, gender distinctions should occur in the plural but not in the singular. Again, however, further investigation of the Biak number system would be required before we could substantiate this analysis. It would not be impossible for the child learning Biak to override the defaults, as she or he would have positive evidence in the form of the plural gender distinctions, but a more complex acquisition path would be expected. Further, we might expect to discover other evidence that plural was the

unmarked number in the system; perhaps bare nominals in Biak receive a default plural interpretation.

The geometry that we have presented provides a representational explanation for the restricted combinations of person/number features attested in the pronouns of the world's languages. Depending on whether or not an interpretive morphological framework is adopted in conjunction with the geometry, certain exceptional patterns can be accounted for by assuming syncretism; others are the product of complexity. In terms of person and number features, as far as we know, no systems exist that are not predicted by the geometry. With a few exceptions, discussed above, pronominal forms with gender also behave in accordance with the predictions of the geometry.

7. CONCLUSION. Feature-geometric organization of phonological features gave theoreticians a tool to capture the idea of a natural class of phonological features, permitting an explanation of certain feature groupings that arise in the phonological patterns of the world's languages. Morphological features group in the same way, although there are fewer of them, and the natural classes are not connected to their physical realization, as is the case for phonological features.

We have proposed here that a representational account of feature groupings extends naturally to morphological person and number features and that the organization of the geometry is constrained by basic conceptual categories. We show how the proposal gives us insight into both the distribution of pronominal paradigms in the world's languages and the structure of unusual individual paradigms.

Like its phonological counterpart, the geometry proposed here makes predictions about possible and necessary contrasts within a given system, as well as predictions about what constitutes a natural grouping of features. These predictions are falsifiable, in two ways. A counteranalysis could present facts that the particular geometry we propose cannot deal with but which could be handled by a revised geometry, with different node values. Alternatively, it could be argued that the geometric approach itself is untenable by showing that any geometry would be inadequate to account for a certain paradigm. For example, a form in a paradigm might show syncretisms that demonstrate that some node would need to be dominated by the Participant and Individuation nodes simultaneously (for instance, an inclusive that collapsed sometimes with 1st person singular forms and sometimes with 3rd person plural forms). If such a case could be found, it could demonstrate that the geometric approach to morphological features is fundamentally flawed. We claim, of course, that no such case could exist.[44]

The idea of a morphological feature geometry as a representational tool in itself does not dictate a choice of theoretical framework; indeed, we feel that at least the concept of such a system of morphological features will be of interest to a broad range of researchers. In some of our specific proposals (for example, for Koasati), it may be apparent that we are thinking in terms of an interpretive morphology, like that of Anderson's A-MORPHOUS MORPHOLOGY or Halle and Marantz's DISTRIBUTED MORPHOLOGY. But nothing about the concept of a feature geometry in itself requires such an approach. The insights the geometric approach provides are compatible with most extant morphological frameworks, although some of our specific proposals may not be.

Several major research questions now arise: the nature of the relationship between the geometry and the syntactic component, in particular with respect to agreement

[44] Our intuition suggests that it might be the case that a geometry-disproving paradigm would also violate Carstairs-McCarthy's (1987) PARADIGM ECONOMY principle. Further investigation of the contrastive possibilities of feature-geometries is necessary to determine this.

phenomena; the best way to integrate and represent gender and class features on the one hand, and case features on the other; the representation of verbal morphological features such as aspect, tense, and mood and their interaction with the nominal feature system; and the spell-out of the geometry. We have demonstrated here that the geometric approach has enough intrinsic merit to warrant the directed investigation of these and related questions.

Appendix

a. Person: 1/2/3
Number: sg/pl 45 languages

LANG	FAMILY	SUBFAMILY	NOTES
Acholi			
Ainu	Isolate		No 3rd person pronouns; demonstratives used for this purpose
Gilyak	Isolate		
Gulf Arabic, Hebrew	Afro-Asiatic	Semitic	
Hausa	Afro-Asiatic	Chadic	
Iraqw	Afro-Asiatic	Cushitic	
Central Tamazight	Afro-Asiatic	Berber	
Wolaytta	Afro-Asiatic	Omotic	
Bandjalang	Australian	Pama-Nyungan	
Basque	Basque		No 3rd person pronouns; demonstratives used for this purpose
Berik	Trans-New Guinea	Northern Trans-New Guinea	Sg/pl in 1st person only, no number distinction in 2nd, 3rd, but number and gender on verbs
Brahui	Trans-New Guinea	Northern Trans-New Guinea	
Daga	Trans-New Guinea	Main Section	
Tauya	Trans-New Guinea	Madang-Adelbert Range	
Cahuilla, Luiseño	Uto-Aztecan	Northern Uto-Aztecan	
Nahuatl	Uto-Aztecan	Southern Uto-Aztecan	
Albanian	Indo-European	Albanian	
Latvian	Indo-European	Baltic	
Dutch, English, German, Swedish	Indo-European	Germanic	
Greek	Indo-European	Greek	
Balochi	Indo-European	Indo-Iranian	No 3rd person pronouns; demonstratives used for this purpose
Catalan, French, Romanian, Spanish	Indo-European	Italic	
Polish, Serbo-Croatian	Indo-European	Slavic	
Welsh	Indo-European	Celtic	
Chechen	North Caucasian	N. Central Caucasian	

