Elements of Number Theory

by

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Abstract

The dissertation argues for the necessity of a morphosemantic theory of number, that is, a theory of number serviceable both to semantics and morphology. The basis for this position, and the empirical core of the dissertation, is the relationship between semantically based noun classification and agreement in Kiowa, an indigenous, endangered language of Oklahoma.

The central claim is that Universal Grammar provides three number features, concerned with unithood, existence of homogeneous subsets, and properties of those subsets.

The features are used to analyze a wide variety of data. Semantic topics include the difference between granular and non-granular mass nouns, collective, non-collective and distributive plurals, and cardinality. Syntactic topics include the structure of DP, noun marking, agreement and suppletion. Morphological topics include the inventory of morphological operations, the featural basis of complex syncretisms, the difference between agreement and suppletion, whether features are privative or binary, and the nature of the Kiowa/Tanoan inverse.

Keywords: Kiowa-Tanoan, number, morphology, semantics, agreement, suppletion, inverse, noun class, singular, dual, plural, features, binary, privative.

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Abbreviations and Notational Conventions

1	first person
2	second person
3	third person
1–11	noun classes (Kiswahili)
1	referential cardinality 1
2	referential cardinality 2
3	referential cardinality 3
A	animate plural agreement type
ADV	adverbial
AGR	agreement
CONJ	conjunction
D	agreement/suppletion type, typical of **2**
DETR	detransitive
DISTR	distributive
FUT	future
HAB	habitual
HSY	hearsay
I	agreement/suppletion type, typical of inverse marked nouns
IMP	imperative
IMPF	imperfective
INV	inverse (marking on nouns)
LOC	locative
MASC	masculine
NEG	negative
NOM	nominalizer
NOM	nominative (Sanskrit)
P	agreement/suppletion type, typical of **3**
PF	perfective
PRES	present
Q	question particle
REAL	a(n unproductive?) suffix seeming to denote prototypicality
RECIP	reciprocal
REFL	reflexive
REL	relativizer
S	agreement/suppletion type, typical of **1**
TOP	topic marker (Japanese)

Chapter 1

Framework

1.1 Aim: a morphosemantic theory of number

This dissertation aims to lay the foundations to a morphosemantic theory of number, or, more realistically, to present some core elements of such a theory. The notion that the study of Universal Grammar requires a theory of number that covers both the semantics and the morphology of number constitutes, I believe, a substantial departure from previous work on the topic. There, morphological theories of number and semantic theories of number have addressed very different problems and have produced answers of little mutual relevance.

To be specific, morphological theories of number have been primarily concerned inventories of pronoun and agreement of the world's languages (see Corbett (2000) for an excellent overview and synthesis). For instance, the morphologist might wonder whether there exist cardinally exact trial, quadral or quintal number, or whether the forms that permit such readings are really paucals, and hence cardinally inexact. More rarely, morphologists concern themselves with the relationship between members of such inventories. For instance, in a system with singular, dual and plural, one can wonder whether each of these is *sui generis*, or whether, for instance, dual is a type of 'restricted' plural or a type of 'almost' singular. Even more rarely, observations that numbers are not *sui generis* have led to attempts to specify the features that underlie them. An important example of this work is Noyer (1992), which the current dissertation follows both in spirit and in content. So, morphological theories of number examine languages' pronoun inventories and agreement categories, aiming to explain why only certain ones are attested or how members of the inventory are related (in that they syncretize in a given context or trigger identical syncretisms in other categories).

Such results are of little interest to semanticists, whose theories of number are concerned with how plurality should be represented so as to capture similarities between mass nouns and plural count nouns, or with the relationship between plurality of nouns and plurality of events, or with collectivity and distributivity of plurals.

To parody the situation, given the sentence 'We [you and I] carried a piano upstairs', the morphologist would worry about how much like 'they (two)' 'we [you and I]' is, whereas the semanticist would worry about how to determine the number pianos transported, and this while both claiming to work on number. As measures of the morphologists' and semanticists' lack of interest in each other's work, consider Corbett (2000) and Winter (2001). In a 350-page survey of number and its morphology, Corbett devotes barely a page to semantic work on the topic; and Winter's highly articulated theory of semantics of number shows no concern with the difference between agreement with a head and the head itself, a difference that is basic to morphology (see his comments on Hungarian).[1]

The untenability of this mutual uninterest is thrown into relief by Kiowa, the language that forms the empirical core of the dissertation (see Section 1.4 for general information). Kiowa displays two typologically noteworthy characteristics. On the one hand, it possesses a complicated rich agreement system, that is, an object of interest to morphologists. On the other hand, it possesses a semantically-based noun class system. As some of these noun classes pick out sets of nouns of traditional interest to semanticists—such as, granular *versus* non-granular mass nouns, nouns that form collective *versus* non-collective plurals—Kiowa's noun classes are of interest to semanticists. Crucially, however, noun class and agreement interact in Kiowa. Indeed, as we will see in Chapter 2, it is precisely on the basis of agreement that noun classes are primarily recognizable. This means that a semantic theory of mass and plurality or of collectivity is answerable to the morphology: whatever primitives it posits must be usable in an account of Kiowa's complex agreement. Conversely, it means that a morphological theory of Kiowa agreement and syncretisms must be answerable to the semantics: whatever primitives it posits must be capable of rigorous definition and implementation in a semantic theory of the concepts according to which Kiowa classifies its nouns. Consequently, Kiowa necessitates a unified morphosemantic theory of number, one capable of addressing core morphological and semantic issues.

Let me spell this argument out a little less abstractly. To do this, I will show how the classic morphological problem that Kiowa agreement poses quickly turns into a semantic issue, thereby illustrating the interrelatedness in Kiowa of the semantic and morphological aspects of number.

One of Kiowa's most striking characteristics is its rich agreement system, exemplifiable by:

(1) Á- tot
3A:3A:3S-send.PF
'They sent it to them'

[1]These observations are not really intended as criticisms of Corbett or Winter. Indeed, I choose their work as examples because, being so good in their respective domains, they can easily take some mild ribbing.

Of course, we should also note that the division between morphological and semantic work is not absolute. See, for instance, Ojeda (1998) or Zabbal (2002).

Unlikely as it may seem, three distinct arguments—the third person plural sender, the third person plural recipient, and the third person singular sendee—are in some way encoded by agreement prefix **á** (the prefix is also responsible for the verb's having low tone). This encoding can be appreciated by changing each of the arguments in turn, to third person dual say:

(2) Ę́- tot
3D:3A:3S-send.PF
'They two sent him to them'

(3) Mé- tót
3A:3D:3S-send.PF
'They sent him to them two'

(4) Et- tót
3A:3A:3D-send.PF
'They sent them two to them'

Each change to an argument results in a different agreement prefix, no two of which are the same; again, the varying tone of the verb is attributable to the prefix.

This system is immediately fascinating. At the most general level, there is the issue of how so much meaning can get into so little sound. More specifically, it is unclear why each change to an argument has the precise phonetic effect that it has. That is, why **et** in (4) and **mé** in (3), and not *vice versa*? Furthermore, one can wonder what (3) and (4) share in virtue of which the verb has high tone, in contrast to the low-toned verb of the earlier examples. One can easily show that prefixes are not unanalyzable wholes; rather each of the arguments makes a distinct and regular phonological contribution to the prefix (Chapter 5). We encounter, therefore, what is practically the paradigm case of a morphological problem: which phonetic features of the prefix realize which syntactic features of which argument?

Now, the syntactic features that prefix realizes do not start their syntactic existence huddled together beside the verb. Rather, taking a standard Minimalist view, the features that comprise the agreement cluster are copies of the feature content of the D^0 of each argument DP. In particular, the number features of each argument will be copied from D^0. The number features on D^0 do not begin their syntactic existence there either, though. We will see, in Chapter 3, that the number content of D^0 is determined by two lower, DP-internal heads, both of them the locus of number features. The content of these heads is determined—and this is the crucial point, where things turn semantic—by the noun itself. Kiowa nouns belong to one of (at least) nine classes. I will argue that the agreement behavior of these classes is readily explicable if we suppose that Kiowa nouns bring with them into the syntax one or more number features, rather like gender features of many Indo-European nouns.

The semantic connection is this: Kiowa's nouns classes are strongly semantically based, in two distinct senses. First, each class is internally coherent, that is, all classmate nouns share particular semantic characteristics. Second, the number feature(s) that nouns of a given class bring with themselves into the syntax is, or are, appropriate to the semantic property of that class. So, for instance, if the defining property of a noun is the type of plurality it forms, collective *versus* non-collective, then the feature that noun brings to the syntax distinguishes (non-)collectivity of plurals. Or, if the defining property of a class is that its nouns generally do not occur in pluralities, then such nouns bring non-plural number features into the syntax. Several of the classes of immediate, obvious relevance to core research into the semantics of number: those consisting non-granular mass nouns, or of granular mass nouns, or of collective plurals, or of nouns that permit a 'collection of collections' reading.

Thus, we have traced a path from the constituents of Kiowa's agreement prefix—a classical morphological problem—via agreement relations with D^0, through the DP-internal heads that determine the content of D^0, to the relation between number features and such properties as granularity, masshood, collectivity, *et cetera*—classical semantic problems. Consequently, it will not do to offer a morphological analysis of the prefix if the features posited in that analysis cannot serve as the foundation to an analysis of the semantic properties just listed. Equally problematic would be a semantic analysis positing primitives that can in no way be correlated with the phonetic units that comprise the agreement prefix. Rather, a unified morphosemantic theory of number must be offered that does justice to the concerns of morphologists and semanticists alike. This dissertation aims to present some elements of such a theory.

1.2 Core claim and overview

The core number-theoretic claim of this dissertation is that Kiowa provides evidence of three binary number features; [±singular] concerns (non-)unithood; [±augmented] concerns the (non-)existence of (homogeneous) subsets; [±group] concerns properties of subsets, should they exist. The dissertation concentrates on motivating these features, on rigorously defining them, and showing how their manipulation, syntactically and postsyntactically, leads to a tightly constrained theory with wide and diverse empirical coverage. In this section, I provide an overview of the topics addressed, motivating and deploying these three number features.

Chapter 2 presents the empirical core of the dissertation, Kiowa's noun class system. First, it shows how Kiowa's has four agreement types can be used to distinguish nine noun classes. On the basis of this agreement behavior, a new system of noun class mnemonics is proposed, to facilitate the discussion. It then shows that the nine classes are internally semantically coherent, that is, that the nouns in each class share certain semantic characteristics. The list of characteristics is shown below.

(5)

Characteristics
First person
Animates and animate-like entities (physically similar to animates or capable of self-propulsion or determining direction of motion)
Naturally regarded both as individual and as occurring in collections; permits 'different type of' reading
Individuable, non-shape-inductive
Non-granular mass nouns
Pluralia tantum, composite nouns (and granular mass nouns for some speakers); abstract nouns
Somewhat default; granular mass nouns for some speakers; much vegetation, members of collections are individuable
Somewhat default; much vegetation, members of collections are not readily individuable
Default; no unifying properties

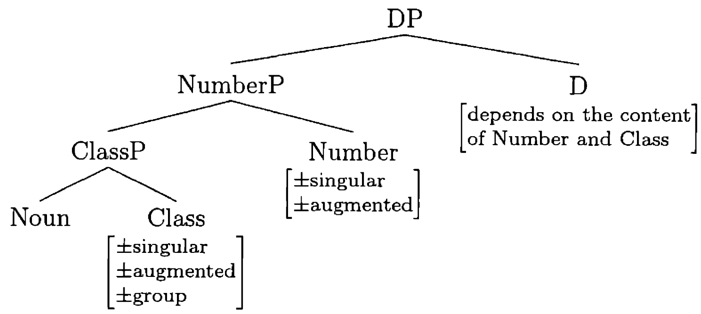
The chapter also introduces one of Kiowa's most fascinating phenomena, inverse marking. Kiowa nouns, like English nouns, if drawn straight from the lexicon and uttered unaltered can be used to refer only to a restricted number of things. For instance, English **table** refers to a single table, **chair** to a single chair, and so on. To talk of not-one-table or not-one-chair, one adds something to the noun, the plural **-s**. In Kiowa, the range of meanings of nouns drawn straight from the lexicon is wider: some nouns refer to exactly two (e.g., **k!ɔ̂n** '[two] tomato[es]'), others to two or more (**áá** '[two or more] stick[s]'), others to one or two (**tógúl** '[one] young man [or two]'), ... Interestingly, Kiowa has a morpheme, just as English has the plural, that permits one to talk of a quantity of nouns other than what *noun* by itself means. This is traditionally called the **inverse**. So, **k!ɔ̨̂ɔ̨dɔ**, 'tomato'+INV, means 'one tomato' or 'three or more tomatoes'; **áádɔ**, 'stick'+INV, means 'one stick'; **tógúúdɔ́**, 'young man'+INV, means 'three or more young men'. Note that the morpheme is the same **dɔ** in all cases.[2] The important interaction between inverse marking and class membership is discussed.

This chapter is mostly expository and empirical. Some readers may prefer to skim through it just to gain a feel for the facts and the grammatical system as a whole, rereading it more thoroughly at a later point.

Chapter 3 presents the theoretical core of the dissertation. It motivates and defines the unithood feature [±singular], the subset-existence feature [±augmented], and the subset-property feature [±group]. Positing a non-novel DP-structure, it claims that these number features occur in two DP-internal positions both of which are semantically contentful: Number is determined by cardinality (singular, dual, plural), and Class, by semantic properties of the noun. A computation over Number and Class determines the number features on D.

[2]The variation in tone is purely phonological. See Watkins (1984) or Harbour (2002). The morpheme itself is subject to allophonic conditioning; see Chapter 2.

(6)



The number-feature content of D is not itself semantically interpreted. However, it is syntactically active and, sometimes, phonetically realized. Syntactically, it is the head that triggers agreement, i.e., contributes features to the agreement prefixes. Phonologically, it is realized as inverse marking, and it otherwise unrealized. A variety of more complex DPs, such as adjectivally modified ones, are examined, showing that inverse marking really is at the D-level, and not lower, at Number or Class say.

The chapter shows further that the relationship between a class' mnemonic and the semantic characteristic of the nouns it subsumes is quite principled, in contrast to the semi-arbitrary nature of gender-based noun classification in Indo-Europe.

The chapter concludes with discussion of what constitutes a possible noun class of a Kiowa-like language. The problem addressed is one of generative capacity. Given the description of Chapter 2, one would think that 64 different noun classes are possible. This prompts the one to wonder why Kiowa should instantiate just nine—why those nine, not others? why nine, not thirteen?—. It is shown that the account proposed for Kiowa is highly restrictive. It permits only ten number-based noun classes, so that Kiowa nearly optimally exploits the space of possibilities. An historical explanation is suggested for absence of the tenth class; it is attested in other Tanoan languages.

Chapter 4 addresses mismatches between agreement and suppletion, which readers, depending on their inclinations, are likely to regard either as delightful or as horrifying. Kiowa has two sets of number-sensitive suppletive predicates: those distinguishing singular from dual/plural, and those distinguishing plural from singular/dual. In the vast majority of cases, agreement and suppletion match. That is, if one is talking of a single young man, agreement will reflect that singularity and any suppletive predicates will be in their singular or singular/dual form; e.g.:

(7) Tógúl ∅- ét
young man 3S-big.S
'The young man is big'

Similarly, talking of two tomatoes, agreement will reflect that duality, and suppletive predicates will be in their singular/dual or dual/plural form; e.g.:

(8) K!ɔ̂n nen- ót
tomato 1s:3D-drop.s/D
'I dropped two tomatoes'

Likewise, *mutatis mutandis*, for talk of several sticks.

However, there are a variety of cases when agreement and suppletion seem to indicate different numbers. Two examples are (9), where agreement indicates plurality and suppletion, singularity:

(9) Ę̃́į́de t!ǫ́ų́gya yą́- dôi-et
this shirt :1s:P-too-big.S
'This shirt is too big for me'

and (10), where this time agreement indicates singularity and suppletion, plurality.

(10) Tóú ∅- sɔ́l
house 3S-be_set.P
'There are [several] houses standing'

Theoretical arguments are presented that the features that condition suppletion are located in a different head from the features that trigger agreement. D triggers agreement whereas the interpretable features directly under D, generally Number, condition suppletion. The theory of Chapter 3 claims, independently of suppletive facts, that the divergences can arise between the content of Class, Number and D. Given such divergences, we predict not only when agreement suppletion mismatches will occur, but precisely which otherwise unexpected combination of agreement and suppletion will result. Thus, agreement∼suppletion mismatches are a strong source of support for the theory of Chapter 3.

Chapter 5 sketches in detail an analysis of the agreement prefix. This is crucial to the project of morphosemantic research on number, for recall the argument that Kiowa not only presents classical morphological and semantic number problems, but demands that solutions to one be exportable to treatments of the other. Having motivated three number features primarily on semantic grounds (though with reference to DP-level morphology and, more cursorily, to the agreement prefix), it becomes crucial to show that phonological subparts of the prefix are precisely realizations of those features. It is shown, moreover, that rather complex allomorphic relations can be naturally stated in terms of these features and the natural classes they define.

Chapter 6 both concludes and extends the previous chapters. First, it compares Kiowa's noun class system with those of other languages, such as Sanskrit and Bantu, suggesting that Kiowa is more like Bantu than Sanskrit. Second, it entertains, and all but disproves, the possibility that number features are privative rather than bivalent.

The solutions proposed for the morphological and semantic number problems that Kiowa poses employ the same elements. Consequently, we appear to be on the way to a unified morphosemantic theory of number.

In presenting a unified analysis of diverse grammatical phenomena in Kiowa, the dissertation attempts to provide some definite answers. In its theoretical aims, however, it is merely programmatic, suggesting a line of inquiry that strikes me as important and interesting and offering some elements of what a fuller morphosemantic theory of number might comprise. If this program is on the right track, then several avenues of inquiry open up. Most obviously, one would wish to test and refine the incipient theory offered here against similar phenomena in other languages—the inventory of syntactic features ought, after all, to be universal. Secondly, one would want to extend the analysis of classic semantic number problems, deepening both the treatment of mass nouns and collectivity, and, hopefully, broadening the domain of inquiry to, say, distributive marking on nouns and verbs. (In fact, Kiowa has two verbal distributive markers, in mostly complementary distribution, which are the topic of my ongoing research.) Thirdly, one would want to extend the general methodology of the inquiry here to other languages. That is, one would want to find other instances in which morphological and semantic analyses clearly impinge on one another. By thus widening the domain of inquiry of both morphologists and semanticists, we will bring to bear on core problems a wider range of data than have until now been considered relevant, making our total theory of Universal Grammar ontologically more constrained but descriptively more adequate and explanatorily more powerful.

1.3 Framework

The syntactic and morphological frameworks I adopt are Minimalism and Distributed Morphology, respectively. My reason for adopting these theories, rather than any others, is that they offer a constellation of assumptions that, in my opinion, make for a particularly interesting research program. Specifically, Minimalism places heavy emphasis on the importance of interfaces and it constrains the variety of features one can posit: every feature must be interpretable, that is, for every feature, [F], there must be a head, X^0, such that, when [F] is located on X^0, [F] has a definite semantic value.[3] And Distributed Morphology claims that 'words' have an internal structure and that the structure is composed, primarily, by the syntax. It claims further more that the pieces of inflection are inserted postsyntactically, at the terminal nodes. Let me illustrate how each of these assumptions is important to the dissertation.

My aim is, as stated, to present elements of a unified theory of number serviceable to morphology and semantics alike. The initial motivation for this theory traces a path from a core morphological problem, via syntax, to a core semantic one. This motivation itself relies on several tacit assumptions about the relationship between syntax, semantics, and morphology, especially those just outlined.

[3]Note: this is not equivalent to the assumption that all *instances* of all features have an interpretation.

It is immediately obvious that this an interface project. It is concerned with what nouns bring with themselves into the syntax in virtue of their meaning—this is the lexicon-syntax interface. It is concerned with the exact relationship between phonological pieces of agreement prefixes and the feature content of syntactic heads—this is the morphology-syntax interface. And most obviously, it is concerned simultaneously with two different modules of the grammar, morphology and semantics. Consequently, both the methodology and the aims of the project itself only make sense in a world where interfaces are central to research. Minimalism offers such an approach.

Second, the motivation of the project began with morphological pieces and ended up at semantic ones. Conversely, the more detailed chapter summary began with semantic features in Chapter 3 and ended with morphological ones in Chapter 5. Now, everyone, I imagine, expects that we will be able to trace paths from one module of the grammar to another. However, there is no *a priori* reason to expect that the semantic atoms and the morphological atoms will be one and the same. Sameness of atoms is, by contrast, expected—indeed it is forced on us—if we assume, with Distributed Morphology, that the pieces of inflection are the phonetic realization of the pieces of syntax, and if we assume, with Minimalism, that all features have an interpretation.

Third, I argue below, and sketched above, that the content of D is determined by the content of two lower heads, Number and Class, evidence for the content of which is semantic. The content of D determines agreement and D's phonetic realization (as inverse marking). Thus, both agreement and inverse marking depend on a syntactic computation. This postsyntactic dependence is completely natural if we assume late insertion, with Distributed Morphology. However, it is quite unnatural if we adopt a morpheme-based theory, where the presence of each morpheme is justified by its contribution the meaning of the word. This is because the semantically interpreted heads are Class and Number. D, where inverse marking is located, is uninterpreted. Put in other words, inverse marking does not have a meaning. It occurs when a constellation of features is distributed over Number and Class. Consequently, inverse marking is a sound without a meaning; it is not an Sausurean sign.

1.4 Overview of Kiowa structure

In the remainder of this chapter, I present the basics of Kiowa grammar and apply some of the framework assumptions above.

1.4.1 The people

Kiowa is a Tanoan language of Oklahoma.[4] It is spoken fluently now only by some 40 people, aged 75–95. Members of the next oldest generation often have

[4]The traditional designation for the family is 'Kiowa-Tanoan'. The double barrelled appellation primarily reflects geographic and cultural differences, rather than linguistic ones: the Kiowa are, geographically and culturally, of the Northern Plains, in contrast to their linguistic relatives, all of whom are Pueblo peoples, resident in the South West. Given these differences,

good comprehension of the language, but they rarely have so intimate a grasp of the grammatical, lexical and stylistic subtleties of the language. Knowledge of the language declines sharply as one moves into the younger generations. The prognosis for the language is therefore not good. However, it is highly likely that a comprehensive documentation project will begin soon, so that future generations of Kiowas will inherit a substantial record of their language in its cultural context, even if direct inheritance of the language becomes impossible.

The Kiowa Tribal Complex is in Carnegie, Oklahoma, and members of the tribe live mostly in Caddo, Kiowa and Comanche counties. The sparseness of the community is, I am informed, the result of deliberate US Government policy. When the Kiowa reservation was disbanded in 1901, Kiowas where given allotments interspersed with allotments owned by Whites and members of other local tribes. This was an experiment in social engineering, in which the White farmers were intended to serve as role models. I have not verified this account, but whatever its source, the lack of a geographically coherent Kiowa community appears to have contributed to the decline in the tribe's language and certainly militates against efforts to revitalize it.

Kiowas enter Whites' historical record several centuries ago, in Montana. Their migration southwards occurred after introduction of the horse, which became central to the culture; it took over from the dog the designation **xę̂į**, with dogs becoming known as **xę̂įhįį** 'dog'+REAL and later as **xégun**.[5] Kiowas' earlier history is unclear, and, indeed, quite intriguing, given the geographic and cultural distance between them and their linguistic relatives in the South West. Kiowa folk memory speaks of a white bear and suggests in other ways an existence even further north. And earlier still, Kiowas had lived underground, escaping only with the assistance of Séndé, the creator-prankster, who pulled them out through an owl hole in a cottonwood tree, having heard their knocking when he chanced to rest against it.

1.4.2 The language

Basic word order

Kiowa is a rich agreement language with relatively free word order. A basic (informationally unmarked) word order is nonetheless discernible:

(11) Particles Subject Indirect_Object Direct_Object Verb

the relationship of Kiowa to Tanoan could not be assumed, but required proof. So it was that the Kiowa-Tanoan family came to be posited (e.g., Harrington 1910). Since Hale's definitive demonstration of the relationship (Hale 1962) and his subsequent partial reconstruction of the proto-phonology (Hale 1967), the double barrelled name has become otiose and is linguistically misleading. I suggest that we refer to the whole family simply as Tanoan. This has the advantage of brevity and of avoiding the cacophonic phrase 'Kiowa is a Kiowa-Tanoan language'. (Harbour 2003 used 'Tanoan' in this way, though, regrettably, without the foregoing explanation.)

[5] Watkins (1984) gives the origin of **gun** as associated with poles or travois.

The Particles in (11) express a variety of aspectual, modal and evidential meanings, as well as negation. They occur in a relatively fixed order. DPs, as well as other constituents, frequently occur at the left edge or right edge of the sentence. These dislocations appear to correlate with information structure, leftward dislocation for topic and focus, rightward for old information; however, the matter has not been thoroughly investigated. DPs may be freely pro-dropped. (See Watkins (1984, 1990), Adger and Harbour (2003) for more detail.)

Nouns

Nominal morphology is sparse in Kiowa. There is no case marking either for DPs or pronouns; however, possessed nouns have low tone throughout. The only marking for number is inverse marking, described briefly above. Taken straight from the lexicon and uttered unaltered, nouns are limited in the number of tokens they can refer to. When this number is not the same as the number of tokens being talked of, the noun is inverse marked. Agreement in Kiowa generally reflects number; however, inverse-marked nouns trigger a special form of agreement. This happens irrespective of the number of tokens that the inverse-marked noun can be used to refer to: one for some nouns, two for others, three or more for others still.

As suggested by the order in (11), Kiowa is a head-final language. Consistent with this, it has postpositions, rather than prepositions.

Verbs

Verbs consist of two parts, an agreement prefix and a complex verb.

The main body of the verb consists of the following parts, of which only the root is obligatory:

(12) Incorporates Root Distributive Aspect/Negation Future Evidential

Aspect and negation are in complementary distribution. Some of these suffixes are in a selective relationship with the Particles in (11). The suffixes show allomorph for a variety of different properties, including agentivity, stativity and transitivity (Watkins 1984, Adger and Harbour 2003).

The prefix registers agreement for up to three DPs: external argument, indirect object and direct object. Harbour (2003) shows that this prefix is phonologically independent from the rest of the verb.

Prefixes are glossed as follows. In:

(13) z-

z is the subject of an unaccusative predicate. In:

(14) $x : z$-

x is the agent of a transitive verb and z, the direct object. In:

(15) $x : y : z$-

x is the agent of a transitive verb and y, the indirect object, and z, the direct object. Finally, in:

(16) $:y:z$-

z is the subject of the unaccusative (it triggers however agreement identical to that triggered by the z direct object in (15)), and y is the indirect object, such as the possessor of z or a benefactor of the event.

Thus, in prefix glosses, something of the form $:n:$ is an indirect object; something of the form $:n$ is a direct object; and something of the form n is a subject/agent.

1.4.3 Orthography

The orthography used here is that of Harbour and Guoladdle (in prep.). The descriptions that follow are approximate. See Watkins (1984) for greater accuracy.

The consonants **b d g h m n s w y** are much as in English. The palatal affricate, similar to English 'exi*ts*' is written **x**. The Kiowa **l** is slightly obstruentized, rather like English 'la*ddle*', though somewhat devoiced; the degree of obstruentization varies between speakers to the extent that it sometimes sounds very like English '*l*addle'. The Kiowa **sy** resembles English *sh*assy, minus the lip rounding; frequently the sound approaches a voiceless palatal fricative; on a couple of occasions, I have heard it pronounced as $s + y$. Finally, **k p t** are voiceless and unaspirated; aspiration is marked by **h** as in **kh ph th**; ejectivity is marked by **!** as in **k! p! t!**; **x** has an ejective counterpart **x!**, but no aspirated one.

Kiowa has six vowels, high, middle and low, front and back: **i e a u o ɔ**. For high and low vowels, length is indicated by repetition: **ii aa uu ɔɔ**. For mid vowels, which are diphthongized, by the appropriate high vowel: **ei ou**. Nasality is contrastive. It is indicated by a Polish hook, e.g.: **ą ąą**. However, nasality is predictable, and so unmarked, on vowels cosyllabic with a nasal stop. Vowels may have one of three tones, high, falling, low: illustrating with the low front vowel, they are **á â a**. If long: **áá âa aa**. Tonology is discussed at length by Watkins (1984) and Harbour (2002). Unless pertinent to the discussion, I will always abstract away from the causes and effects of tone interactions.

(17) **Summary of Orthography** (Harbour & Guoladdle, in prep., p. 20)

Basic Vowels

a	e	i	o	u	ɔ
Ferrari	Mercedes	Fiat	so	push	off

ya	yam

Short and Long Vowel Pairs

a	aa	o	ou
e	ei	u	uu
i	ii	ɔ	ɔɔ

Length, Nasality, Tone

short high	á	short high nasal	ą́
short low	a	short low nasal	ą
short falling	â	short falling nasal	ą̂
long high	áá	long high nasal	ą́ą́
long low	aa	long low nasal	ąą
long falling	âa	long falling nasal	ą̂ą

Kiowa-English Shared Sounds

b d g h m n s w y z

English-like Sounds

la*dle*	*sh*assy	exi*ts*

Plain, Puffed, Popped

Plain	Puffed	Popped
k	kh	k!
p	ph	p!
t	th	t!
x	—	x!

Chapter 2

Kiowa's Noun Classes

2.1 Overview: Meaning and Features

This chapter presents Kiowa's noun class, the empirical core of the dissertation.

The key insight into noun classification in Kiowa was provided by Wonderly, Gibson, and Kirk (1954):

(1) Kiowa nouns are classified according to number properties

That is, number plays in Kiowa the role that gender plays in Indo-European languages; it is the primary classifier of nouns. The substantive difference between the Kiowa and Indo-European systems lies in their degree of arbitrariness. Gender-based classification is necessarily largely arbitrary, for most of a language's nouns, such as implements, vegetation and places, lack gender. We will see below and in the next chapter that, in Kiowa, members of each noun class share semantic characteristics which relate to number concepts.

A second insight was provided by Merrifield (1959a), who refined Wonderly, Gibson and Kirk's four-class system. Whereas the latter focused on number marking on the noun, Merrifield focused on number agreement in the verb prefix (cf., Harrington 1928).

(2) Kiowa noun classes revealed through their effect on the verb prefix

In this way, he was able to argue for an seven-class system. Watkins (1984), the most thorough description of Kiowa grammar to date, upheld Merrifield's classification, and Takahashi (1984) provided insight in the semantic coherence of the seven classes.

The aims of this chapter are:

(3) a. To explain how Kiowa noun classes are distinguished on the basis of number agreement in verbal prefix.
    b. To argue that this methodology reveals **nine classes** and to present a new nomenclature for these.

c. To show that membership of the nine classes is semantically coherent.

The later sections of the chapter treat two residual issues: whether the verbal agreement prefixes support a tenth class, as Harrington (1928) believed, and whether phonology plays a role in Kiowa noun class system. The features that underlie the system, their semantics and their manipulation in the syntax are explored in subsequent chapters. The important issue of how Kiowa compares to other languages with rich noun class systems, such as Bantu, is left until Chapter 6.

2.2 Preliminaries

The basis of noun classification in Kiowa, and to the mnemonics adopted below, is the correlation between agreement and singularity / duality / plurality. As preliminaries, therefore, the relevant properties of agreement and number are highlighted.

By number, I intend **referential cardinality**, the cardinality of the set of things that a noun is used to refer to on a particular occasion. Formally:

(4) **Definition: Referential Cardinality**
Let U be an utterance containing a noun N and let S be the subset of the universe of discourse that N denotes. The referential cardinality of N is defined as $\mid S \mid$, i.e., the cardinality of the set that N denotes.[1]

So, in 'I saw two men', the referential cardinality of the subject is 1 and the referential cardinality of the object is 2.

Kiowa distinguishes singular, dual, and plural, that is, the language distinguishes referential cardinalities 1, 2, and ≥ 3. In order to keep morphological and semantic terminology separate, the following notational convention is adopted:

(5) **Notation: Referential cardinality**
1 denotes referential cardinality 1 (singular).
2 denotes referential cardinality 2 (dual).
3 denotes referential cardinality ≥ 3 (plural).

Now consider the morphological form of verbal agreement in Kiowa, abstracting away from person. Agreement on the verb covaries with referential cardinality as well as with morphological marking on the noun. Four types of agreement are observed:

(6) **Notation: Agreement types**
S, D, P, I

[1]This definition glosses over certain technicalities, such as whether proper nouns, like *John*, should be semantically represented as singleton sets or as individuals (on this issue, see the Schwarzchild's (1996) appendix on Quinean set theory) and how to accommodate the contention that DPs are referential and NPs predicative (Winter 2001).

As a rule of thumb, S, mnemonic for 'singular', occurs when referential cardinality is **1**; D, mnemonic for 'dual', occurs when referential cardinality is **2**; and P, mnemonic for 'plural', occurs when referential cardinality is **3**. I, mnemonic for 'inverse', occurs when the verb agrees with an inverse-marked noun (see Section ?? and below); I-agreement can occur when referential cardinality is **1**, **2**, or **3**.

Not all nouns in Kiowa trigger the same agreement type for a given value of referential cardinality. For instance, as just implied, for referential cardinality **1**, some nouns trigger S-agreement whereas others trigger I-agreement. A learner of Kiowa must learn the agreement behavior of each noun, just as a learner of French, German or Russian must learn the gender properties of each noun they encounter.

Information about the correlation between referential cardinality and agreement type is represented below in the form of mnemonics. In each triliteral mnemonic, the first letter indicates the type of agreement triggered when referential cardinality is **1**; the second letter the type of agreement triggered when referential cardinality is **2**; and the third letter the type of agreement triggered when referential cardinality is **3**. So, a noun, N, with the fictitious mnemonic DIP would trigger D-agreement when referential cardinality is 1 ('Here's an N' would show D-agreement); it would trigger I-agreement when referential cardinality is 2 ('Here are two N's' would show I-agreement); and it would trigger P-agreement when referential cardinality is 3 ('Here are three N's' would show P-agreement).

2.3 The noun classes

Merrifield (1959a) observed that Kiowa's noun classes are revealed through covariation between referential cardinality and agreement on the verb. I will now show that this methodology reveals the existence nine noun classes. (There are, of course, 4^3, or 64, mnemonically possible classes. Section 3.6 addresses why 55 are unattested.)

The nine classes, in mnemonic form, are:

(7)
a. SDP
b. SDI
c. SII
d. IDP
e. IDS
f. IDI
g. SDS
h. SSS [2]

[2]The class mnemonic SSS will turn out to have quite a different status from the others and a simple monoliteral mnemonic, 'S class', is in certain respects more appropriate. See Section 2.3.8. Similar comments apply to a subclass of nouns that fall under the PPP mnemonic. It should be borne in mind that the mnemonics are merely pretheoretic devices for organizing the data. It is not detrimental to their use as expository tools that the theory of later chapters shows that they mask deeper differences.

i. PPP

A noun from, say, the SDP class will be referred to as an SDP noun.

To illustrate the mnemonics, consider an SDP noun. When referential cardinality is **1**, we find S-agreement on the verb; when referential cardinality is **2**, D-agreement; and when referential cardinality is **3**, P-agreement. Consider also an IDS noun. When referential cardinality is **1**, we find I-agreement; when referential cardinality is **2**, D-agreement; and when referential cardinality is **3**, S-agreement.

To justify the existence of nine classes and the appropriateness of their mnemonics, it is necessary to show that each mnemonic corresponds to one or more nouns and that each noun is described by one of the mnemonics in (7), proceeding through each mnemonic in turn. Immediately below, I will concentrate only on showing that each mnemonic corresponds to one noun. Fuller lists of members of each noun class are given during the discussion of the classes' semantic coherence (Section 2.4), supporting the claim that all Kiowa nouns are described by one of the listed mnemonics.

As the following sections are rather data rich, it should be pointed out that the reader is not required to remember any individual fact or form given below. Empirical specifics will be repeated in the theoretical chapters as and when they become relevant. The main purpose of the discussion that follows is to acclimatize the reader to Kiowa, as it were, familiarizing them with morphological and semantic characteristics of the noun class system that will be treated in subsequent chapters. A summary of classes and their characteristics is presented in (85).

2.3.1 The SDP class

Consider **tóúdé** 'shoe'. When referential cardinality is **1**, the verb shows S-agreement.[3, 4]

(8) Tóúdé ∅- dɔ́ɔ́
shoe 3S-be
'It's a shoe'

When referential cardinality is **2**, the verb shows D-agreement.

(9) Tóúdé ȩ- dɔ́ɔ́
shoe 3D-be
'It's two shoes *or* a pair of shoes'

And when referential cardinality is **3**, the verb shows P-agreement.

[3] It is to be assumed in all of the following examples that the agreement shown is the only permissible option.

[4] It will quickly be noticed that the phonological form of the agreement prefixes bears no obvious relation to its gloss. The rather opaque relationship between prefixes' sound and meaning is a classic problem in Kiowa-Tanoan linguistics. See Chapter 5 for a discussion of the Kiowa case.

(10) Tóúdé gya-dɔ́ɔ́
shoe 3P- be
'They're shoes'

By triggering S-agreement when referential cardinality is **1**, D-agreement when referential cardinality is **2** and P-agreement when referential cardinality is **3**, **tóúdé** 'shoe' shows itself to be an SDP noun and so justifies SDP as a noun class mnemonic.

Subsequent mnemonics are illustrated by running them through the three sentence frames above: 'It's a __', 'It's two __s', 'They're __s'.

2.3.2 The SDI class

Tógúl 'young man' is an SDI noun.

(11) Tógúl ∅- dɔ́ɔ́
young_man 3S-be
'It's a young man'

(12) Tógúl ẹ- dɔ́ɔ́
young_man 3D-be
'It's two young men'

(13) Tógúúdɔ́ e-dɔ́ɔ́
young_man.INV I-be
'They're young men'

2.3.3 The IDP class

Kútaa 'pencil' is an IDP noun.

(14) Kútaadɔ e-dɔ́ɔ́
pencil.INV I-be
'It's a pencil'

(15) Kútaa ẹ- dɔ́ɔ́
pencil 3D-be
'It's two pencils'

(16) Kútaa gya-dɔ́ɔ́
pencil 3P- be
'They're pencils'

2.3.4 The IDS class

Áá 'tree' is an IDS noun.

(17) Áádɔ e-dɔ́ɔ́
tree.INV I-be
'It's a tree'

(18) Áá ę- dɔ́ɔ́
tree 3D-be
'It's two trees'

(19) Áá ∅- dɔ́ɔ́
tree 3S-be
'They're trees'

2.3.5 The IDI class

K!ɔ̂n 'tomato' is an IDI noun.

(20) K!ɔ̨̂ɔ̨dɔ e-dɔ́ɔ́
tomato.INV I-be
'It's a tomato'

(21) K!ɔ̂n ę- dɔ́ɔ́
tomato 3D-be
'It's two tomatoes'

(22) K!ɔ̨̂ɔ̨dɔ e-dɔ́ɔ́
tomato.INV I-be
'They're tomatoes'

2.3.6 The SDS class

P!ɔ́ɔ́ 'river' is an SDS noun.

(23) P!ɔ́ɔ́ ∅- dɔ́ɔ́
river 3S-be
'It's a river'

(24) P!ɔ́ɔ́ ę- dɔ́ɔ́
river 3D-be
'It's two rivers'

(25) P!ɔ́ɔ́ ∅- dɔ́ɔ́
river 3S-be
'They're rivers'

2.3.7 The PPP class

Hólda 'dress' is a PPP noun.

(26) Hólda gya-dɔ́ɔ́
dress 3P- be
'It's a dress' *or* 'It's two dresses' *or* 'They're dresses'

2.3.8 The SSS class

The appropriateness of the mnemonic SSS cannot be illustrated via the sentence frames used for the previous classes. Nouns in this class are all mass nouns and so uncountable. Nonetheless, the mnemonic can be justified, by mass-to-count conversion and conjunction.[5] The significance of employing means different from those used above in order to justify the current mnemonic is discussed at the end of the section.

As a preliminary to conjunction of SSS nouns, observe that an increase in referential cardinality due to conjunction has much the same effect on agreement as the implicit numeral modification above. Thus compare (27), seen above, with (28).

(27) Tógúl ẹ- dɔ́ɔ́
young_man 3D-be
'It's two young men'

(28) Ẹ́ḭde tógúl gɔ óíde ẹ- dɔ́ɔ́
this young_man and that 3D-be
'It's this young man and that (one)'

In both cases, referential cardinality is **2**, in (27), owing to implicit numeral modification,[6] in (28), owing to the conjunction of **ẹ́ḭde tógúl** 'this young man' and **óíde** 'that' (**1** + **1** = **2**). Similarly, compare (29), seen above, and (30).

(29) Tógúúdɔ́ e-dɔ́ɔ́
young.man.INV I-be
'They're young men'

(30) Ẹ́ḭde tógúl gɔ óíde yíí e-dɔ́ɔ́
this young.man and that two I-be
'It's this young man and those two'

In both cases, referential cardinality is **3**, in (29), owing to implicit numeral modification, in (30), owing to the conjunction of **ẹ́ḭde tógúl** 'this young man' and **óíde yíí** 'those two' (**1** + **2** = **3**).

Having illustrated that conjunction and numeral modification are equivalent for the purposes of noun class identification, we can now use conjunctions of SSS nouns to justify the use of this class mnemonic.

(31) Thọ́ṵ́ ∅- dɔ́ɔ́
water 3S-be
'It's water'

[5] Conjunction can also be used to justify the assignment of some mass nouns to the PPP class.

[6] This can be made explicit by inclusion of **yíí** 'two', as in (30)

(32) Thǫ́ų́ gɔ xóí ∅- /*ę- dɔ́ɔ́
water and coffee 3S-/ 3D-be
'It's water and coffee'

(33) Thǫ́ų́ gɔ xóí gɔ xóígúl∅- /*gya-dɔ́ɔ́
water and coffee and tea 3S-/ 3P- be
'It's water and coffee and tea'

Extra motivation for the SSS mnemonic comes from mass-to-count conversion, i.e., talk of **one water** meaning 'one portion / helping of water'. Though the mechanisms of mass-to-count conversion themselves require clarification, it is sufficient to defer this clarification for the moment and to observe that mass-to-count converted SSS nouns are still SSS.

First, observe the typical SSS agreement of a noun in this class.[7]

(34) Hɔ́ thǫ́ų́ɔ́lkhɔ́í an a- thónmɔ
Q whisky HAB 2S:S-drink.IMPF
'Do you drink whisky?'

Second, observe that in (35), 'whisky' has been converted to a count noun. Notwithstanding, we find S-agreement; D-agreement is unacceptable.

(35) Yíí thǫ́ų́ɔ́lkhɔ́í gya /*nen- thóm
two whisky 1S:S-/ 1S:D-drink.PF
'I drank two whiskies'

Even when the explicit measure phrase **k!ɔâl** 'dish, cup' is included, the verb shows agreement for the SSS noun class.

(36) Yíí k!ɔâl thǫ́ų́ɔ́lkhɔ́í gya /*nen- thóm
two cup whisky 1S:S-/ 1S:D-drink.PF
'I drank two glasses of whisky'

(37) Yíí k!ɔâl gya- thóm thǫ́ų́ɔ́lkhɔ́í
two cup 1S:S-drink.PF whisky
'I drank two glasses of whisky'

(38) Phą́ą́o k!ɔâl an gya /*gyat-hânmɔ
three cup HAB 1S:S-/ 1S:P-devour.IMPF
'I used to get through three glasses [of whisky]'

The irrelevance of the measure phrase **k!ɔâl** 'dish, cup' in determining the S-agreement above is further underlined by the following sentence.

(39) Páágɔ k!ɔâl xóí gya- thóm
one cup coffee 1S:S-drink.PF
'I drank one cup of coffee'

[7] **Thǫ́ų́ɔ́lkhɔ́í** 'whisky' [lit.: crazy water] is an SSS noun in virtue of its semantics: all liquids are in this class, as discussed below.

What is surprising here is the absence of inverse marking on **k!ɔâl** 'dish, cup'. It is an IDP noun:[8]

(40) K!ɔáttɔ bé- ót- x!ep
dish.INV 2S:I-drop.S/D-lay.S/D
'You dropped the plate'

(41) K!ɔâl men-ót
dish.INV 2S:P-drop.S/D
'You dropped two plates'

(42) K!ɔâl bat- p!ét
dish.INV 2S:P-drop.P
'You dropped some plates'

Being an IDP noun, it is expected to show inverse marking when referential cardinality is **1**, as it is in (39). Yet, there, it is no inverse marking. This suggests that nouns used as measure phrases do not function as normal nouns do for the purposes of number marking and agreement. Consequently, it is appropriate to attribute the S-agreement in the preceding sentences to **thǫ́ų̂ɔ́lkhɔ́í** 'whisky' and **xóí** 'coffee' and to conclude that these nouns remain SSS whether they are pure mass nouns or have undergone mass-to-count conversion.

We therefore have two means of justifying the SSS mnemonic. However, one might regard these as means of justifying only an S mnemonic. The problem is that mnemonics are meant to track agreement under changes of referential cardinality. As all putative SSS nouns are mass nouns, and as mass nouns lack referential cardinality—that is, as one cannot say *'It's a water' or *'It's two waters', *et cetera*—, the mnemonic seems to track something non-existent and so untrackable.

Though the strength of this objection is certainly palpable, it reveals at worst that there is a slight equivocation in the use and interpretation of triliteral mnemonics. If for other nouns they measure referential cardinality, what do they measure for mass nouns? Whatever it is they measure, it is certainly something worth measuring, as the agreement behavior of these mass nouns is not universal.[9] Now, it would have been possible, if more cumbersome, to moti-

[8]The reader may notice that (40) contains two verb roots, 'drop' and 'lay', whereas (41) and (42) contain just one, 'drop'. I have not been able to discover the difference that 'lay' makes. However, it should be noted that it is independent of referential cardinality.

(i) Hɔ̂ndé a- ót?
what 2S:S-drop.S/D.PF
'What did you drop?'

(ii) Étté gyat-ól- k!op
many 1S:P- drop.S/D-lay.P.PF
'I dropped a lot'

See Section 4.7 for discussion of the surprising combination of incorporated S/D 'drop' with main verb P 'lay' in (ii).

[9]Compare the non-singular agreement of English:

vate the previous mnemonics by use of conjunction-based sentence frames, such as 'It's a ___ and a ___', without mention of referential cardinality *per se.* In these frames, SSS nouns would be motivated straightforwardly and without raising cardinality-based qualms. It would have been an open question whether the factors that determine agreement in each instantiation of the sentence frames are the same. However, this question would not have been thrown into relief during this expository phase, as it has been by the use of referential-cardinality-based sentence frames. These considerations serve to underline that the mnemonics are merely useful devices for data organization but themselves require theoretical explanation. Such explanation is offered in the coming chapter and, in the meantime, I continue to use the triliteral mnemonic SSS, for notational uniformity.

2.3.9 The SII class

The SII class is special. Its sole member is the first person and it is the only class triggering I-agreement for referential cardinality **2**. Its existence is justified on the basis of morphological syncretism. The first person in Kiowa exhibits four interesting properties. We will see later that all follow straightforwardly from the assignment of first person to an SII class. However, this demonstration must wait until analysis of the other eight noun classes has provided a certain quantity of theoretical apparatus. For now, I present the four sets of syncretisms to be explained and motivate cursorily the existence of an SII class. The reader is reminded that the facts need not be understood in their full detail at this stage; rather, they are presented so as to give a feel for how the language works.

Syncretism #1. For agents of (di)transitives and the subjects of unaccusatives, the first person exclusive dual and first person exclusive plural trigger I-agreement.[10, 11]

(43) Nɔ́ɔ́ a- dɔ́ɔ́
1 1S-be
'It's me'

(i) Tea and coffee taste(*s) good

with Kiowa:

(ii) Xóígúl gɔ xóí ∅ /*ę- t!ólǫǫ
tea CONJ coffee 3S/ 3D-tasty
'Tea and coffee taste good'

Whereas the English sentence shows the plural agreement typical of any conjunction, whether of mass nouns or not, the Kiowa sentence shows S-agreement, the agreement as triggered by either conjunct alone.

[10]Unergatives in Kiowa generally exhibit object agreement and so may be classed with transitives.

[11]Kiowa has only two pronouns. **Nɔ́ɔ́**, glossed below as '1', is used for first person singular, dual and plural, inclusive and exclusive. **Ám**, glossed below as '2', is used for second person singular, dual and plural. For third person, deictics are used as described by Watkins (1984).

(44) Nɔ̃ɔ̃ e- dɔ̃ɔ̃
1 1D.INCL-be
'It's me and him *or* me and her'

(45) Nɔ̃ɔ̃ e- dɔ̃ɔ̃
1 1P.INCL-be
'It's me and them'

Compare (44) and (45) with (46) which has I-agreement in virtue of the inverse-marked **tógúúdɔ́** 'young men'.[12]

(46) Tógúúdɔ́ e-dɔ̃ɔ̃
young_man.INV I-be
'They're young men'

The emergence of I-agreement—*inverse* agreement—for referential cardinalities **2** and **3** is by itself suggestive of a SII class.

Syncretism #2. For agents of (di)transitives and the subjects of unaccusatives, the first person inclusive dual and first person inclusive plural trigger 2P-agreement. That is, it exhibits the same pattern as Syncretism #1, though it is syncretic with second person plural.

(47) Nɔ̃ɔ̃ ba- dɔ̃ɔ̃
1 1D.INCL-be
'It's me and you.S'

(48) Nɔ̃ɔ̃ ba- dɔ̃ɔ̃
1 1P.INCL-be
'It's me and you.DP'

Compare (47) and (48) with second person plural agreement in (49). Note that (49) does not have a dual reading; the dual would have the prefix **ma-**, not **ba-**.

(49) Ám ba-dɔ̃ɔ̃
2 2P-be
'It's you.P'

Syncretism #3. For indirect and direct objects, the first person inclusive dual, the first person inclusive plural, the first person exclusive dual, and the first person inclusive plural all syncretize. Moreover, these forms are distinct from the inverse and second plural as well as from other persons.[13]

[12]D-agreement is always nasal in Kiowa, unless a structurally higher position is non-singular (see Harbour (forthcoming 2003), or Chapter 5, for details). Consequently, the lack of nasality in (44) and (47) is genuinely noteworthy and stands in need of explanation.

[13]More specifically, for given values of object agreement (D, I, S, P), some of the prefixes in this group are homophonous with others. E.g.: **dét** means both 3S:1D/P:D (as in 'He gave us two cats') and 3S:2S:D (as in 'He gave you.S two cats'). However, this is phonological coincidence, not a principled syncretism, and second singular indirect object agreement is not identical with first non-singular indirect object agreement for other values of object agreement: for instance, 3S:1D/P:I (as in 'He gave us many cats') is **dɔ̃t**, whereas 3S:2S:I (as in 'He gave

(50) Dɔ́- bǫ́ų́
3P:1D/P-see.PF
'They saw me and you *or* me and him *or* me and them'

(51) Báougɔ dɔ́t- ɔ́ɔ̨
cat.INV 3P:1D/P:I-give.PF
'They gave cats to me and you *or* to me and him *or* to me and them'

Syncretism #4. First person never distinguishes dual from plural. This can be verified by examining Syncretisms #1–3. However, this should not be misinterpreted as claiming that there is no syntactically represented, semantically contentful difference between first person dual and first person plural in Kiowa. The difference is evident in the suppletion they condition in the number-sensitive predicates discussed at length in Chapter 4.

(52) A- x!óígyá
1S-fall.S/D.PF
'I fell'

(53) E-x!óígyá
I- fall.S/D.PF
'She and I fell'

(54) E-k!úígyá
I- fall.P.PF
'They and I fell'

The existence of an SII class will be justified by the role it plays in deriving the syncretisms above. We return to them in Section 2.3.9.

2.4 Semantic coherence of the classes

We have seen that each mnemonic corresponds to some noun. It must now be shown that each noun falls under some mnemonic. Ideally, to show this, we would assign every noun in the language to one class or another. Such thoroughness belongs, however, to a project of dictionary writing. (Laurel Watkins has a dictionary of Kiowa well advanced for which she has recently adopted the system of noun class mnemonics argued for here.) In the scheme of this dissertation, however, such thoroughness is excessive. To make this apparent, I will briefly explain the relevance of noun classes' semantic coherence to the aims of the dissertation as a whole. At the same time, this will set the standard of proof for the discussion that follows.

This dissertation is concerned with the number features provided by Universal Grammar, their semantics and their syntax. In the next chapter, I will argue from the noun class mnemonics to the existence of three number features. These features are shown to classify Kiowa nouns, just as gender features classify nouns

you.S two cats') is **gɔ́t**.

in Romance, and so to define the noun classes. However, deducing the existence of features on the basis of morphology tells us little about their meaning. Such semantic information is provided by the relationship between the features and the shared semantic properties of the nouns they classify. Consequently, the focus below is on the semantic properties common to the members of each class. That is, I establish the following claim:

(55) Kiowa nouns classes are internally coherent in that there are semantic properties common to members of a given noun class.

The reader will observe as we progress through the classes that there is unlikely to be a noun that cannot be assigned to any class, especially given that, e.g., SDI is the default for animates, IDP for vegetation and implements, and SDP is default in general. Consequently, establishing (55) implies that every noun in Kiowa does in fact fall into some class or other.

Let me now clarify what constitutes success in showing that the noun classes are semantically coherent, or rather, let me forestall three likely misunderstandings of what constitutes failure.

Non-uniqueness. The claim that classmates cohere semantically does not entail the converse, that semantically coherent nouns are classmate. Falsehood of the converse is not surprising, as one noun can possess characteristics of two classes. For instance, rivers are moving bodies of water. Consequently, **p!ɔ́ɔ́** 'river' might reasonably be assigned to one of two classes: to SDI, which contains many things that move autonomously, or to SDS, which contains many bodies of water. As nouns must be assigned to one class or another—class membership is not determined 'on-line' according to the property most salient at the moment—'river' cannot be classmate with every noun that it shares semantic characteristics with. Interestingly, Dr McKenzie, with whom Watkins worked, assigned 'river' to the SDI class, whereas the speakers with whom I have worked assign it to the SDS class.

Arbitrariness. Semantic generalizations over members of a class need not be exceptionless. Exceptions are typical of noun class systems. For instance, in Russian, there is a strong implication from real-world gender to grammatical gender. Thus, nouns denoting females generally end in **-a** in the nominative singular, as do **ženščina** 'woman', **devuška** 'girl', **tsarina** 'czarina', **Karenina** 'female of the Karenin family'; such nouns end in **-u** in the accusative singular. By contrast, nouns denoting males generally end in **-a** in the accusative singular, but in a consonant in the nominative, as do **starik** 'old man', **mal^{j}čik** 'boy', **tsar^{j}** 'czar', **Karenin** 'male of the Karenin family'. `cite whom for general discussion?` Despite these robust generalities, **mužčina** 'man', ending in **-a** in the nominative singular, patterns with female-denoting nouns. At the other end of the classificatory spectrum are languages like Arapesh in which class membership is primarily a matter of phonology (Foley 1986, Aronoff 1994). Here too nouns are found in classes without exhibiting the class' phonological characteristic. Such classificatory residue does not undermine the claim that noun classification in Russian or Arapesh is systematic. The same will be true of Kiowa.

Subclasses. A single semantic characteristic need not be common to all the nouns in a given class. Instead, they can divide into subclasses where the nouns in each subclass share a single characteristic. We will see examples of this, for instance, in the PPP class, which subsumes both abstract and pluralia tantum nouns, and in the IDI class, which comprises a hair and a fruit subclass. Subclasses do not undermine the claimed internal coherence of the classes for the following reason. Classes are defined by a classifying number feature. Let P and P′ be two properties and let [F] be a number feature. If there are conceptually natural relations both between P and [F], and between P′ and [F], then [F] can serve as the classificatory feature for nouns exhibiting either property. Consequently, the noun class defined by [F] will comprise two subclasses. Examination of the internal semantic coherence of noun classes is a means to discover the semantics of the number features. Having two semantic characteristics that correlate with a single number feature is beneficial, not detrimental.

To reiterate, then, the aim is to show that nouns in each (sub)class share a semantic characteristic.

2.4.1 The animate classes

The SII class

This class is trivially semantically coherent, having a single member, the first person.

The SDI class

The SDI class subsumes all animate nouns and several inanimate nouns that share certain interesting properties with animates, centering on motion.[14] Let us begin with animacy.

Human animates. The following words for humans and relations are SDI.

[14] Cf., 'motility' (Noyer 1992).

(56)

Gloss	1 / 2	3
baby	iip!ɔ́ɔ́gya	iip!ɔ́ɔ́gɔt
child	íí	yyóí
child	sân	sâ̜a̜dɔ
boy	thalíí	thalyóp
girl	máthɔn	máthɔ̜ɔ̜dɔ
young man	tógúl	tógúúdɔ́
young woman	yɔ́kɔ́í	yɔ́kɔ́ígú
man	k!yá̜á̜hî̜i̜	k!yá̜á̜hyóp (/hyôm/hyô̜i̜)
woman	maayí̜	maayóp
old, old man	k!yápthɔɔ	k!yápthɔɔgɔ
maternal uncle	tê̜i̜	tê̜i̜dɔ
father's mother	thál	tháályóp
wife	thâa	thêi
husband	k!íí	k!yóí
women's sister	p!íí	p!yóí
man's sister	thá̜á̜	thá̜á̜dɔ

Similarly falling under the SDI mnemonic are designations for humans formed by attaching a gender suffix, **-k!ii** 'male' or **-maa** 'woman', to a group name, such as 'Apache', 'Comanche', 'Mexican', 'White', or adjective or noun, such as 'crazy', 'chief', 'big, old'.

(57)

Gloss	1 / 2	3
Apache man	Thɔgúik!ii	Thɔgûi
Apache woman	Thɔgúimaa	Thɔgûi
Comanche man	Kyâik!ii	Kyâigu
Mexican woman	K!ópt!ɔ́khɔ́ímaa	K!ópt!ɔ́khɔ̂i
White man	T!ɔ́khɔ́ík!ii	T!ɔ́khɔ̂i
Black man	Paidômdek!ii	Paidô̜u̜bɔ
Black man	Khó̜ú̜gí̜o̜u̜k!ii	Khó̜ú̜gí̜o̜u̜
chief	k!yátáík!ii	k!yátâi
madman	ɔ́lkhɔ́ík!ii	ɔ́lkhɔ̂i
elder[15]	êlk!ii	bî̜i̜dɔ

When referential cardinality is **3**, the gender suffix is omitted and is replaced by the inverse (Watkins 1984, p. 196).

Non-human animates. Also in the SDI class are animal, bird, reptile and insect names. McKenzie (n.d.a) lists 135 birds and reptiles and McKenzie (n.d.b) lists 154 mammals, all but one SDI nouns.[16] A sample, and some insects

[15]'Old', from which comes 'elder' in (i), is suppletive for number in Kiowa. See Chapter 4 for discussion.

[16]The unique exception is the SDP noun **kɔ̂l**, for which McKenzie writes:

> A cow or cows; a buffalo or buffaloes; usu., in the sense of "beef" or "beeves." Sometimes, "herd" or "herds." (The term has only one form--like English "sheep.") (McKenzie n.d.b, p. 3)

Observe that the availability of the collective 'herd(s)' makes this word different from SDI and similar creatures, is given below (not all from McKenzie's lists).

(58)

Gloss	1 / 2	3
dog	xégun	xégų̨dɔ
horse	xę̂į	xę̂įgɔ
kid	káábolíiii	kááboliiyyoi
bird	t!ęįné	t!ęįnóp
cedar waxwing	zont!ɔɔiyátmaa	zont!ɔɔiyátmaimɔ
quail	pę̂įsyan	pę̂įsyąądɔ
snake	sąąné	sąąnóp[17]
frog	khɔɔlék!yâalé	khɔɔlék!yâalóp
rattle snake	sąąnéhįį	sąąnéhyǫį
butterfly	khɔibatôulé	khɔibatôulóp
grasshopper	k!ɔɔlɔ́tkɔ̂ɔyí	k!ɔɔlɔ́tkɔ̂ɔyóp
spider	k!ǫǫnɔ́ɔ́thǫǫ	k!ǫǫnɔ́ɔ́thǫǫgɔ

Inanimates. Thus far, all SDI nouns have been animate. Indeed, there is an implication from animacy to the SDI class, as Watkins observes. However, the implication is one-way: there are inanimate SDI nouns. One such is **hę̂įii** 'doll'. This suggests that entities animate-like in some respect are considered animate enough for SDI membership. In the case of 'doll', the nature of this likeness is clear. So, it is reasonable to ask what else are core properties of animate beings that non-animate beings might share.

Self-propulsion or the ability to determine the course of motion is one such property. Several SDI inanimates may be explained in this way, including heavenly bodies, machines and implements.[18]

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animals.

[17]A phonological observation: The inverse form of 'snake' is sometimes pronounced as **sąąnyóp**, i.e., the **é** appears to form a glide rather than deleting (**ny** does not indicate $\tilde{n}$, but $n{+}y$). This glide-like aspect of **e** is seen in two other contexts. First, in the diphthongs **ai**, **oi**, **ui**, **ɔi**, the height of the orthographic **i** is determined by that of the preceding vowel. So, though **ui** contains an **i** proper, **ai** and **ɔi** sound rather like **ae** and **ɔe**, especially in slow speech. At times, in speech at normal speed, the verbal agreement prefix **e-** 'contracts' to **-i** after a low vowel. See (71) for such a context. Second, all the Kiowas I have worked with have an optional process of backward spreading of glides across consonants. (This is in addition to the forward spreading of glides across **h** and **?** described by Harrington (1928, p. 11), which is near obligatory. Watkins was aware of the backward spreading (p.c.), however, with her principal informant regarding it as improper, it did not receive mention in her book.) An example is **t!áígya** for the more frequent **t!áágya** 'pleasant'. Interestingly, such backward spreading can be triggered by **e**, as in **ɔ́lp!ɔ́ǫ́įméí** for the more frequent **ɔ́lp!ɔ́ǫ́ǫméí** 'wash.PF'.

[18]Watkins gives **p!ɔ́ɔ́** 'river' as an SDI noun, which might be explicable on these lines. For my consultants, it is SDS, however.

(59)

Gloss	1 / 2	3
star	tą́ą́	tą́ą́gɔ
moon	p!ɔ́ɔ́	p!ɔ́ɔ́gɔ
sun	páí	páígú
wheel, wagon, car	k!ɔ́dál	k!ɔ́dáttɔ
car	khɔ̂ɔ	khɔ̂ɔgɔ
car	ɔ́l(ɔ́)mɔ́bíl	??
knife	k!ɔ̂ɔ	k!ɔ̂ɔgɔ
scissors	t!ą́į́khɔ́tháá	t!ą́į́khɔ́tháá gɔ
axe	hǫ́ǫ́thǫų	hǫ́ǫ́thǫųgɔ
hoe	dɔmkûu	dɔmkûu gɔ
comb	ɔ́lsǫ́ų́	ɔ́lsǫ́ų́gɔ
eyebrow tweezers	tááɔlxon	tááɔlxǫųdɔ
awl, (bone) needle	xǫ́ų́	xǫ́ų́gɔ

However, three terms given by Watkins do not lend themselves to this way of thinking: **k!ɔ̂ɔsǫų** 'whetstone' [lit.: knife-grind], **hôux!o** 'decorative silver button (worn on head)', and **t!ǫ́ǫ́** 'spoon'. She suggests for the latter being made of animal material as relevant—Kiowas frequently made spoons from horn, an SDI body part.

Several body parts belong to the SDI class. Watkins lists the following:[19]

(60)

Gloss	1 / 2	3
heart	thén	thę́į́dɔ
liver	t!ɔ́lel	t!ɔ́lettɔ
kidney	t!ɔlthɔn	t!ɔ́lthǫǫdɔ
gall bladder	t!ǫ́ǫ́dé	t!ǫ́ǫ́gɔ́
eye	táádé	táágɔ́
ear	t!ɔ́ɔ́dé	t!ɔ́ɔ́gɔ́
tongue	dén	dę́į́dɔ
leg	thǫ́ų́dé	thǫ́ų́gɔ́
knee	t!elbǫ̂ų	t!elbǫ̂ųgɔ
hip	pííthel	pííthettɔ
buttocks [sic.]	t!él	t!éttɔ
toe	ɔnthál	ɔnháttɔ
spine	gómthǫ	gómthǫgɔ
spinal cord	pâisen	pâisęįdɔ
neck	k!ól	k!óttɔ
horn	gų́ų́dé	gų́ų́gɔ́
tooth	zǫ́ų́	zêm
tripe	ɔ́ɔ́bį́į́	ɔ́ɔ́bį́į́gɔ́
hide	khɔ́í	khɔ́ígɔ
egg	t!ą́į́	t!ą́į́mɔ

[19] She also includes **mɔnx!ǫ́** 'fingernail'. In my fieldnotes, this is SDS, as are **ɔnx!ǫ́** and **ɔnk!ɔ́n**, both of which mean 'toenail'.

Some of these body parts are again suggestive salient properties of animate beings, such as motion and movement ('legs', 'spine', etc.), perception and speech ('ear', 'eye', etc.), being a major organ ('heart', 'liver', etc.). Others ('horn', 'tooth') are implement-like, as are some items in (59). However, the last three in the list admit no such explanation.[20]

For the most part then, we see that SDI nouns are animates or inanimates that share certain salient with animates, such as ability to move or determine direction of motion. There is a residue of cases not readily explained by such principles. However, their relative rarity suggests that the principles are broadly correct and that the exceptions may be no more than the slight arbitrariness expected of any class system. Alternatively, the correct analogy with animate entities may simply have eluded me or these organs may be subsumed under a separate subclass in virtue of a different semantic property. In either case, they do not undermine the claim that members of the SDI class semantically cohere.

2.4.2 Symmetric non-constant classes

There are four classes with symmetric mnemonics, i.e., mnemonics of the form XYX. Two of these, PPP and SSS, are constant, whereas as the other two, IDI and SDS, are non-constant. We turn to the latter pair now. Section 2.4.3 addresses PPP and SSS.

The IDI class

The IDI class is very small, with only eight members (four, according to previous reports), mostly hair and fruit.[21]

(61)

Gloss	**2**	**1 / 3**
hair (of head)	ɔ́l	ɔ́ɔ́dɔ́
eyebrow	tááɔl	tááɔɔdɔ
eyelash	táápho	táápho gɔ
apple / plum	álɔɔ	álɔɔgɔ/bɔ
orange	thǫ́t!ólǫ̨ǫ̨	thǫ́t!ólǫ̨ǫ̨gɔ
tomato	k!ɔ̂n	k!ǫ̂ǫdɔ
blackberry	sąąnéei	sąąnéeigɔ
brain[22]	k!yágóp	k!yágóp

[20]These also fall beyond Watkins' observation that 'most of the [SDI] nouns are either paired (eye, ear) or individual organs' (p. 82). (Takahashi 1984) suggests that SDI body parts are 'attention grabbers' (**page?**). Perhaps this is so; though I am uncomfortable with attention grabbing as a criterion for class membership.

[21]**Póúei** 'strawberry' may also belong to this class. On one occasion, Mr Bointy assigned **phídátkyá** 'cantaloupe' to this class, though at all other times, he and others treat this as an IDP noun.

[22]When a noun takes a zero allophone of the inverse marker, as is common for *p*-final nouns like **k!yágóp** 'brain', class membership is still detectable through Merrifield's method of examining the agreement the noun triggers on the verb for referential cardinalities **1**, **2**, and **3**.

Fundamental to this class is, I suggest, Chierchia's observation that the Italian **capelli** is a count noun whereas its nearest English counterpart, **hair**, is a mass noun (Chierchia 1998). Hence the following contrast, where the singular is preferred to the plural in English, but vice versa in Italian.

(62) a. My hair is long
b. ??My hairs are long

(63)

a.	??Il	mio	capello	è	lungo	
	the.MASC.S	my.MASC.S	hair	is	long.MASC.S	
b.	I	miei	capelli	sono	lunghi	
	the.MASC.P	my.P	hair	are	long.MASC.P	

'My hair is long'

He goes on to observe that 'hair' vacillates between a mass noun and count noun crosslinguistically, in contrast to strongly count nouns, such as 'man' or 'woman', or strongly mass nouns, such as 'sand' or 'water'.

IDI nouns are those that can be easily regarded either as individual or as part of collections. With regard to hair, this arises because individual strands of hair are clear individual, minimal parts of bodies of hair. In a body of hair—a head of hair, or an eyebrow, or a fringe of eyelashes—, the individual parts are not readily recognizable, and so the body too may function as an individual, albeit a group-like one.

IDI fruits—apples, plums, oranges, blackberries, tomatoes—naturally occur in large collections, when growing on the tree or vine. However, when consumed, with the exception of berries, they tend to be consumed individually. Thus, like hair, IDI fruits can naturally be conceived of as individuals or as part of collections.

This line of thought does not readily extend to brains. They are certainly composed of parts poorly distinguishable in the whole; however, I do not know whether their typical mode of preparation in Kiowa cookery would break them into distinguishable subparts.[23] Leaving brains aside, IDI nouns share two properties: natural occurrence in large collections, and yet occurrence in forms that make them easily distinguished, when removed from the group.

Watkins has observed a third, morphosemantic, property of this class. The non-inverse-marked noun yields a 'different types of' reading. As illustrated below, this triggers S-agreement.

(64) (Watkins 1984, p. 88–9)

Álɔɔ	bâa-	bɔɔ
apple	2P:1S:**S**-bring.IMP	

'Bring me apples [of three or more sorts]'

[23]Mrs Dupoint said:

An k!yágóp dé-pɔ́ttɔ. T!ę̣néxeiyot!ą̨mɔ gɔ k!yágóp ét-khɔleitɔnmɔ. E-ɔɔt!olɔ̨ɔ̨

'I eat brains. They cook them together with chickens' eggs. It's really delicious.'

The implication was that brains and eggs were scrambled.

(65) Hɔ́ndé ɔ́l bɔ́- sɔ̨̀ɔ̨́míí
what hair :2P:S-interesting
'What interesting [kinds of] hair you all have'

Observe, again, the relevance of grouphood and its connection to S-agreement.
IDI nouns are semantically coherent in virtue of three properties.

The SDS class

Like the IDI class, the SDS class is comparatively small. It subsumes:[24]

(66)	tóú	house (not teepee)
	hǫ́ɔn	path, road
	phán	cloud
	xenthǫ́ų́	puddle
	séíxó	pond
	p!ɔ́ɔ́	river
	dɔ́m	land(holding)
	dɔ́ɔ́gya	song
	mɔ́nx!ǫ́	fingernail
	ɔnx!ǫ́	toenail
	ɔnk!ɔ́n	toenail
	sôude	ring

The nouns in (66) are again semantically coherent. All are clearly individuable: one can tell one river from another, one song from another, and so on. However, the shape of one is a poor indicator of the shape of another. That is, clouds, houses, paths, *et cetera* might be termed non-shape-inductive (cf., Takahashi 1984). Strong support for this intuition comes from my having discovered that 'cloud', 'puddle' and 'song' are SDS by thinking of things that are individuable but non-shape-inductive.

Non-shape-inductiveness may connect interestingly with the property of grouphood discussed with regard to the 'different types of' reading available for IDI nouns when they trigger S-agreement (see also IDS nouns, below). Trigger S-agreement when referential cardinality is **3** was said to correlate with grouphood, i.e., whether individual members of a plurality were easily distinguishable. SDS nouns too trigger S-agreement when referential cardinality is **3**, and non-shape-inductive plausibly makes individuals hard to distinguish amongst a plurality: concretely, the difficulty lies in recognizing where one pond, puddle, cloud, house, or song begins and the other next begins.[25]

[24] Watkins gives **xóí** 'liquid' as SDS. I have this word only as SSS with the meaning 'coffee'. Given that all liquids I have recorded are SSS, to find 'liquid' in this class would be surprising, unless it meant 'body of liquid', a sense similar to several items in (66).

[25] I do not see how to apply the reasoning of this and the preceding paragraph to 'ring'. The answer may depend on what traditional Kiowa rings looked like. Alternatively, further investigation may show the class to contain several nouns that share with rings properties for which SDS is semantically natural. Given the presence in this class of finger- and toenails, the property might be 'being an appendage of the finger', though I am at a loss as to why finger

2.4.3 Symmetric constant classes

Kiowa has two more classes with symmetric mnemonics, PPP and SSS. These are strongly semantically coherent.

The SSS class

The SSS class consists exclusively of non-granular mass nouns, such as 'milk' and 'honey', or mass nouns of dubious granularity, such as 'snow' and 'sleet', which, if granular, are so primarily when descending.

(67)		
	thǫ́ų́	water
	thǫ́ų́ɔ́lkhɔ́í	whisky
	phítt ǫ́ų́	beer
	thǫ́ų́gul	soda
	thǫ́ų́t!ólǫǫ	juice, soda
	kɔ́lzep	milk
	xóí	coffee
	xóígúl	tea
	t!elséppenhaa	honey
	áápenhaa	honey, syrup
	sép	rain
	t!ól	snow
	t!én	hail, sleet
	sɔphán	ash
	pénhaa	sugar
	tę́ígya	ice
	sén	snot, mucous
	táásek!ɔn	eyebutter[26]

All the names for liquids in my fieldnotes are in this class. Its semantic coherence should be clear.

The PPP class

The PPP class is more heterogeneous than the SSS class, subsuming two or, depending on the speaker, three subclasses: pluralia tantum and composite nouns, abstract nouns, and, for some, granular mass nouns.

Pluralia Tantum and Composite Nouns. Objects composed of several parts are constant plurals in Kiowa. These include items familiar as pluralia tantum from English, such as 'trousers'.

appendages should be SDS.

[26]'Eyebutter' is Mrs Kodaseet's translation. It refers to the mucus that collects and dries in the corner of the eye when one is sleeping; 'sleepy dust' in my English.

(68)

k!ɔ́dálɔɔgya	hoop game
olphą́thɔɔgya	pack saddle
tóú	teepee
ól	belongings
pál	quilt
khɔ́ɔ́dé	trousers
t!ǫ́ų́gya	shirt, clothing
k!ólphąą	necklace
k!ókɔ́íouphɔl	roach (headdress)
aat!ɔhɔ́í	war headdress
k!ólphą	choker
kút	book, letter, picture

Granular Mass Nouns. Granular mass nouns are distinguished from non-granular mass nouns in having natural minimal parts. Thus, sand, which comes in grains, is granular, whereas water, which does not, is not.[27] Some examples are:

(69)

péígya	sand
ɔ́ɔ́thą́t!ąį	salt
xóíséǫųgya	pepper
éítǫ	flour
éíyóguuei	rice

These nouns are classified as PPP on the basis of conjunction, analogously to SSS nouns:

(70)

Ɔ́gɔ	gya-kót	gɔ	ɔ́gɔ	gya-phɔ́ɔ́	dé
REL	3P- expensive	and	REL	3P- cheap	NOM

gya-/*ę-	mɔsótdɔɔ
3P- /	3D-be_mixed

'The expensive and the cheap (salt) are mixed up'

Although two quantities of salt are talked of, we find P-agreement, not D-agreement.

It is, however, to be noted that these nouns are not PPP for all speakers. Rather, they appear to be IDP nouns, with the inverse-marked noun corresponding to the minimal part:

[27] Recall that **pénhaa** 'sugar' is SSS even though it is granular. Two explanations appear plausible for this. Decades ago, when Kiowas would first have encountered sugar, it commonly came in blocks and was not readily available granularly. Also, recall from (67) that **pénhaa** is the base of 'sugar' and two words for 'honey'. It is possible, then, that the Kiowa for 'sugar' really means something like 'sweet stuff'. (According to Mr Bointy, **pínha** is the Comanche for 'sugar'.)

(71) Xóísę́ǫ̨gɔt mɔ́ɔ́ e-ét
pepper.INV[28] like I-big.S
'The pepper grain is kind of big'

Such speakers permit a corresponding dual reading for the granular sense.

(72) Ę́įde yíí xóísę́ǫ̨gya ę- bîn
this two pepper 3D-big.D/P
'These two grains of pepper are big'

However, speakers for whom granular mass nouns are PPP strongly reject sentences like (71) and (72).[29] Instead, such speakers offer **syɔ́ndé xóísę́ǫ̨gya** 'a little pepper' as a Kiowa equivalent for 'a grain of pepper'.

PPP classification of granular mass nouns is on a semantic par with the treatment of pluralia tantum: both trousers and piles of salt are single objects composed of complex parts. Note, however, that this composition of parts differs from the group-like IDI and SDS plurals (and IDS below). There, the plurality consists of naturally salient parts, such as apples or hairs, or houses or rivers. In the case of pluralia tantum nouns, the constituent parts are non-uniform and so there is no minimal part; and, in the case of granular mass nouns, though there are minimal parts, a grain of sand is not salient to the same extent as, say, an apple is.

Abstract Nouns. The second use of PPP classification common to all speakers is reserved for abstract nouns. Watkins observes that abstract nouns, such as 'zero', 'biology', 'adverb' are PPP (though, with the discussion focused on productivity of noun classification, Kiowa examples are not provided; Watkins 1984, p. 92). The following from my fieldnotes fit this description.

(73)

mɔɔ́íde	problem
kúngya	dance
tǫ́ǫ́gya	word, language
dę́ígyá	sleep
sɔ́ɔ́tégya	work

She hypothesizes that this is a natural extension of the use of P-agreement for unidentified or unspecified arguments, exemplified below.

(74) Gya-gį́į́- sal (Harrington 1928, p. 64)
3P- night-be_hot
'It's a hot night'

[28]**Xóísę́ǫ̨gya** 'pepper' is ethnoetymologically interesting. When Kiowas first encountered it in US Government rations, they had no use for it and so invented one: a flavoring for coffee. Literally, **xóí+sę́ǫ̨gya** is 'coffee'+'perfume'. This use of pepper is no longer current; however, the combination of flavors is surprisingly natural. I recommend it with honey as sweetener.

[29]Watkins gives no granular mass noun as PPP but assigns them to her Class II, a superclass of my IDP (her IIa) and IDS (her IIb). Her exposition of the noun class system does not dwell on mass nouns and so the crucial sentences are not supplied.

(75) Yą́- kɔ̂m háágyá gya-k!úl (Watkins 1984, p.
2S:1S:P-indicate.IMP where 3P- be_lying.P
'Show me where they are'
235)

(76) Nɔ́ɔ́ mán- pį́į́ɔ́mtɔ́ɔ́ nɔ dáal mán- pɔɔ (ibid., p.
1 1S:2D:P-cook.FUT CONJ must 2D:P-eat.IMP
'I will *or* If I cook for you, you must eat'
237)

If this is correct, then PPP classification of abstract nouns is independent of pluralia tantum, composite nouns and granular mass nouns. Consequently, the class is semantically coherent, but comprises two morphologically indistinguishable subclasses, a state of affairs that does not undermine the general point.

2.4.4 The default classes

Finally, Kiowa has three classes that may be regarded to some extent as defaults. This means that the criteria for inclusion in the classes is often negative, resulting in a lack of strong semantic coherent for each class. Notwithstanding, some semantic principles are to be discerned.

The IDP and IDS classes

The IDP and IDS classes are the largest in the language. They subsume 'plants and plant material, natural and man-made objects and a small number of body parts' (Watkins 1984, p. 85). Examples from each of these categories is provided below.

(77)	áá	tree
	séáá	willow
	khį̂įgulaa	redbud
	ááhįį	cottonwood
	ááthap	cottonwood
	zónaa	pine tree
	kɔ́laa	elm
	thɔɔáá	elm
	ááeiphep	hackberry
	zépgutk!oaa	Osage orange
	ǫǫkuáá	pecan trees
	álɔɔaa	peach tree
	phohónaa	walnut tree
	ááhyalaa	persimmon tree
	tą́ípéei	skunkberry bush
	sę́į́	peyote, cactus
	éíthâl	corn
	t!ettéei	grape vine
	són	grass
	thǫ́ų́éí	watercress
	thépsɔyaa	weed

(78)	éí	seed
	áídęį	leaf
	zemk!ɔ́ɔ́te	nut
	ǫǫkuéí	pecan nuts
	phohónei	walnuts
	áákhįįgya	flower
	t!ɔ́lthɔn	bean
	phídátkyá	cantaloupe
	sôl	onion
	k!íí	firewood

(79)

dɔál	bucket
áátha	saw
zêiba	arrow
xát	door
khɔ́ɔ́	blanket
tɔnphą̂ą	belt
tɔ̂ide	breech cloth
phą́ą́tol	cradle
sálpakomgya	fan
thááde	match
thɔ̨̂ɔ̨	gourd rattle
sɔ́ɔ́tol	pipe
khį̂į	shield
mɔ́x!ą́į́	paper
t!ą́į́	(bed) sheet
tól	peg, stake

(80)

thǫ́ų́se	bone
x!ǫ́ų́gya	downy feather
áá	hard-stem feather
gúú	rib
mɔɔk!ɔ́n	nose, beak
ɔ́lthǫ́ų́	head
tę́į́	sinew
kyâip!ɔn	scalplock
áál	lymph gland
ɔnsóú	foot
sóp	penis
ɔɔzáá	udder
sékhǫ́ų́	large intestine
sét!ą́į́	small intestine
x!ól	wing

Given the classes' size, membership is best defined negatively, as excluding all plants, natural objects, man-made objects and body parts the belong to other classes.

Definition by exclusion suggests that these classes are, to varying degrees, defaults. However, this is not to say that they are incoherent. Watkins observes that compounds built on **áá** 'stick, pole, tree, brush, timber' provide insight into the difference between the basis of IDP~IDS classification. Trees that grow in spinneys and groves are naturally grouped and hard to individuate, so that the collection of trees itself can by thought of as a single unit. Such trees tend to IDS nouns. Indeed, **áá** as an IDS noun means simply 'tree'.

(81) **IDS**

áá	tree
zónaa	pine
ááeiphep	hackberry
thɔɔáá	elm
ɔ̨ɔ̨kuáá	pecan

This is corroborated by a spontaneous comment of Mrs Dupoint's: the following sentence would be said when one sees a grove.

(82) Téí phohónaa ∅- dɔ́ɔ́
all walnut.tree 3S-be
'They're all black walnuts'

By contrast, IDP trees tend to easily individuable even when there are several of them. This can be due either to their relative smallness or distance from other trees of the same kind.

(83) **IDP**

séáá	willow
khį̂įgulaa	redbud
thépsɔyaa	weed

Note that **áá** as an IDP noun means 'pole, stick', which is both smaller than a tree and, being an implement and bound up with human intentions, tends towards individuability.

There are a number of discrepancies between Watkins' IDP/IDS classification of plants and mine (i.e., that which emerges from my fieldnotes). I shall not assign all the words in (77) to one or other category, as the grounds for this discrepancy are unclear. Possible sources are artifacts of judgment elicitation methodology, regional variation, or difference in speakers' knowledge of the relevant properties of the trees in question. This uncertainty with respect to certain lexical items does not, however, undermine the validity of the observation that a concept of grouphood distinguishes IDS from IDP nouns. The same concept pertains to the classification of IDI, SDS and SSS nouns. We see, then, that the IDP and IDS classes, though to some extent default classes, are semantically coherent in two ways: they are the main classes for trees and other natural entities, and they are distinguished by a property of grouphood when referential cardinality is **3**.

The SDP class

Speakers of languages for whom Kiowa's noun class system is somewhat foreign are likely to anticipate SDP as the most natural class, given that its members trigger agreement that transparently reflects referential cardinality. Oddly, this class appears small.

(84)

x!óú	rock, stone
zêibat!ǫįǫǫba	arrow smoother
phą́ą́xo	key
yáípɔ́	rope
touhį̂į	moccasin
tókį́į́níí	boot
tóúdé	shoe
mɔ́nsɔ́	thumb
khóúgyáp	body
t!ɔáá	earring
hǫ́ǫ́t!ɔkuu	nail

Naturally, this class excludes elements that ought to be in other classes, such as animates, vegetation, mass nouns, and shape-non-inductive items. However, there is little in the way of positive criteria for this class, beyond a collection of footwear. This suggests that SDP is the class to which nouns are assigned when they do not meet the membership criteria of other classes, i.e., the language's real default.