LANG	FAMILY	SUBFAMILY	NOTES
Kabardian	North Causasian	Northwest Caucasian	
Georgian	South Caucasian	Georgian	
Finnish	Uralic	Finno-Ugric	
Godié, Kongo, San Salvador, Southern Sotho, Swahili	Niger-Congo	Atlantic-Congo	
Haitian Creole	Creole		No number distinction in 2nd person
Nigerian Pidgin	Creole		
Halkomelem	Salishan	Central Salish	
Lillooet	Salishan	Interior Salish	
Kaingáng, Xokleng	Macro-Gé	Ge-Kaingang	
Rikbatsa	Macro-Gé	Rikbaktsa	
Kannada	Dravidian	Southern Dravidian	
Koasati	Muskogean	Eastern Muskogean	3rd person unmarked for number
Ladakhi	Sino-Tibetan	Tibeto-Burman	
Lugbara	Nilo-Saharan	Central Sudanic	
Mohawk	Iroquoian	Northern Iroquoian	1st and 2nd person unmarked for number
Paipai	Hokan	Esselen-Yuman	
Eastern Pomo	Hokan	Northern Hokan	
Turkish	Altaic	Turkic	
Tzutujil	Mayan	Quichean-Mamean	

b. Person: 1in/1ex/2/3
Number: sg/pl 23 languages

LANG	FAMILY	SUBFAMILY	NOTES
Aceh	Austronesian	Malayo-Polynesian	Sg/pl in 1st exclusive only, no number distinction in 1st inclusive, 2nd, or 3rd
Marshallese	Austronesian	Malayo-Polynesian	
Chinese, Mandarin	Sino-Tibetan	Chinese	
Cubeo	Tucanoan	Central Tucanoan	
Dakota	Siouan	Siouan Proper	
Dong	Daic	Kam-Sui	
Kalihna	Carib	Northern Carib	
Kwakiutl	Wakashan	Northern Wakashan	Sg/pl in 1st exclusive only, no number distinction in 1st inclusive, 2nd, or 3rd
West Makian	West Papuan	North Halmahera	
Central Marghi	Afro-Asiatic	Chadic	
Maxakalí	Macro-Gé	Maxakalí	Sg/p1 in 1st exclusive only, no number distinction in 1st inclusive, 2nd, or 3rd
Miskito	Musumalpan	—	Objective and genitive case-marked pronouns unmarked for number; Nominative pronouns distinguish singular and plural in all persons except 1st inclusive, which has plural only
Central Sierra Miwok	Penutian	California	Singular inclusive form
Halh, Mongolian	Altaic	Mongolian	No 3rd person pronouns; demonstratives used for this purpose

LANG	FAMILY	SUBFAMILY	NOTES
Ojibwa	Algic	Algonquian	
Potowatomi	Algic	Algonquian	
Pakaásnovas	Chapacura-Wanha	Madeira	
Palauan	Austronesian	Malayo-Polynesian	
Quechua	Quechuan	Quechua 1	
Sirionó	Tupi	Tupi-Guarani	
Somali	Afro-Asiatic	Cushitic	
Telugu	Dravidian	South Central Dravidian	No 3rd person pronouns; demonstratives used for this purpose
Yaoré	Niger-Congo	Mande	
Yatzachi Zapoteco	Oto-Manguean	Zapotecan	

c. Person: 1/2/3
Number: sg/pl/du 10 languages

LANG	FAMILY	SUBFAMILY	NOTES
Awtuw	Sepik-Ramu	Sepik	
Arapesh	Torricelli	Kombio-Arapesh	Dual in 1st person only
Hmong Njua	Hmong Mien	Hmongic	
Lithuanian	Indo-European	Baltic	
Tonkawa	Coahuiltecan		
Tunica	Gulf		Dual in 3rd person masculine only
Wappo	Yuki		Dual in 3rd person only
Zuni	Isolate		No separate dual form for 1st & 2nd person nominative & accusative pronouns—dual number expressed via verb agreement; separate 1st and 2nd dual genitive pronoun, as well as 3rd nom., acc., and genitive
Navajo	Na-Dene	Nuclear Na-Dene	Obviative 4th person[45]
Central Yupik	Eskimo-Aleut		Obviative 4th person