2.4.5 Summary

The foregoing discussion of the noun classes has shown that they are internally semantically coherent, that is, that there are properties that members of each class generally share. These are summarized below.

(85)

Class	**Characteristics**
SII	First person
SDI	Animates and animate-like entities (physically similar to animates or capable of self-propulsion or determining direction of motion)
IDI	Naturally regarded both as individual and as occurring in collections; permits 'different type of' reading with S-agreement
SDS	Individuable, non-shape-inductive
SSS	Non-granular mass nouns
PPP	Pluralia tantum, composite nouns (and granular mass nouns for some speakers); abstract nouns
IDP	Default; granular mass nouns for some speakers; much vegetation, members of collections are individuable
IDS	Default; much vegetation, members of collections are not readily individuable
SDP	Default; no unifying properties

In the coming chapter, we turn to a second way in which the classes are semantically coherent, namely the connection between the semantic characteristics of class members and the class mnemonic. That is, I will argue that, given the internal semantic coherence of the classes, there could not be a language Kiowa′

with noun classes summarizable by the left column of (85) together with the right in reverse order. Before proceeding to that discussion, the coming two sections discuss and dismiss the possibility of a tenth noun class and the notion that class membership is to some extent phonologically, rather than purely semantically, determined. Readers of unbridlable enthusiasm may wish momentarily to skip these sections.

2.5 Against a Tenth Class

Noun classes were distinguished above by examining the correlation between referential cardinality and agreement, following Merrifield (1959a). Harrington (1928), employing a similar method, identified a class not represented above. Its mnemonic on current terms would be SDA, where A-agreement is a special animate (hence A) agreement.[30] Watkins explains that speakers typically use A-agreement to refer to fellow tribal members but I-agreement for members of other tribes, as illustrated below. Observe that, in both cases, the nouns are inverse marked.

(86)	Kɔ́ígú	á- kúúyɔ́	(Watkins 1984, p. 84)
	Kiowa.INV	**A**-be_lying.P.DISTR	
	'Kiowas are camped about'		
(87)	Kyâygu	e-kúúyɔ́	(ibid.)
	Comanche.INV	**I**-be_lying.P.DISTR	
	'Kiowas are camped about'		

Unlike Harrington, Watkins does not treat SDA as a separate class however. Watkins', I believe, is the correct response.

Nearly any noun, or for some speakers, any noun, capable of triggering A is also capable of triggering I-agreement. So, on the assumption that classes are pairwise disjoint, SDA is not a class distinct from SDI. Rather, nouns triggering A-agreement are SDI nouns with a special property. On the basis of the following types of complementary examples, I suggest that this property is 'empathy' or 'degree of identification' with the SDI noun.

In a hunting story related to me by Mr Bointy in August 2001, **k!yą́ą̂hyóp** 'man.INV', i.e., 'men', triggers both I-agreement and A-agreement. The story relates an incident in which Mr Bointy was not a participant. It begins with three sentences saying where the men were and what they were doing—a simple reporting of facts, with nothing for the speaker to empathize with. The verbs all show I-agreement.

[30]Harrington distinguished between 'animate major' (SDA) and 'animate minor' (SDI) categories; pp. 14, 237ff.

(88)

Phą́ą́o	k!yą́ą́hyóp	e-	ɨ́ɨ́ąąhel	áádom.	Syɔ́ndé
three	man.INV	**I**-	go.hunting.HSY	woods.LOC	small.ADV

gya-hóɔn-dǫǫmei	déem	téí	e-khɔléí-	ąąhel.
3P- path-be.IMPF.HSY	REL.LOC	all	**I**-together-go.HSY	

Gɔ	e-xándehel	ɔ́gɔ	áádɔ	e-bôndǫǫmei	dę́ę̨i...
CONJ	**I**-reach.HSY	REL	tree.INV	I- be_bent.IMPF.HSY	REL.LOC

'Three men were hunting in the woods. They were all going along a narrow path when they reach a place where there was a bent tree...'

Then, there follow a few sentences of reported speech, concerning what should be done about a panther lying in ambush. These relate an experience with which Mr Bointy, an experienced hunter, could well empathize. Thereafter, the verbs show A-agreement.

(89)

Nɔ	thɔ́p	á- khúttehel.	T!ɔm-ą́ą́-	dé	gôm	gya- bǫ́ų́hêl
CONJ	beyond	**A**-pass.HSY.	first-	come-NOM	back	3S:P-look.HSY

nɔ	hę́ɨ́	∅- dǫ́ǫ́mêi.	Tékhop	á- donhel	né	hɔ́n
CONJ	gone	3S-be.IMPF.HSY.	everywhere	**A**:S-seek.HSY	but	NEG

á- thǫ́ǫ́mɔɔ.	
A:S-find.NEG	

'They passed to the other side. The one at the head turned back and [the panther] was gone. They looked all over for it but did not find it.'

Another pair of examples on similar lines concerns animals. In (90), which is about horses, the verb bears A-agreement, whereas (91), which is about ants, it bears I-agreement. (I assume (90) to have a *pro* argument; this is irrelevant to agreement type (Watkins 1990, Adger and Harbour 2003).)

(90) Á-zę́ɨ́ma (Watkins, p.c.)
A-move.P.IMPF
'They are milling around, moving around (of horses in a pasture)'

(91)

Emhą̂ąmop	e-xǫ́ų́- zę́ɨ́ma	(Watkins, p.c.)
ant.INV	I- crawl-move.P.IMPF	

'Ants are crawling around'

A-agreement in (90) does not motivate an SDA class, as, generally, **xę̂ɨgɔ** 'horses' triggers I-agreement, so that **xę̂ɨgɔ** is best regarded as the inverse-marked form of the SDI noun **xę̂ɨ** 'horse'. A typical example is:

(92)

Ɔ́íhyɔɔ	xę̂ɨgɔ	ɔ́- pɔ́ɔ́hel
there	horse.INV	:3S:**I**-stop.PF.HSY

'That's when got the horses'

Once again, I propose that A-agreement in (90) should be explained by appeal to empathy, given the centrality of horses to traditional Kiowa culture—a conclusion drawn on the basis of numerous stories and facts told me by Mr Bointy in the course of our work together—a centrality, or empathy, in which ants by no stretch of the imagination partake.

Such grammaticalized empathy is in part a cultural phenomenon. Indeed, Watkins observes that I-agreement has a slightly disrespectful connotation when used for adults. And for most speakers, A-agreement is obligatory for **Kɔ́ígú** 'Kiowas':

(93) Kɔ́ígú né- /??nɔ́- xán
Kiowa.INV :1S:**A**/ :1S:**I**-arrive.PF
'The Kiowas came to me'

The constancy with which **Kɔ́ígú** 'Kiowas' triggers A may be seen as a default, cultural empathy between any Kiowa speaker and their kin.[31]

Given that putative SDA nouns are in reality empathized with SDI nouns, it is incorrect to suppose that A-agreement indicates the existence of a tenth class.

2.6 Phonological Incoherence

Crosslinguistically, membership of noun classes is frequently phonologically determined. Phonological classes are of two types: there are Bantu-style classes, where noun, adjective, determiner, and verb all begin, say, with *ba-* if the noun is in Class 2, but with *mu-* if it is in Class 8; and there are Indo-European-style classes, where nouns with a particular ending are all classmate, as are Latin nouns in *-iō*. Bantu-style classes are apparent from phonological elements external to the noun itself; by contrast, Indo-European-style classes are apparent from elements internal to the noun. Dramatic instances of the latter are the Arapesh and Yimas languages of Papua New Guinea (Foley 1986, Aronoff 1994). A natural question is whether Kiowa's noun classes are (to some extent) phonologically defined, that is, whether the claim that the classes are semantically defined in fact represents the whole truth.

I suggest that Kiowa's noun classes are not phonologically defined. First, the ten or so allophones of inverse marking distribute freely across all inversive classes (Section 2.6.1), so classes are not phonologically defined in virtue of selecting particular affixes. Second, thematic nouns (to be defined in Section 2.6.2), which could imaginably yield Indo-European-style classes, cross-cut the number classes and show semantics to be the key factor in determining class membership.

[31]The notion of 'default empathy' may help to explain why A-agreement is systematically ambiguous between animate plural agreement and reflexive agreement:

(i) De- hól
1S:A-kill.PF
'I killed myself *or* them (people)'

The reflexive 'oneself' might be regarded as involving obligatory empathy, rather than as being in some mysterious sense obligatorily animate plural.

2.6.1 Inverse allophones

The only morpheme capable of yielding Bantu-style noun classes in Kiowa is the inverse, as it is the only nominal affix that triggers agreement. For instance, in (94), the IDP direct object in the relative clause is inverse marked and triggers inverse marking on the subordinate verb, on the relative clause itself and on the matrix verb.

(94) [Pį́áádɔ e-ét]-gɔ dé- hɔ́ɔ́gya (Watkins 1984, p. 231)
table.**INV** **I**-big.S -**INV** 1S:**I**-get.PF
'I bought a table that is big'

Similarly, demonstratives agree for inverse with their noun. This is shown below for the SDI noun **sân** 'child'. In (95), where referential cardinality is **1**, there is no inverse marking; however, in (96), where referential cardinality is **3**, there is inverse marking on the demonstrative, the noun and the verb.

(95) Ę́į́de/óíde sân ∅- khópdɔɔ (Watkins 1984, p. 97)
This/that child 3S-be_sick
'This/that child is sick'

(96) Ę́į́gɔ /óígɔ są̂ądɔ e- khópdɔɔ (ibid.)
This.**INV**/that.**INV** child.**INV** 3**I**-be_sick
'These/those children are sick'

The inverse marker has some ten distinct forms. So, it is reasonable to ask whether any are proprietary to particular classes. To show that they are not, it is sufficient to show that all are allophones and none are (class-conditioned) allomorphs.

The inverse marker has the following forms in (97).[32] Thematic nouns (-TH) such as 'tobacco' are discussed in Section 2.6.2.

[32]This follows Watkins, except that the zero is my addition. Some phonological comments are needed. First, note two informally stated processes:

(i) VN→V̨V̨ | INV

(ii) l→t | __t

Second, note that the tone of the inverse marker need not be specified, contra Watkins' practice, as it is predictable (Harbour 2002; the right parenthesis erasure rule conditioned by the imperfective hearsay should also be conditioned by **-gu** in (97)—hence its high tone following **Kɔ́í-**, which otherwise lowers subsequent tones, as in **Kɔ́ímaa** 'Kiowa woman', **Kɔ́ítǫgya** 'Kiowa language').

(97)	**-mɔ**	| Vį__	t!ą́į́~t!ą́į́mɔ	egg
	-bɔ	| m__	kóm~kǫ́ų́bɔ	friend
	-dɔ	| n__	k!ɔ̂n~k!ɔ̨̂ɔ̨dɔ	tomato
		| l__	tógúl~tógúúdɔ́	young man
	-tɔ	| l__	tâl~tâttɔ	skunk
	-ɔt	| TH__	tháábá~tháábɔ́t	tobacco
	-gu	| Vi__	kɔ́í-~kɔ́ígú	Kiowa
	-oi	| ii__	p!íí~p!yói	(female's) sister
	-op	| e__	sąąné~sąąnóp	snake
	∅	| p/t__	k!óp~k!óp	mountain
			xát~xát	door
	-gɔ		xę̂į~xę̂įgɔ	horse
			thǫ́ų́se~thǫ́ų́segɔ	bone

Additionally, tone change may occur, either alone or concomitant with vowel change or inverse marking.[33]

(98)	tone change only:	mɔɔk!ɔ́n~mɔɔk!ɔ̂n	nose
	tone + vowel change:	thâa~thêi	wife
	tone change + suffixation:	zêiba~zéíbɔt	arrow

The point to observe, relating to (97) and (98), is that no allophone of the inverse marker is proprietary to any one noun class. Each allophone is found in any class with a phonologically appropriate noun in it. Hence, we find **-tɔ** on SDI **tâl** 'skunk', IDP **k!ɔâl** 'dish' and IDS **tól** 'peg, stake'; -∅ on SDI **t!áp** 'deer', IDS **k!óp** 'mountain' and IDI **k!yágóp** 'brain'; **-dɔ** on IDI **k!ɔ̂n** 'tomato', SDI **sân** 'child', and IDP **són** 'grass'; **-mɔ** on SDI **t!óút!ą́į́** 'white faced cattle', IDP **mɔ́x!ą́į́** 'paper', IDS **t!ą́į́** 'sheet'; **-op** is SDI **sąąné** 'snake' and IDP **mɔ́nsóúde** 'bracelet'; and so on.

Particularly striking in this regard are words that serve as the base for compounds or metaphorical extensions of meaning. Though the phonological shape conditions the inverse allophone is identical, the class membership varies according to semantic principles. Hence, **t!ɔ̂lthɔn** is SDI as 'kidney' but IDP as 'bean'; **thǫ́t!ólɔ̨ɔ̨** is SSS as 'soda, fruit juice' but IDI as 'orange'; **áá** is IDP as 'stick, pole' but IDP as 'tree', and it forms the IDP compound **khį̂įgulaa** 'redbud' and the IDS compound **zépgutk!oaa** 'Osage orange'; **t!ą́į́** 'white' forms SDI **t!ą́į́** 'egg' and **t!óút!ą́į́** 'white faced cattle' and the IDS **t!ą́į́** 'sheet'; PPP **hɔ̨́ɔ̨́gya** 'metal' forms IDS **hɔ̨́ɔ̨́gya** 'gun' and SSS **ɔ́lhɔ̨́ɔ̨́gya** 'money'

Similarly, observe that the inverse form of noun+adjective compounds is determined by the phonology of the adjective, to which the inverse suffix must

[33]Watkins observes that tone change is common in nouns, as in (57), that end in **-Vi** and take gender markers. I suggest that this leads us to posit an extra inverse marker, a preaccenting **-i**; **)i** in the terms of Harbour (2002). **-i**'s preaccenting ")" guarantees that **i** will have low tone and the vowel before, high; consequently, the syllable will have a falling contour. That is, to derive **ɔ́lkhɔ̂i** 'crazy people', we concatenate: **...ɔi-)i**; regularly delete the middle vowel: **...ɔ)i**; and assign high tone up until the right parenthesis and low tone thereafter: **...ɔ́ì**, or, in current orthography, **...ɔ̂i**. The same processes derive the also **ɔnsôi** 'foot.INV' from **ɔnsóú**, **ɔɔzâi** 'udder.INV' from **ɔɔzáá** and **sékhǫ̂į** 'large intestine' from **sékhǫ́ų́**.

attach, and not by the noun: hence, in **k!óp** 'mountain', the inverse suffix is ∅, but in **K!ópéttɔ** 'Mount Scott' [lit.: big mountain], it is **-tɔ**, attaching to **êl** 'big.S'; compare also the inverse markers of **áákyǫįmɔ** 'long pole' and **áádɔ** 'pole'.

Consequently, no allophone of the inverse marker can be regarded as constituting the phonological signature of any particular class. This means that affixal phonology does not define classhood, as it does in other languages.

2.6.2 Thematic nouns

In Indo-European, nouns with the same ending frequently belong to the same gender class. Many Kiowa nouns end in the 'themes' **-gya, -de** and **-ba**, which might be reminiscent of gender-specific noun endings in Romance. However, a noun's number properties correlate with the theme it takes, suggesting that phonology is again irrelevant. Moreover, these number properties are not always the same as the semantic principles that determine membership of the classes discussed above. Where they conflict, the semantic principles, not the theme, is decisive.

Themes

I begin with morphological and semantic properties associated with the themes.[34]

Kiowa has a variety of nominal roots that cannot occur independently. They must be suffixed, for instance, by **-gya** 'in' (99), or incorporated (100).

(99) Táá-gya hɔ́ndé ę́- xél (Watkins 1984, p. 93)
eye- in something :1S:S-be_set.S/D
'There is something in my eye'

(100) tá- hot- gų̀ų (ibid.)
eye-travel-DISTR
'watch everywhere'

When without a postposition or when unincorporated, thematic nouns end in a special -CV(C) suffix, the 'theme'. In the case of **táá-** 'eye', this is **-de** when referential cardinality is **1** or **2** and **-gɔ** when it is **3**. (Agreement reveals that **-gɔ** corresponds to inverse marking.)

The following nouns are found with the pair **-de∼-gɔ**.

[34]The discussion follows Watkins' Section 3.131, though aspects of the morphological decomposition are my own.

(101) táá́de 'eye'
t!ɔ́ɔ́dé 'ear'
thǫ́ų́dé 'leg'
gų́ų́dé '[cow] horn'
khɔ́ɔ́dé 'trousers'
tóúdé 'shoe'
zâide 'half'

These nouns naturally occur in pairs. Interestingly, the vowel **e** is a frequent exponent of D-agreement in the verbal prefixes, and **ɔ**, of I-agreement, as illustrated below.[35]

(102) **né** = :1S:D; **ménêi** = 2D:1S:D; ...
nɔ́ = :1S:I; **ménɔ̂ɔ** = 2D:1S:I; ...

This suggests that these thematic nouns have **e** when non-inverse because inherently paired. Consequently, the vowel appears to be independent from the consonant in the thematic CV suffix and is connected to number. The consonant may be supposed to be **g**: **g+ɔ** derives trivially from **gɔ** and **g+e** yields **de** by regular Kiowa phonology.[36]

The other themes support this number-related decomposition. Consider nouns in **-gya**:

(103) pǫ́ų́gya 'beads'
x!ǫ́ų́gya 'downy feathers'
péígya 'sand'
phátkyá 'fabric, dry goods'
dǫ́ų́gya 'seeds'
phídátkyá 'cantaloupes'
t!ǫ́ų́gya 'shirt'

These form their inverse in **-gɔt**. Decomposing onset and rhyme yields **-g-** and **-ya** / **-ɔt**. Again, the rhymes are recognizable as object agreement from the verbal prefixes.

(104) **gyát** = :1D/P:P; **gyát** = 3S:2S:P; ...
dɔ́t = :1D/P:I; **gɔ́t** = 3S:2S:I; ...

The non-inverse form of the thematic suffix correlates with plural agreement morphology and the nouns in (103) naturally occur but in groups or are pluralia tantum.

Similar observations can be made of the handful of nouns that take the theme

[35]The prefixes are discussed at length in Chapter 5.

[36]The following rule switches dentals to velars before **i/y** and velars to dentals before **e**.

(i) $$[\alpha\text{back}] \rightarrow [-\alpha\text{back}] \mid \begin{array}{ll} + & \text{consonantal} \\ - & \text{sonorant} \\ & \underline{\qquad} \end{array} \begin{array}{ll} - & \text{consonantal} \\ + & \text{sonorant} \\ \alpha & \text{back} \end{array}$$

-ba. Decomposing, we have the theme **-b-** and the plural-associated rhymes **-ya** / **-ɔt**.[37] Again, the nouns in this class plausibly occur in natural groups.

(105)	zêiba	arrows (INV = zéíbɔt)
	tǫ́ṵ́bá	reed pipes
	tháábá	tobacco

The resulting picture of Kiowa thematic nouns is that they consist of a root followed by a thematic consonant, **b** or **g**, followed by a number-related coda, **ya/ɔt** or **e/ɔ**.

Themes and classes

The relationship between themes and the meaning of the nouns to which they attach means that themes are not indicative of phonological noun classification in Kiowa. Observe, however, that the 'pairhood' that conditions **e/ɔ** is not a conditioning factor for noun class membership. Such cases might open the door to phonologically determined class membership, but instead underline the semantic basis of the system. In such cases, the semantic principles of each noun class determines class membership: of the nouns in **-de**, 'eyes', 'ears', 'legs' and 'horns' are SDI, 'trousers' PPP, and 'shoes' SDP; of the nouns in **-gya**, 'shirts' and 'sand' are PPP, 'beads', 'cantaloupes' IDP, and 'guns' IDS. Indeed, two words oddly in this last group, **iip!ɔ́ɔ́gya** 'baby' and **bélkítkya** 'screech owl', are animates; consequently, they are SDI. Thus, nouns that share thematic endings can fall into different noun classes and do so on purely semantic grounds.

2.6.3 Conclusion

Kiowa noun classes are not phonologically defined. Rather, the semantic classification in (85) stands.

[37] The combination **b+y** standardly simplifies to **b**; for instance compare (104)'s **gyát**, :1P:P, from **d+y...**, with **bát**, :2P:P, from **b+y...**.

Chapter 3

Number Features

The previous chapter showed that nouns in Kiowa are organized into nine number-related classes, according to semantic properties of their referents. Such a system poses several questions:

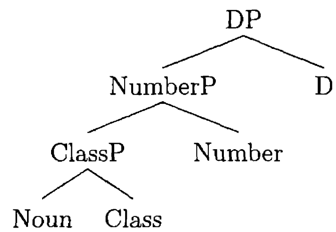
(1) a. What are the features that do the classifying?
b. What is the relationship between a class mnemonic and the properties of the nouns it subsumes? (Is it coincidence that 'hair' is IDI and 'child' SDI and not *vice versa*?)
c. How do classifying features interact with referential cardinality to yield inverse marking on the noun?
d. How do the classifying features and referential cardinality interact with the syntactic mechanisms responsible for agreement to create patterns like SDP, IDI, PPP, *et cetera*?
e. Why are there nine classes and why are DID, SIP, or PSI not amongst them?

These questions are the focus of this chapter. Answering them consists in providing an inventory of number features, properly semantically defined, together with a theory of their distribution and interaction in the syntax and their treatment in the morphology. To do this, I make two claims.

Claim #1. There are four number features: [±singular], [±augmented], [±group] and [inverse]. The three binary features are interpretable and are motivated on semantic grounds, [±singular] and [±augmented] primarily by referential cardinality, [±group] by semantic properties of noun classes and there correlation with unexpected S/P-agreement. The privative feature [inverse] arises only in the course of syntactic computations and has no semantic interpretation; it is motivated on morphosyntactic grounds. The features [±singular], [±augmented] and [±group] determine noun class; [±singular] and [±augmented] determine referential cardinality; and [±singular], [±augmented] and [inverse] are phonologically realized as determine agreement on the verb and inverse marking on the noun.

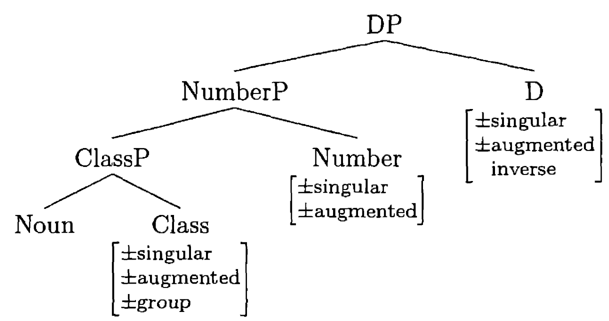
Claim #2. DPs have the structure below (cf., Ritter 1991, 1993), where Class is the locus of classificatory features, Number the locus of referential cardinality, and D the locus of the features the trigger agreement and inverse marking.

(2)



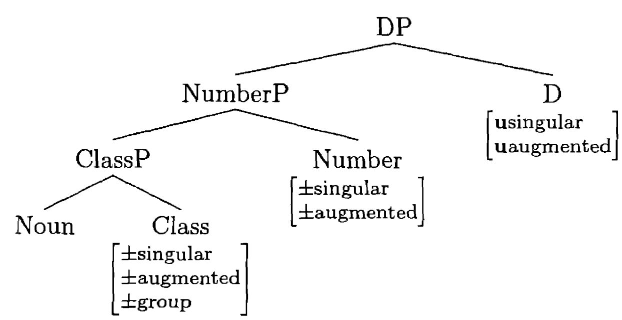
Given Claim #1, this means that features are distributed as in (3). Note that (3) shows only where features may occur, not where they must. Features and values are subject to cooccurrence restrictions.

(3)



The features in (3) are not all of the same status. Those on Class and Number are intrinsic to the meaning of the head, i.e., they are interpretable in the sense of Chomsky (2000, 2001). The number features on D are not intrinsic to its meaning. When merged, D bears uninterpretable number, notated below as [**u**singular **u**augmented], which must be valued in the syntax. This valuation depends on the features both at Class and at Number and is discussed at length in Section 3.2.2 and following.

(4)



Verbal agreement is with D, i.e., with the value assigned to D's uninterpretable number features; the agreeing head(s) do not enter into a direct relationship with the features on Number or Class. Evidence for the feature content of Class and of Number is semantic. Evidence for the feature content of D is morphosyntactic and will be discussed at length in Chapter 5.

The features' semantics permit us to explain why nouns with given properties belong to classes with given mnemonics. Moreover, we will see that Kiowa's class system makes near optimal use of the inventory of classificatory features at its disposal.

3.1 Referential cardinality

The main claim of this section is that **1**, **2** and **3**, the values of referential cardinality, are not atomic. Rather, they are composed of two features, to be called [±singular] and [±augmented] and defined below. The evidence for this claim comes from the distribution of I-agreement and inverse marking.[1]

3.1.1 Natural classes

Considering the values, **1**, **2** and **3**, one might be tempted to posit three monovalent number features, [singular], [dual], [plural]. This inventory of privative number features predicts that there are no natural classes of number features, i.e., that no process of the grammar refers both to **1** and **2** or to **2** and **3**. However, such processes do exist, both in the morphology, as discussed in Chapter 5, and in the syntax, as we shall now see, by considering inverse marking.

Recall that there are four agreement types in Kiowa, S, D, P and I. I-agreement always cooccurs with marking on the noun, the so-called inverse marker. This is exemplified below for the SDI noun **tógúl** 'young man', for the IDP noun **kútaa** 'pencil' and the IDI noun **k!ɔ̂n** 'tomato'.

(5) Tógúúdɔ́ e-dɔ́ɔ́
young.man.**INV** I-be
'They're young men'

(6) Kútaadɔ e-dɔ́ɔ́
pencil.**INV** I-be
'It's a pencil'

(7) K!ɔ̨̂ɔ̨dɔ e-dɔ́ɔ́
tomato.**INV** I-be
'It's a tomato' *or* 'They're tomatoes'

As the reader can verify by inspecting examples from the previous chapter, there is no noun marking concomitant with and proprietary to any of the other agreement types.

[1]This section recapitulates, in part, arguments from Noyer (1992) and Harbour (forthcoming 2003).

A natural question is what inverse marking means. However, class mnemonics cast doubt on the coherence of this question, as I-agreement, and so inverse marking, occurs with referential cardinalities **1**, as in IDP, **2**, as in SII, and **3**, as in SDI. (Observe that other agreement types do not pose this problem. D-agreement occurs exclusively with **2**. S-agreement occurs primarily with **1**, the exception being objects that are group-like and hence **1**-like. And P-agreement occurs primarily with **3**, the exception being objects that are always composed of parts, such as pluralia tantum nouns, which are **3**-like.) Moreover, if we examine the sets of referential cardinalities for which inverse marking occurs, the result is not enlightening: $\{\mathbf{1}\}$ for IDP and IDS, $\{\mathbf{3}\}$ for SDI, $\{\mathbf{1}, \mathbf{3}\}$ for IDI, and $\{\mathbf{2}, \mathbf{3}\}$ for SII. Nothing seems to unite the classes beyond IDI's being the union of the first two.[2]

By contrast, a quite neat picture emerges if we ask what non-inverse marked members from each class mean. The sets of referential cardinalities that emerge are $\{\mathbf{1}\}$ for SII, $\{\mathbf{2}\}$ for IDI, $\{\mathbf{1}, \mathbf{2}\}$ for SDI, and $\{\mathbf{2}, \mathbf{3}\}$ for IDP and IDS. The correct natural classes follow from two features that compose the referential cardinalities as shown below. For concreteness, let us call these features [±singular] and [±augmented].[3]

(8)

	[±singular]	[±augmented]
1	+	−
2	−	−
3	−	+

Given this feature composition, $\{\mathbf{1}, \mathbf{2}\}$ is the natural class defined by [−augmented], $\{\mathbf{2}, \mathbf{3}\}$ is the natural class defined by [−singular], $\{\mathbf{1}\}$ is the defined by [+singular] and $\{\mathbf{2}\}$ by [−singular −augmented].

The features [±singular] and [±augmented] yield the desired natural classes yet also raise questions about what they mean and how they connect with inverse marking. Answering these questions lays the foundations for an explanation of the relationship between nouns' semantic properties and their class mnemonic, e.g., why 'hair' is IDI and 'child', SDI and not *vice versa*.

3.1.2 Definitions

Consider first the definitions of [±singular] and [±augmented]. Feature definitions are phrased in terms of N, the set of indices linking the noun to the 'real world entities', and a feature set [A]. As a definitional convention, for any feature [±F], I will define only [+F]. From a definition like

[+F] holds of N if ...

[2] Strictly speaking, one might imagine features [±F], where $[+\mathrm{F}] =_{def} \{\mathbf{1}\}$, and [±G], where $[+\mathrm{G}] =_{def} \{\mathbf{2}\}$. These yield the natural classes required: $[-\mathrm{F}] = \{\mathbf{2}, \mathbf{3}\}$, $[-\mathrm{G}] = \{\mathbf{1}, \mathbf{2}\}$, $[-\mathrm{F}\ -\mathrm{G}] = \{\mathbf{3}\}$. However, when we come to consider the relationship between the nouns' semantic properties and their class mnemonic, it will become apparent that these are not the desired features.

[3] The combination [+singular +augmented] corresponds to no referential cardinality. See the proofs that follow.

the definition of [−F] follows:

> [−F] holds of N if *not* ...

The convention of defining the plus value should not be mistaken for a claim that there is a universal correlation between '+' and markedness or between '−' and unmarkedness.[4, 5]

(9) **Definition: [±singular]**
[+singular] holds of N if $\mid N \mid = 1$.

That is, [+singular] guarantees that N has cardinality 1, and [−singular] that it hasn't.

(10) **Definition: [±augmented]**
[+augmented, A] holds of N if $\exists N' \subset N$, $N' \neq \emptyset$, such that [A] holds of N'.

---

[4]The reader may wonder whether it is not simpler to combine the plus and minus definitions into a single biconditional:

> [+F] holds of N if and only if ...

This biconditional would be equivalent to the conjunction of the [+F] and [−F] conditionals only if we assume a two-valued logic. In such a logic, everything that is not [+F] would be [−F], so we would be committed to a type of privative feature system. In the analysis that follows, privativity is not assumed, and in Section 6.2, it is argued to be untenable.

[5]Once a feature has been defined, it is an empirical matter as to whether the plus or the minus value is default (in a given context). For instance, based on P-agreement's being the default agreement in Kiowa, it appears that minus is the unmarked value of [±singular] but that plus is the default value of [±augmented] (Harbour forthcoming 2003).

Now, one can transform a feature inventory into one with a uniform representation of markedness as plus, say, as follows (Harbour 2003, p. 135):

> [I]f $\{[\alpha_i \mathrm{F}_i]\}$ is a set of binary features where '+' is not the marked value of F_i for all i, then we ... define a new feature set, $\{[\alpha'_i \mathrm{F}'_i]\}$, where '+' is the marked value for all i, essentially by negating and switching the sign of any feature with the marked value minus. Letting $\|x\|$ represent x's semantic value, we define the features, for all i, by
>
> $$\mathrm{F}'_i = \begin{cases} \mathrm{F}_i & \text{if } \alpha_i = + \text{ is the marked value of } \mathrm{F}_i \\ \overline{\mathrm{F}_i} & \text{where } \|\overline{\mathrm{F}_i}\| = \textit{not}\, \|\mathrm{F}_i\|\text{, otherwise} \end{cases}$$
>
> and the values, for all i, by
>
> $$\alpha'_i = \begin{cases} \alpha_i & \text{if } \mathrm{F}'_i = \mathrm{F}_i \\ -\alpha_i & \text{otherwise.} \end{cases}$$

However, an important point must be noted here. This transformation is available if—and only if—marked values are invariant both language internally (i.e., independent of morphological or syntactic context) and crosslinguistically. That is, if the marked value [±F] varies, then the phrase 'the marked value of [±F]' and the notation [+F] are not equivalent, no matter how we redefine the feature or switch signs.

It is clearly an empirical matter as to whether marked values are crosslinguistically consistent. It is also an empirical matter as to whether they vary language internally. Consequently, the assumption that 'minus equals unmarked' is not innocent (Nevins 2003, Wunderlich 2003). (Nevins' real question is whether certain complicated person-number syncretisms follow if vocabulary items realize only marked feature-value combinations. In the regard, multiple exponence in the Kiowa agreement prefix is particularly interesting; see Chapter 5.)

That is, [+augmented] guarantees that other properties of N hold not just of N but also of (non-empty) proper subsets. An informal paraphrase would be: taking away one element of N does not make a substantial difference to the whole. In a sense, it guarantees continuity of properties from the whole to its parts.

Intuitively, one can see how these definitions work together. A single object is clearly [+singular] and, as single things have no non-empty proper subsets, it is [−augmented]. On the other hand, pluralities are clearly [−singular] and, as they do not lose plurality if one of their elements is removed, are also [+augmented]. However, pairs do lose their pairhood if a single part is removed, and so are [−augmented], and, being pairs, are also [−singular]. So, the definitions of [±singular] and [±augmented] yield the referential cardinalities required.

Given the previous paragraph's reliance on informal paraphrases of the definitions, one might wonder whether the formal definitions really work. And one might wonder why [±augmented] is defined in terms of subsets rather than a condition on cardinality, as [±singular] is, say, $\mid N \mid \geq 3$. These issues are addressed in following subsections. Readers prepared to take these matters on trust may prefer to skip the discussion of inverse marking and classificatory features in Section 3.2.

Formal demonstrations

There now follow four simple proofs justifying (8) and its exclusion of [+singular +augmented]. The reader should bear in mind that the definition of N varies from between proofs.[6]

Notation. When [A] holds of N, we write $[\mathrm{A}]_N$.

Lemma 1. [+singular −augmented] corresponds to **1**.

Proof. $[\text{+singular −augmented}]_N$ iff $[\text{+singular}]_N \wedge [\text{−augmented}]_N$.

$$\begin{array}{lll}
[-\text{augmented}]_N & \text{iff} & \neg\exists N' \subset N,\ N' \neq \emptyset,\ [+\text{singular}]_N \rightarrow [+\text{singular}]_{N'} \\
 & \text{iff} & \forall N' \subset N,\ N' \neq \emptyset,\ \neg(\,[+\text{singular}]_N \rightarrow [+\text{singular}]_{N'}) \\
 & \text{iff} & \forall N' \subset N,\ N' \neq \emptyset,\ [+\text{singular}]_N \wedge \neg[+\text{singular}]_{N'} \\
 & \text{iff} & [+\text{singular}]_N \\
 & \text{iff} & \mid N \mid = 1
\end{array}$$

Corollary. [+singular +augmented] corresponds to no referential cardinality.

[6] In the context of this formal section, it is worth noting why 'there is a non-empty subset of N' is represented formally as '$\exists N' \subset N,\ N' \neq \emptyset$' and not, as one sometimes observes in the linguistic literature, as '$\exists N' \subset N \setminus \emptyset$'. It follows from the definition of 'subset' (X is a subset of Y if and only if $\forall x,\ x \in X \rightarrow x \in Y$) and from the second ZF axiom ($\exists x \forall y \neg(x \in y)$), which establishes the existence of an empty set, that the empty set is a subset of every other set. So, $N \setminus \emptyset$ is either contradictory or includes the empty set, so that $\exists N' \subset N \setminus \emptyset$ does not guarantee that $N' \neq \emptyset$.

Lemma 2. [−singular −augmented] corresponds to **2**.

Proof. $[-\text{singular} -\text{augmented}]_N$ iff $[-\text{singular}]_N \wedge [-\text{augmented}]_N$.

$$
\begin{array}{lll}
[-\text{augmented}]_N & \text{iff} & \neg\exists N' \subset N,\ N' \neq \emptyset,\ [-\text{singular}]_N \rightarrow [-\text{singular}]_{N'} \\
 & \text{iff} & \forall N' \subset N,\ N' \neq \emptyset,\ [-\text{singular}]_N \wedge \neg[-\text{singular}]_{N'} \\
 & \text{iff} & \forall N' \subset N,\ N' \neq \emptyset,\ \mid N' \mid = 1 \\
 & \text{iff} & \mid N \mid = 2
\end{array}
$$

Lemma 3. [−singular +augmented] corresponds to **3**.

Proof. $[-\text{singular} +\text{augmented}]_N$ iff $[-\text{singular}]_N \wedge [+\text{augmented}]_N$.

$$
\begin{array}{lll}
[+\text{augmented}]_N & \text{iff} & \exists N' \subset N,\ N' \neq \emptyset,\ [-\text{singular}]_N \rightarrow [-\text{singular}]_{N'} \\
 & \text{iff} & \exists N' \subset N,\ N' \neq \emptyset,\ \neg[-\text{singular}]_N \vee [-\text{singular}]_{N'} \\
 & \text{iff} & \neg[-\text{singular}]_N \vee \exists N' \subset N,\ N' \neq \emptyset,\ [-\text{singular}]_{N'} \\
 & \text{iff} & \exists N' \subset N,\ N' \neq \emptyset,\ [-\text{singular}]_{N'} \quad \text{(by Corollary)} \\
 & \text{iff} & \exists N' \subset N,\ \mid N' \mid \geq 2 \\
 & \text{iff} & \mid N \mid \geq 3
\end{array}
$$

Theorem. (8) accurately represents, and exhausts, the combinatorial possibilities of [±singular] and [±augmented].

Proof. Lemma 1, Lemma 2, Lemma 3, Corollary.

On the definition of [±augmented]

The definition of [±augmented] may seem unnecessarily complicated. It is easily checked that the results established above hold if we replace [±augmented] with [±augmented′]:

(11) $[+\text{augmented}']_N$ if $\mid N \mid \geq 3$

When we look beyond Kiowa, to Ilocano and Rembarrnga, two of the languages that first motivated the notion of augmentation, we find that only (10), and not (11), will do.

Augmentation has its conceptual origin in descriptions of languages of the Philippines and was adopted in descriptions of languages of Arnhem Land, Australia (Corbett 2000, whose exposition, pp. 166–169, is followed here). Its motivation lies in the rather odd view of pronoun systems that results from use of the traditional descriptive categories 'singular', 'dual', 'plural', *et cetera*. This was first noted by Thomas (1955) for Ilocano.

(12)

Person	Singular	Dual	Plural
1 exclusive	-ko	......-mi......	
1 inclusive		-ta	-tayo
2	-mo	......-yo......	
3	-na	......-da......	

Observe that there is only one specifically dual form. As this is for the first person inclusive 'you and I', the dual is to some extent 'forced' on the language—a singular inclusive is impossible. Consequently, one can avoid positing a defective dual category, one that appears only when semantically forced, by adopting instead a 'minimal'∼'augmented' opposition, as in (13).

(13)

Person	Minimal	Augmented
1 exclusive	-ko	-mi
1 inclusive	-ta	-tayo
2	-mo	-yo
3	-na	-da

Given the definition of [±augmented], 'Minimal' is [−augmented] and 'Augmented' is [+augmented]. If we take [1 inclusive]$_N$, informally, as meaning that {you, I} $\subseteq N$, then [inclusive −augmented]$_N$ means that N has no subsets to which 'you' and 'I' both belong. Consequently, N is has referential cardinality **2**. However, for [1 exclusive −augmented], clearly referential cardinality is **1**. Thus, [±augmented] allows for flexibility in referential cardinality. If we adopted an alternative, such as [±augmented′], imposing a specific bound on cardinality, this result would be lost.

This point is emphasized by comparison of Ilocano with Rembarrnga, a language of Australia's Arnhem Land (McKay 1978, 1979). In terms of the traditional number categories, Rembarrnga exhibits singular, dual, trial and plural, as the following table of its dative pronouns shows.

(14)

Person	Singular	Dual	Trial	Plural
1 inclusive	ngʉnʉ	yarr**bbarrah**	..........yarrʉ..........	
1 exclusive		yʉkkʉ	ngakorr**bbarrah**	ngakorrʉ
2	kʉ	nakor**bbarrah**	.... nakorrʉ	
3 masculine	nawʉ	barr**bbarrah**	..........barrʉ..........	
3 feminine	ngadʉ	barr**bbarrah**	..........barrʉ..........	

Notice, again, that the row out of step with others is first person inclusive, where the smallest grouping, 'to you and me', is necessarily dual. As with the dual in Ilocano, there is a distinct trial form only for the first person inclusive. Moreover, (14) obscures the fact that **-bbarrah** occurs only with what we might call medial forms, trial if the other forms are dual and plural, but dual if they are singular and trial-cum-plural.

Again, the notion of augmentation yields a more elegant classification:

(15)

Person	Minimal	Unit Augmented	Augmented
1 inclusive	ngʉnʉ	yarr**bbarrah**	yarrʉ
1 exclusive	yʉkkʉ	ngakorr**bbarrah**	ngakorrʉ
2	kʉ	nakor**bbarrah**	nakorrʉ
3 masculine	nawʉ	barr**bbarrah**	barrʉ
3 feminine	ngadʉ	barr**bbarrah**	barrʉ

The precise featural correspondents of 'minimal' and 'unit augmented' depend on the theory of composite pronouns, which lies beyond the scope of the investigation. The reader is referred to Noyer (1992, pp. 198–207).

Ilocano is crucially different from Rembarrnga and Kiowa in having only a two-way split, not a three-way one. Clearly, then, the effects of augmentation are not confined to a particular cardinality, and so the subset-based definition of [±augmented] is to be preferred over the cardinality-specific definition of [±augmented′].

Various versions of the feature [±augmented] have been offered: [±restricted] (Conklin 1962), [±others] (Matthews 1972). That adopted here is a more compact version of Noyer's, the most modern and robustly typologically tested (p. 195). (Noyer, it should be noted, was the first to use the feature in the analysis of Kiowa-Tanoan languages.)[7]

3.1.3 Summary

The referential cardinalities **1**, **2** and **3** have been shown not to be primitive. Rather they are composed, as shown in (8), by the features [±singular] and [±augmented], defined in (9) and (10) respectively. Adopting Ritter's proposal that Number constitutes a separate projection within the DP (Carstens 1991, Ritter 1991), we have arrived at:[8]

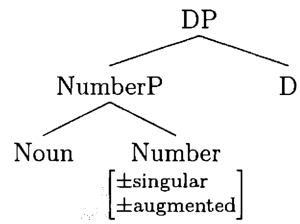
[7] An interesting case where [±augmented] might further be applicable is in Japanese number morpheme **-tati**. It creates 'a non-uniform plural whose extension can include entities that are not in the extension of the common noun to which -tati is attached' (Nakanishi and Tomioka 2002, p. 1). Non-uniformity is illustrated by **tati**-modified proper names:

(i)	Taro-tati- wa	moo	kaetta	(ibid., p. 21)
	Taro-TATI-TOP	already	went home	
	'The group of people represented by Taro went home already'			

Groups of people represented by Taro are subsets of people saliently containing Taro, a notion reminiscent of the subset property of the feature [±augmented]. I leave the augmented-based cashing out of the notion 'represented' or 'salient' for a later date.

[8] It is worth noting that the syntactic structure here is not the substantive claim. The substantive claim is the feature content that underlies the values of referential cardinality, with the syntactic structure adopted for concreteness. The reason for this syntactic hedging is that I take Pollock (1989), McCloskey (1996), or Cinque (1999) the standard of proof that a semantically discernible element comprises an autonomous syntactic head and projection. At the time of writing, my understanding of the syntactic literature on NumberP is somewhat limited and so I cannot say whether NumberP has been justified to the extent of split IP, or verbs' raising out of VP but not to T. See Watanabe (2002) for an extensive review of literature and discussion. Readers who share these qualms may take Number, and later Class, to be features on Noun. Readers who do not, may take the trees that follow as true representations

(16)



3.2 Class

Given the preceding section, we are now well placed to answer, in part, several of the questions listed at the start of this chapter. With respect to the classes SII, SDI, IDP, IDI, and, to some extent, IDS, we can say what the classifying features are. A simple hypothesis about the nature of inverse marking further enables us to say how the inverse arises. Furthermore, we can explain the relationship between the mnemonics of the classes just listed and the semantic properties of the nouns they subsume.

3.2.1 Classification by [±singular], [±augmented]

Let us begin by taking stock of the noun class mnemonics as a whole. There is a broad correlation between referential cardinality and agreement type: **1** with S-agreement, **2** with D-agreement, **3** with P-agreement. Therefore, we can extend the correlation between features and referential cardinalities in (8) to include also agreement types:

(17)

Referential Cardinality	**Features**		**Agreement Type**
	[±singular]	[±augmented]	
1	+	−	S
2	−	−	D
3	−	+	P

The SDP class, members of which do not exhibit any robust, unifying semantic characteristics, then trigger agreement as expected on the basis of referential cardinality in (17).

Other classes' mnemonics diverge from this broad correlation in two ways. On the one hand, some mnemonics contain I, where S, or D, or P is to be expected. For instance, replacing P by I in SDP gives SDI; replacing S by I gives IDP; replacing both gives IDI. On the other hand, some, like PPP, exhibit P where S and D are expected, or, like SDS, S where D or P are. We return to these unexpected S's and P's in Section 3.4 and focus now on I.

The mnemonics SII, SDI, IDP and IDI partially reflect referential cardinality, as SDP does, but sometimes have I in place of a value in (17). So, an ideal explanation of these mnemonics should make the occurrence of S, D and P as straightforward as possible and should subsume all occurrences of I under

of the syntax.

a single principle. This is what we shall now do, by means of the features [±singular] and [±augmented].

As emphasized in the preceding section, the referential cardinalities where agreement is as expected form natural classes with respect to the features [±singular] and [±augmented]. The table below expresses when S, D and P occur as expected, given (17); the middle column gives the features that must occur under Number in order for S, D or P to occur and the right column gives the corresponding agreement type(s).

(18)

Class	Feature on Number	Agreement Type
SII	[+singular]	S
SDI	[−augmented]	S/D
IDP	[−singular]	D/P
IDI	[−singular −augmented]	D

For instance, for SII, the feature [+singular] must occur under Number. This happens only with [+singular −augmented], which, according to (17), yields S-agreement for referential cardinality **1**. Consequently, S appears in the first mnemonic position. For IDP, the feature [−singular] must occur under Number. This happens with [−singular −augmented] / [−singular +augmented], which according to (17), yields D-agreement for **2** / P-agreement for **3**. Consequently D/ P appear in the second / third mnemonic positions.

I suggest that we take (18) as representing the classificatory features (right column) of each of the classes shown (left column). I.e., the Feature column gives the classificatory feature of the corresponding class. By so doing, we can state a simple generalization about the expected occurrence of S, D and P and another concerning occurrence of I.[9]

(19) **Generalization: S, D, P**
S, D, P occur when Class $\subseteq$ Number.

That is, S, D, P occur when the features that make up referential cardinality subsume the class features.

(20) **Generalization: I**
I occurs when Class $\not\subseteq$ Number.

That is, if a class feature is not also one of the features that make up referential cardinality, then I occurs. The generalizations are exemplified by the half paragraph following (18).

We have now moved from the features that compose referential cardinality to a proposal about the specific classificatory features of certain classes. Further, generalizations have been stated about how S, D, P and I depend on relations between class features and referential cardinality. However, the discussion so far has been conducted largely at the level of the mnemonic—"A mnemonic has I

[9]These generalizations concern only the classes under discussion in this section, not PPP, SDS, *et cetera.*

in such-and-such a position if so-and-so holds". The mnemonics are merely expository devices that track referential cardinality and agreement type. Useful as generalizations over mnemonics are, they are quite superficial. So, we must now ask what are the mechanisms and structures that underlie these generalizations.

A brief observation before preceding: the generalizations above apply to the SDP and IDS classes, as well as to SII, SDI, IDP and IDI. Consider the classificatory features below:

(21)

Class	**Feature**
SDP	[ ]
IDS	[−singular ...]

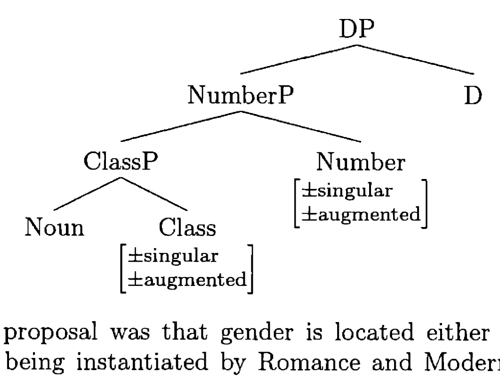
If SDP has no classificatory feature, then its class features are trivially always a subset of referential cardinality. Consequently, I will never arise. If IDS is supposed to be [−singular], then I will arise for referential cardinality **1**, i.e., in the first mnemonic position. Naturally, no principle above will account for S in third position and so the class features are at present incomplete; hence, the '...'.

3.2.2 ClassP and number on D

In this section, I present a syntactic structure and a computational mechanism that produces S, D, P and I in accord with the above mechanisms. Moreover, these make clear what the locus of inverse marking on the noun is and how I-agreement arises. The broad view of syntax adopted is that of Chomsky (2000, 2001), which has been applied in detail to Kiowa by Adger and Harbour (2003). Other theoretical assumptions concern the geometric organization of morphosyntactic features (Harley and Ritter 2002) and the syntactic location of class features, to which I now turn.

Following ideas of Ritter (1993), I propose that classificatory features occupy their own projection, which I label Class. Class, then, like Number, is a locus of the features [±singular] and [±augmented].

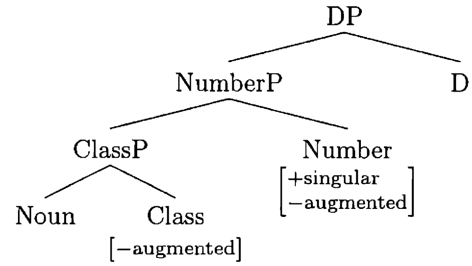
(22)



Ritter's original proposal was that gender is located either at Number or at Noun, the cases being instantiated by Romance and Modern Hebrew respectively. The structure in (22) modifies that proposal in two ways. First, Ritter's gender is expanded to include other classificatory features, such as number. I take this move to be uncontroversial. Second, Class is an autonomous projection, as opposed to a dependent feature on Noun or Number.[10]

So, for an SDI noun of referential cardinality **1**, [−augmented] would be located at Class and [+singular −augmented] at Number, as shown.

(23)



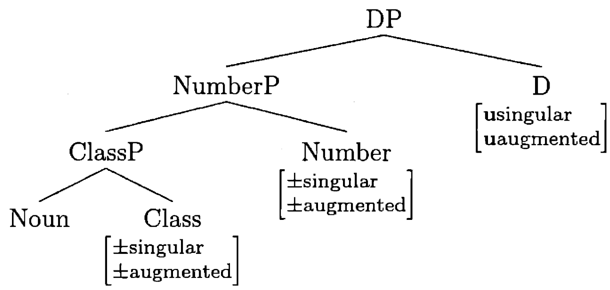
How does this tree give rise to S-agreement?

To address questions of agreement, I adopt the framework of Chomsky (2000, 2001) and its implementation in Kiowa by Adger and Harbour (2003). DPs require Case, which they can gain from a verbal head, such as T or v. This is triggered by means of an Agree relation between the Case checking head and D. Under the Agree relation, not only is D's Case requirement met, but D's φ-features are also copied onto the Case checking head. The term **uninterpretable** is given to features that acquire their values via copying from another head under Agree. For instance, v is said to have uninterpretable φ-features. The phonological realization of these valued (copied) φ-features is what is commonly called agreement and what has been called S/D/P/I-agreement above.

In this framework, then, for (23) to trigger S-agreement, the appropriate features must be copied from D onto a Case checking head. In (23), there are no number features on D. However, the same mechanisms that get number features from D to the Case checking head can be used to get number features from Class or Number onto D in the first place. That is, D must be supposed to have uninterpretable number features, as shown below.

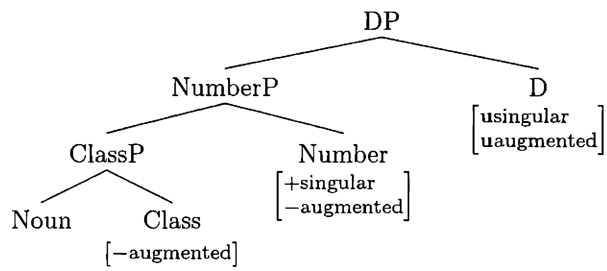
(24)

[10]It is not crucial to anything that follows that Class be an autonomous syntactic head; the main purpose point in separating from other projections is that it makes the trees easier to read and exposition easier to follow. It would be interesting, though, to investigate whether (22) is the true underlying structure. Ritter's answer to the question 'Where's gender?', namely, 'On Noun or Number', prompts the further question 'Where else is gender?'. Could there be languages where classificatory features are located on D or other DP-internal projections? Ritter's squib is (justifiably) neutral on this issue. By contrast, making Class an autonomous projection between Noun and Number entails that gender-on-D languages do not exist. We should then ask which position Ritter's evidence supports. (It is not clear to me that Ritter's evidence decides between the alternatives and (22) may permit Ritter's claim to be preserved more or less as is. It is possible that in Hebrew and Romance, Class coalesces with a neighboring head—candidate mechanisms for coalescence are fusion in the syntax (Bobaljik and Jonas 1996) or fusion in the morphology (Bonet 1991). So, the correctness of Ritter's two-headed treatment of the Hebrew/Romance difference is potentially orthogonal to the question of Class' syntactic autonomy in general.)



Consequently, (23) is properly represented with uninterpretable number on D:

(25)



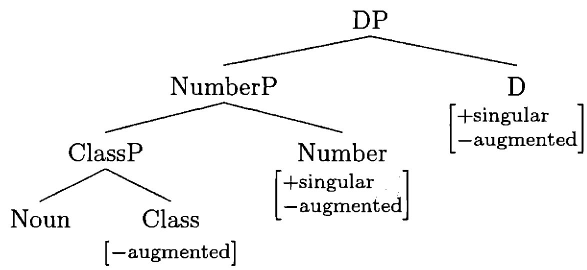
In order for D in (25) to trigger S-agreement, it must bear the features [+singular −augmented]. At first thought, one might imagine that it suffices for the features on Number simply to be copied onto D. However, this would entail that referential cardinality alone determines the value of D and consequently the type of agreement. That is, every Kiowa noun should be SDP. To avoid this problem, Class must enter into the valuation of D. A simple proposal is that instead of merely copying from Number, D copies the features of both Number and Class.

(26) **Valuation of D**
Uninterpretable number on D is valued by a computation of Number and Class. The features of both are replicated on D.

In the current case, where the [−augmented] of Class feature is also a feature of Number, (26) would seem vacuous: copying Class and Number is simply equivalent to copying Number alone. However, we shall shortly see that this is not always the case.

Adopting (26) to value D in (25) yields (27):

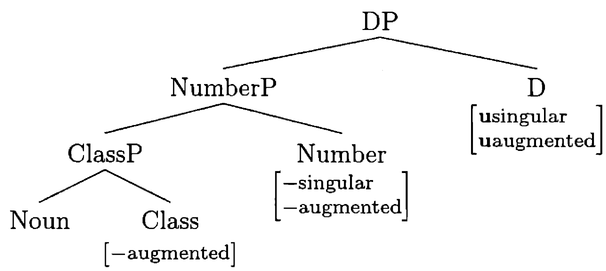
(27)



Comparison with (17) shows that this is the correct feature content to trigger S-agreement.

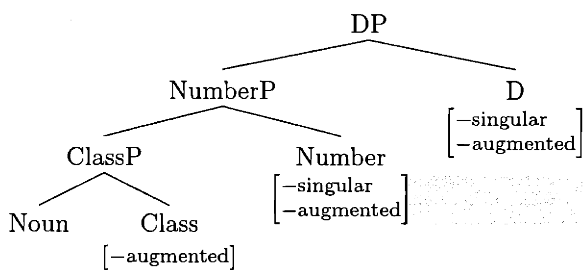
Exactly the same mechanisms account for an SDI noun's D-agreement when referential cardinality is **2**. Class is [−augmented], as before, and Number is [−singular −augmented]. Prior to valuation, we have:

(28)



To value uninterpretable number on D, features are copied from Class and Number yielding (29).

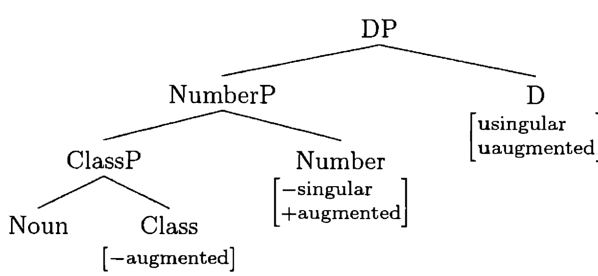
(29)



Again, (17) shows that this is the correct feature content to trigger D-agreement.

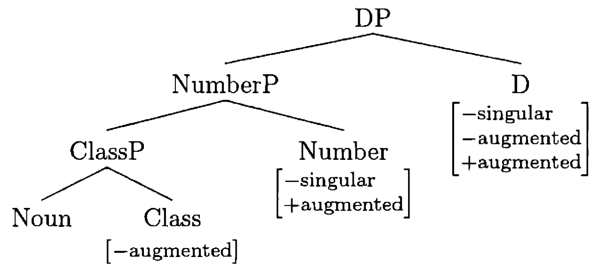
Now consider an SDI noun for referential cardinality **3**. We begin with:

(30)



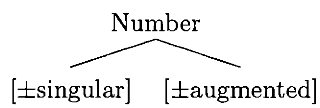
Observe that Number is specified as [+augmented] and Class as [−augmented]. Blindly apply the copying operation would yield:

(31)



In (31), D bears opposite specifications for the same feature; it is both [+augmented] and [−augmented]. Such contradictory specifications are only possible if feature bundles are taken to be sets without internal organization, i.e., quite literally, bundles. However, Harley and Ritter (2002) have recently argued extensively that morphosyntactic features are geometrically organized. As for phonological geometries, this entails that, in any bundle, a feature can only have one specification. I.e., assuming that Number is structured geometrically as, say:

(32)



entails the ill-formedness, indeed the unrepresentability, of (31), owing to (33), or, more generally, (34), where X is a head and [±F], a feature.

(33) $* \begin{matrix} \text{D} \\ \begin{bmatrix} -\text{singular} \\ -\text{augmented} \\ +\text{augmented} \end{bmatrix} \end{matrix}$

(34) $* \begin{matrix} \text{X} \\ \begin{bmatrix} -\text{F} \\ +\text{F} \end{bmatrix} \end{matrix}$

So, in (30), it is impossible to assign a value to number on D simply by copying from Number and Class.[11] Consequently, something different must

[11] After further thought, I am disinclined to take the position just outlined. There appear to me to be two problems with it.

First, the introduction of a feature violates inclusivity. Within Minimalism, the issue of whether syntax obeys inclusivity—that is, whether it does anything more than stick things together, move them around, and duplicate them—is a major is as it speaks to the issue of design optimality. If syntax is not subject to inclusivity, if, instead, it can produce things from nowhere, then the theory of syntax becomes potential far less constrained.

Second, I believe it is an abuse of Harley and Ritter's work to see in it an argument that [+F −F] is geometrically impossible. The data set they consider is in principle incapable of providing such evidence. This is because their data, pronouns, are constrained by semantics. Pronouns that are semantically incoherent, as [+F −F] is, are unusable. Consequently, they be done. I suggest that, when (26) cannot apply (because of the geometrical constraint (34)), D is assigned a special value. For consistency with past work on Kiowa, I call this value [inverse].

(35) **Definition: [inverse]**
When D is valued by a computation over two heads with opposite specifications for the same feature, it is valued as [inverse].

Note that this definition makes [inverse] a value for number as a whole.[12]

Applying (35) to (30) yields:

(36)

will never enter Harley and Ritter's data set. So, the inventory of attested pronouns can tell us nothing about the geometric possibility of semantically impossible feature combinations.

As an alternative to use of [inverse], Alec Marantz (personal communication) suggests that when uninterpretable [**u**F] must be valued, it is possible to assign it only one value; we are dealing, after all, with a single [**u**F], not [uF **u**F]. So, when [**u**F] dominates [+F] and [−F], valuing it is impossible. This is certainly plausible, though I do not see what to do next. There must be something that is realized as inverse marking and triggers inverse agreement; and [**u**F] must be assigned some pseudo-value if the syntactic computation is to converge. The obvious thing is to say that the pseudo-value assigned is what is responsible for inverse marking and inverse agreement. However, this seems also to violate inclusivity: where does the value come from?

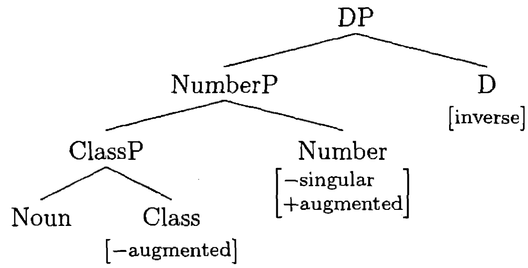
Noam Chomsky (personal communication) suggests that all values are copied onto D, and from D elsewhere, and inverse marking / agreement is simply the realization of the feature clash. I have yet to work through the implications of this approach for the analysis of the prefix in Chapter 5. However, one consequence is immediately apparent. The new 'inverses' would be:

(i) $\begin{bmatrix} -\text{singular} \\ -\text{augmented} \\ +\text{singular} \end{bmatrix} \begin{bmatrix} -\text{singular} \\ -\text{augmented} \\ +\text{augmented} \end{bmatrix} \begin{bmatrix} -\text{singular} \\ +\text{augmented} \\ +\text{singular} \end{bmatrix}$

Observe that all share the feature [−singular], which would explain why I-agreement patterns with D-agreement and P-agreement, which are also [−singular]. Observe also that the comments above concerning geometrical *versus* semantic possibility suggest that such copying operations are in principle possible. On the other hand, observe that there is a tension between this suggestion and Marantz's suggestion that [**u**F] can only be assigned a singular value. In (i), [usingular] is valued as [+singular −singular] and [**u**augmented] as [+augmented −augmented]. Given these difficulties, I leave aside resolution of this issue and continue with [inverse] as adopted in the main body of the text.

(A third possibility is that [inverse] is really [+singular +augmented]. This would be neat in that it exploits the fourth logically possible combination of the number features [±singular], [±augmented]. However, it is difficult to imagine integrating the plus-plus option into an analysis of the agreement prefix. On the one hand, I-agreement and D-agreement pattern together to the exclusion of everything else; one might attribute this to their both being [αsingular αaugmented]. On the other hand, I-agreement patterns with the [−singular] agreement forms, which would appear to be impossible on a plus-plus account. (For how [inverse] can be(come) [−singular], see Chapter 5.))

[12][inverse] is assumed to be a privative feature because processes of Kiowa grammar, so far as I am aware, refer only to its presence; non-inverseness never counts. This is perhaps, unsurprising. The binarity of [±singular] and [±augmented] is semantically necessary. [inverse], by contrast, is a purely formal entity, without interpretation. Consequently, it cannot receive semantic motivation for binarity.



We need now simply assume that [inverse] is the feature that triggers I-agreement, clearly the null hypothesis, and we have the desired result.

Observe that the derivations just given force a noun classified as [−singular] to give S-agreement when referential cardinality is **1**, D-agreement when **2** and I-agreement when **3**. That is, they justify the mnemonic SDI. We are now in a position to justify several other mnemonics.

3.2.3 Further derivations

The previous subsection provided a locus for class features, Class, and explained how these interact with Number to give agreement that reflects referential cardinality, on the one hand, or the inverse, on the other. This apparatus now enables us to derive the mnemonics of several other classes, based on the classificatory features argued for above:

(37)

Class	Feature
SII	[+singular]
SDI	[−augmented]
IDP	[−singular]
IDI	[−singular −augmented]
SDP	[ ]

We begin, however, with an explanation of inverse marking on nouns. (Details of the derivations for SDP, IDP and IDI—though not SII—are much the same as for SDI. Readers satisfied with the latter may wish to skip the former. During the derivations, it may be helpful to refer back to the example sentences in Section 2.3.)

Inverse marking

Recall that I-agreement on the verb is concomitant with inverse marking on the noun, as exemplified below.

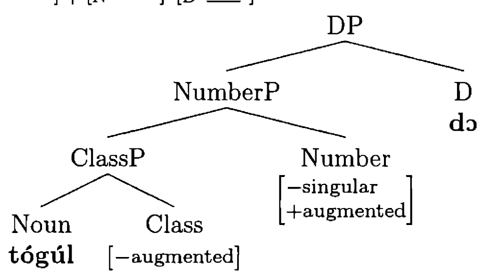
(38) Tógúúdɔ́ e-dɔ́ɔ́
young.man.**INV** **I**-be
'They're young men'

The nature of inverse marking is now trivially explained: it is simply the realization of the feature [inverse] on D.

As a specific example, consider (38). **Tógúl** 'young man' is an SDI noun. Therefore, when referential cardinality is **3**, the full DP will be exactly like (36). Vocabulary insertion will place **tógúl** at Noun and the phonologically appropriate inverse marker **dɔ**, (39), at D (see Section 2.6.1 for phonological details).

(39) -dɔ ⇔ [inverse] | [$_N$ ... **l**] [$_D$ ___]

(40)



In linear terms, this is **tógúl-dɔ**. Standard phonology (Watkins 1984, Harbour 2002) yields the surface form **tógúúdɔ́** 'young man.INV'.

Before preceding to other mnemonics, it is worth noting that inverse marking on demonstratives is easily amenable to the treatment just given. Kiowa has two demonstratives, proximal and distal. These comprise a root and a number-conditioned suffix. The proximal root is **ę́į́** and the distal, **óí**. They are found, for instance, in the locatives, **ę́į́hɔɔ** 'here' and **óíhyɔɔ** 'there'. As demonstratives, they are suffixed with **-gɔ** if modifying an inverse-marked noun, i.e., a D valued as [inverse], and by **de** otherwise.

(41) ę́į́de/óíde thalíí
this/that boy
'this/that boy' *or* 'these/those (two) boys'

(42) ę́į́gɔ /óígɔ thalyóp
this.INV/that.INV boy.INV
'these/those (several) boys'

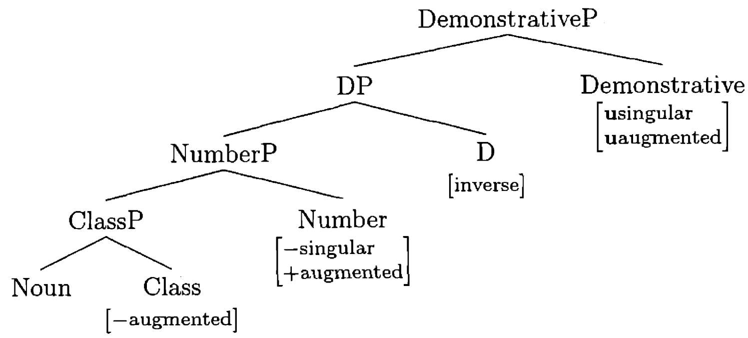
For **thalíí** 'boy', an SDI noun, the inverse-marked demonstratives occur when referential cardinality is **3**. For an IDP noun, say, they would occur for **1**.

(43) ę́į́gɔ /óígɔ áádɔ
this.INV/that.INV stick.INV
'this/that stick'

(Demonstratives generally occur before the noun, as above. However, they may occur after it, discontiguous from it, or without an overt noun.)

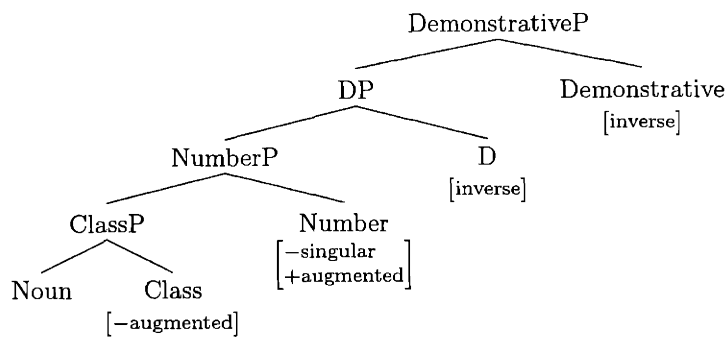
To derive (42), we can posit the following structure. It is simply (36) embedded under a demonstrative, where the demonstrative, like D, has uninterpretable number that must be valued.

(44)



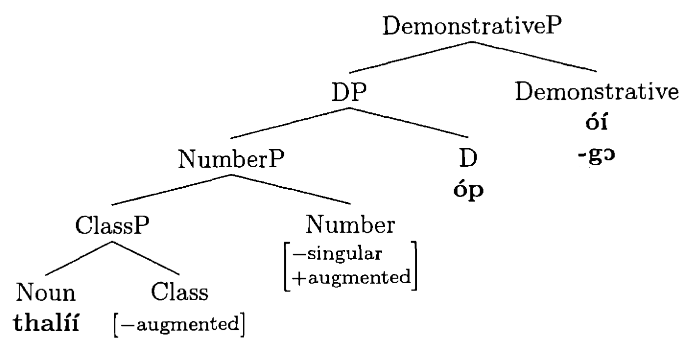
Leaving aside whether uninterpretable number on the demonstrative is value by copying from D or by reexecuting the computation over Class and Number that valued D—they have the same end effect—number on Demonstrative is valued as [inverse].

(45)



After vocabulary insertion, we have (modulo phonological abstractness and issues of word order):

(46)



from which regular phonology produces **óígɔ thalyóp**. To derive the non-inverse-marked form, **óíde**+DP, we need only assume that **-de** is a default realization of number on Demonstrative:[13]

[13]Interestingly, the same suffixes are found with relative clauses—**de** if the relativized noun is non-inverse:

(47) [number] ⇔ -de | [Demonstrative ___]

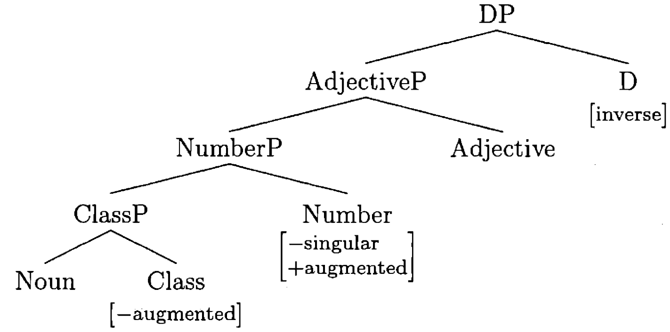
Then, for referential cardinality **1** with an SDI noun, number on Demonstrative will be valued as [+singular −augmented]. This cannot be realized by **-gɔ** ⇔ [inverse], so, the default **-de** inserts, giving **óíde thalíí**.

By similar means, we can derive an inverse-marked DP containing an adjectivally modified noun, such as **k!yą̂ą̂hį́k!ǫųbɔ** 'old men'.

(48) k!yą̂ą̂hį́-k!ǫų-bɔ (Watkins 1984, p. 99)
man- old- INV
'old men'

Assuming uncontroversially that adjectives are below D, we have the DP below, once number on D has been valued:

(49)



After vocabulary insertion we have:

(50)

(i) [ám gyá- tǫ́ų́- khǫ̂ǫ̂mɔ]-**de** (Watkins 1984, p. 231)
ANPH 1S:2S:3S-talk-name.IMPF -DE
'[the man] who I was speaking to you about'

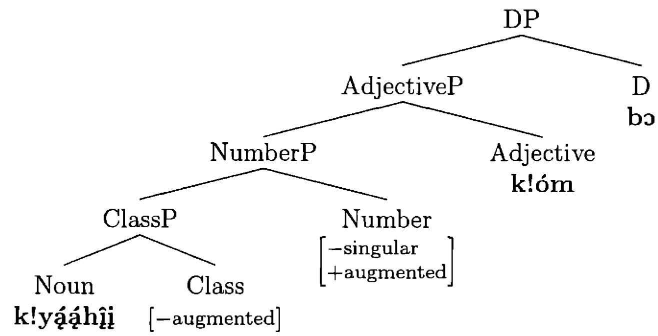
gɔ if the relativized noun is inverse:

(ii) [pį́ááɗɔ e-ét]-**gɔ** (Watkins 1984, p. 231)
table.INV **I**-big.S -GO
'a big table'

To derive this syncretism between demonstrative marking and relative clause marking, we must suppose one of two things. Either that demonstratives and relative clauses share some feature, X, so that the same vocabulary item inserts in both structures:

(iii) [number] ⇔ -de | [X ___]

Or that demonstratives are themselves relative clauses (agreement-less and so presumably highly reduced). I leave these questions for further research.

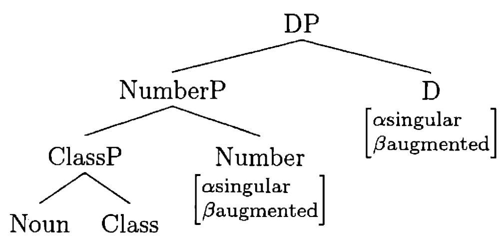


Standard phonology yields **k!yą́ą́hį́k!o̰ṵbɔ**. Note that DPs with adjectively modified nouns serve to emphasize that the inverse marker and, hence, [inverse] are D-level, rather than lower in the structure.

The SDP class

The SDP class represents the simplest case. For this class, the only locus of number features is Number; Class has none.[14] Consequently, the feature content of Number is always replicated on D. As a result, agreement (being trigger by D) always reflects referential cardinality. The general case of a fully valued DP is shown below.

(51)



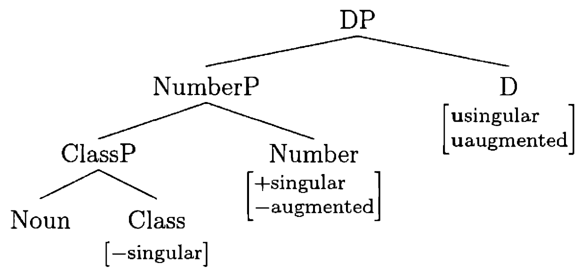
For **1** / S-agreement, α is plus and β is minus; for **2** / D-agreement, α and β are both minus; for **3** / P-agreement, α is minus and β is plus.

The IDP class

When Noun belongs to the IDP class, Class is [−singular]. For referential cardinality **1**, Number is [+singular −augmented]:

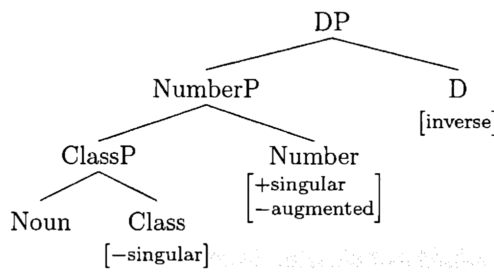
(52)

[14] It may be preferable to omit the Class head if it is empty. It is retained here for uniformity of exposition.



Class and Number have opposing values for [±singular]. Therefore, uninterpretable number on D cannot be valued by copying. Instead, it receives the value inverse.

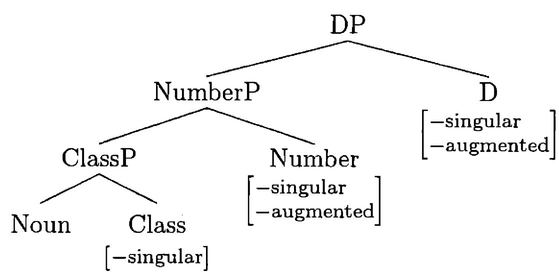
(53)



Such a noun will be inverse marked and will trigger I-agreement.

For referential cardinality **2**, no such incompatibility arises. Number is [−singular −augmented], which subsumes Class, and so all features can be replicated on D. The valued DP is:

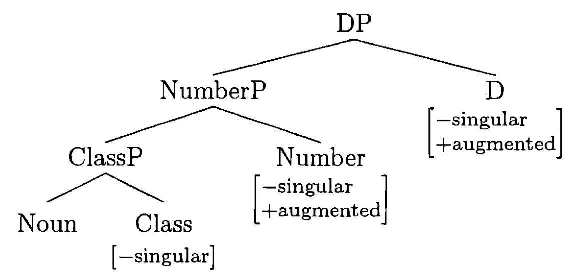
(54)



The DP will not be inverse marked and will trigger D-agreement. (Note that (53) and (54) also adequately derive agreement and inverse marking for IDS nouns; (55), however, does not represent IDS nouns of referential cardinality **3**.)

For referential cardinality **3**, Number is [−singular +augmented] and, again, all values can be copied onto D. This yields:

(55)

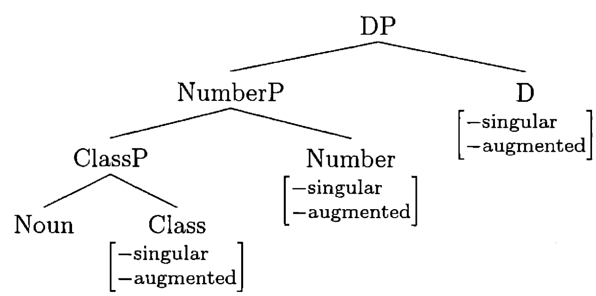


The DP will not be inverse marked and will trigger P-agreement.

The IDI class

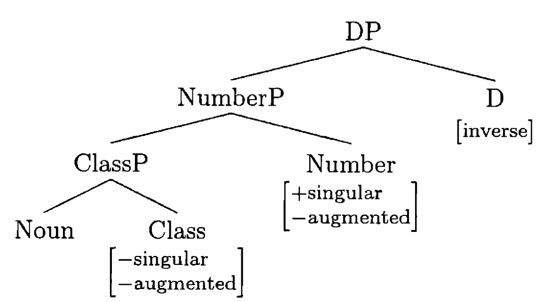
When a noun belongs to the IDI class, Class is [−singular −augmented]. Only when Number bears the same values is it possible to value D by copying.

(56)



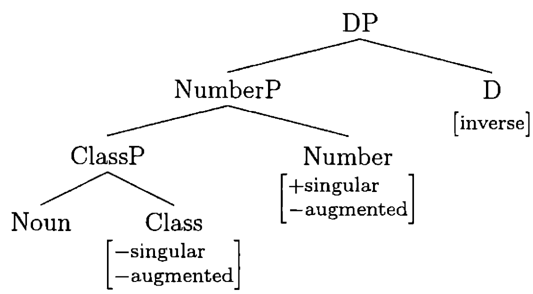
Such DPs trigger D-agreement, and so only for **2** do nouns of this class trigger agreement that reflects referential cardinality. By contrast, for **1**, Class and Number have opposite values of [±singular] and so D is valued as [inverse]:

(57)



And for **3**, they have opposite values of [±augmented], so that, again, D is valued as [inverse].

(58)



In either case, the DPs will be inverse marked and will trigger I-agreement.

The SII class: justification by syncretism

We are now in a position to justify the existence of the SII class and to account for the syncretisms of Section 2.3.9. The core facts and generalizations are repeated below.

(59) **Syncretism #1.** For agents of (di)transitives and the subjects of unaccusatives (without indirect objects), the first person exclusive dual and first person exclusive plural trigger I-agreement.

a. Nɔ́ɔ́ a- dɔ́ɔ́
1 1S-be
'It's me'

b. Nɔ́ɔ́ e-dɔ́ɔ́
1 I-be
'It's me and him *or* me and her'

c. Nɔ́ɔ́ e-dɔ́ɔ́
1 I-be
'It's me and them'

(60) **Syncretism #2.** For agents of (di)transitives and the subjects of unaccusatives (without indirect objects), the first person inclusive dual and first person inclusive plural trigger 2P-agreement, i.e., the same pattern as Syncretism #1, though syncretic with second person plural.

a. Nɔ́ɔ́ ba-dɔ́ɔ́
1 2P-be
'It's me and you.S'

b. Nɔ́ɔ́ ba-dɔ́ɔ́
1 2P-be
'It's me and you.D/P'

(61) **Syncretism #3.** For indirect and direct objects, the first person inclusive dual, the first person inclusive plural, the first person exclusive dual, and the first person inclusive plural all syncretize.

a. Dɔ́- bǫ́ų̨
3P:1D/P-see.PF
'They saw me and you *or* me and him *or* me and them'

b. Báougɔ dɔ́t- ɔ̨́ɔ̨
cat.INV 3P:1D/P:I-give.PF
'They gave cats to me and you *or* me and him *or* me and them'

(62) **Syncretism #4.** First person never distinguishes dual from plural. (Illustrated by the previous examples.)

In addition to the principles relied on above—the mechanisms that give rise to inverse marking and I-agreement, and the view of Kiowa case and agreement argued for by Adger and Harbour (2003)—an account of these syncretisms requires two rules of postsyntactic deletion (impoverishment). I follow Noyer (1992) in assuming two person features, [±author] and [±hearer], that combine to yield first person inclusive and exclusive and second person.[15]

(63)

Person	**[±author]**	**[±hearer]**
first inclusive	+	+
first exclusive	+	−
second	−	+

The features are defined relative to the author and hearer, which I assume to be semantically given.[16]

(64) [+author] holds of N if $|$ author $| \leq | N |$.

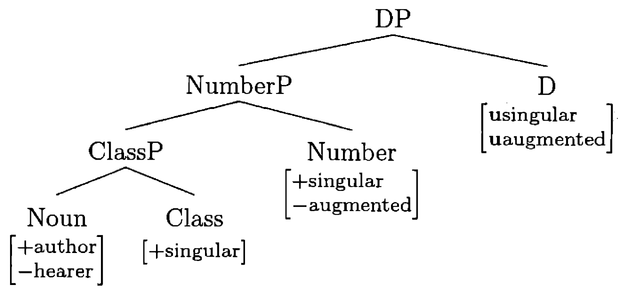
(65) [+hearer] holds of N if $|$ hearer $| \leq | N |$.

We begin with the unproblematic first person singular. Following earlier examples, first person, [+author −hearer], is located at Noun. This placement is not crucial, and others may prefer to locate the person features directly at D. By contrast, the classificatory feature [+singular] must crucially be placed below D, so as to interact with Number and give rise to the value [inverse] in later examples. Consequently, I continue to place it at Class. Number for the first person singular is naturally [+singular −augmented]. The structure before valuation of number on D is:

(66)

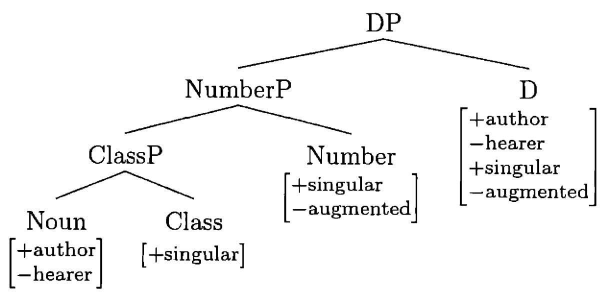
[15]The combination [−author −hearer] corresponds to third person. However, third person may also be represented by absence of person features (Adger and Harbour 2003 and references therein). For ease of exposition, I systematically ignore them for third person.

[16]The $\leq$ notation is standard: $X \leq Y$ is true if and only if either X is an individual and $X \in Y$ or X is a set and $X \subseteq Y$.



D dominates no conflicting number specifications and so will be valued as [+singular −augmented]. Observe, additionally, that the existence of person agreement means that person features must come to be instantiated on D (given that agreement arises via a relation between D and a Case assigning head). I assume that person features arise on D as part of the process of number valuation.[17] The result, then, is:

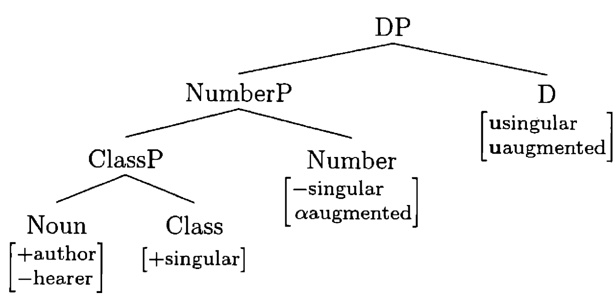
(67)



This will trigger first person singular agreement.

Now consider the first person exclusive. Dual and plural are conflated, by means of α-notation, as [−singular αaugmented]. Noun and Class are as before.