d. Person: 1in/1ex/2/3
Number: sg/pl/du 7 languages

LANG	FAMILY	SUBFAMILY	NOTES
Chinook	Penutian	Chinookan	
Comanche	Uto-Aztecan	Northern Uto-Aztecan	
Dieri	Australian	Pama-Nyungan	
Djingili	Australian	West Barkly	
Ngandi	Australian	Gunwingguan	
Ho	Austro-Asiatic	Munda	
Nama	Khoisan	Southern Africa	

[45] Mary Willie and Eloise Jelinek inform us that the so-called 4th person is better characterized as a type of 3rd person form, whose distribution is not thoroughly understood. It appears in some contexts to be behaving like an obviation marker, singling out referents who are not 'proximate' in the discourse (i); in others, it seems to have a politeness function, used in conjunction with kinship terms or in place of the first person when it is appropriate to 'distance' the speaker from a request or desire. In some cases, it seems to affect the aspectual interpretation of an embedded event, providing a type of imperfective reading.

(i) Jáan Jein yił naalnish. Doo eii Séelii bił **nji**lnishda.
John Jane 3.with 3.works Not Sally 3.with **4**.works
'John works with Jane. **He** doesn't work with Sally.'

Whatever the correct treatment of these extremely interesting forms, we do not attempt to incorporate them into our geometry for the same reasons we omit formality considerations (§5): the principles that govern the appearance of the 4th person are clearly context-dependent. For further discussion, see Willie 1991.

LANG	FAMILY	SUBFAMILY	NOTES
e. Person: 1/2/3			
Number: sg/pl/du/trial-paucal		1 language	
LANG	FAMILY	SUBFAMILY	NOTES
Yimas	Sepik-Ramu	Nor-Pondo	No 3rd person pronouns; demonstratives used for this purpose
f. Person: 1in/1ex/2/3			
Number: sg/pl/du/trial-paucal		2 lanuages	
LANG	FAMILY	SUBFAMILY	NOTES
Fijian	Austronesian	Malayo-Polynesian	
Tok Pisin	Creole		
g. Person: 1/2/3			
Number: sg/pl/du	1 language		
LANG	FAMILY	SUBFAMILY	NOTES
Kiowa	Kiowa-Tanoan	Kiowa-Towa	No 3rd person pronouns; demonstratives used for this purpose; Pronominal prefixes on verb encode person and sg/pl/du/ number[46]
h. Person: 1/2/3			
Number sg/pl	1 language		
LANG	FAMILY	SUBFAMILY	NOTES
Kutenai	Isolate		Word forms for 1st and 2nd person only, showing number distinctions[47]; clitics for all three persons unspecified for number
i. Person: 1in/1ex/2/3			
Number: none (sg/pl)		2 languages	
LANG	FAMILY	SUBFAMILY	NOTES
Campa, Perené Ashéninca	Arawakan	Maipuran	m/f gender in 3rd person; Plural suffix *-payeeri* can attach to nouns and pronouns but it is infrequently used
Mixteco Chalcatongo	Oto-Manguean	Mixtecan	Pronominal prefixes on verb encode plural number

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[46] The independent pronouns, which are uncommon optional elements in Kiowa, are not themselves specified for number; see Watkins 1984:100ff. But this language has an elaborate system of number marking on nouns and verbs, which is used to identify a noun phrase as singular, plural, or dual. In fact, the number system is quite complex, involving, in addition to the expected number prefixes, an inverse marker for 3rd person. The latter expresses singular number for nouns that are basically dual or plural, and plural number for nouns that are basically singular or dual. A pronominal system of this type could be handled in our framework, if we assume that the basic number is the underspecified option, lexically listed for each noun. The inverse number simply represents the marked alternative. For an insightful discussion of inverse number along these lines, see Corbett 2000:159–66.

[47] According to Morgan (1991:420), 'The independent pronouns in Kutenai are all syntactically third person nominal phrases, regardless of any apparent first or second person reference'. First and second person independent pronouns are comprised of a 1st/2nd person possessive proclitic and a 3rd person nominal base. Note that the number distinction in 1st and 2nd person is therefore not part of the pronominal form, but marked on the 3rd person base.

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[Received 20 October 1998;
revision received 5 May 2001;
accepted 11 March 2002]