(68)

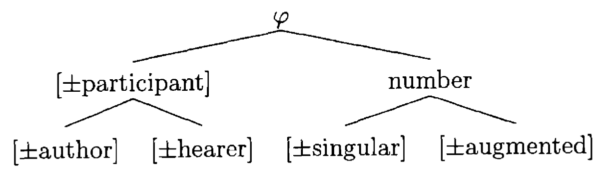


Class and Number bear opposing specifications for [±singular]. Consequently, D will be valued as [inverse].

[17]Technically, it may be preferable to regard D as having a full complement of uninterpretable φ-features, not just uninterpretable number. As the treatment of SII nouns is the only case in which the issue of person arises, it is expositorily simpler to continue with the assumption that D bears uninterpretable number and that person features 'piggy back' on the valuation process.

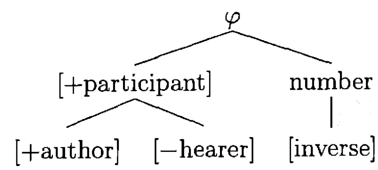
Following, again, Harley and Ritter's research into the geometry of morphosyntactic features (Harley and Ritter 2002), I assume that person and number occupy different parts of the geometry:

(69)



Given this structure, the valuing of number on D as [inverse] is orthogonal to the copying of person features. Person and [inverse] coexist as below:

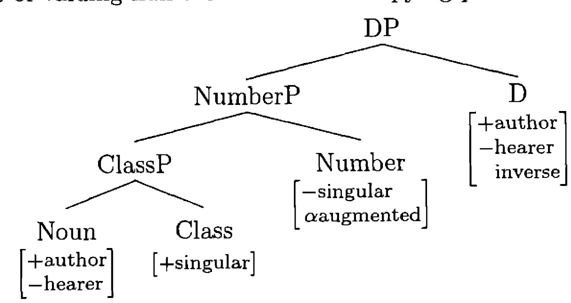
(70)



(The DP trees above and below abstract away from such geometric fine-structuring, as it is, in general, otiose; (70), for instance, is more economically represented as a simple feature bundle in square brackets, as under D in (71).)

The result of valuing number on D and of copying person features is:

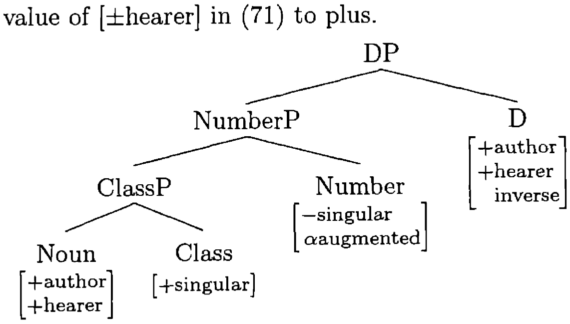
(71)



Observe that, whatever agreement this triggers, it will be impossible to recover from D whether α was minus or plus, i.e., whether referential cardinality was **2** or **3**. Consequently, first dual exclusive and first plural exclusive will syncretize (Syncretism #4).

Consider now the DP structure of first person inclusive. This merely involves changing the value of [±hearer] in (71) to plus.

(72)



As before, D contains no information to distinguish first inclusive dual from first inclusive plural, forcing these two again to syncretize (Syncretism #4).

Consider Syncretisms #1–3. First person agreement shows two different types of syncretic behavior. Agents of (di)transitives and subjects of unaccusatives (without indirect objects) fall under Syncretisms #1 and #2; indirect objects and direct objects fall under Syncretism #3. Adger and Harbour (2003) show that these two sets of arguments are syntactically natural classes in virtue of the heads that they check Case against: agents of (di)transitives and subjects of unaccusatives (without indirect objects) check Case against Asp, whereas indirect objects and first person direct objects check Case against v. Adger and Harbour argue that several agreement syncretisms hinge on the head that an argument checks Case against. I extend this general approach by linking Syncretisms #1 and #2 to Asp, and Syncretism #3 to v.

Specifically, I propose that [±author] and [±hearer] can be deleted postsyntactically in ways dependent on Asp and v.

(73) **[±author]-deletion on Asp**

$$[\alpha\text{author}] \rightarrow \emptyset \mid \begin{bmatrix} \text{v} \\ +\text{hearer} \\ \underline{\qquad} \end{bmatrix}$$

(74) **[±hearer]-deletion on v**

$$[\alpha\text{hearer}] \rightarrow \emptyset \mid \begin{bmatrix} \text{v} \\ +\text{author} \\ \underline{\qquad} \end{bmatrix}$$

To see how these work, consider what happens when the DPs in (71) and (72) trigger agreement on the verb.

Consider the first person exclusive as the agent of a (di)transitive verb or the subject of an unaccusative (without no indirect object). In this case, the DP enters into an Agree relation with Asp and so D's φ-features are copied onto Asp. This yields:

(75)
$$\begin{array}{c} \text{Asp} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ \text{inverse} \end{bmatrix} \end{array}$$

After Spell Out, but prior to Vocabulary Insertion, (73) takes effect, deleting [+author] in (75) and yielding:

(76)
$$\begin{array}{c} \text{Asp} \\ \begin{bmatrix} -\text{hearer} \\ \text{inverse} \end{bmatrix} \end{array}$$

There are no vocabulary items for [−hearer] *per se*. So, (76) licenses only the vocabulary items that realize [inverse]. That is, first person dual or plural exclusive triggers I-agreement on Asp. This explains Syncretism #1.

Consider now the first person inclusive for the same arguments. The Agree relation between D and Asp yields:

(77)
$$\begin{array}{c}\text{Asp}\\ \begin{bmatrix}+\text{author}\\ +\text{hearer}\\ \text{inverse}\end{bmatrix}\end{array}$$

Again, (73) deletes [+author] in (77) and yielding:

(78)
$$\begin{array}{c}\text{Asp}\\ \begin{bmatrix}+\text{hearer}\\ \text{inverse}\end{bmatrix}\end{array}$$

Clearly, this will license second person agreement, as required. This almost explains Syncretism #2. The missing piece is why [inverse] in the presence of [+hearer] is realized as P-agreement. On this, see Chapter 5.

Finally, consider first person indirect and direct objects, both dual and plural. Here, D enters into an Agree relation with v, yielding (79). I use α-notation to conflate the inclusive and the exclusive.

(79)
$$\begin{array}{c}\text{v}\\ \begin{bmatrix}+\text{author}\\ \alpha\text{hearer}\\ \text{inverse}\end{bmatrix}\end{array}$$

Between Spell Out and Vocabulary Insertion, (74) takes effect, deleting [+hearer] in (79) and yielding:

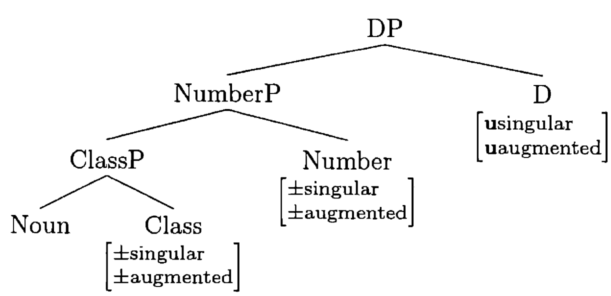
(80)
$$\begin{array}{c}\text{v}\\ \begin{bmatrix}+\text{author}\\ \text{inverse}\end{bmatrix}\end{array}$$

Because of [inverse], (80) is distinct from first person singular (in)direct objects. Because of [+author], it is distinct from all other persons. So, we explain why first person (in)direct object agreement does not syncretize with agreement for other persons. This explains Syncretism #3.

3.2.4 Summary

The preceding subsections have motivated the DP structure below.

(81)



The features at Class are determined by idiosyncratic properties of the noun: for some, Class is [+singular], for others, [−singular], or [−augmented], as shown below.

(82)

Class	Feature
SII	[+singular]
SDI	[−augmented]
IDP	[−singular]
IDI	[−singular −augmented]
SDP	[ ]
IDS	[−singular ...]

In (81), D bears uninterpretable number features, which must be valued; valued, these go on to trigger agreement. As agreement does not always reflect referential cardinality, it was argued that Number and Class both affect the valuation of D. The near null hypothesis is:

(83) Uninterpretable number on D is valued by a computation of Number and Class. The features of both are replicated on D.

This principle cannot operate in all cases as Class and Number can have conflicting specifications. So, a second principle is required in the case of conflict:

(84) When D dominates [+F] and [−F], it is valued as [inverse].

These two principles together with possible values of Class generate several of the mnemonics of the previous chapter: SDP, SII, SDI, IDP and IDI. Furthermore, they account for inverse marking on nouns.

The economy of this account is worth emphasizing. It relies on a variety of theoretical assumptions concerning DP structure, feature geometry, agreement and Case. However, these are assumptions are neither novel nor specific to this analysis. The remainder of the account consists in a near null hypothesis about valuation of number on D and second principle that operates where feature geometry prevents the first. The most arbitrary part of the analysis so far is the claim that a noun N has classificatory feature [αF] whereas N' has [α'F$'$]. However, the relationship between a noun and its classificatory feature is, in fact, far from arbitrary. As we will see in Section 3.3, it is semantically constrained.

3.3 Mnemonic Naturalness

With the underlying classificatory features of five (and a half) classes uncovered, we can consider the naturalness of their mnemonics given the semantic properties of the nouns they subsume.

The SII mnemonic is entirely natural: it claims that first person, the sole SII member, is inherently [+singular]. This not to claim first person dual or plural ineffable, but merely to observe in Kiowa grammar the commonplace of the Western philosophical tradition that one has a special access to one's own mind, given which, the correlation between singularity and first person is natural. Similarly, it claims, doubtless correctly, that genuinely plural first persons, as in 'We, the undersigned, believe...', are less frequent than pluralities of which the speaker is a member, as in 'We all went home'.

The SDI mnemonic is also natural for animates and other nouns that determine or influence the course of their own motion. As stated following its definition, [±augmented] can be thought of as measuring a degree of homogeneity: [A, +augmented] means that [A], the properties of the whole, are also properties of the parts. This holds even when [A] is unspecified. Given the autonomy concomitant with SDI nouns' capacity for independence of movement, such homogeneity is not expected. Consequently, it is natural for such nouns to be [−augmented].

In this light, **kɔ̃l**, the unique exception to the implication from animacy to SDI membership also appears natural. In addition to 'cattle' and 'buffalo', it means 'herd(s)'. Herds are crucially collective and so describable as [+augmented], for properties of herds can easily be properties of subparts of herds. For nouns that are ambiguously herd-denoting or individual-denoting, the classification [−augmented], and with it SDI class membership, is inappropriate.

For IDP nouns, the mnemonic results from the feature [−singular], which means that IDP nouns do not naturally occur singularly. For vegetation, this is reasonable, as it is also for other members of this class, such as implements. The same reasoning applies to the I and D of the IDS mnemonic.

The IDI mnemonic is at first sight mysterious. Given that the combination [−singular −augmented] is both the inherent features for this class and the featural correlate of referential cardinality **2**, it seems that these nouns are conceptualized as inherently dual. However, this makes scant sense. First, of all IDI nouns, only eyebrows come in pairs—apples, hair, blackberries, brains, eyelashes, plums and tomatoes do not. Second, there are good many things that are inherently paired—the thematic nouns in **de** (Section 2.6.2) for instance—but these are not IDI nouns. Third, it is doubtful that 'two hairs', 'two apples', *et cetera* are frequently enough uttered and heard for IDI membership to be acquired.

The naturalness of the mnemonic becomes apparent, however, if each class feature is considered separately. Recall, from 2.4.2, Chierchia's observation that hair is classified as count in some languages and as mass in others. This crosslinguistic classificatory equivocation can be expressed in terms of the number features motivated above. The individuability of count nouns implies [−augmented] whereas the plurality of mass nouns implies [−singular]. Alternatively, thinking of apples, *et cetera*, their natural state when growing on trees is characterizable as [−singular], but, when given the quantities in which they are generally consumed, any apple is more likely [−augmented]. Consequently, for these nouns, [−singular] and [−augmented] are both justifiable as classificatory features. The apparent inherent duality in which the joint classification [−singular −augmented] results is accidental. So, 'two hairs', 'two apples', *et cetera* are not requisite data for the acquisition of this class.[18, 19]

For the SDP class, absence of inherent number features explains why, as noted in Section 2.4.4, no positive properties unite members of this class, an assortment of implements, footwear, body parts and natural items. The lack of positive properties is the semantic correlate of the lack of classificatory number features.

The preceding chapter argued that the classes are internally semantically coherent in the sense that the nouns each class subsumes share certain properties. We now see that these shared properties are naturally expressible in terms of number features. Moreover, these number features are responsible, in combination with one another and the mechanisms for valuing number on D, for the agreement types S, D, P and I. Consequently, the system of mnemonics is not coincidental but is in accord with the semantic properties of the nouns each class subsumes. As we discuss the remaining classes and their underlying features and values, the semantic naturalness of those other mnemonics will also become clear.

[18]One might think that the inherent pairhood of eyebrows or, possibly even, of brains, owing to their having two hemispheres, reflects true inherent duality. However, eyebrows are plausibly IDI nouns because on a conceptual par with other types of hair. And the hemispheres of brains are not relevant to their classification as can be seen in the following sentence, an idiom meaning 'How intelligent he is!'. (I have also heard: **Hááxo k!yágóp....**)

(i)	K!yágóp	hááxo	ɔ́-	háí-dɔɔ!
	brain.INV	how	:3S:I-agreement-Q-	be
	'What a brain he has!'			

Note that 'brain' triggers I-agreement and so must be inverse marked. However, only one brain is being talked of. If **k!yágóp** really meant 'pair of brain hemispheres' rather than simply 'brain', (i) would have D-agreement.

[19]An important point emerges here. The explanation just offered for the naturalness of IDI's class features involved a different interpretation of [−singular −augmented] than when these features appears under Number. Under Number, [−singular] is one of the other features that [−augmented] is taken to 'apply to'. Under Class, it is not. However, if this constitutes an equivocation, it constitutes a non-vicious one. It is already apparent that the interpretation of Class is different from that of Number. For instance, Number has a direct effect on the truth conditions of the sentence in which it occurs; Class does not. To the extent that Class affects on the interpretation of the sentence, it does so via the interpretation of Noun. For instance, as observed in Section 2.6.1, one and the same nominal root can have different meanings depending on Class, e.g., **áá** is IDS 'tree' but IDP 'stick, pole'. However, it is not clear *a priori* whether this is an effect of Class on the interpretation of Noun or of Noun on the content of Class. Rather, Class represents some property of Noun in the abstract, but Number represents some property of Noun in the concrete, that is, on a particular occasion of use.

Given that Class is not interpreted in the same fashion as Number, it is not to be taken for granted that the cooccurrence of two features means the same thing under each head. In the case of Number, a head the interpretation of which directly affects the interpretation of the whole sentence, feature cooccurrences are to be interpreted as they are elsewhere; that is, the semantics of feature cooccurrence on interpreted heads is well theorized about. What is undertheorized is what it means for a noun to bear semantically contentful features in the lexicon or for these features to come with it into the syntax, i.e., the lexicon-syntax interface for nouns. One possibility is that the content of Class is true of the mereological structure of Noun, in the way explored by Ojeda (1998). At this time, I do not have anything to further to say on this point.

3.4 Spurious S, Spurious P

The previous section established and explained the broad correlation between S-agreement and referential cardinality **1**, D-agreement and **2**, and P-agreement and **3**. It further explained how I-agreement interferes with this correlation. The classes under consideration in this section also interfere with the correlation. However, they do so by virtue of what might be term spurious S and spurious P, occurrences of S-agreement and P-agreement they do not correlate with their typical referential cardinality values: SDS, IDS and IDI in its 'different types of' reading show S-agreement when referential cardinality is **3**, and PPP nouns show P-agreement for referential cardinalities **1** and **2**.

Below, I argue that spurious S and P should be attributed to a feature [±group]. As before, the feature can be given a clear semantics associated with the relationship between wholes and parts. The feature is shown to have an effect on the valuation of D that reflects its interpretation.

3.4.1 The meaning of [±group]

The cases of spurious S share the semantic property of forming plurals in which the boundaries of individual members are poorly distinguishable; that is, they form plurals where the whole is more salient than the part. For SDS nouns, this results because they are non-shape inductive. Faced with a single cloud, or a small number of them, it is generally clear where the boundaries are. However, in a large group, boundaries of the single clouds are unclear and one is apt to view the whole a single mass itself. For IDS, similar reasoning holds. A single mountain or a single tree may be well defined. However, in a mountain range or in a grove or spinney, the boundaries of individuals can be indistinct and the range or grove or spinney is apt to be viewed a whole itself. For IDI, Watkins describes the reading they attain under S-agreement as one of 'plural sets': 'three or more separate collections of a single type, e.g., varieties of apples in separate piles or bags', or 'more than two sets of hair, i.e., heads of hair belonging to different individuals' (Watkins 1984, 88–89). The key notion of 'collection' or 'set' again exhibits the property of not exhibiting clear or inductive boundaries. The generalization then is:

(85) **Generalization: spurious S nouns ...**
...have plurals for which the whole is more salient than the part.

Pluralia tantum nouns exhibit a property almost the opposite of (85). Even when not in a plurality, trousers, war headdresses, necklaces, and so on are clearly composed of parts. That is, in a whole, the parts are salient.

(86) **Generalization: spurious P nouns ...**
...have salient parts even when non-plural.

Given the complementarity of (85) and (86), we should define a single binary feature for which the whole∼part relations of correspond to the plus and minus values. At first, one might think to define simply a predicate Parts(x):

(87) Parts(x) is true if and only x has salient subparts.

However, this feature is too coarse. We are concerned not with properties of N *per se* but with properties of pluralities of N and properties of non-pluralities of N. One might capture the dependence on plurality by including an implication in the definition. So, again adopting the shorthand $[\mathrm{A}]_N$ for [A] holds of N, we could write:

(88) $[+\text{group}]_N$ if $[+\text{augmented}]_N \rightarrow \text{Parts}(N)$

(89) $[-\text{group}]_N$ if $[-\text{augmented}]_N \rightarrow \neg\text{Parts}(N)$

However, note that in this pair of definitions, the meaning of the minus value is not deducible from the plus, nor *vice versa.* This problem cannot be fixed by choosing some other, possibly more complicated truth functor that '$\rightarrow$'.[20] An alternative is to use α-notation, as below (interpreting $-\text{Parts}(N)$ as $\neg\text{Parts}(N)$ and $+\text{Parts}(N)$ simply as $\text{Parts}(N)$):

(90) $[\alpha\text{group}]_N$ if and only if $[\alpha\text{augmented}]_N \rightarrow \alpha\text{Parts}(N)$

However, this still represents a richer type of definition than we have needed until now, given that this cannot be paraphrased into a definition in terms of

[20]This can be proven by assumption of such a functor and deduction of a contradiction. Since this deduction is performed in propositional calculus, I will write the features as predicates: $[+\text{augmented}]_N$ as augmented(N) and $[-\text{augmented}]_N$ as $\neg$ augmented(N); $[+\text{group}]_N$ as group(N) and $[-\text{group}]_N$ as $\neg$ group(N).

Let $*$ be a two-place truth functor, $*(A, B)$, such that the following logical equivalences hold:

$$* (\text{augmented}(N), \text{Parts}(N)) \dashv\vdash \neg\text{augmented}(N) \rightarrow \text{Parts}(N) \tag{3.1}$$

$$\neg * (\text{augmented}(N), \text{Parts}(N)) \dashv\vdash \text{augmented}(N) \rightarrow \neg\text{Parts}(N) \tag{3.2}$$

Then the meaning of [$-$group] would simply be the negation of [+group] under the definition:

$$[+\text{group}]_N \text{ if and only if } *([+\text{augmented}]_N, \text{Parts}(N))$$

It follows from (3.2) that:

$$\begin{aligned} \mid \neg * (\text{augmented}(N), \text{Parts}(N)) \mid = 0 \quad & \text{iff} \quad \mid \text{augmented}(N) \rightarrow \neg\text{Parts}(N) \mid = 0 \\ & \text{iff} \quad \mid \text{augmented}(N) \mid = \mid \text{Parts}(N) \mid = 1 \end{aligned} \tag{3.3}$$

However, it follows from the definition of negation that:

$$\mid \neg * (\text{augmented}(N), \text{Parts}(N)) \mid = 0 \quad \text{iff} \quad \mid *(\text{augmented}(N), \text{Parts}(N)) \mid = 1$$

So, by (3.1):

$$\mid \neg * (\text{augmented}(N), \text{Parts}(N)) \mid = 0 \quad \text{iff} \quad \mid \neg\text{augmented}(N) \rightarrow \text{Parts}(N) \mid = 1 \tag{3.4}$$

Combining (3.3) and (3.4), we have:

$$\mid \text{augmented}(N) \mid = \mid \text{Parts}(N) \mid = 1 \quad \text{iff} \quad \mid \neg\text{augmented}(N) \rightarrow \text{Parts}(N) \mid = 1$$

This is the desired contradiction.

one value, from which the other can be deduced.[21]

Instead, I propose that [±group] be a 'partial' feature. That is, it has a definition in the standard style, (91), however it is dependent for its interpretation on the value of [±augmented], as in (92).

(91) **Definition: [±group]**
[+group] holds of N if and only if Parts(N)

That is, N is [+group] if it lacks salient or distinguishable subparts, and it is [−group] if it has them.

(92) **Restriction of [±group]**
[αgroup] is a predicate of [+augmented].

If [+augmented] is absent, then [αgroup] does not predicate of anything. Now, this is potentially problematic, as having a predicate with nothing to predicate of could be regarded as the cause of a presupposition failure. I propose, therefore, that (92) is a restriction on the syntactic licensing of [±group], so that, if interpretable [+augmented] is not present, that is, if there is no [+augmented] on Class or Number, then [±group] is deleted. Taking (91) and (92) together then, we have that, if $[+\text{augmented}]_N$ is [+group], then N lacks salient parts, and if $[+\text{augmented}]_N$ is [−group], then N has salient parts.

There is a useful consequence of restricting [±group] according to (92). Watkins observed that IDI nouns, when they trigger S-agreement, refer to three or more groupings (see the start of this subsection). This reading arises when Number is [+augmented] and has typical [+group] semantics. Watkins' description means that the reading does not arise for other values of Number; **álɔɔ** cannot mean 'two groups of apples' when Number is [−singular −augmented]. This restriction follows naturally if the group interpretation comes from [+group] which depends on [+augmented]: in the absence of the latter, the collections reading is unavailable.

We can now state the classificatory features of several more classes.

(93)

Class	Feature
SDS	[+group]
IDS	[−singular +group]
IDI	[−singular −augmented (+group)]
PPP	[+augmented −group]

For IDI, [+group] is parenthetic because the group reading optional. Observe that PPP's classificatory features must include [+augmented]. Otherwise, for

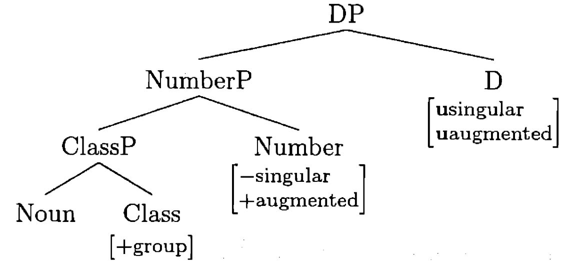
[21] This problem is non-trivial. One is inclined to think of statements of the semantics of features as different from the statements of the semantics of other entities, such as negation, aspect, quantification, and other semantic mainstays. However, as Bromberger and Halle (1997) discuss, phonological features, such as [+round], are in fact abbreviations for predicates. I take it as given that all features, whether morphosyntactic or phonological, are to receive a single type of semantic treatment. Consequently, morphosyntactic features should be defined in terms familiar for predicates elsewhere. As α-notation is not a standard device, we should exercise caution before adopting it here.

referential cardinalities **1** and **2**, there will be no [+augmented] feature, and so the feature [−group] will not be licensed; consequently, it will have no effect on D and so S-agreement or D-agreement will result. This is explained at more length below, during the [−group] derivations.

3.4.2 The morphosyntax of [±group]

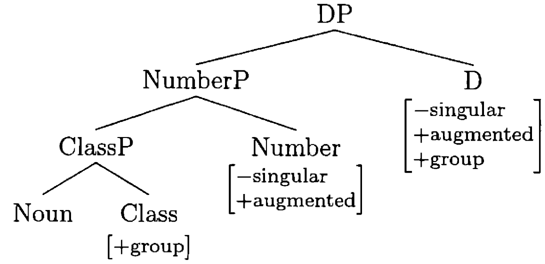
The feature [±group] presents three problems for the theory summarized in Section 3.2.4. For concreteness, consider an SDS noun of referential cardinality **3**, for which Class is [+group] and Number is [−singular +augmented]. Prior to valuation of uninterpretable number on D, the structure is:

(94)



D dominates no opposing specifications for any feature. So, according to the account above, valuation should entail replication on D of all dominated number features.

(95)

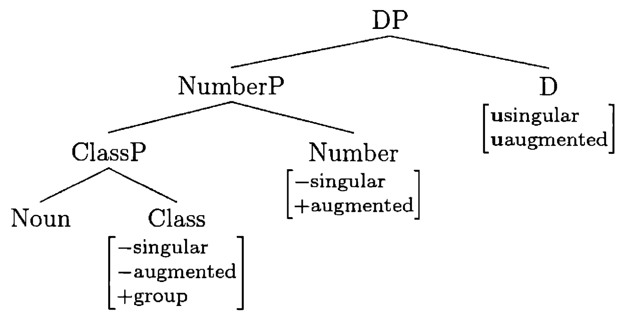


The features on D will be further copied onto whatever head checks its uninterpretable Case feature, resulting in the agreement morphology that comprises the verb prefix. This is where the first problem arises. The Agree relation should lead to S-agreement agreement, which is the realization of the features [+singular −augmented]. Instead, the features to be realized are [−singular +augmented +group], which we would naively expect to yield P-agreement.

The second problem, related to the first, is that neither [+group] nor [−group] is ever realized by any vocabulary item. This does not undermine the claim that there is such a feature as [±group], for its semantic motivation still stands. It does, however, bring into question whether the feature is ever present in the feature bundles comprise the verbal prefix. Of course, in all the trees above, D has borne [**u**singular] and [**u**augmented], but not [**u**group]. This prevents the feature from arising on D, but does so by brute force. It is legitimate to ask why.

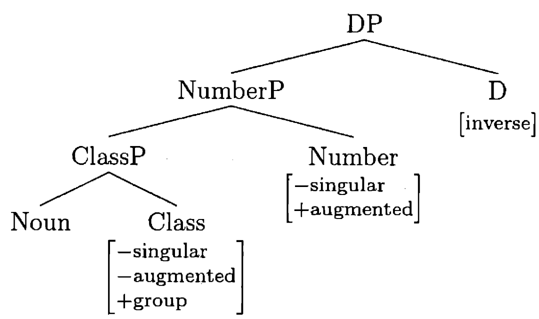
The third problem arises with IDI nouns on their 'different types of' reading. Prior to valuation of uninterpretable number, the structure is:

(96)



Observe that Number and Class have opposite specifications for [±augmented]. Therefore, D is assigned the value [inverse].

(97)



This DP will be inverse marked and trigger I-agreement, whereas it should not be inverse marked and should trigger S-agreement.

Toward a computational solution

This third problem points to the solution to the other two. Absence of inverse marking on IDI nouns with the 'different types of' reading means that [±group] prevents [inverse] arising on D. As [inverse] arises via a computation, [±group] must itself trigger or affect computations. Consequently, the solution to the third and, potentially, the first and second problems lies in the correct statement of [±group]'s computational effect.[22]

[22] Observe that [±group] is prevented from arising on D because D's uninterpretable number is, specifically, [**u**singular **u**augmented]. It is reasonable to ask whether there are language is which D bears [**u**group]. In such a language, there would be distinct forms of [±group]-agreement. Non-existence of such languages would suggest that [±group] is not a number feature on a par with [±singular] and [±augmented]. Corbett (2000) has suggested, on typological grounds, that distributivity and collectivity are not numbers on par as singular, plural, dual, trial, paucal, abundance, although there is clearly a correlation between distributivity

In light of the three problems, we can state conditions on what the computational effect [±group] must be.

(98) a. The presence of [±group] affects the computation that values uninterpretable number on D.

b. [±group]'s effect is to force S-agreement where referential cardinality is not **1** and P-agreement where referential cardinality is not **3**. I.e., its effect is on the values, acquired at D, by [±singular] and [±augmented], the features that compose S-agreement and P-agreement.

Observe that if the last condition is satisfied, then [±group] never appears on D and so there is no call for a rule to remove it from the agreement prefix postsyntactically.

The effect of [±group] can be made clearer by considering the classes and referential cardinalities it affects. The table shows in full (see (100) for a summary) the effects of [±group] on computations. The left and middle column give the input to the computation that values uninterpretable number on D, and the right, the output of the computation. Where the value on D is not the same as the value on Number, the former is boldfaced. The pairs of rows represent, in descending order, the classes SDS, IDS, IDI (with the 'different types of' reading) and PPP. In each pair of rows, the upper member represents referential cardinalities **1** and **2**, and the lower, **3**.

/ collectivity and other numbers (e.g.: distributive → non-singular). If [±group] is one of the featural components of distributivity and collectivity, then there could be crosslinguistic grounds for excluding [ugroup] from D. Substantiating this claim will require careful work on the semantics of distributivity, collectivity, and the feature [±group].

(99)

Class	Number	D
$[+\text{group}]$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$
$[+\text{group}]$	$\begin{bmatrix}-\text{singular}\\ +\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\mathbf{+singular}\\ \mathbf{-augmented}\end{bmatrix}$
$\begin{bmatrix}-\text{singular}\\ +\text{group}\end{bmatrix}$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$
$\begin{bmatrix}-\text{singular}\\ +\text{group}\end{bmatrix}$	$\begin{bmatrix}-\text{singular}\\ +\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\mathbf{+singular}\\ \mathbf{-augmented}\end{bmatrix}$
$\begin{bmatrix}-\text{singular}\\ -\text{augmented}\\ +\text{group}\end{bmatrix}$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$
$\begin{bmatrix}-\text{singular}\\ -\text{augmented}\\ +\text{group}\end{bmatrix}$	$\begin{bmatrix}-\text{singular}\\ +\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\mathbf{+singular}\\ \mathbf{-augmented}\end{bmatrix}$
$[-\text{group}]$	$\begin{bmatrix}\alpha\,\text{singular}\\ -\text{augmented}\end{bmatrix}$	$\begin{bmatrix}\mathbf{-singular}\\ \mathbf{+augmented}\end{bmatrix}$
$[-\text{group}]$	$\begin{bmatrix}-\text{singular}\\ +\text{augmented}\end{bmatrix}$	$\begin{bmatrix}-\text{singular}\\ +\text{augmented}\end{bmatrix}$

Two facts about (99) should be noted. First, D differs from Number if and only if the values of [±group] and [±augmented] are the same. Second, when D differs from Number, [±augmented] on D has the opposite value from [±augmented] on Number (and the opposite value of [±singular] on D). We can, therefore, state a condition on computations analogous to **??** concerning [inverse].

(100) **Generalization: Effect of [±group]**
Suppose that [**u**number] is valued by a computation over the heads it dominates and that these heads are specified for [α augmented] and [α group]. Then [**u**number] is valued as [α singular $\bar{\alpha}$ augmented].

The reader may verify the accuracy of (100) by consulting the preceding table or by referring to the explicit derivations that follow.

From generalization to computational solution

Statements like (100) raise questions concerning the computational power of the syntactic component of Universal Grammar. (100) is apparently like [inverse], as both involve comparison of features and values. Yet, they are quite different.

The computation of [inverse] requires only comparison of value specifications of one feature. Such comparisons are all but inevitable if the valuation of uninterpretable number on D involves replication of dominated features and values; for feature geometry constrains replication to the copying over of only a single value and so replication is possible only if a single value is dominated. Consequently, the valuing procedure must be sensitive to the existence of opposing values of a single feature. So [inverse] requires no more than what is, to borrow Chomsky's terminology, 'virtually conceptually necessary'.

The computational effect of [±group] is more complex. It requires comparisons of values across features.[23] As stated, (100) appears to require reference to three feature values, [±singular], [αaugmented] and [$\bar{\alpha}$group]. In fact, [±singular] is referred to only in the output of the computation, not in the computation itself, and even this reference may be avoidable given the postsyntactic process of feature insertion (Noyer (1998), Harbour (forthcoming 2003)).

On the basis of Kiowa, Harbour (forthcoming 2003) shows that number features with contextually unmarked values may be inserted after the syntax and prior to vocabulary insertion. The feature combination [−singular +augmented] is argued to be the default number for the language in general, so, presumably, minus is the default value for [±singular] in the context of [+augmented]. It is further plausible that plus is the default value of [±singular] in the context of [−augmented], for [A, −augmented] hold of N if and only if N has no non-empty proper subsets of which [A] hold. If [+singular] $\subset$ [A], then N cannot have non-empty proper subsets, so that [−augmented] holds trivially.

Given these two contextual defaults for [±singular] in the presence of [±augmented], we can revise (100) by omitting all mention of [±singular]. The appropriate values can be assumed to arise postsyntactically.

(101) **Generalization: Effect of [±group]**—Simplification 1
Suppose that [**u**number] is valued by a computation over the heads it dominates and that these heads are specified for [αaugmented] and [αgroup]. Then [**u**number] is valued as [$\bar{\alpha}$augmented].

We can further simplify (101) by omitting mention of [±group] in the input to the computation.

(102) **Generalization: Effect of [±group]**—Simplification 2
Suppose that [**u**number] dominates [αgroup]. Then [**u**number] is valued as [$\bar{\alpha}$augmented].

As it stands, this simplification creates complications. It appears to guarantee that whenever [**u**number] dominates [αgroup], D will be valued as [αaugmented]. This means, incorrectly, that all [±group]-classes are constant classes, though SDS, IDS and IDI clearly are not. What is required is to restrict the computational effect of [±group] precisely to those cases where it has semantic import, [+augmented] for [+group] or [−augmented] for [−group].

[23] The fact that (100) seeks the same value, [αaugmented] and [αgroup], is purely notational. Had the features been defined differently, it would seek values [αaugmented] and [$\bar{\alpha}$group]. See Harbour (2003) for comments on such redefinition.

As simple way to do this is to place a syntactic licensing condition on [±group], one that dovetails with its semantic restriction:

(103) **[±group] licensing condition**
[αgroup] must be licensed in the syntax by [αaugmented].

If Number cannot license [±group], then the feature is deleted.

A note on mnemonic naturalness

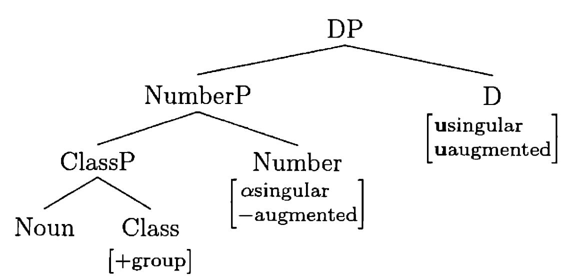
The semantics of the feature [±group] has been motivated directly on the basis of the semantic properties of the nouns that it classifies. Consequently, nothing more need be said about the naturalness of the role that [+group] and [−group] play in classification. Furthermore, the foregoing statements concerning its effect on the valuing of D are constrained by the morphological analysis of agreement in Chapter 5. Consequently, nothing more can be said about the mnemonic natural of these classes than is mentioned above and illustrated below.

[+group] derivations

We now consider derivations for SDS and IDS nouns.

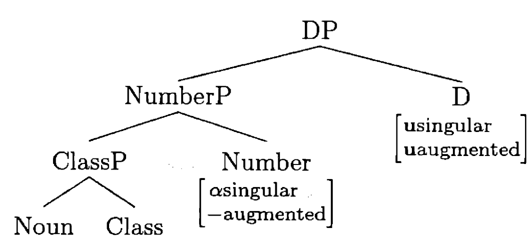
We begin with referential cardinalities **1** and **2** for the SDS class. Class is [+group] and Number is [αsingular −augmented], where α is plus if referenial cardinality is **1**, plus if **2**.

(104)



However, [±group] must be licensed by an (interpretable) instance of [+augmented], that is to say, by [+augmented] on either Class or Number. As there is none in (104), [+group] is deleted. This yields:

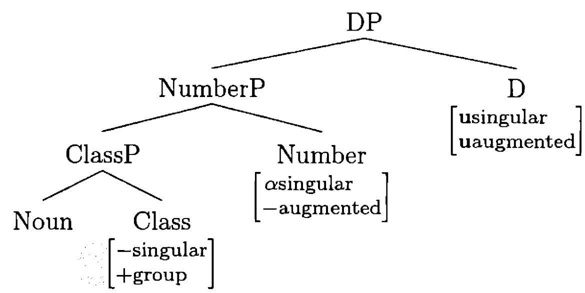
(105)



This is identical to the DP of an SDP noun for referential cardinalities **1** and **2**. Therefore, S-agreement and D-agreement result respectively, as desired.

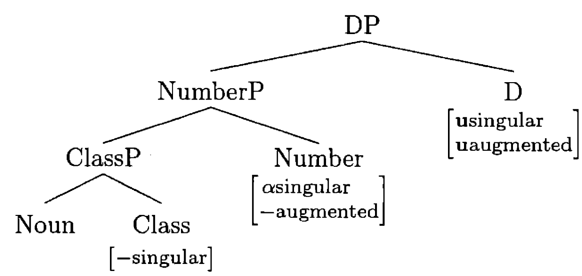
Similarly, for IDS nouns of referential cardinality **1** or **2**, we have:

(106)



Again, [+group] is deleted, yielding:

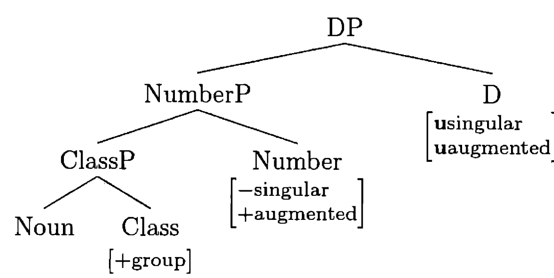
(107)



This is identical to the DP of an IDP noun for referential cardinalities **1** and **2**. Therefore, I-agreement and D-agreement result respectively, as desired.

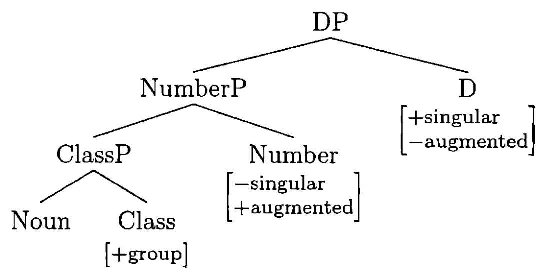
Now consider referential cardinality **3** for an SDS noun. Class is empty and Number is [−singular +augmented].

(108)



Here, [+group] is licensed by [+augmented] on Number. Therefore, D is valued as [+singular −augmented].

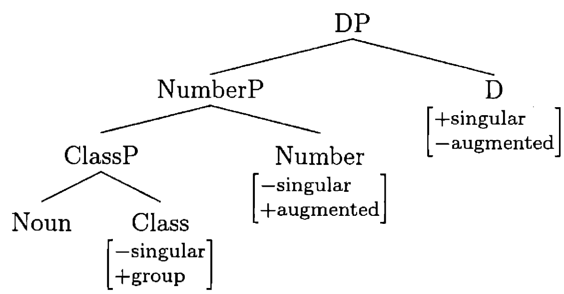
(109)



The DP will trigger S-agreement as desired.

Exactly the same derivation applies when the noun is IDS and referential cardinality is **3**. The extra feature, [−singular], on Class, has no effect on the computation. The end result is:

(110)

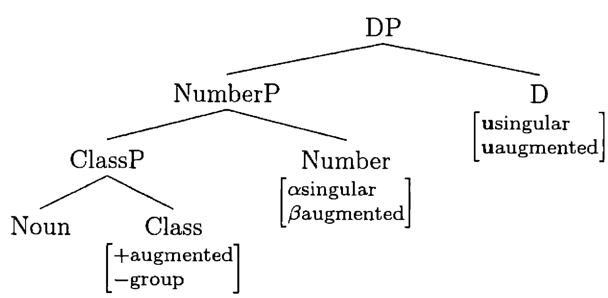


Again, the DP will trigger S-agreement.

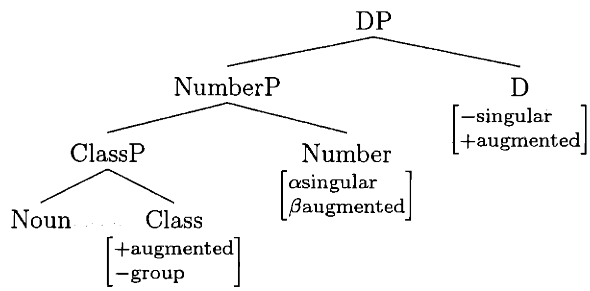
[−group] derivations

Now consider a pluralia tantum PPP noun, for any referential cardinality. Class is [+augmented −group] and Number, [αsingular βaugmented], where referential cardinality **1** corresponds to the values plus for α, minus for β, **2** to minus minus, and **3** to minus plus.

(111)



Irrespective of the value, β, of [±augmented] on Number, the [+augmented] of Class will license [−group] on the same head. Therefore, D will be valued as [−singular +augmented], irrespective of the values of α and β.

(112) 

The DP will trigger P-agreement for all referential cardinalities.

Now, it is worth noting at this point that it is possible to analyze PPP pluralia tantum nouns differently from above. Specifically, we can make two changes, a simplification of Class and a complication of the licensing condition on [±group]. Above, it was assumed that [±group] is licensed by [+augmented]. This essentially forces us to suppose that, for pluralia tantum nouns, [+augmented] is present for all values of referential cardinality, which is only possible if [+augmented] is on Class. Suppose instead that we revise the licensing condition on [±group] to:

(113) **Alternative [±group] licensing condition?**
[αgroup] is licensed by [αaugmented].

Let first observe how this revision would work, and then comment on how advisable it is to adopt it.

For SDS and IDS nouns, the revision makes no difference. They have [+group] on their Class node, which is licensed, on either account, by [+augmented], and [+augmented] is present only on Number and only when referential cardinality is **3**. For PPP pluralia tantum nouns, the revision permits a simplification of the Class node to [−group]. This can be seen as follows. For referential cardinalities **1** and **2**, Number bears the feature [−augmented], which licenses [−group] on Class. So, D is valued as [−singular +augmented] and triggers P-agreement. For referential cardinality **3**, Number bears [+augmented], which does not license [−group], so [−group] deletes. Class is then empty, and so D is valued, by copying Number, as [−singular +augmented], which, again, triggers P-agreement.

Given that the two licensing conditions can both be made to work, depending on the classificatory features ascribed to PPP pluralia tantum nouns, which should we adopt? General considerations compel us to take the more parsimonious. However, it is not immediately clear which one that is, for one involves a simpler specification of Class and the other a simpler licensing condition for [±group]. To decide, recall that we have already seen Class nodes that consist of more that one feature, IDS' [−singular +group] and IDI's [−singular −augmented]. So, simplifying PPP pluralia tantum nouns from [+augmented −group] to [−group] is not a simplification of the theory, but merely a simplification of the analysis. However, we can simplify the analysis only by complicating the theory. The idea that one feature is the dependent of another is not novel; nor is the idea that a feature can be the dependent of a particular value of another feature.[24] The licensing condition (113) requires that licensing be yet more fine grained: it is not just that one feature or one feature-value combination licenses a second feature, but rather that different values of a given feature license specific values of a second feature. Such fine grained relations between licensor and licensee raise questions about the nature of relations between features and their values and, in the absence of a general theory of such things, should be avoided. Therefore, we remain with the analysis illustrated above.[25]

3.4.3 Summary

We can now expand the list of noun classes and their classificatory features.

(114)

Class	Feature
SII	[+singular]
SDI	[−augmented]
IDP	[−singular]
IDI	[−singular −augmented (+group)]
IDS	[−singular +group]
SDS	[+group]
PPP	[+augmented −group]
SDP	[ ]

The feature [±group] pertains to salience of objects' subparts. It is licensed by interpretable [+augmented]. That is, if [+augmented] is found either on Class or Number, [±group] remains affects the computation. Otherwise, it is deleted.

The computational effect of [αgroup] appears to be that D is valued as [αsingular $\bar{\alpha}$augmented]. The reason I write that the effect 'appears to be' rather than simply 'is' is that the only evidence that there is for the feature content of D is morphological (Chapter 5). It is, therefore, possible, that D is valued as a subset of [αsingular $\bar{\alpha}$augmented], with the remaining feature or value arising postsyntactically, as a morphological default. I do not believe that there is any Kiowa-internal evidence bearing on the matter, so it will have to be decided on crosslinguistic or broad theoretical grounds.

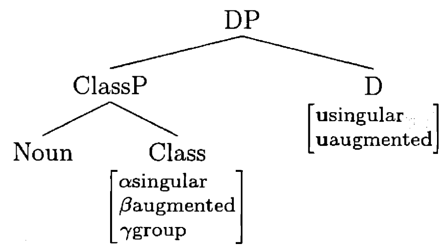
3.5 Mass Nouns

The treatment of mass nouns is comparatively simple. The well noted incompatibility of mass nouns' referential cardinality indicates, I believe, that these nouns do not project a NumberP:

[24] For instance, Noyer (1992) makes plus specifications of person features dependent on a plus specification of [±participant].

[25] The suppletion triggered by PPP pluralia tantum nouns support the position that these nouns are classified as [+augmented −group], rather than simply [−group]. See Section 4.5.1.

(115)



We now have a firm enough grasp of the semantics of the classificatory features [±singular], [±augmented] and [±group] to move from the semantic properties of the different types of mass nouns to the classificatory features and values. For both granular and non-granular, it is clear that cardinality is not 1. So, they are [−singular].[26] Similarly, for both types, properties of the whole are also properties of the parts. So, they are [+augmented]. Consequently, the difference between granularity and non-granularity must be attributed to [±group]; or, more precisely, given the absence of [−augmented] and the resultant lack of licensing for [−group], the difference resides in [+group] *versus* nothing. Given that non-granular mass nouns do not have distinguishable subparts, these should be [+group].

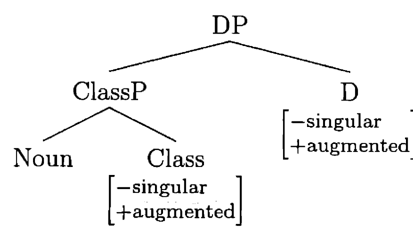
(116)

Class	**Feature**
PPP	[−singular +augmented]
SSS	[−singular +augmented +group]

(Given the absence of Number from (115), one might think that SSS nouns are specified as [+singular −augmented]. However, as the paragraph above makes clear, this feature specification does not make sense for mass nouns.)

Thus, a fully valued PPP DP is:

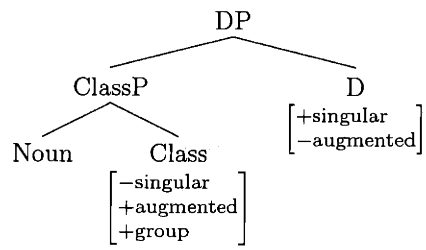
(117)



And SSS:

(118)

[26]Alternatively, one might regard the feature [±singular] as wholly inapplicable to mass nouns, so that their Class node is unspecified for the feature. I have no evidence bearing on the matter and nothing that follows hinges on which turns on the minus *versus* zero specification for this feature.



The foregoing is enough to justify only the first place of each mnemonic—recall that these mnemonics were justified mainly by their agreement behavior under conjunction. We now turn to their behavior under conjunction.

3.5.1 Conjunction

A brief examination of conjunctions of non-mass nouns establishes several generalizations from which the agreement behavior of mass noun conjunctions follows directly.[27]

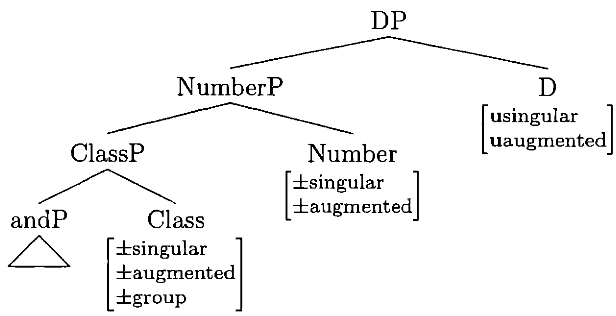
Conjunctions can have greater referential cardinality than any of their individual conjuncts. For instance, $\mathbf{1} + \mathbf{1} = \mathbf{2}$ (but $\mathbf{3} + \mathbf{3} = \mathbf{3}$). Recall from Chapter 2, examples (27)–(30), that, for SDI nouns, increasing in referential cardinality through conjunction has the same effect on agreement as increase in referential cardinality by numeral modification. That is, 'this young man and that' triggers D-agreement, 'this young man and those two', I-agreement. By contrast, conjunctions of SDP nouns trigger agreement purely according to referential cardinality of the conjunction. Therefore, that the contents of Class and Number of each conjunct contribute to the agreement triggered by the conjunction as a whole. I implement this by proposing that the functional projection that hosts gɔand cooccurs with Number and D projections.

(119)

[27]Agreement triggered by conjunction is a topic of my ongoing research. It is relevant to the number theory for several reasons. First, observe that languages have mechanisms for determining the referential cardinality of a conjunction from the referential cardinalities of its individual conjuncts. Clearly, some form of computation is involved and it is the task of a theory of number to account for the such mechanisms. Second, computations over referential cardinalities is a second type of computation over number features, in addition to the computation over Class and Number that values number on D. It is natural to ask how these computations interact. Furthermore, intra- and cross-class conjunction provides an important opportunity to test the number features proposed for Class and Number here; the agreement type triggered by a conjunction

$$C = \bigwedge_{i=1}^{n} C_i$$

for some integer $n > 1$, should be follow from simple generalizations concerning the featural content of Class and Number for each conjunct C_i. This is no small task, as the total number of intra- and cross-class conjunctions, even excluding the SII class, is $(8 \times 3)^2 + (8 \times 3)^3 = (8 \times 3)^2 \times 25 = 12^2 \times 100 = 14{,}400$. The reason that this is a topic of ongoing research is not that I intend to sift through each one of these cases. Rather, it is that each modification to one's view of the feature content of Class, Number and D in turn changes what are the crucial test-case conjunctions, requiring further trips to the field.



The contents of Number are determined by a computation over the c-commanded Number heads, i.e., those of the conjuncts under andP. Likewise, those of Class are by a computation over the c-commanded Class heads. The computation of Number is simply 'addition' (recall that **3** is the equivalence class of all cardinalities greater than 2). Based on the behavior of conjunctions of SDI nouns, let us tentatively assume that, when all conjuncts are classmate, Class in (119) simply copied from the lower Class nodes.[28]

Therefore, in a conjunction of SSS or PPP nouns, Class in (119) will be as for the conjuncts. Number in (119) is slightly trickier. One possibility, is that, in the absence of lower Number heads, Number is valued by a computation over Class heads. However, the details of such a computation would have to made explicit; perhaps it does no more than copy the Class head above andP in such cases, and if so, can for all intents and purposes be ignored. An alternative is that absence of Number on the conjuncts entails absence of Number on the conjunction. Again, the mechanisms behind this must be made clear. If absence of the higher Number reflects a failure to Merge Number, then the Merge operation is sensitive to larger domains than adjacency, a claim for which independent motivation should be given. Assuming that one of these or a similar mechanism guarantees either the absence of Number or its identity with Class, we can

[28]In fact, matters are slightly more complex, as some intra-class conjunctions permit different agreement options.

In Mr Bointy's dialect, 'this young man and those two' triggers either D or I. This is not a right-conjunction effect, as, more generally, D-agreement and I-agreement are both possible for any conjunction of SDI nouns that have referential cardinality **1** or **2**. Other speakers do not have this variation. On the D∼I alternation in Kiowa generally, see Section 4.5.2.

Optional agreement are also seen with IDS nouns.

(i)	P!ɔ́ɔ́	gɔ	áá	gya(t)-gúttɔ		
	river	and	tree	1S:S/P-draw.IMPF		
	'I'm drawing rivers and trees'					

(ii)	Tóú	gɔ	p!ɔ́ɔ́	gɔ	áá	gya(t)-gúttɔ
	house	and	river	and	tree	1S:S/P-draw.IMPF
	'I'm drawing houses and rivers and trees'					

In (i) and (ii), both S-agreement and P-agreement are acceptable for conjunctions of IDS nouns that have referential cardinality **3**. I do not at this point know whether this optionality and that of the last paragraph deserve a single explanation, in terms of the mechanisms that value Class and Number in conjunctions.

disregard it. In consequence, conjunctions of mass nouns will agree just as the single SSS or PPP noun does.

3.6 Missing Mnemonics

The foregoing discussion, and that of the chapter before, has concentrated on the classes that Kiowa has and not on the classes it hasn't. Yet, there are 64 mnemonically possible classes, from the 4 possibilities in each mnemonic position:

(120) $$\left\{\begin{array}{c}\text{S}\\\text{D}\\\text{P}\\\text{I}\end{array}\right\}\left\{\begin{array}{c}\text{S}\\\text{D}\\\text{P}\\\text{I}\end{array}\right\}\left\{\begin{array}{c}\text{S}\\\text{D}\\\text{P}\\\text{I}\end{array}\right\}$$

It is natural to ask why only nine of the possibilities are attested.

(121)
a. SDP
b. SDI
c. IDP
d. IDS
e. IDI
f. SDS
g. PPP
h. SSS
i. SII

Where are the missing 55, such as DDD, PIP, PDS? A large number of these classes are excluded on principled grounds and we find that Kiowa makes near optimal use of its classificatory resources.

An attempt to explain the scarcity of attested mnemonics might concentrate on the inventory of mnemonics itself, as exemplified below.

> Consider D-agreement. This arises only when D is valued as [−singular −augmented]. This in turn requires that Number be specified as [−singular −augmented] (and Class as some subset thereof, [(−singular) (−augmented)]). The requirement that Number be specified in this way restricts D-agreement to the referential cardinality corresponding to the feature combination [−singular −augmented], i.e., **2**. Therefore, D is confined to the middle position of the mnemonic. The number of possible mnemonics reduces from 64 to $3\times4\times3$, which is 36.
>
> If the third position of the mnemonic is S, then the class is [+group]. If the first position is P, it is [−group]. Such specification is impossible as geometry prevents the appearance of both values of one feature. Consequently, exclusion of P. . . S reduces the number of possible mnemonics reduces to 32.

> If the second position of the mnemonic is I, then the class is either [+singular] or [+augmented]. If [+singular], then the second and third mnemonic positions are identical, unless the class is specified as [+group]. However, [+singular +group] makes no sense. This excludes SIP and SIS. If [+augmented], then the first and second positions are identical, unless the class is specified as [−group]. But [−group] would block I-agreement when referential cardinality is **2**. So, PIS and PIP are excluded, and PII. Likewise, IIS is impossible as the last position requires the specification [+group] and the first two [+augmented]; but [+augmented +group] would yield SSS. The number of possible mnemonics reduces to 26.

One can imagine how such reasoning would continue.

However, observe that this methodology is rather superficial as the emphasis is on the mnemonics first and on the features that generate them second. The main interest of this dissertation is the converse: the number features first and the mnemonics second. It is a far better test of the theory developed above to see how the three number features constrain the space of possible mnemonics.

There are three classificatory features, [±singular], [±augmented], [±group]. A class is defined by a feature's plus value, by its minus value, or by its absence. This yields 27 featurally possible classes.

(122) $$\left\{\begin{array}{c}\text{[+singular]}\\ \text{[−singular]}\\ \rule{2cm}{0.4pt}\end{array}\right\}\left\{\begin{array}{c}\text{[+augmented]}\\ \text{[−augmented]}\\ \rule{2.5cm}{0.4pt}\end{array}\right\}\left\{\begin{array}{c}\text{[+group]}\\ \text{[−group]}\\ \rule{1.7cm}{0.4pt}\end{array}\right\}$$

Therefore, 37 mnemonically possible classes are featurally impossible.

Of these, some are likely semantically impossible. For instance, if *[+singular +augmented], then we exclude three values of Class: [+singular +augmented (αgroup)]. It makes semantic sense that [+singular +augmented] should be impossible, for there are not plausibly any nouns that are inherently units and yet inherently pass properties of the whole to its subparts.[29]. Another implausible feature combination is [+singular αgroup]. Given the incompatibility of [+singular] with [+augmented], and given that [±group] must be licensed by [+augmented], the combination [+singular αgroup] inherits semantic implausibility from [+singular +augmented]. Tabulating the remaining 20 possibilities yields (123). '0' represents absence of a feature; boldfacing marks the possible classes not attested above. [30]

[29] The nearest approximation to such nouns that I can conceive of are non-granular mass nouns. However, [(−singular) +augmented +group] is more satisfying, especially when faced with two liquids at once.

[30] The checer may easily check the calculations here, but should be aware that I assume Number to be fully specified in each case; consequently, there are no more mass nouns, for which Number is absent, beyond those discussed above. The justification for this is, first, that granularity versus non-granularity appears an exhaustive classification. Second, new mass nouns are only mnemonically interesting if they generate DDD or III. As mass nouns must be [+augmented], DDD is impossible. III is also impossible for [inverse] requires opposing specifications of a single feature. Since feature geometry prevents such opposing specifications

(123)

[±singular]	[±augmented]	[±group]	Mnemonic
+	−	0	SII
+	0	0	SII
−	+	+	SSS
−	+	−	PPP
−	+	0	**IIP**
−	−	+	SDS
−	−	−	SDP
−	−	0	SDI
−	0	+	IDS
−	0	−	IDP
−	0	0	IDP
0	+	+	SSS
0	+	−	PPP
0	+	0	**IIP**
0	−	+	SDS
0	−	−	SDP
0	−	0	SDI
0	0	+	SDS
0	0	−	SDP
0	0	0	SDP

Observe that only one of the resulting mnemonics is not identical to classes we have already seen. The missing class is IIP, corresponding to [(−singular) +augmented].[31]

The absence of IIP from modern Kiowa may reflect historical contingencies. Comparing Kiowa's number system with those of its Tanoan relatives Jemez, Tewa and Tiwa, Noyer (1992) concludes that the protolanguage uniformly used one value, either plus or minus, for classification. The table below shows the

on a single head and since mass nouns, in the absence of Number, have number features only at Class, [inverse] cannot arise.

[31]Recall that two licensing conditions for [±group] were entertained above. Besides the one adopted—[+augmented] licensed [±group]—there was the complicated α condition: [αaugmented] licensed [αgroup]. The reader may check that this yields only *two* extra mnemonics: PPI corresponding to [+singular −group] and IIP corresponding to [(−singular) +augmented]. Two notes on these are appropriate.

Note 1. Because of the different licensing condition on [±group], the class [+singular −group] is possible. Those excluded are [+singular +augmented (αgroup] owing to [+singular +augmented], and [+singular (αaugmented) +group] owing to [+singular +group]. It is the difference in possibility of having [+singular −group] as a class feature that accounts for PPI's presence in one system and absence from the other.

Note 2. The historical conjectures that follow in the main text apply equally well to the α-based system to explain the absence from Kiowa of IIP and PPI. Specifically, if (125) had applied to [+singular −group] and [(−singular) +augmented], these would have become [−augmented −group] and [−singular (+augmented)], with the latter further simplifying to [−singular], owing to the general move away from plus-valued classificatory features. The corresponding mnemonics of these classes would be the already familiar PPP and IDP.

Consequently, I do not view the typology of possible classes as giving evidence for or against either licensing condition.

classificatory features of the non-mass classes.

(124)

Class	Classifying Features
SII	[+singular]
SDI	[−augmented]
IDI	[−singular −augmented (+group)]
IDP	[−singular]
IDS	[−singular +group]
SDS	[+group]
PPP	[+augmented −group]
SDP	[ ]

The values of [±singular] and [±augmented] are almost entirely minus. The exceptions are SII's [+singular] and PPP's [+augmented]. For PPP, this appears semantically well motivated, given the licensing condition of [−group] and the composite nature of pluralia tantum nouns. For SII, the exception concerns only one item, and, it being the first person, the exception is well motivated. That these lone plus values should be manifested in corners of the language, where semantic motivation for it is strongest, suggests that plus values were the classificatory features of the protolanguage. If so, then the absence of IIP, corresponding to [(−singular) +augmented], from Kiowa is historical accident: [+augmented] of has simply been lost.

What would be the correlates of [+singular −group] [(−singular) +augmented] in Kiowa today? Noyer observes the classificatory role played by [αsingular] in Jemez belongs to [$\bar{\alpha}$augmented] in Kiowa (p. 230). Let us hypothesize that we can read 'protolanguage' for Noyer's 'Jemez' and that proto-[αaugmented] similarly corresponds to Kiowa [$\bar{\alpha}$singular]:

(125) **Hypothesis: Diachrony of classification in Kiowa-Tanoan**
Proto-Tanoan [αsingular] → Kiowa [$\bar{\alpha}$augmented]
Proto-Tanoan [αaugmented] → Kiowa [$\bar{\alpha}$singular]

Then, [(−singular) +augmented] would have become [−singular (+augmented)], further simplifying to [−singular], owing to the general move away from plus-valued classificatory features. The corresponding mnemonic of this class is the already familiar IDP.

If these historical suggestions are broadly correct, then there is no mystery as to why Kiowa should exhibit only nine of sixty-four mnemonically possible classes. On the contrary, this represents near optimal use of the classificatory apparatus.

Limitations of Merrifield's methodology

At the very start of Chapter 2, it was explained that Merrifield's methodology for identification of noun classes—examination of correlations between referential cardinality and agreement type—reveals a more fine grained class system than Wonderly, Gibson and Kirk's—examination of the distribution of inverse marking on nouns. The foregoing discussion reveals that Merrifield's methodology too has its limitations, because agreement mnemonics underdetermine classificatory features. That is, different classificatory features can result in the same mnemonic. It is therefore possible that what were identified in the previous chapter as semantically distinct subclasses of one mnemonic.

A plausible example of this is **p!ɔ̃ɔ̃** 'river', discussed at the start of Section 2.4 under the heading of non-uniqueness. As a autonomously mobile object, it is plausibly SDI, and so [−augmented]; as a body of water it is plausibly SDS, and so [+group]. Observe that if we assign 'river' a combined classification [−augmented +group], the result would be mnemonically identical to other bodies of water, SDS, even though the classificatory features of the two are distinct. Another instance where such classifications might be useful are PPP pluralia tantum nouns and PPP abstract nouns, or IDS trees and IDS implements.

Such a tightening in the relationship between semantics of noun classes, their classificatory features and their mnemonics would provide strong evidence for the theory advance here. I leave it for future research.

3.7 Conclusion

Noun class systems are often regarded as bastions of the arbitrary. However, Kiowa's noun class system is in fact highly principled. We saw in the last chapter that the nouns subsumed under each class mnemonic are semantically coherent. In this chapter, the featural system that underlies this classification has been examined. The results are that [±singular] and [±augmented], the features that compose referential cardinality, are also used for noun classification along with a third feature, [±group], which qualifies type of augmentation.[32]

(126)

Class	Feature
SII	[+singular]
SDI	[−augmented]
IDP	[−singular]
IDI	[−singular −augmented (+group)]
IDS	[−singular +group]
SDS	[+group]
PPP	[+augmented −group]
SDP	[ ]
SSS	[−singular +augmented +group]
PPP	[−singular +augmented]

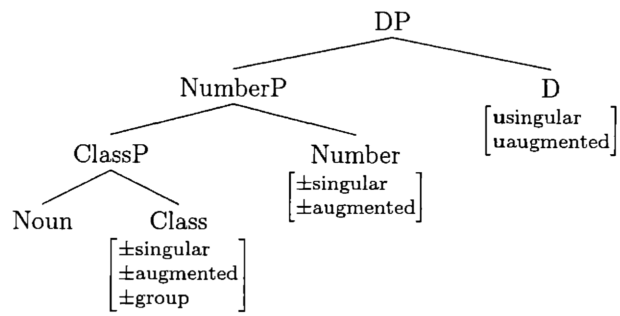
There is a principled relationship, constrained by semantics, between a noun's semantic properties and it classificatory feature. Furthermore, the class features interact with referential cardinality according to three principles to value D and,

[32]It is worth noting that both across Kiowa-Tanoan and within Kiowa, both plus and minus values are required as lexically stored classificatory information. (See Wunderlich (2001) for stipulations to the contrary.) This tells us either that both marked and unmarked values can be used for noun classification, or that the marked value of a given feature varies contextually.

so, to generate the class mnemonics. Consequently, the relationship between nouns' semantic properties and their class mnemonic is non-arbitrary. Moreover, the three classificatory features generate a space of possible classes that Kiowa almost optimally exploits.

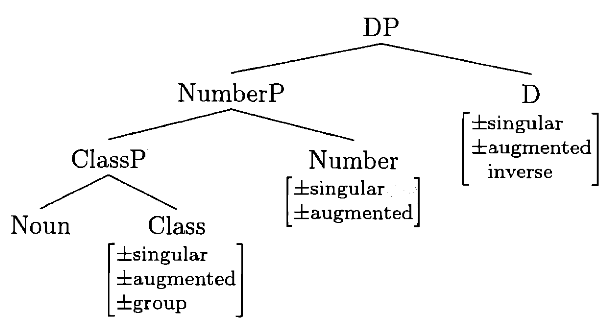
The theory offered above employs a number of well justified and/or standard assumptions concerning the structure of DPs, the nature of Case and agreement, and the geometrical organization of morphosyntactic features. The main points of the resulting system are that Class, Number and D bear the features shown below (though not all need be present on Class or Number).

(127)



Uninterpretable number is valued by a computation over Class and Number. The basic valuation procedure consists in replicating on D the features at Class and Number. This is constrained by two factors. First, replication is impossible if Class and Number are oppositely specified for the same feature. In such cases, D is valued as [inverse], yielding inverse marking on the noun and I-agreement on the verb. Second, when [±group] is licensed by [+augmented], it affects the valuation of D, yielding [αsingular $\bar{\alpha}$augmented] (with the possibility that one of these features or values is inserted postsyntactically, by the morphology). [±group] itself never arises on D (Chapter 5). Consequently, a valued DP, capable of triggering agreement, has the form:

(128)



Given that the feature content of Class and of Number are motivated on semantic grounds and that of D on morphological grounds, there is little that can be said about the nature of the computations valuing D. Semantics and morphology force one's syntactic hand, as it were. That is not to say that [inverse] and [$\pm$group] cannot or should not be the topic of syntactic research. Rather, there is little that can be said in this regard on the basis of Kiowa alone and so progress in this regard requires a crosslinguistic perspective.

Chapter 4

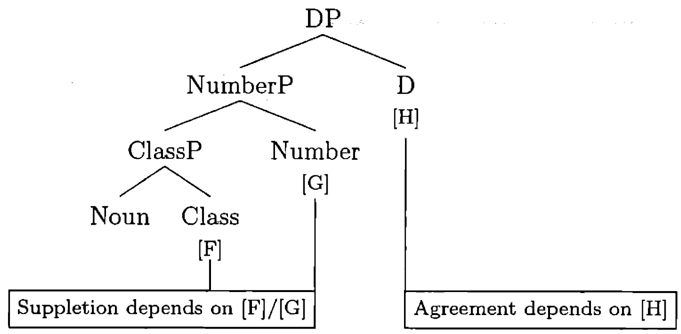
Agreement and Suppletion

Several predicates in Kiowa are sensitive to the number of their inner argument; that is, Kiowa has predicates that supplete for number. Consequently, sensitivity to number is a property of two parts of Kiowa grammar: agreement and suppletion. For the most part, these two operate in tandem: if referential cardinality is **1**, the verb will occur in its S-suppletive form bearing S-agreement, or if referential cardinality is **3**, the verb will occur in its P-suppletive form bearing P-agreement. However, at times, agreement and suppletion mismatch, with agreement, say P, implying one referential cardinality value, and suppletion, say S, another.

This chapter is concerned with the mechanisms of suppletion in general and with agreement∼suppletion mismatches in particular. I argue that these facts receive a natural analysis given the theory developed in Chapter 3. The aspect of that theory relevant to mismatches is the divergence permitted between the feature content of Number and the feature content of D (and also between that of Class and that of D). Such divergence arises in two ways: either because Number and Class are oppositely specified for one and the same feature, in which case D is [inverse], or because Class and Number are specified for [±group] and [+augmented]. By providing divergent feature specifications in a single syntactic structure, the theory permits divergence between two number-sensitive phenomena, if these phenomena depend on different heads. For instance, if agreement depends on D, as argued in Chapter 3, and if suppletion depends on Number or Class, then, whenever D and the relevant lower head diverge in feature content, agreement and suppletion will be conditioned by different features, which may result in mismatch.

The principle can be easily graphically illustrated. Let [F] be the number features of Class, [G], of Number, and [H], of D. The dependence of agreement on [H] and of suppletion on the lower heads is indicated below.

(1)



The mismatches derive in the following manner. Let us momentarily assume—what will be argued to be generally the case below—that suppletion depends on [G]. Then agreement and suppletion will dovetail one another if [G] = [H] but will mismatch if [G] ≠ [H]. We will see below a variety of such mismatches, dependent on the content of [F], [G] and [H].

The discussion begins with the introduction of Kiowa's number-sensitive predicates and clarification of the notion of suppletion, as opposed to allomorphy and phonological readjustment. I then suggest some syntactic and morphological principles following Sportiche (1997) and Adger, Béjar and Harbour (2001, in preparation), according to which it is natural for agreement and suppletion to be sensitive to different heads. With these principles in hand, basic cases of suppletion without mismatches are derived. These are followed by treatment of inversive mismatches, mass nouns, [±group]-induced mismatches, and reflexive-induced mismatches. An appendix provides information on further uses of suppletive pairs and their interesting differences in meaning.

4.1 Suppletion

This section introduces Kiowa's suppletive predicates and clarifies what suppletion is.

4.1.1 Number-sensitive predicates

Kiowa's number-sensitive predicates fall into two classes. Those in (2) display an **1∼2/3** opposition.

(2)	**S**	**D/P**	
	êl	bîn	big, old, important
	syɔ́n	syán	small, young
	kyǫ́į́	kį́į́níí	tall, long
	xéí	xáádóú	short

By contrast, those in (3) display an **1/2∼3** opposition.

(3)

S/D	P	
ą̨ą̨gya	k!úl	be sitting
k!ɔ́ɔ́	k!úl	be lying
xél	sɔ́l	be sitting.INAN
xéí	sɔ́ɔ́	set, put in
x!óú	k!úú	lay
x!óígyá	k!úígyá	land, fall against, fall
ól	p!él	drop, fall
t!ál	tháá	sever

In featural terms, the predicates in (2) are sensitive to the value of [±singular], whereas those in (3) are sensitive to the value of [±augmented].[1,2] Below, I shall speak of a feature's **condition**ing **suppletion of** the predicate.

Number-conditioned suppletion can be illustrated by combining 'big' from (2) and 'be lying' from (3) with the SDP noun **tóúdé** 'shoe' whilst varying the referential cardinality. In (4), the referential cardinality of 'shoe' is **1** and we find S-agreement and the S-form of the predicate, **êl**.

(4) Tóúdé ∅- êl
shoe 3S-big.S
'[The] shoe is big'

In (5), referential cardinality is **2** and we find D-agreement and the D/P-form of the predicate, **bîn**, in contrast to (4).

(5) Tóúdé ę- bîn
shoe 3D-big.D/P
'[The two] shoes are big'

In (6), referential cardinality is **3** and we find P-agreement and the D/P-form of the predicate, as in (5).

(6) Tóúdé gya-bîn
shoe 3P- big.D/P
'[The several] shoes are big'

The double underlining indicates, then, 'the odd predicate out'.

Now consider 'be lying'. In (7) and (8), referential cardinality is respectively **1** and **2** and we find S/D-form of the predicate, **k!ɔ́ɔ́**. The sentences differ only in agreement, S-agreement when referential cardinality is **1** (7), and D-agreement for **2** (8).

[1] The two classes are of predicates are to some extent natural in that those in (2) are more 'adjectival' and those in (3), more 'verbal'. I hesitate to conjecture whether it is grammatically or conceptually natural for adjectives to be sensitive to [±singular] rather than to [±augmented], or *vice versa* for verbs.

[2] Observe that some of the predicates in (3) are built on the same root: 'lay' and 'land, fall against, fall', and 'be sitting.INAN' and 'set, put in'. See Watkins (1984) for discussion of the morphemes **-l**, **-i** and **-gyá**.

(7) Tóúdé ∅- k!ɔ́ɔ́
shoe 3S-be_lying.S/D
'[The] shoe is lying'

(8) Tóúdé ę- k!ɔ́ɔ́
shoe 3D-be_lying.S/D
'[The two] shoes are lying'

In (9), referential cardinality is **3** and we find, in contrast to (7) and (8), the P-form of the predicate, **k!úl**, and P-agreement.

(9) Tóúdé gya-k!úl
shoe 3P- be_lying.P
'[The several] shoes are lying'

Again, double underlining indicates the odd predicate out. Note that this is arises at **3** for 'be lying' but **1** for 'big'.

It is possible to illustrate both patterns in tandem (cf., Hale (1997) for Hopi). Here, 'big' is used attributively rather than predicatively, and 'drop' is sensitive to the number of its internal argument. Note that **tóúdé** 'shoe' is a thematic noun in **-de** and that such nouns do not exhibit the theme when modified as below (Section 2.6.2).

(10) Tóú-êl gya-ót
shoe-big.S 1S:S-drop.S/D.PF
'I dropped [the] big shoe'

(11) Tóú-bîn nen-ót
shoe-big.D/P 1S:D-drop.S/D.PF
'I dropped [the two] big shoes'

(12) Tóú-bîn gyat-p!ét
shoe-big.D/P 1S:P-drop.P.PF
'I dropped [the several] big shoes'

Lastly—before clarifying some concepts relevant to the analysis of these and similar sentences—consider the following examples for agreement∼suppletion mismatches. Possibilities, from sentences analyzed below, include I-agreement with an S/D-form of the predicate:

(13) e-k!ɔ́ɔ́
I-be_lying.**S/D**

I-agreement with a P-form of the predicate:

(14) nɔ́- k!úl
:1S:**I**-be_lying.**P**

P-agreement with an S-form of the predicate:

(15) yą́- dôi- et
:1S:3P-be_lying.S

and S-agreement with a P-form of the predicate:

(16) ∅-sɔ́l
S-be_sitting.P

These examples may at first thought undermine the classification of the predicates as S-forms or D-forms or P-forms, or the classification of agreement types. However, we will see that these mismatches are principled and follow naturally from the theory developed in Chapter 3.

4.1.2 Clarification

There now follows a definition of suppletion and a comparison of suppletion, readjustment and allomorphy, as well as some description of Kiowa phonology relevant to distinguishing suppletion from forms that are related but by non-obvious means. Only the definition of suppletion is central to what follows and even this may be skipped by readers familiar with the concept.

Suppletion, readjustment and allomorphy

The term 'suppletion' has been used to cover three phenomena that probably deserve explanation by different theoretical mechanisms. Examples of each, from English, are:

(17) a. Past tense morphemes **-ed**∼**∅**
b. Present∼past forms **sing**∼**sang**
c. Present∼past forms **go**∼**went**

I suggest that only the last of these is suppletion in the sense relevant here. The other two differ from it in ways detailed below.

A pair $\psi \sim \psi'$ is suppletive if the two forms realize the same root in different grammatical contexts, but not related by synchronic phonology.

(18) **Definition: Suppletion**
An item is said to supplete if and only if:
a. it is a root
b. it has (at least) two phonologically distinct exponents, ψ and ψ', such that:
(i) ψ' is conditioned (by, say, tense, number or animacy)
(ii) no phonological process of the language is capable of generating ψ' from ψ (or *vice versa*).

Consequently, a suppletive item is a vocabulary item of the form below: a single root with two or more exponents, conditioned by morphosyntactic features (with the possible exception of an unconditioned elsewhere form).

(19) $\sqrt{} \Leftrightarrow \psi' \quad | \text{ F } \_\_$

$\quad\quad \vdots$

$\quad\quad \Leftrightarrow \psi$

On this definition, **go∼went** is suppletive. The pair realize a root as shown:[3]

(20) $\sqrt{\text{GO}} \Leftrightarrow$ went $\quad | \_\_$ [+past]
$\quad\quad \Leftrightarrow$ go

Cases of suppletion should be held distinct from alternations like **-ed∼∅** and **sing∼sang** for the following reasons.

Chomsky and Halle (1968/1991) reject a suppletive analysis for **sing∼sang**:

(21) **NOT** $\sqrt{\text{SING}} \Leftrightarrow$ sang $\quad | \_\_$ [+past]
$\quad\quad \Leftrightarrow$ sing

Rather, simplifying slightly, they posit that a phonological rule that is triggered by the context __ [+past]. On such an account, only one form of the root is stored.

(22) $\sqrt{\text{SING}} \Leftrightarrow$ sing

Chomsky and Halle observe that the phonological processes that derive **sang** from **sing** can be called on elsewhere in the grammar, as in the superficially unique **āi∼æ** alternation of **satisfy∼satisfaction** (pp. 201–202). See also Yang (1999, 2002) for more recent discussion of consequences of distinguishing **go∼went** from **sing∼sang** alternations.

Consider now the alternation **-ed∼∅**, which I regard as a case of grammatically conditioned allomorphy:

(23) **Definition: Allomorphy**
An item is said to exhibit allomorphy if and only if:
a. it is *not* a root
b. it has (at least) two phonologically distinct exponents, ψ and ψ', such that:
(i) ψ' is conditioned (by, say, tense, number or animacy)
(ii) no phonological process of the language is capable of generating ψ' from ψ (or *vice versa*).

Terminology aside, allomorphy differs from suppletion in exactly one respect: suppletion is confined to roots, allomorphy to non-roots, hence, affixes. Adger, Béjar and Harbour (2001, in preparation) argue that this terminological difference is warranted because the apparent locality conditions on suppletion and allomorphy differ. Suppletion requires sisterhood, whereas allomorphy does not be. For Adger, Béjar and Harbour, this difference reflects the syntactic difference between roots and affixes. Affixes are feature bundles that can enter Agree

[3] I leave aside the issue of whether **went** is, in fact, the root **wend** together with the past tense morpheme of **send∼sent**, **lend∼lent**, *et cetera*.

relations; these Agree relations are non-adjacent and can provide the conditioning context that licenses ψ' as opposed to ψ. Roots, by contrast, are assumed to be primitive, i.e., not bundles of features, and so do not enter into Agree relations; consequently, they have no access to non-adjacent features. This difference between (affixal) allomorphy and (root) suppletion is exportable to other frameworks making a principled distinction between affixes and roots.

It is clear that the alternations in (2) and (3) could not be allomorphy, as they concern roots. Moreover, as is clear from the thorough description of segmental alternations in Harrington (1928) and, especially, (Watkins 1984), (2) and (3) cannot be the result of readjustment rules. Therefore, I conclude that these are all cases of suppletion.

Suppletion *versus* phonology

As just emphasized, what counts as suppletion in a given language depends on that language's phonology. A skeptic may wonder whether, say, **xéí** 'set.S/D' and **sɔ́ɔ́** 'set.P' might not be related by a series of readjustments, each of which is, itself, quite reasonable. Say:

(24) xéí → séí | Context$_1$ ___
séí → sɔ́ɔ́ | Context$_2$ ___

I counter that, to make such a claim, one must have evidence for each step along the way. In a pseudo-derivation such as (24), each of the steps is otherwise unattested and the context unspecified. It should be noted, however, that the demand for evidence is not setting the standard impossibly high, for, first, the child must likely have such evidence, and, second, the standard can be met in some quite daunting cases, as I now illustrate. (This illustration is not crucial to the analysis of suppletion that follows and readers without a taste for phonological oddments may wish to proceed directly to subsequent sections.)

Watkins (1984, p. 164) lists four root∼perfective pairs as suppletive. I suggest that they are actually phonologically regular.

(25)

Root	Perfective	Gloss
yíí	yâi	disappear
hî̜į̜	hêm	die
kį́į́	tém	pull
khîi	thép	exit, carry out

To explain 'disappear', observe that **-i** is an infrequent exponent of the perfective found with a few other roots:

(26)

Root	Perfective	Gloss
tɔ̜́ɔ̜́	tɔ̜́į́	roast
tǫ́ų́	tǫ́į́	speak, say
pǫ́ų́	pǫ́į́	sound

The rightwards spreading of nasality and high tone onto **-i**, and the shortening of the root vowel are phonological regularities of Kiowa (Watkins 1984, Harbour 2002).

Second, note that the alternation **(y)i∼ya** is frequent, if poorly understood. It is exemplified by:

(27)

i-Form	ya-Form	Gloss
phį́į́	phyą́į́sǫ́n	fire; kindling
segîi	segyâi	uncle.VOC; uncle.NAME
dɔɔk!ı́ı́	dɔɔk!yaı́ı́	God; Jesus

On the basis of such examples, we may hypothesize that a sufficient condition for the alternation is that **i** be short and followed by another **i**—an OCP effect, not to be confused with the orthographically identical long **ii**.

Last, note that anything following the root **yı́ı́** has low tone, as in **yı́ı́hɔɔ** 'keep on vanishing'. With these observations in place, we now derive the perfective of **yı́ı́** 'disappear' from $\sqrt{\text{ROOT}}$+PF, **yı́ı́-i**:

(28)

Concatenation yields:	**yı́ı́-i**
Low tone assignment yields:	**yı́ı́-ì**
Shortening of the root vowel yields:	**yı́-ì**
yi → **ya** before **i** yields:	**yá-ì**

By orthographic convention, $\acute{V}_1\grave{V}_2$ is written $\hat{V}_1V_2$. So, the desired **yâi** results.

To derive the other three forms, several of the same mechanisms are called on. First, observe that **-p** is another infrequent exponent of the perfective and that it nasalizes to **-m** after a nasal vowel (it may therefore be preferable to underspecify this morpheme, as a bilabial stop). Vowel shortening applies here as before:

(29)

Root	Perfective	Gloss
óú	óp	pour
hɔ́ɔ́	hɔ́p	recall, be aware of
thǫ́ų́	thóm	drink

Second, note that the high vowel **úú** lowers (and shortens) before this morpheme:

(30)

Root	Perfective	Gloss
k!úú	k!óp	lay.P

If we generalize this lowering to all high vowels, then we can derive 'die.PF' correctly from in **hį̂į-p**:

(31)

Vowel shortening / lowering yields:	**hę̂-p**
Nasalization yields:	**hę̂-m**

Or, orthographically, **hêm**, as required.

Recall, from the discussion of dental-velar switching in Section 2.6.2, that velars become dental before **e**. This switching, together with processes affecting **hį̂į** 'die', apply to **kį́į́** 'pull':

(32) Concatenation yields: **kį́į́-p**
Vowel shortening / lowering yields: **kę́-p**
Velar-to-dental switching yields: **tę́-p**
Nasalization yields: **tém**

Finally, observe that falling tones cannot be realized over the sequence **Vp**; hence, when **-p** triggers vowel shortening (and when it does not nasalize), it forces tonal simplification:

(33)

Root	Perfective	Gloss
gûu	góp	hit

Given this, the perfective of **khîi** 'pull' is derivable:

(34) Concatenation yields: **khîi-p**
Vowel shortening / lowering yields: **khê-p**
Velar-to-dental switching yields: **thê-p**
Tone simplification yields: **thép**

Returning to the pairs in (2) and (3), the claim is that none of these are explicable by regular, synchronic phonology in the manner just illustrated and for that reason must be regarded as suppletion, rather than readjustments.[4]

4.2 Analysis of the Basic Cases

We now return to the basic cases, the examples of suppletion from Section 4.1.1.

4.2.1 Assumptions

The analysis is based on the theory of allomorphy and suppletion of Adger, Béjar and Harbour (2001, in preparation). The conclusions relevant here are:

(35) a. Suppletion requires adjacency between the suppletive root and the conditioner.
b. Uninterpretable features do not condition suppletion.

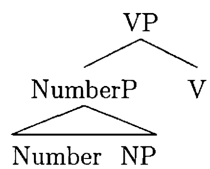
These two conclusions tightly constrain the syntactic structure in terms of which suppletion must be explained. There are three heads capable of bearing number

[4]The emphasis on 'synchronic' is important. It is possible that some of these forms were synchronically related at an earlier stage of the language. For instance, consider **x!óú∼k!úú** 'lay'. **X!óú** has a homophone **x!óú** 'rock'. Interestingly, the word for 'rock' in Rio Grande Tewa is **k'u:**; compare also Kiowa **x!ól** 'wing' with Rio Grande Tewa **k'un**, **x!éí** 'thick' with **k'a:'i'**; but **k!ól** 'neck' with **k'é:** (Kroskrity 1993, Appendix 1, citing Randall and Anna Speirs, p.c.).

features: Class, Number and D. In the current case, with an SDP noun, Class is empty. So, suppletion must depend on Number or D. The number features on D are uninterpretable, however, and so cannot condition suppletion according to (35-b). This leaves Number, the highest head with interpretable number features, as the possible source of suppletion conditioning.

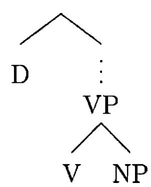
The adjacency requirement (35-a) requires the following structure:

(36)



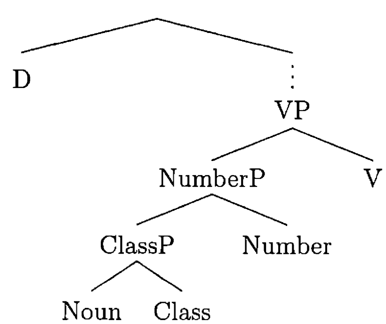
Given (36), D cannot immediately dominate Number, as was implicitly assumed in the Chapter 3. Instead, a position nearer to that of Sportiche (1997) is required, according to which D and its complement NP do not begin as complements in the syntax. Rather, NP begins as the complement of the verb and both are lower than D.

(37)



NP moves to join D later, creating a DP. Here, it is necessary to modify Sportiche's proposal by replacing his NP with NumberP:

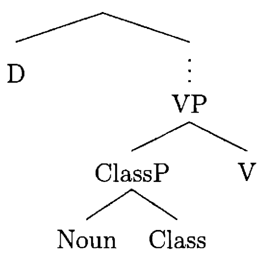
(38)



This structure has the requisite adjacency relations for Number to trigger suppletion, as we shall now see.[5, 6]

A further prediction should also be noted. Suppose that Noun is a mass noun. Consequently, Number is absent:

(39)



Absence of Number establishes an adjacency relation between the verb and Class. So, for mass nouns, suppletion should reflect the classificatory features.

4.2.2 Analysis

Consider first the general case of an SDP noun with a suppletive predicate. Number, i.e., referential cardinality, is specified as [αsingular βaugmented]. NumberP and the verb are Merged:[7]

(40)

---

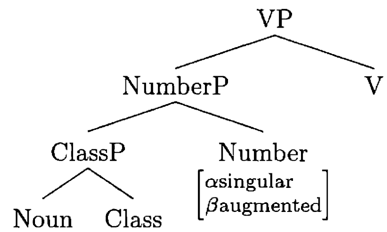
[5]Sportiche himself suggests that Number, like D, is higher than V. It seems to me that his arguments really address the position of D and are somewhat neutral with respect to number. I.e., he comments on number for the sake of thoroughness, not out of theoretical compulsion. The placement of number depends on two factors: (i) whether membership of the thematic domain is the criterion that determines membership of the VP, (ii) whether number is part of the thematic domain. In that regard, the following is interesting:

> D is generated outside the thematic complex containing its NP. [¶More generally everything non thematic associated with head of argument is outside VP, e.g. plural number - problems with plurals, telicity] (p. 5)

If acceptance of (i) leaves (ii) up for grabs, Number can be placed as in (37).

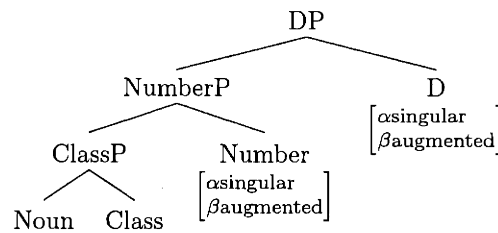
[6]Readers who, for whatever reason, as disinclined to accept the foregoing assumptions concerning the syntax of suppletion or the constituency of DP—or, who, indeed, regard the DP structure of Chapter 3 as a expository device and not a reflection of the real syntax—need not despair. These assumptions are not what counts here. What counts is the core claims that the syntax performs computations of Class and Number to value D and that D may diverge from both lower heads and that all three are *ipso facto* syntactically represented. The foregoing assumptions were used to establish that suppletion depends on Number and agreement on D. From this a number of predictions will now follow. The reader skeptical of these assumptions may view the first prediction as a demonstration of what suppletion and agreement depend on and will still be left with several further predictions concerning the specifics of agreement∼suppletion mismatches.

[7]'V' in the trees abbreviates a root together with a category forming head, v. It is this root (or possibly root-cum-categorial-head combination) that the vocabulary entries for 'big', 'be lying', *et cetera* refer to.



The value α will condition suppletion of the verb if it is [±singular]-sensitive, or β will if it is [±augmented]-sensitive. D is Merged higher in the structure and attracts NumberP. (This movement can be simply implemented, via an EPP feature, as a reflex of the valuation of uninterpretable number on D discussed in Chapter 3 (cf., Chomsky 2000). Movement and valuation yield:

(41)



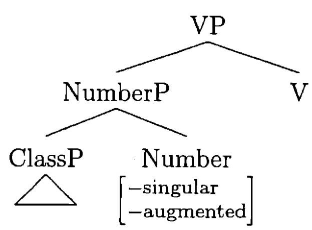
D, when its Case is checked, will trigger agreement that exactly reflects referential cardinality.

As a specific example, consider (5), repeated below.

(42) Tóúdé ẹ- bîn
shoe 3D-big.D/P
'[The two] shoes are big'

Referential cardinality is **2**, so the content of Number is [−singular −augmented]. VP, then, has the structure:

(43)



The predicate 'big' is [±singular]-sensitive:[8]

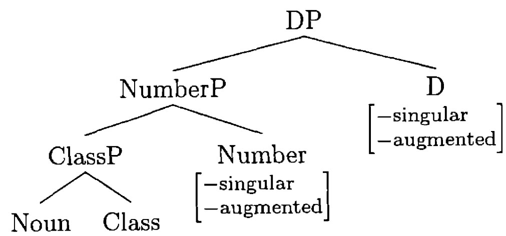
[8]Observe that in (44), as in the vocabulary entries for all suppletive forms given below, both forms have conditioning contexts, [+singular] conditioning **êl**, [−singular] conditioning **bîn**. This may be excessive, as one could be the elsewhere form and so be uncontextualized, as exemplified, with **bîn** as the elsewhere form, below:

(44) $\sqrt{\text{BIG}}$ ⇔ êl | [+singular] __
⇔ bîn | [−singular] __

In (43), the value of [±singular] is minus and so licenses **bîn**.

Raising of NumberP to D and valuing of D's uninterpretable number yields:

(45)



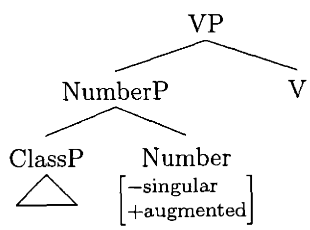
The feature specification on D triggers D-agreement. In the case of a single argument unaccusative, like 'big', this D-agreement is ę. The resulting complex verb, then, is **ę-bîn**, as desired.

As an example of the other predicate class, consider (9), repeated below.

(46) Tóúdé gya-k!úl
shoe 3P- be_lying.P
'[The several] shoes are lying'

The specification of Number is [−singular +plural] as shown:

(47)



The predicate 'be lying' is [±augmented]-sensitive:

(48) $\sqrt{\text{BE LYING}}$ ⇔ k!ɔ́ɔ́ | [−augmented] __
⇔ k!úl | [+augmented] __

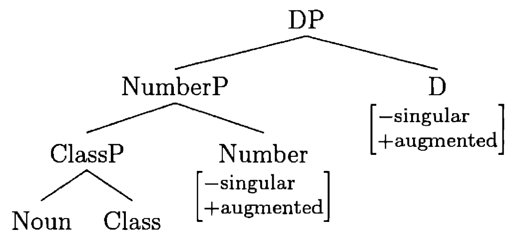
In (47), the value of [±augmented] is plus and so licenses **k!úl**.

Raising of NumberP to D and valuing of D's uninterpretable number yields:

$\sqrt{\text{BIG}}$ ⇔ êl | [+singular] __
⇔ bîn

I avoid designating members of each pair as elsewheres for two reasons. First, I have no clear evidence for which is the elsewhere form in each case; on the contrary, I am quite perplexed by the evidence that might have revealed what the elsewhere forms are. Second, elsewhere forms are of no relevance in the cases analyzed below. This is because there is no principle that would force the elsewhere forms of two suppletive predicates to be the same in each case—for instance 'big.S' might be the elsewhere form of $\sqrt{\text{BIG}}$, but 'small.D/P' the elsewhere form of $\sqrt{\text{SMALL}}$. However, in all the cases below, the predicates of each suppletive class pattern alike, indicating that an explanation, rather than an appeal to elsewheres, is required.

(49)



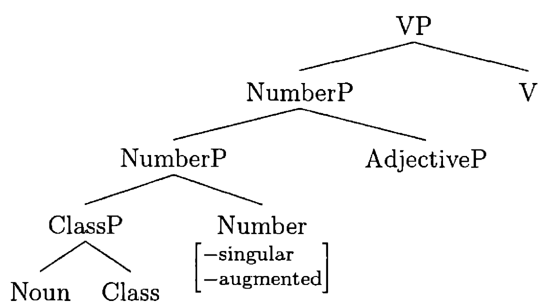
The feature specification on D triggers P-agreement. In the case of a single argument unaccusative, like 'be lying', this P-agreement is **gya**. The resulting complex verb, then, is **gya-k!úl**, as desired.

Finally consider an example with adjective and verb. Repeated below is (11).

(50) Tóú- bîn nen- ót
shoe-big.D/P 1S:D-drop.S/D.PF
'I dropped [the two] big shoes'

I shall assume that the adjective 'big' is adjoined to NumberP. Consequently, both it and the verb in (51) can have their suppletion conditioned by Number:

(51)



The adjective 'big' is [±singular]-sensitive; by (44), **bîn** is inserted. The verb 'be lying' is [±augmented]-sensitive; by (48), **ól** is inserted. With Class empty, D will be valued, by copying Number, as [−singular −augmented], triggering D-agreement. The end result is as shown in (50).

4.2.3 Summary

The system of agreement and suppletion triggering stated and illustrated in this section—with suppletion dependent on Number but agreement dependent on D—derives the correct agreement and suppletion forms for SDP cases. However, it may seem overcomplicated, particularly in its reliance on Adger, Béjar and Harbour (2001, in preparation), which forces suppletion and agreement, two rather similar phenomena, to depend on different parts of the structure.

Admittedly, for SDP nouns, where the feature content of D is always that of Number, it would be sufficient for both to look only at one. Chapter 3, however, presented a variety of cases in which the feature content of Number and D diverge. These are predicted to show agreement~suppletion mismatches, correctly, as we shall now see.

4.3 Inversive mismatches

I-agreement is opaque to referential cardinality. It can occur when it is **1**, as with IDP, IDS and IDI, **2**, as with SII, and **3**, as with SII, SDI, and IDI. In each case, D has the value [inverse], which lacks the information required to trigger suppletion. Number, however, varies, in each case containing the information requisite for suppletion. We, therefore, predict that verbs with I-agreement will still supplete according to referential cardinality. The subsections below consider minus-valued, i.e., non-SII, and plus-valued classes separately.

4.3.1 Minus-valued classes

To illustrate that this prediction is correct, consider the following sentences with the IDI noun 'hair' and the S/D~P predicate 'be lying' (Watkins 1984, p. 89). For referential cardinality **1**, the noun is inverse marked and triggers I-agreement. However, the predicate, in its S/D-form, reflects referential cardinality.

(52)	Ę̃́į́gɔ	ɔ́ɔ́dɔ́	e-k!ɔ́ɔ́
	there	hair.INV	I-be_lying.**S**/D
	'There's a hair lying there'		

For **2**, the predicate is still in its S/D-form but bears D-agreement and the noun is not inverse marked.

(53)	ɔ́l	ę́į́gɔ	ę- k!ɔ́ɔ́
	hair	there	D-be_lying.S/**D**
	'There are two hairs lying there'		

For **3**, the noun is again inverse marked and triggers I-agreement. Again, the predicate, now in its P-form, still reflects referential cardinality.

(54)	ɔ̃́ɔ́dɔ́	hóldap	nɔ́- k!úl
	hair.INV	dress.on	:1S:**I**-be_lying.**P**
	'I've got some hair on my dress'		

As a sample derivation, consider that of (54). The VP with its NumberP complement is (47), and, given (48), [+augmented] licenses **k!úl**, as in (46). When NumberP raises to D, the clash between Class, [−singular −augmented], and Number, [−singular +augmented], will cause D to be valued as [inverse]. This yields inverse marking on the noun and I-agreement on the verb, as desired.

As examples of the S~D/P predicate type, consider an SDI (55) and an IDP noun (57). (**2**, essentially the same as for SDP nouns, is neglected in these examples.)

(55)	Nɔ́ɔ́-baou	ę́- ét,	né	ám-baougɔ	gɔ́- syân	
	1- cat	:1S:**S**-big.**S**	but	2- cat.**INV**	:2S:**I**-small.D/**P**	
	'My cat is big, but your cats are small'					

For SDI nouns, such as **báou** 'cat', Class is [−augmented]. In the first clause, where referential cardinality is **1**, Number is [+singular −augmented]. This plus value on [±singular] licenses the S-form of the predicate 'big', given (44). D is valued as [+singular −augmented], triggering S-agreement. The resulting verb, with agreement for the indirect object (possessor), is **ę́-ét**.

In the second clause, where referential cardinality is **3**, Number is [−singular +augmented]. The minus value of [±singular] licenses the D/P-form of the [±singular]-sensitive predicate 'small':

(56) $\sqrt{\text{SMALL}}$ ⇔ syɔ́n | [+singular] __
⇔ syân | [−singular] __

Class and Number have opposite specifications of [±augmented]. So, D is valued as [inverse]. The possessed noun, **báougɔ**, then, is inverse marked and triggers I-agreement. The resulting verb, with agreement for the possessor, is **gɔ́-syân**, which shows number-conditioned suppletion despite number-neutral I-agreement.

In contrast to (55), consider (57), with an IDP noun.

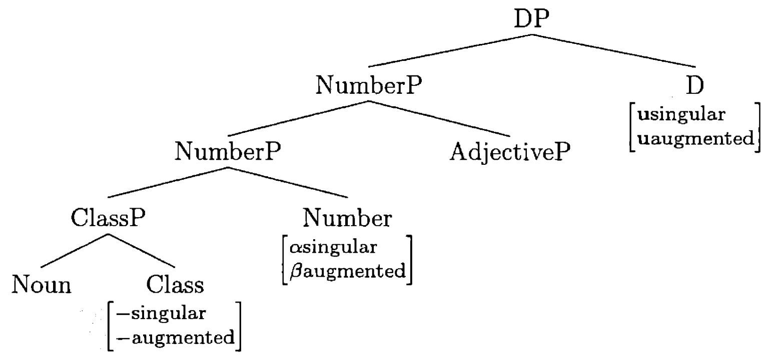
(57)	Ę́į́gɔ	pį́áádɔ	e-ét,	né	óíde	gya-syân
	this.**INV**	table.**INV**	**I**-big.**S**	but	that	**P**- small.D/**P**
	'This table is big, but those tables are small'					

Here, class is [−singular]. So, in the first clause, where Number is [+singular −augmented] (**1**), the S-form of 'big' is licensed, by (44). However, Number and Class clash, so that D is valued as [inverse], leading to inverse marking on the demonstrative, **ę́į́gɔ**, and on the noun, **pį́áádɔ**, and I-agreement on the verb. The resulting verb, **e-ét**, again shows number-conditioned suppletion despite number-neutral I-agreement.

In the second clause, both agreement and suppletion are transparent to Number. [−singular +augmented] licenses the D/P-form of the predicate and triggers P-agreement, via D. These yield **gya-syân**.

Consider, lastly, an appositively used S∼D/P adjective with the IDI noun **álɔɔ** 'apple'. Class is [−singular −augmented]. Since we are only concerned with the DP, I simplify the discussion by assuming a structure in which NumberP, with its adjectival adjunct, has raised to D.

(58)



The forms we are concerned with are taken from Wonderly, Gibson and Kirk (1954, p. 6; with minor corrections to tone):

(59) álɔɔ- et- tɔ
apple-big.S-INV
'[one] big apple'

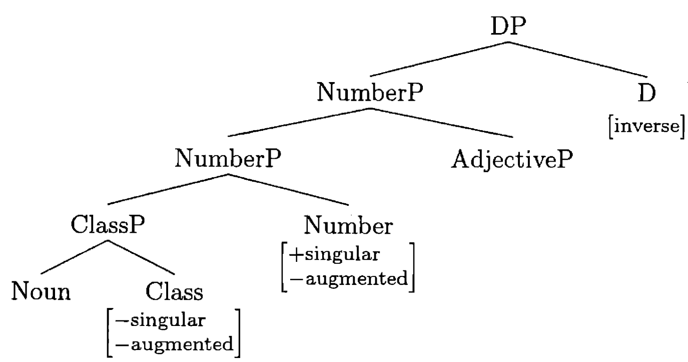
(60) álɔɔ- bin
apple-big.D/P
'[two] big apples'

(61) álɔɔ- bį̀į- dɔ
apple-big.D/P-INV
'[several] big apples'

What is noteworthy in these examples is that the adjective suppletes for number as expected and the DP as a whole is inverse marked exactly on a par with any IDI noun. We now derive the three DPs.

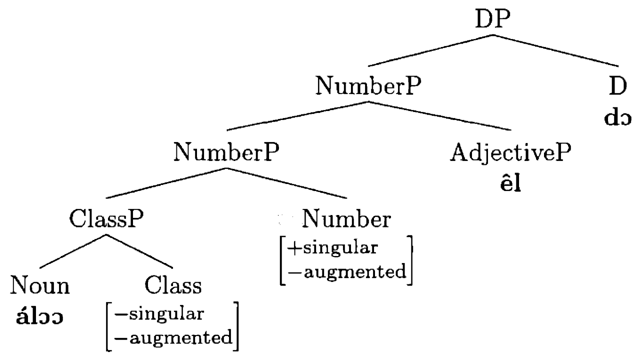
Consider first '[one] big apple'. Number is [+singular −augmented]. Because Number and Class are oppositely specified for [±singular], D is valued as [inverse]:

(62)



When it comes to vocabulary insertion, the adjective is realized as **êl**, conditioned by [+singular] on Number. The feature [inverse] on D is realized by the inverse marker **dɔ**:

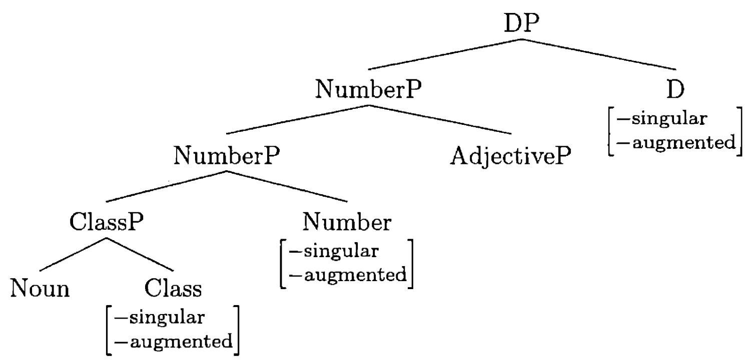
(63)



By standard phonology, this yields the desired form **álɔɔettɔ**.

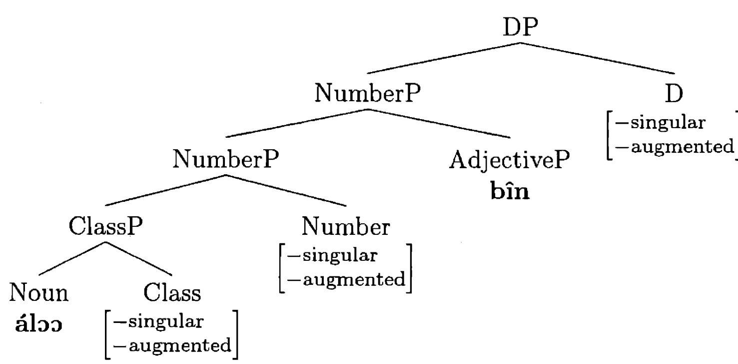
Things are slightly simpler for referential cardinality **2**. The valued tree is:

(64)



Observe that, because Class and Number are both [−singular −augmented], these values can be copied straightforwardly onto D. There is no inverse marking. Number conditions **bîn**, the [−singular] form of 'big'.

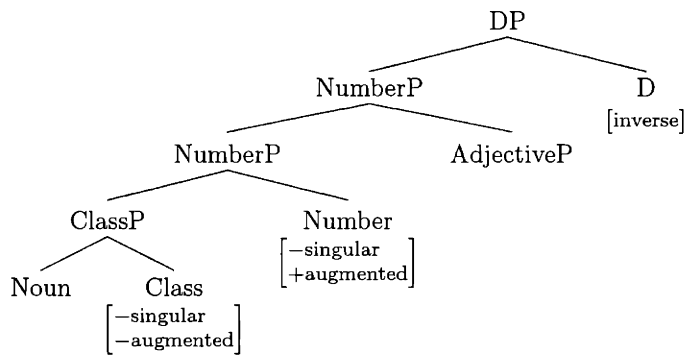
(65)



Again, regular phonology yields the desired form, **álɔɔbin**.

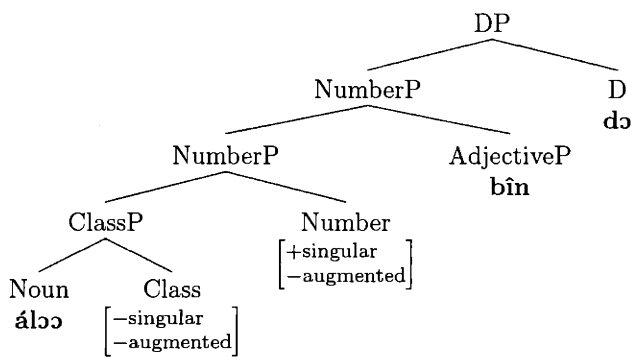
Finally, consider referential cardinality **3**. The valued DP is:

(66)



This combines aspects of both of the preceding DPs: D is again valued as [inverse] (owing to the conflicting specifications of [±augmented]) as for **1**; however, as for **2**, [+augmented] on Number conditions **bîn** for 'big'.

(67)



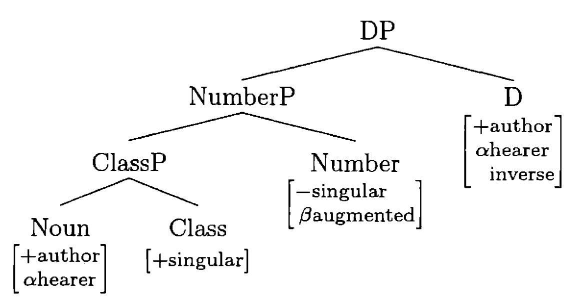
Again, standard phonology yields the desired form, **álɔɔbi̧dɔ**.

So, we see that the correct forms are easily derivable for all relevant nouns classes under values of Number and in a variety of syntactic constructions.

4.3.2 Plus-valued class

Consider now the [+singular] class considered SII, the only member of which is the first person, [+author]. Recall from Chapter 3 that a valued first person DP for referential cardinality **2** or **3** has the following structure:

(68)



This corresponds to first person inclusive if α is plus, and to exclusive if α is minus; and it corresponds to **2** if β is minus, and to **3** if β is plus.

The important point to observe in (68) is that Number distinguishes **2** from **3**, but that agreement does not. This differs from, say, IDP and SDI nouns, where there are distinct agreement types for each referential cardinality. It also differs from IDI, however. Both IDI and SII share the property that they trigger I-agreement for two values of referential cardinality. However, for IDI, these values are **1** and **3**, a non-natural class. For SII, they are **2** and **3**, the natural class defined by [−singular]. One might imagine, therefore, that SII simply lacks specification for [±augmented]. Given the preceding discussion, we can use suppletion to show that this is not so. Specifically, we can show that [±augmented]-sensitive predicates can be used to distinguish first person dual from first person plural.

The following sentences show that first person comprises [±augmented], even though this is never manifested in its agreement. For first person exclusive, dual occurs with the S/D-forms, as in (69), whereas plural occurs with the P-forms, as in (70).

(69) E-x!óígyá
I- fall.S/D.PF
'She and I fell'

(70) E-k!úígyá
I- fall.P.PF
'They and I fell'

The relevant vocabulary items are shown in (71), with the forms in (69) and (70) derived by detransitivization with **-ígyá** (see Watkins 1984).

(71) $\sqrt{\text{LAY}}$ ⇔ x!óú | [−augmented] ___
⇔ k!úú | [+augmented] ___

Similarly, for first person inclusive, dual occurs with the S/D-forms, as in (72), and plural with the P-form, as in (73).[9]

(72) Ba-thóúya (Watkins, p.c.)
2P- move.S/D.IMPF
'You and I fell are moving around'

(73) Ba-zę́į́ma (Watkins, p.c.)
2P- move.P.IMPF
'You, I and (s)he/they are moving around'

The relevant vocabulary items are shown in (74) (for imperfective allophony, see Watkins 1984).

[9]The suppletive pair used here has for a while been ceding to use of the S/D-form in all cases, according to Dr McKenzie (Watkins, personal communication). Mrs Whitehorse Taylor, who uses the forms, agrees with this observation.

(74) $\sqrt{\text{WANDER}} \Leftrightarrow$ thóú | [−augmented] ___
$\Leftrightarrow$ zę́į́ | [+augmented] ___

4.3.3 Summary

The DP structure of Chapter 3, by permitting divergence between the content of Number and D, provides the correct features to derive the agreement∼mismatches that arise with I-agreement, which is unrevealing of referential cardinality, as it may occur with **1**, **2** and **3**.

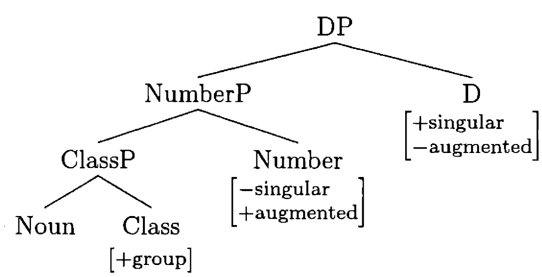
4.4 [±group]-induced mismatches

If agreement∼suppletion mismatches arise in virtue of differences between the feature content of Number and D, then they are predicted to arise in virtue of [±group]. This follows because, if Class bears [αgroup], then D will always bear [$\bar{\alpha}$augmented], even if Number bears the opposite value of [±augmented]. We examine first the SDS, IDS and IDI cases, then SSS, the [+group] mass nouns. Although pluralia tantum nouns, PPP, fall naturally into this discussion, being [−group], they are deferred until Section 4.5, as their behavior is more complicated than [+group] nouns'.

4.4.1 [+group], non-mass

For countable [+group] nouns, agreement∼suppletion mismatches are predicted to occur for referential cardinality **3**, where the DP has the structure:[10]

(75)



Observe that Number and D are oppositely specified for [±singular] and [±augmented]. Therefore, given an S∼D/P suppletive predicate, such as 'big', we expect S-agreement on the D/P-form; and given an S/D∼P predicate, such as 'be set', we expect S-agreement on the P-form. These combinations are exemplified below.

First, consider the S/D∼P suppletive predicate 'be set'. This is illustrated with the SDS noun, **tóú** 'house' (Watkins 1984, p. 90).

[10]I abstract away from the possibility, suggested to simplify the statement of [±group]'s computational effect (Section 3.4.2), that [+singular] arises postsyntactically, by feature insertion.

(76) Tóú ∅-xél
house s-be_set.s/D
'There's [one] house standing'

(77) Tóú ę- xél
house 3D-be_set.s/D
'There are [two] houses standing'

(78) Tóú ∅- sɔ́l
house 3s-be_set.P
'There are [several] houses standing'

In the first two sentences, agreement and suppletion both transparently reflect referential cardinality. However, observe that, in (78), we have s-agreement on the P-form of the predicate. This is exactly as expected given (75) and the vocabulary items:[11]

(79) $\sqrt{\text{BE SET}}$ ⇔ xél | [−augmented] __
⇔ sɔ́l | [+augmented] __

The [+augmented] on Number licenses **sɔ́l**, but the [+singular −augmented] on D license s-agreement, yielding the form in (78).

(The same point is made for IDS nouns by (Watkins 1984, p. 87):

(80) Áádɔ e-xél
tree.INV I- be_set.s/D
'A tree is standing / growing'

(81) Áá ę- xél
tree 3D-be_set.s/D
'[Two] trees is standing / growing'

(82) Áá ∅- sɔ́l
tree 3s-be_set.P
'[Several] trees are standing / growing'

As details are as discussed above for SDS nouns and for the inverse, these examples require no further comment.)

Consider, now, s/D∼P suppletive predicates. These are illustrated with IDI nouns on their 'different types of' reading.

(83) Hɔ́ndé ɔ́l bɔ́- kį́įníí /*kyǫ́į́
what hair :2P:s-long.D/P/ long.s
'What long [types of] hair you all have'

(84) Hɔ́ndé ɔ́l bɔ́- xáádóú /*xéí
what hair :2P:s-short.D/P/ short.s
'What long [types of] hair you all have'

[11]Strictly speaking, these predicates should be decomposed into **xéí/sɔ́ɔ́** and the stative marker -l. This finegrainedness is not need here.

In each case, 'hair' triggers S-agreement. However, the S-form of the predicates is unacceptable and the D/P-form must be used. Again, this is exactly as expected given (75) and the vocabulary items:

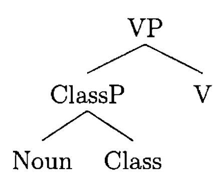
(85)	√LONG	⇔	kį́į́níí	| [+singular] ___
		⇔	kyǫ́į́	| [−singular] ___
(86)	√SHORT	⇔	xáádóú	| [+singular] ___
		⇔	xéí	| [−singular] ___

Thus, nouns that trigger S-agreement when referential cardinality is **3** trigger suppletion in as expected.

4.4.2 [+group], mass

Thus far, all agreement∼suppletion mismatches have been cases in which suppletion sees through agreement, as it were, to true referential cardinality. In this regard, non-granular mass nouns are very interesting. If their uncountability indicates absence of Number, as suggested in Chapter 3, then suppletion in such cases cannot depend on Number. Nonetheless, it can depend on number features, as these are present on Class. So, for mass nouns, Class-conditioned suppletion, rather than Number-conditioned suppletion is expected, in virtue of the structure:

(87)



Given (87), the feature composition of Class is of key importance for mass nouns, especially SSS. Generally, S-agreement arises because D dominates the features [+singular −augmented] which are replicated on D when D's uninterpretable number is valued. However, I argued that the classification [+singular −augmented] makes no sense for mass nouns—for instance, they do not have cardinality 1, as [+singular] guarantees. Rather, on semantic grounds the class features must be [−singular +augmented +group]. The correctness of this argument can now be verified by the predictions it makes with respect to suppletion.

Consider an SSS noun with a [±augmented]-sensitive predicate. These always occur in their P-form.

(88)	Étté /syɔ́ndé	thǫ́ų́	∅- sɔ́l	dɔálkya
	much/little	water	3S-be_sitting.**P**	bucket.LOC
	'There's much / little water in the bucket'			

(89)	Syɔ́ndé	thǫ́ų́	∅- p!étkyá	/*ótkyá
	little	water	3S-fall.**P**.DETR.PF/	fall.S/D.DETR.PF
	'A drop of [lit.: (a) little] water fell'			

(90) K!ɔálkya étté pénhaa ∅- sɔ́l /*xél
dish much sugar 3S-be_sitting.**P**/ be_sitting.S/D
'There's a lot of sugar in the dish [suggestive of a bowl]'

(91) K!ɔálkya étté pénhaa ∅- k!úú /*k!ɔ́ɔ́
dish much sugar 3S-be_lying.**P**/ be_lying.S/D
'There's a lot of sugar on the dish [suggestive of a plate]'

Evidence for how SSS mass nouns behave with [±singular]-sensitive predicates is harder to come by, owing to the meanings of these predicates. Sentences such as 'The sugar is short' or 'The whisky is long' do not make much sense, and 'The water is large' or 'The snow is small', to the extent that they are interpretable, are so in a non-mass sense, such as 'body of water' or 'snow flake'. The nearest I have come to a suitable example is **ɔ́lhǫ́syan** 'dime', from 'money'+'small'. This seems to support the idea that 'money', and so SSS nouns, are [−singular]. However, here, the language tricks us, for, of the four S∼D/P predicates, precisely 'small' ceases to be [±singular]-sensitive when attributive rather than predicative: **syân** is used in all cases (Watkins 1984, p. 99).

For the sake of completeness in the treatment of mass nouns, observe that PPP nouns also occur only with the P-form of predicates. This is expected given the inherent classification [−singular +augmented]. (Again, I have no examples of [±singular]-sensitive predicates with these nouns, for semantic reasons.)

(92) Ɔ́ɔ́thą́t!ąį pį́ááthai gya-sɔ́l
salt table.LOC 3P- be_sitting.**P**
'There's salt on the table'

(93) K!ǫ́ǫ́etǫǫ étté ɔ́ɔ́thą́t!ąį gya-sɔ́l
frybread much salt 3P- be_sitting.**P**
'There's a lot of salt in the frybread'

(94) Péígya toudôm yą́- sɔ́l
sand floor.LOC :1S:P-be_sitting.**P**
'I laid sand on the floor'

The examples of mass nouns show that it is irrelevant to suppletion whether number features are provided by Number or by Class and that the class features [−singular +augmented +group] for SSS nouns, motivated on semantic grounds, correctly predicts a set of [+group]-induced suppletion agreement mismatches parallel to those of SDS, IDS and IDI nouns.

4.5 Harder Cases

The agreement∼suppletion mismatches induced by [inverse] and [+group] fall under a single generalization: that the information relevant to suppletion is the feature content of Number, or Class, when Number is absent. This result has been established above for the vast majority of nouns in the language, the SDP, SDI, SII, IDP, IDI, IDS, SDS, SSS, and PPP mass. In this section, we examine two corners of the language where the generalization that governs the previous cases breaks down. They are pluralia tantum PPP nouns and reflexives.

4.5.1 [−group], pluralia tantum

Pluralia tantum nouns, such as **khɔ́ɔ̀dé** 'trousers', **hólda** 'dress', **t!ǫ́ų́gya** 'shirt', and **tóú** 'teepee', fall into the PPP class. Their class feature is [+augmented −group]. Their behavior with respect to suppletion only partly conforms with the generalization that suppletion depends on the feature content of Number, or Class, when Number is absent. PPP nouns with [±singular]-sensitive predicates obey the generalization, however, PPP nouns with [±augmented]-sensitive predicates do not. [±augmented]-sensitive predicates display the [+augmented]-form throughout. This is illustrated by the examples below.

Consider, first, a [±singular]-sensitive predicate.

(95) Ę́į́de t!ǫ́ų́gya yą́- dôi-et
this shirt :1S:**P**-too-big.**S**
'This shirt is too big for me'

Here, referential cardinality is **1**. So, the value of [±singular] at Number is plus. By (44), this licenses the S-form of the predicate. However, the class features [+augmented −group] guarantees that D is valued as [+augmented] and so triggers P-agreement on the verb. The P-agreement∼S-suppletion mismatch is then correctly predicted. Now consider:

(96) Hólda yą́- dôi- bin
dress :1S:**P**-too-big.**D/P**
'My [two/several] dresses are too big for me'

When referential cardinality is **2** or **3**, the value of [±singular] at Number is minus. Consequently, the predicate occurs in its D/P-form, thus matching the P-agreement. So, [±singular]-sensitive predicates behave as expected. Some further examples are provided below.

(97) Ę́į́de k!ókɔ́íouphɔl gya-dôi-kyǫį /xei
this roach 3P- too-long.S/short.S
'This roach is too long/short'

(98) Téí gya-dôi-kįįnii /xaadou
all 3P- too-long.D/P/short.D/P
'They [roaches] are all too long/short'

More complicated are [±augmented]-sensitive predicates, such as 'lay'. Irrespective of referential cardinality, the predicate takes the P-form and has P-agreement throughout.

(99) T!ǫ́ų́gya gyat-p!ɔ́í-k!óp
shirt 1S:**P**-mis-lay.**P**.PF
'I lost [one/two/several] shirt(s)'

Though this is predicted for referential cardinality **3**, it is entirely unexpected for **1** and **2**. For these, Number is [αsingular −augmented] and so, given (71), **x!óú** should be licensed. However, it is in fact ungrammatical.

(100) *T!ǫ́ǫ́gya gyat-p!ɔ́í-x!ép
shirt 1S:P-mis-lay.S/D.PF
for 'I lost [one/two] shirt(s)'

Similar examples are:

(101) K!ókɔ́íouphɔl yą́- p!étkyá /*ótkyá
roach :1S:P-fall.P.DETR.PF/ fall.S/D.DETR.PF
'My roach fell off'

(102) Téí k!ókɔ́íouphɔl gya- p!étkyá
all roach :3A:P-fall.P.DETR.PF
'Everyone's roaches fell off'

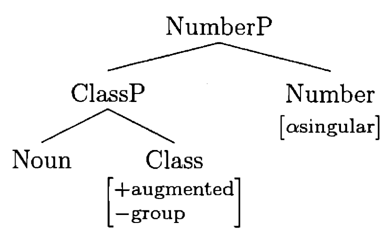
The constant occurrence of [+augmented]-forms, whether Number is [+augmented] or [−augmented], clearly contradicts the generalization that suppletion is conditioned by Number = [αsingular βaugmented].

The nearest I can offer to a solution at present hinges on the claim that Number is defective for PPP pluralia tantum nouns.

(103) **Defective Number**
For PPP pluralia tantum nouns, Number is specified only for [±singular].

That is, a pluralia tantum noun has the NumberP structure below, from which [±augmented] is absent.

(104)



The crucial fact about this tree is that it has the right features to condition suppletion: [±singular]-sensitive predicates will covary with the specification of that feature on Number, whereas [±augmented]-sensitive predicates will have access only to [+augmented] on Class.

The reason that I do not label this a complete solution is that it requires a two revisions to what was assumed above. First, there is the defectiveness of Number. Second, there is the issue of sisterhood and suppletion.

With regard to sisterhood and suppletion, the issue is that the verb, if a sister to Number, cannot be a sister to Class. It is not clear what exact revision of the theory this warrants, however. We know that Number and Class must count as equidistant from D (otherwise, they would not both be relevant to the valuation of D's uninterpretable number). And yet, Class can condition suppletion, but only if the relevant feature is absent from Number, as for pluralia tantum or mass nouns; this suggests that—according possibly to some other metric of distance—Number and Class are not equidistant from the suppletive predicate, though they are both accessible, with Number the more 'readily' accessible. Several footnotes in this chapter and earlier have suggested that the syntactic structures offered here need not be interpreted literally. It is conceivable that an appropriate reinterpretation of the syntactic trees will fix this problem. I leave this problem open.

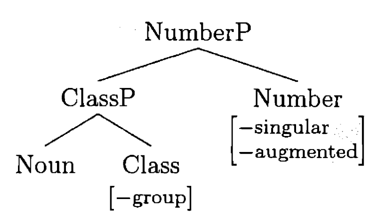
The issue of the defectiveness of Number strikes me as less problematic. Carstens (1991) argues that a point of crosslinguistic variation is the feature content of Number. Paraphrasing to the terminology of the current investigation, she says that there is no reason to suppose that Number in English is specified for [±singular] and [±augmented]. As English has a singular∼non-singular contrast, rather than a singular∼dual∼plural one, like Kiowa's, Number in English consists only of [±singular]. The question is whether a form of variation that is attested crosslinguistically may also occur internal to a particular language. Based on the current case, one is tempted to say it is.[12] This would make PPP pluralia tantum nouns a half-way case between mass nouns, for Number is totally defective, i.e., empty, and all the other nouns of the language, for which Number, apparently, if fully specified.

It is, I think, fair to conclude that the suppletion triggered by PPP pluralia tantum nouns constitutes a slightly harder case than those examined above, but that it is not by any means beyond all analysis.

A note on α licensing of [±group]

Recall, from Section 3.4.1, that two licensing conditions for [±group] and two specifications of Class for pluralia tantum nouns were entertained: either [±group] is licensed by [+augmented] and Class for pluralia tantum nouns is [+augmented −group], or [αgroup] is licensed by [αaugmented] and Class for pluralia tantum nouns is [−group]. It was argued on conceptual grounds that the first was to be preferred. Observe now that we have something of an empirical argument for the same conclusion, namely that the partial solution offered above is impossible if we adopt the α licensing condition and the simpler specification of Class. To see this, consider the NumberP for a pluralia tantum noun of referential cardinality **2** (with Number not defective).

(105)



[12]Split ergativity is can be considered in this way: some languages are ergative, other accusative, and others exhibit this variation internally.

It is impossible for any head in (105) to condition the [+augmented]-forms of suppletive predicates, because there is no head specified for [+augmented]. The situation is not helped, as it was above, by claiming that Number is defective.

4.5.2 Reflexive-induced mismatches

Pluralia tantum PPP nouns are not the only nouns for which the direct correlation between the feature composition of Number and the suppletive form of the predicate breaks down. Reflexives, too, cause agreement∼suppletion mismatches. These clearly condition the [−augmented] form of S/D∼P-suppletive predicates, yet do not obviously condition [−augmented] forms of agreement. Rather, they trigger what is best described as animate plural agreement (cf., Section 2.5). We begin with a detailed description reflexive agreement before moving to the relevant suppletive predicates.

Reflexive agreement

As described in Section 2.5, reflexive agreement in Kiowa is simply animate plural agreement. A is a special form of agreement, requiring that the noun in question be animate and have referential cardinality **3**. In addition, some sense of 'empathy' is required, so that A-agreement is near obligatory with **Kɔ́ígú** 'Kiowas', common with **k!yą́ą̂hyóp** 'men' and **maayóp** 'women', and rare with children and lower animates.

The identity between reflexive agreement and A-agreement results in a systematic ambiguity, recorded by Harrington (1928).

(106) De- hól
1S:A-kill.PF
'I killed myself *or* them (people)'

The one agreement type is ambiguous, for all person-number combinations, P, between P's doing something to a group of people and P's doing something to itself.[13]

[13]The two can be disambiguated by inclusion of **ɔ̨̂ɔ̨gɔ**.

(i) Ɔ̨́ɔ̨gɔ de- hól
AUGAU 1S:A-kill.PF
'I killed myself / *them'

Tempting though it is to gloss this **ɔ̨̂ɔ̨gɔ** as 'self', I hesitate to do so in light of examples such as (ii), where **ɔ̨̂ɔ̨gɔ** is used as the first person pronoun, and (iii), where it seems to mean 'of his own accord'.

(ii) Ɔ̨́ɔ̨gɔ a- xán
AUGAU 1S-arrive.PF
'*I* arrived'

(iii) Ɔ̨́ɔ̨gɔ em- tǫ́- hɔ̂n (Harrington 1928, p. 29)
AUGAU 3S:A-talk-exhaust.PF
'He became silent of his own accord'

A natural question is whether the identity that (106) exemplifies is a systematic fact about Kiowa grammar, i.e., a principled syncretism, or whether it is mere accidental homophony. I suggest that the syncretism is principled, because reflexive and A-agreement behave as a natural class in the morphology: a morphological operation that affects one identically affects the other. Two such operations are discussed immediately below.

Indirect objects of ditransitives. When the indirect object of the verb is animate plural, it is absent from the agreement prefix. That is, the verb shows agreement only for the external argument and direct object, the same agreement expected of simple transitive verbs.

(107) Kɔ́ígú phɔ́ɔ́ gya- pên
Kiowa.INV buffalo 1S:A:S-butcher.PF
'I butchered a buffalo for the Kiowas'

(108) Phɔ́ɔ́ gya- pên
buffalo 1S:S-butcher.PF
'I butchered a buffalo'

Likewise, when the indirect object is reflexive, it is not realized by any agreement morphology.

(109) **Q:** Hâatêl gya- pį́įǫ́ǫméí?
who 3S:3P-cook.PF
'Who cooked?'

A: Téí ǫ́ǫ́gɔ gyá- pį́įpasat?
all AUGAU A:A:3P-cook.PF
'Everyone cooked for themself'

This last verb **gyá-pį́įpasat** also means simply 'they cooked', without the reflexive benefactive reading.

Adger and Harbour (2003) show that absence of agreement here is a morphological matter, rather than a syntactic one. That is, they enter into the right relations with the right heads to trigger agreement, as attested by their syntactic 'blocking' behavior. However, they are absent from the agreement prefix, and so, deleted postsyntactically, as a natural class.[14]

Direct objects of ditransitives. In simple transitives, there is a form of agreement triggered by animate plural and reflexive objects and this agreement is distinct from all other agreement types. In ditransitives, by contrast, there

To check whether this last augau qualifies as an object, rather than an adverbial?, test: augau em-sep: does it mean he sewed himself, or he sewed of his own accord.

[14]It is not the case that these trigger zero agreement, as one can tell on the basis of object agreement allomorphy. Indirect object agreement conditions allomorphy of direct object agreement (Harbour forthcoming 2003, Chapter 5). The indirect-object-conditioned allomorphs do not appear when the indirect object is reflexive or animate plural, however, entailing that these do not trigger zero agreement.

is no special form of agreement. Instead, animate plurals generally trigger D-agreement, as illustrated by the identity of the agreement prefixes below:[15]

(110) Nén- hól (Harrington 1928, p. 249)
1S:3S:A-kill.PF
'I killed them (people) for him'

(111) Yíí nén- hól
two 1S:3S:D-kill.PF
'I killed two for him'

Similarly, reflexive direct objects trigger D-agreement, when there is indirect object agreement:

(112) Nén- hól (Harrington 1928, p. 249)
1S:3S:A-kill.PF
'I killed myself for him'

Note that it is also possible for animate plurals to trigger I-agreement, as these are, after all, SDI nouns.[16] Reflexives, too, permit I-agreement. For instance, a small number of predicates generally trigger D-agreement for an unspecified object. As complete a list as I can provide follows.[17]

(113)

án	awake
hónx!oigya	come late
ɔ́tkyadɔɔ	need
dótkyai	look nice
ɔnyáí	trip
khútdɔɔ	experience pounding (of the heart, say)

Examples of these predicates with D-agreement follow. The object agreement is glossed as A, not D, however. That is, the predicates in (113) are treated as reflexives, where the reflexive direct object is coindexed with the indirect object.

(114) Háop né- ą́ą́néí (Watkins 1984, p. 146)
when 2S:1S:A-wake.PF
'At what time did you wake me?'

[15]See Harbour (forthcoming 2003) for an explanation of what makes D-agreement possible here.

[16]Watkins observes that I-agreement has slightly disrespectful for connotations when used for adults and I have found variation between speakers in their willingness to use accept such sentences in elicitation sessions.

[17]Watkins (1984, p. 145) notes that **t!ɔ́ɔ́hál** 'listen to' and **mɔ́nyáígɔ́** 'wave to' also take D-agreement for an unspecified object. However, these differ from (113) in two respects. First, they are agentive with the listener or waver triggering agreement typical of external arguments. Second, as Watkins observes, the verbs make explicit reference to paired body parts: **t!ɔ́ɔ́+hál** 'ear'+'bore' and **mɔ́n+yáígɔ́** 'hand'+[unidentified root]. Consequently, the D-agreement for these predicates might be motivated by real referential cardinality **2**.

(115) Hɔ́ né- dótkyai (Watkins 1984, p. 146)
Q :1S:A-look_nice.PF
'Do I look nice?'

(116) Thénme né- khút- dɔɔ
heart.LOC :1S:A-pounding-be
'My heart was pounding'

Examples of I-agreement with these predicates are (117) and (118). Though I have heard 'come late' used spontaneously with D-agreement, I have given it only with I-agreement, which seems to be much preferred.

(117) Tę́į́gyá-kyǫ́į́ né- /nɔ́- ɔ́tkyadɔɔ
thread- long.S :1S:A/:1S:I-need
'I need a long thread'

(118) Em- ɔ̂ibattɔ- do ɔ́- hónx!oigya
3S:A-beautify-because :3S:I-come_late.PF
'She's late because of [taking too long] beautifying herself'

Thus, agreement for reflexive direct objects and agreement for animate plural direct objects behave as a natural class when there is indirect object agreement, syncretizing with D-agreement or I-agreement.

In summary, then, reflexive agreement is animate plural agreement. They do not resemble each other by phonological accident, but form a natural class for morphological purposes.

Reflexive-conditioned suppletion

Given the association between reflexivity and plurality, and given the correlation between plurality and [−singular +augmented], one might expect reflexives to condition the P-form of S/D∼P-suppletive predicates. (As reflexives are confined to internal arguments of (di)transitive, they cannot occur with S∼D/P-predicates, all of which are intransitive, 'big', 'small', *et cetera.*) In fact, this expectation is wrong, as we shall now see.

There are, to my knowledge, two expressions built on suppletive predicates and demanding reflexive agreement. From 'sever' comes **hóút!at** 'to part ways' [lit.: to travel sever]:

(119) Ø- sɔ́ǫǫdehel gɔ . . . téphɔi em- tóúdɔ gɔ
3S-angry.HSY CONJ everyone 3S:A-gather.PF CONJ
hegɔ́ ém- hóút!alhel (Harrington 1928, p. 252)
then A:REFL-part_ways.PF.HSY
'He [the chief] became angry and . . . he gathered everyone [of his group] together they part ways [from the others]'

And from 'fall, land' comes **hónx!oigya** 'come late' [lit.: to land last]:

(120)	Hɔ́n	dɔ́-	sɔ́í-	ɔm-then-	dǫǫmɔɔ-do	dɔ́t-	hónx!oigya
	NEG	:1P:S-fast-do-			heart-be.NEG-because	:1P:REFL-come_late.PF	

'We arrived late because we didn't want to drive fast'

What is surprising about both 'part ways' and 'come late' is that they are built on the [−augmented]-form. Observe that this is so even though the reflexives are anaphoric to explicitly [+augmented] arguments, 'everyone' in (119) and 'we' in (120). Indeed, [+augmented]-forms, like ***hóúthaa** and ***hónk!uigya** are explicitly rejected here, not matter what the person or number of the traveller off or arriver late.

To deepen the mystery of reflexive conditioned suppletion, we should note the suppletion-conditioning behavior of nouns that trigger A-agreement. In short, though they mean [−singular +augmented], they condition suppletion as though they were [+singular −augmented]. By way of illustration, consider a [±singular]-sensitive predicate:

(121)	Kɔ́ík!yakǫų̨bɔ	á-kyǫ́į́
	Kiowa.people.INV	A-tall.S
	'Kiowas are tall'	
(122)	Kɔ́ík!yakǫų̨bɔ	á-khóú-xéí
	Kiowa.people.INV	A-body-short.S
	'Kiowas are short'	

The predicates are in their S-forms. Consider also [±augmented]-sensitive predicates:

(123)	Dɔ́mgyá	Kɔ́ígú	á-x!óígyá
	land.LOC	Kiowa.INV	A-land.S/D.PF
	'The Kiowas fell down [onto the ground]'		
(124)	Á-péí-x!óígyá		
	A-dead- land.S/D.PF		
	'They fell down dead'		
(125)	Kɔ́ígú	de-	dę̨į̨- x!ép
	Kiowa.INV	1S:A-	sleep-lay.S/D.PF
	'I laid the Kiowas down to sleep'		

All predicates are in their S/D-forms.

These perplexing agreement a suppletion patterns suggest, oddly reassuringly, that the failure to account for reflexive conditioned suppletion does not indicate a shortcoming with the theory of suppletion and agreement offered here, but rather a failure to understand the nature of animate plurals and reflexives themselves. As I cannot suggest an explanation for these forms at present, I leave this topic for future fieldwork and serendipity.

4.6 Conclusion

Agreement∼suppletion mismatches present any theory of number with a challenge. I believe that the theory developed in the Chapter 3 meets this challenge satisfactorily. It distributes number features throughout three locations, Class, Number and D, and claims that each can diverge from the other in systematic ways. Independent theories of agreement and of suppletion ensure that the features on D are responsible for agreement whereas the features on Number or Class are responsible for suppletion. This correctly predicts nearly all the mismatches observed. The two sets of exceptions are PPP pluralia tantum nouns with [±augmented]-sensitive predicates and reflexive / animate plural conditioned suppletion. However, the former are nearly accommodable, requiring perhaps a modified understanding of the syntactic nature of Number and Class. The latter point to a deficiency in understanding of the category or categories reflexive and animate plural themselves; whether these, properly understood, can be accounted for in the theory offered here, remains to be seen.

4.7 Appendix: Adverbs built on suppletive roots

In addition to the concrete aim of explaining aspects of Kiowa grammar, this dissertation has more programmatic aims, one of which is to propose a theory of number that is at once semantically rigorous and morphologically well-founded. The suppletive predicates that have been the focus of this chapter feed into this endeavor in a rather surprising way: via adverbs built on [±singular]-sensitive roots. Adverbs built on the [−singular] form of the root do not have the same meanings as adverbs built on the [+singular] form. At present, my grasp of the facts is not solid enough to support a theory's weight. However, some of the facts are clear and interesting, and so I note them here for completeness and in case they are relevant to others' research.

Kiowa forms adverbs by affixation. Watkins (1984, p. 185) writes that 'stative verbs of quantity (e.g., "big", "long")' take **-de∼-te**, giving the following examples (to which I have added information about the root):

(126)

Root	Adverb	Gloss
long.S	kyǫ́į́dé	a long time
big.D/P	bînde	a lot, much
short.S	xéíde	a short time
small.S	syɔ́nde	a little
big.S	étté	a lot

All of the S-forms in (2) are represented in (126) but only one of the D/P-forms. However, these too form adverbs, as shown below.[18]

[18] I am unsure of the final tones of **kį́į́nííte** and **xáádóúte**. Possibly, they are high.

(127)

Root	Adverb	Gloss
long.D/P	kį́į́nííte	a long time
short.D/P	xáádóúte	a short time
small.D/P	syânde	a little

The glosses in (126) and (127) suggest that the meanings of each S∼D/P adverb pair is identical. However, this is not so.

To be sure, there are cases in which the S-adverb is interchangeable with the D/P-adverb.

(128) Kyǫ́įdé /kį́į́nííte bé- tháá
long.S.ADV/long.D/P.ADV 2S:I-sever.IMP
'Cut it [into] long [pieces]'

(129) Thą̂ąte étté /bînde gya- éí- k!óp
grandmother[19] big.S.ADV/big.D/P.ADV 3S:P-seed-lay.P.PF
'Grandma planted a lot'

Such interchangeability appears independent of the referential cardinality of the nouns involved, as the following paradigm crosscutting S∼P 'short' with **1∼3** 'tree'.

(130) Áádɔ xéíde bé- t!âl
tree.INV short.S.ADV 2S:I-sever.S/D.IMP
'Cut the tree short'

(131) Óíde áá xéíde a- tháá
that tree short.S.ADV 2S:S-sever.P.IMP
'Cut those trees short'

(132) Óígɔ áádɔ xáádóúte bé- t!âl
that.INV tree.INV short.D/P.ADV 2S:I-sever.S/D.IMP
'Cut that tree short'

(133) Óíde áá xáádóúte a- tháá
that tree short.D/P.ADV 2S:S-sever.P.IMP
'Cut those trees short'

Observe that these examples show that the adverbs can be used in Kiowa where secondary predicates are appropriate in English.[20] A similar example,

[19]Strictly speaking, this is the name form of 'maternal grandmother'.

[20]Norvin Richards suggests that if the Kiowa adverbials really are akin to secondary predicates, then they may indicate that PRO is may have any number specification in Kiowa. The idea that these adverbials have a more articulated syntactic structure that English adverbs formed in **-ly** is present in Watkins (1984, p. 203). She observes that adverbial '-dé looks suspiciously like nominal dé' and suggests that the adverbials 'may in fact be derived nominals with adverbial syntactic function'. An alternative is that they are highly reduced, agreement-less relative clauses, a suggestion made in relation to demonstratives in Section (37).

Further evidence bearing on PRO's number may come from incorporated forms of number-suppletive predicates (some examples of which were seen in Chapter 2, e.g.: (40)).

repeated from Chapter 2 is:

(134) syɔ́ndé gya-hɔ́ɔn-dǫ̀ǫmei déem
small.S.ADV 3P- path-be.IMPF.HSY REL.LOC
'along a narrow path'

Another is (135), where both forms of the root 'big' are attested: the S-form **étté** has quantificational force as 'many', and the D/P-form **bînde** has depictive force, describing the pies.

(135) Éít!áppây bînde étté gyat-ǫ̀ǫ̀méí
pie big.D/P.ADV big.S.ADV 1S:P-make.PF
'I made lots of pies big'

Secondary predication is a first instance in which the two types of adverbs are not interchangeable. Though they are in (130)–(133), they are not in sentences like (135). Observe that with **bînde** in (136) there is only the depictive reading, whereas with **étté** in (137), there is only the quantificational.

(136) Bînde dé- tháttetɔɔ
big.D/P.ADV 1S:I-break_up.FUT
'I'm going to cut it into big pieces'

(137) Étté dé- tháttetɔɔ
big.S.ADV 1S:I-break_up.FUT
'I'm going to cut it into many pieces'

An initial conclusion here might be that **bînde** simply is not quantificational. However, this is incorrect. It appears to have two quantificational senses.

(i) Hɔ̃ndé a- ól- x!ep?
what 2S:3S-drop.S/D-set.S/D.PF
'What did you drop?'

(ii) Étté gyat- ól- k!op?
much 1S:3P-drop.S/D-set.P.PF
'I dropped a lot'

Observe that in both (i) and (ii), agreement and suppletion match: S-agreement and the S/D-form of the predicate in (i), and P-agreement and the P-form of the predicate in (ii). However, the form of the incorporated predicate remains constant throughout, seemingly oblivious to the change in number of the matrix direct object. This is not evidence that the S/D-form of 'drop' is the default form, inserted in both (i) and (ii) because of lack of conditioning environment, for both of the following forms were given:

(iii) p!él- x!ep /k!op
drop.P-set.S/D/set.P
'knock off [e.g.: from a table]'

(I do not believe that there is a meaning difference corresponding to incorporation of the S/D-form *versus* the P-form; it just happens that the particular glosses above imply one.) Here, the incorporated predicate is 'drop' in its P-form, but the main predicate may be either in its S/D- or in its P-form. These incorporated predicates show the same indifference to number as do the adverbials in (130)–(133).

First, Watkins observes that, in her examples, **bînde** is generally confined to things to do with food (Watkins, personal communication), as in:

(138) Xȩ̂į hegɔ gyá- hágyá- ton k!ɔt dôi-binde
horse already :2S:S-already-fat CONJ too-big.D/P.ADV
a- máágop (Watkins 1984, p. 241)
2S:S-feed.IMPF
'You already have the horse fat and yet you feed it too much'

The same holds true for examples in my fieldnotes. Representative examples are food-oriented (139), where **bînde** is acceptable, versus non-food-oriented (140), where it is not. (With the regard to the limits of food-orientation, see (129).)

(139) **Q:** Háote an gya- pɔ́ttɔ?
how_much HAB 3S:P-eat.IMPF
'How much does he usually eat?'

A: Étté / Bînde / Dôiette / Dôibinde
big.S.ADV / big.D/P.ADV / too.big.S.ADV / too.big.D/P.ADV
'Too much'

(140) **Q:** Háot an gya- sɔ́ɔ́tétɔɔ?
how_much HAB 3S:P-work.IMPF
'How much does he usually work?'

A: Étté / * Bînde / Dôiette / * Dôibinde
big.S.ADV / big.D/P.ADV / too.big.S.ADV / too.big.D/P.ADV
'Too much'

Second, **bînde** appears connected to event quantification. Mrs Dupoint comments that (141), with **bînde**, emphasizes repeated gain of lots of money. I surmise that (141), with **étté**, has a more stative reading, implying constant wealth.

(141) Bînde ɔ́lhɔ̨̨́ɔ̨gya gya- dóú
big.D/P.ADV money 1S:S-hold
'I have a lot of money [on different occasions]'

(142) Étté ɔ́lhɔ̨̨́ɔ̨gya gya- dóú
big.S.ADV money 1S:S-hold
'I have a lot of money [generally]'

An interesting issue raised by the foregoing examples is whether the difference between **bînde** and **étté** stems from the difference between their roots **bîn** 'big.S/D' and **ét** 'big.S'. If so, and if the only non-phonological difference between the two forms of 'big' is their [+singular]∼[−singular] specification, then we would have to ask what is the semantic connection between [−singular] and food and event quantification, and between [+singular] and quantification of individuals.

Similar questions arise for the other adverbs in (126) and (127). For 'small', Mrs Dupoint and Mrs Kodaseet translated the [−singular] adverb **syânde** as 'a little at a time', but the [+singular] adverb **syɔ́nde** simply as 'a little'.

(143)	Ę̇́į́de	syânde	ę́-	máágop	gɔ	a- sɔ́ǫ̀ǫdetɔɔ
	this	small.D/P.ADV	3S:1S-feed.IMPF		CONJ	1S-anger
	'She's serving me a little at a time and I'm getting mad'					

This suggests event quantification as key, as with 'big'-based adverbs.

For the other adverbs, the differences are less clear. For instance, (144) and (145) imply interchangeability of 'long'-based adverbs. (Given (139) and (140), I take **dôi** 'too' to be irrelevant here.)

(144)	Dôikyǫįde	an	án-	tǫ́zánma
	too.long.S.ADV	HAB	:3S:P-talk.IMPF	
	'She speaks too long'			
(145)	Kį́įnííte	án-	tǫ́zánma	
	long.S.ADV	:3S:P-talk.IMPF		
	'She talks for a long time'			

However, (146) and (147) have substantially different interpretations.

(146)	Kyǫ́į́de	an	em-	sôugu
	long.S.ADV	HAB	3S:REFL-sew.IMPF	
	'She sews for a long time'			
(147)	Kį́įnííte	an	em-	sôugu
	long.D/P.ADV	HAB	3S:REFL-sew.IMPF	
	'She sews with great distance between stitches'			

I leave further exploration of these facts and their explanation for future work, noting them, for now, as interesting potential sources of insight into the meaning and uses of number features.

Chapter 5

The Agreement Prefix

This chapter addresses one of the central problems of Kiowa linguistics, the structure and content of the verbal agreement prefix.

The classic problem is simply put. Consider the sentence below:

(1) Á- tot
A:A:S-send.PF
'They sent him to them (people)'

As the gloss indicates, the form of the agreement prefix depends on three arguments, the third person animate plural sender, the third person animate plural recipient, and the third person singular sendee. Indeed, if we change any of these arguments, the prefix changes too. The following three sentences show the respective results of changing sender, recipient or sendee to third person dual. (The change in tone of the verb is an effect of the prefix.)

(2) Ę́- tot
3D:A:S-send.PF
'They two sent him to them (people)'

(3) Mé- tót
A:3D:S-send.PF
'They sent him to them two'

(4) Et- tót
A:A:D-send.PF
'They sent them two to them (people)'

With the agreement prefixes encoding information about three participants in as little as a single vowel, the question is how so much information gets into so little space.

Related to this is the size of the inventory of agreement prefixes. Given that Kiowa distinguishes ten person number combinations (three persons, three numbers and the inverse) and given that these may be external arguments, indirect objects or direct objects, and given also that verbs may be unaccusative, transitive or ditransitive,[1] the total number of agreement combinations is naively expected to be 1,110.

(5) Total number of argument combinations

$$= \sum_{n=1}^{3} \text{total number of } n\text{-argument combinations}$$
$$= \sum_{n=1}^{3} 10^n$$
$$= 1{,}110$$

Clearly, some of these 1,110 are excluded by person-case restrictions (*'I will bring you to him' (Adger and Harbour 2003)) and binding conditions (*1s:1s; instead 1S:REFL). However, these considerations are insufficient to bring the number of prefixes down to the mere 80 or 90 that actually exist. (The exact number depends on how one counts certain homophones). So, the question is how so few agreement prefixes can encode so many argument combinations.

These questions are relevant to the current investigation because they permit a justification of the feature inventory and mechanisms that value D, argued for in Chapter 3. That is, if agreement prefixes arise via copying of φ-features from D, and if the feature content of D is [±singular], [±augmented], [inverse], [±author] and [±hearer], then it must be possible to explain properties of agreement prefixes in terms of precisely these features.

The justification and the answers to the preceding questions consist in providing a syntax-to-phonology mapping that transforms bundles of syntactic features into the phonologically familiar agreement prefixes. I.e., we must specify what the mystery mechanisms are in (6) that produce **gya** from the feature specification of a first person singular agent and a third person singular object.

(6)
$$\left\{ \begin{array}{cc} \textbf{Agent} & \textbf{Object} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \right\} \longrightarrow \textbf{gya}$$

I regard an explanation of this sort as consisting in the specification of:

(7)
a. A structure in which the agreement features of each argument are located.
b. A list of morphological processes that affect this structure and the features it contains.
c. A list of vocabulary items, that is, of correspondences between feature bundles and phonological strings.
d. A list of phonological processes that yield the surface forms.

Each of the preceding has featured in one or more past analyses of the agreement system: Merrifield (1959b), Trager (1960), Watkins (1984, and later manuscript revisions), Takahashi (1984), Harbour (forthcoming 2003).

[1] Unergatives in Kiowa are overtly transitive.

It should be noted that the analyses that followed Merrifield's have differed only little in point of phonemic segmentation or phonological processes. Substantial differences have arisen with respect to framework and morphosyntactic features. Also, Merrifield's and Watkins' inventory of prefixes differ in slight phonological details, such as length-tone correlations. In my own fieldwork, I have found some regional variation in this regard and in point of syllabification. These differences do not substantially affect past analyses or my own. Watkins' prefixes are assumed below. The analysis that follows very much builds on past work.

A full analysis of the prefix system proceeds in several stages. First, the number of explicanda is reduced by appeal to morphological operations. On the one hand, these explain why the inventory of prefixes is substantially smaller than the number of possible argument combinations. On the other, they allow one to exclude from active analysis certain prefixes, the phonological form of which is predictable from others. Second, the prefixes are decomposed into segments that are correlated with particular arguments or sets of arguments. Finally, a list of vocabulary items, i.e., correlations between phonological pieces and person / number features, is given that accounts for the segmentation and the regular relationship between sets of prefixes. At this point, I am unable to offer the list of vocabulary items—but it should be appreciated, *qua* attenuating circumstances, it should be noted that Bonet's treatment of Catalan preverb clusters comprised an entire dissertation and that Catalan is no more complicated than Kiowa in this regard. Therefore, I offer a number of desiderata below, i.e., conditions that must be satisfied by an eventual vocabulary list or inventory morphological operations. The crucial point to what follows is that the desiderata are stated in terms of features and their values, not in terms of the traditional categories 'singular', 'dual', and so on. Consequently, even though incomplete, what follows supports the theory and feature inventory of previous chapters.[2]

5.1 Preliminaries

Before proceeding to the analysis, I give a full list of Kiowa's prefixes and outline some theoretical assumptions.

5.1.1 Prefixes

The following is a table of all permitted argument combinations and their corresponding prefixes.

(8) **Kiowa Agreement Prefixes**

[2]A terminological note: I shall use the term **license**, as in 'Feature bundle [F] licenses a vocabulary item φ', to mean that φ realizes some yet-to-be-specified subset of [F].

Subject: Ind. Obj.:	Direct Object					
	∅	S	D	P	I	A
1S:(A:)	a	gya	nen	gyat	dé	de
2S:(A:)	em	a	men	bat	bé	be
2D:(A:)	ma	má*	mén	mán*	mén*	mé
2P:(A:)	ba	bá*	bet	bát*	bét	bé
3S:(A:)	∅	∅	ę	gya	é	em
3D:(A:)	ę	ę́*	én	én*	én	én
I:(A:)	e	é*	et	ét*	ét	ét
A:(A:)	á	á*	et	gyá*	et	ém
∅/2S/3S:1S:	ę́	ę́	né	yą́	nɔ́	né
2D:1S:	mâa*	mâa*	ménêi*	mánîi*	mɔ́nɔ̂ɔ*	D~I
2P:1S:	bâa*	bâa*	bédêi*	bágîi*	bɔ́dɔ̂ɔ*	D~I
3D:1S:	ę̂į*	ę̂į*	ę́nêi*	ę́nîi*	ę́nɔ̂ɔ*	D~I
I:1S:	êi*	êi*	édêi*	égîi*	édɔ̂ɔ*	D~I
A:1S:	âa*	âa*	dêi*	gîi*	dɔ̂ɔ*	D~I
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D~I
∅/1S:2S:	em	gyá	nén	yán	gɔ́	D~I
other:2S:	gɔ	gɔ́	dét	gyát	gɔ́t	D~I
any:2D:	mɔ́	mɔ́	mén	mán	mɔ́n	D~I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D~I
1S:3S:		gyá	nén	yán	gɔ́	D~I
∅/2S/3S:3S		á	én	án	ɔ́	D~I
any:3D:		mé	mén	mén	mén	D~I
any:I:		bé	bét	bét	bét	D~I
2D:3S:		mâa*	ménêi*	mánîi*	mɔ́nɔ̂ɔ*	D~I
2P:3S:		bâa*	bédêi*	bágîi*	bɔ́dɔ̂ɔ*	D~I
3D:3S:		ę̂į*	ę́nêi*	ę́nîi*	ę́nɔ̂ɔ*	D~I
I:3S:		êi*	édêi*	égîi*	édɔ̂ɔ*	D~I
A:3S:		âa*	dêi*	gyâa*	dɔ̂ɔ*	D~I

The table requires the following comments:

1. Cells representing impossible agreement combinations are blank.
2. 'A' represents animate plural / reflexive agreement discussed in Sections 2.5 and 4.5.2.
3. There is no 3P:... row because 3P is necessarily inanimate and subjects of (di)transitives are obligatorily animate in Kiowa.
4. '*any*' includes ∅. However, as ∅:x:∅ is an impossible argument combination in Kiowa. '*any*' is also constrained by binding theory; for instance, in '*any*:2D:...', '*any*' cannot be second person.

5. Agreement prefixes for transitive sentences with first / second person objects are represented as *agent:object*:∅. E.g.: 2P:1S:∅ would be used in 'You all (2P) saw me (1S)'. The reason for this notation is that first / second person objects behave morphologically as indirect objects. See Adger and Harbour (2003) for discussion.

6. Intransitive agreement is represent as *argument*:∅. E.g.: 1S:∅ would be used in 'I arrived'. (Note that these cannot be termed either 'agents' or 'external arguments'. Consequently, they are labelled simply 'subjects' in (8). Note also that if the DO agreement is ∅ then A must be absent in such prefixes as 1S:(A:).... I.e., **a** is the prefix only for 1S:∅, not for 1S:A:∅, which is, in any event, an impossible argument combination in Kiowa.)

7. Third plural inanimate intransitive agreement, 3P:∅, absent from the table, is **gya**. (There are no other 3P:... prefixes as agents in Kiowa are animate and 3P is not.)

8. The symbol '*' indicates that the following verb has low tone. For instance, in (1), we have **á*+tót** yielding **á-tot**.

9. Recall from Chapters 2 and 3 that 1D/P.EXCL syncretizes with I, and 1D/P.INCL with 2P, when the external arguments of a (di)transitive or the only argument of an unaccusative.

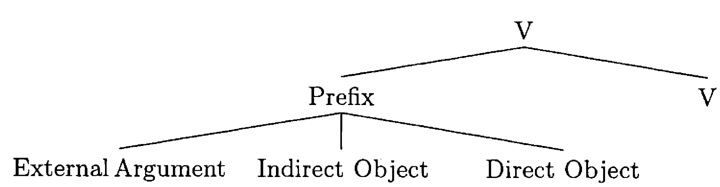
10. Recall from Section 4.5.2 that A DO agreement is realized either as D or I when there is IO agreement.

5.1.2 Theoretical Assumptions

Prefix Structure

Following Harbour (forthcoming 2003), I assume that the prefix contains as many heads as there are (potentially) agreeing arguments (i.e., one, two, or three) and that these heads form a cluster dependent on the verb. (The prefix forms a phonological domain separate from the verb.)

(9)



The following abbreviations are adopted and used in the trees and vocabulary items that follow.

(10) **Notation: Argument Abbreviations**
EA = external argument
IO = indirect object
DO = direct object

Consequently, the feature structure of the prefix in, say, 'I gave them to you two', would be:

(11)

$$\begin{array}{c} \text{Prefix} \\ \begin{array}{ccc} \text{EA} & \text{IO} & \text{DO} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ -\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} -\text{singular} \\ +\text{augmented} \end{bmatrix} \end{array} \end{array}$$

(Two issues not addressed below are the feature content of the argument labels, EA, IO and DO, themselves, and the morphological or syntactic process that generate (9).)

The challenge posed by Kiowa agreement prefixes can now be clarified. It is to explain how to structures like (11) yield **yán**, or, more generally, how (9) yields (8). The answer offered relies in part on the operations that follow.

Phonology

The following phonological processes, informally described, are assumed (Harrington 1928, Merrifield 1959b, Watkins 1984; see Harbour (2002) on tone)

(12) **Dental-velar switching**
$g\ /\ k(!/h) \rightarrow d\ /\ t(!/h) \mid \_\_ i/y$
$d\ /\ t(!/h) \rightarrow g\ /\ k(!/h) \mid \_\_ e$

(13) **Glide insertion**
$a \rightarrow ya \mid g\ /\ k(!/h)\ \_\_$

(14) **Glide formation**
$i \rightarrow y \mid g/k(!/h)\_\_a$

(15) **Nasalization**
[+nasal] spreads to every phoneme of the verb agreement prefix

(16) **Engma-deletion**
$\eta \rightarrow \emptyset$
Note: engma is not a phoneme of the language

(17) **(y)i∼ya alternation**
$(y)i \leftrightarrow ya$
Note: the conditions for this alternation are not entirely understood

(18) **Final devoicing**
$d/b \rightarrow t/p \mid [_{\sigma}\ V\ \_\_]$

(19) **Vowels in hiatus**
$V \rightarrow \emptyset \mid \_\_\ V$
Note: the proper statement of the rule does not affect certain diphthongs.

These rules require ordering, though I do not address this here.[3]

Morphology

The following morphological processes are assumed (Bonet 1991, Noyer 1998, Harbour forthcoming 2003; see the last two for discussion of how a morphological theory with these operations succeeds in restricting the class of logically possible grammars).

Feature deletion removes features from a terminal node. Such rules are of the form: $[\alpha\mathrm{F}] \rightarrow \emptyset$. Applying this rule to the feature bundle $[\alpha\mathrm{F}\ \beta\mathrm{G}]$ yields $[\beta\mathrm{G}]$.

Node deletion removes an entire terminal node and all features located at it. Such rules are of the form:

$$\begin{array}{c} | \\ [\alpha\mathrm{F}] \end{array} \rightarrow \emptyset$$

Applying this rule to:

$$\begin{array}{ccc} \diagup & | & \diagdown \\ [\alpha\mathrm{F}] & [\beta\mathrm{G}] & [\gamma\mathrm{H}] \end{array}$$

yields

$$\begin{array}{cc} \diagup & \diagdown \\ [\beta\mathrm{G}] & [\gamma\mathrm{H}] \end{array}$$

Feature insertion inserts the (contextually) unmarked value of a feature. Such rules are of the form $\emptyset \rightarrow [\alpha\mathrm{F}]$. Taking minus to be the unmarked value of [±singular] in the context of [+augmented], the rule $\emptyset \rightarrow$ [+singular] would apply to [+augmented] to yield [−singular +augmented].

5.2 Reduction of Explicanda

In this section, morphological operations are appealed to to reduce the argument combinations and prefixes that must be accounted for. For instance, deletion of syntactic features neutralizes differences between argument combinations. This induces a many-to-one correspondences between argument combinations and prefixes. Furthermore, natural classes of prefixes are predictable on the basis of other prefixes. Such correlations induced requirements on the vocabulary list. For instance, if prefixes for EA_1 can be derived by adding a phonological string φ to the prefixes for EA_2, then we want the phonological components of the EA_1 prefixes to be licensed by features common to both EA_1 and EA_2 prefixes (to derive the overlap), and we want φ to be licensed by features of EA_2 prefixes that EA_1 prefixes lack.

[3]One crucial case, for instance, is that Nasalization must precede Dental-velar switching to derive **mánĩi** from /b+ia+d+ia+[+nasal]/; the reverse ordering yields ***máŋĩi**.

5.2.1 Deletion

We now examine the role of deletions in reducing the number of prefixes.

'*any*'

What is the featural reality behind '*any*'? For concreteness, consider *any*:2D:S. This is used when the indirect object is second person plural, the direct object is third singular. There are no restrictions on the external argument (beyond binding theoretic ones, * 2S:2D:S). So, it could be zero, as with an experiencer predicate ('You two know him', ∅:2P:S); or it could be first person singular, first exclusive dual or plural, or third person singular, dual or plural, or inverse.

Now, the structure for the prefix of 'You two know him', where there is no external argument, is:

(20)

$$\begin{array}{cc} \multicolumn{2}{c}{\wedge} \\ \text{IO} & \text{DO} \\ \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ -\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array}$$

And the structure for an agent is:

(21)

$$\begin{array}{ccc} \multicolumn{3}{c}{\wedge} \\ \text{EA} & \text{IO} & \text{DO} \\ \begin{bmatrix} (+\text{author}) \\ (-\text{hearer}) \\ \alpha\text{singular} \\ \beta\text{augmented} \end{bmatrix} & \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ -\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array}$$

where the parenthetic features are present for first person and absent for third, and where α and β take the values discussed in Chapter 3. Thus '*any*' corresponds to the absence of an EA node in (20) and to any of the feature combinations in (21). How do all these feature combinations come to be realized as a single phonological form?

I suggest that the EA node in (21) is deleted making (21) identical to (20). When vocabulary insertion occurs, this identity results in syncretism. In the current case, deletion is:

(22) $$\underset{\text{EA}}{|} \rightarrow \emptyset \mid \_\_ \; [_{\text{IO}}\ 2\text{P}\ ]\ [_{\text{DO}}\ \text{S}\ ]$$

However, deletion of the EA node should apply not just when the direct object triggers S-agreement, but for also D-agreement, P-agreement, and so on. Furthermore, it should apply not just for 2P indirect objects, but for 1D/P, 2D, 3D and I too. This seems to comprise two natural classes, that defined by [−singular], {2P, 2D, 3D}, and that defined by [inverse], {1D/P, I}—recall, the analysis of first person agreement syncretisms of Section 2.3.9. However, we will see below that [inverse] patterns with [−singular] for a variety of morphological purposes. Leaving the reason for this temporarily aside, we can write the following deletion rule to cover all cases.

(23) $$\underset{\text{EA}}{|} \;\rightarrow\; \emptyset \mid \_\_\_ \; [_{\text{IO}} \; -\text{singular}]$$

Note a welcome consequence of (23). A cursory glance at the top part of (8), specifically, at the simple transitive part, shows that the featural composition of the EA node has a phonological effect on the agreement prefix—scanning down any column, i.e., keeping the direct object constant, we find that the cells vary as the external argument changes. In the '*any*' cases, we require a means of preventing the external argument from having any phonological effect on the prefix. That is, we must derive their syncretism with absence of an external argument, ∅. Deleting the EA node achieves just that.

More EA deletion

The node deletion mechanisms just called on are required in the case of the ∅/1s:2s:... syncretism, that is, the syncretism between ∅:2s:...:

(24)

$$\begin{array}{cc} \text{IO} & \text{DO} \\ \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} \alpha\text{singular} \\ \beta\text{augmented} \end{bmatrix} \end{array}$$

and 1s:2s:...:

(25)

$$\begin{array}{ccc} \text{EA} & \text{IO} & \text{DO} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} \alpha\text{singular} \\ \beta\text{augmented} \end{bmatrix} \end{array}$$

To render (25) identical to (24), thereby deriving the syncretism, we can posit the following rule:

(26) $$\begin{array}{c} | \\ \text{EA} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \;\rightarrow\; \emptyset \mid [\,\_\_\_ \; \begin{array}{c} \text{IO} \\ \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \;]$$

What then of the '*other*' cases, i.e., *other*:2s:...? Again, we find the prefixes phonologically invariant despite variation of the external argument. So, EA features must be deleted. However, deletion of the entire node will force syncretism with the ∅:2s:... forms, incorrectly. I follow Harbour (forthcoming 2003) in regarding the relevant operation as deletion of features but not of the EA node itself. Consequently, the deletion:

(27) $$\begin{bmatrix}(+\text{author})\\(-\text{hearer})\\\alpha\ \text{singular}\\\beta\ \text{augmented}\end{bmatrix} \rightarrow \emptyset \mid [\_\_\ \ \overset{\text{IO}}{\begin{bmatrix}-\text{author}\\+\text{hearer}\\+\text{singular}\\-\text{augmented}\end{bmatrix}}\ \ ]$$

applies to:

(28) $$\begin{array}{ccc} \text{EA} & \text{IO} & \text{DO}\\ \begin{bmatrix}(+\text{author})\\(-\text{hearer})\\\alpha\text{singular}\\\beta\text{augmented}\end{bmatrix} & \begin{bmatrix}-\text{author}\\+\text{hearer}\\+\text{singular}\\-\text{augmented}\end{bmatrix} & \begin{bmatrix}\gamma\text{singular}\\\delta\text{augmented}\end{bmatrix} \end{array}$$

to yield:

(29) $$\begin{array}{ccc} \text{EA} & \text{IO} & \text{DO}\\ [\quad\quad] & \begin{bmatrix}-\text{author}\\+\text{hearer}\\+\text{singular}\\-\text{augmented}\end{bmatrix} & \begin{bmatrix}\gamma\text{singular}\\\delta\text{augmented}\end{bmatrix} \end{array}$$

The significance of this empty node in preventing syncretism of (29) with ∅:2s:... is discussed below.

A deletion

Recall from Sections 2.5 and 4.5.2 that transitive agreement prefixes are systematically ambiguous. **Gya**, for instance, in addition to meaning 1s:s, also means 1s:A:s, so that one and the same sentence means 'I killed it', 'I killed it for them', and 'I killed it for myself'. Abstracting away from the featural reality behind the label A-agreement, we may write the following node deletion rule.

(30) $$\begin{array}{c}|\\\text{IO}\\[\text{A}]\end{array} \rightarrow \emptyset$$

Person deletion

Observe that x:1S:y = x:3S:y, for all non-singular x (and all non-zero y):[4]

(31)

Subject:	Direct Object					
Ind. Obj.:	∅	S	D	P	I	A
2D:1S:	mâa∗	mâa∗	ménêi∗	mánîi∗	mɔ́nɔ̂ɔ∗	D∼I
2D:3S:		mâa∗	ménêi∗	mánîi∗	mɔ́nɔ̂ɔ∗	D∼I
2P:1S:	bâa∗	bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗	D∼I
2P:3S:		bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗	D∼I
3D:1S:	ȩ̂į∗	ȩ̂į∗	ȩ́nêi∗	ȩ́nîi∗	ȩ́nɔ̂ɔ∗	D∼I
3D:3S:		ȩ̂į∗	ȩ́nêi∗	ȩ́nîi∗	ȩ́nɔ̂ɔ∗	D∼I
I:1S:	êi∗	êi∗	édêi∗	égîi∗	édɔ̂ɔ∗	D∼I
I:3S:		êi∗	édêi∗	égîi∗	édɔ̂ɔ∗	D∼I
A:1S:	âa∗	âa∗	dêi∗	gîi∗	dɔ̂ɔ∗	D∼I
A:3S:		âa∗	dêi∗	gyâa∗	dɔ̂ɔ∗	D∼I

Now, the cause of this correlation cannot be that 1S IO and 3S IO license the same vocabulary items. If they did, then ∅/2S/3S:1S:S and ∅/2S/3S:3S:S would syncretize, whereas they, **ȩ́** and **á**, clearly do not. (It is imaginable that 1S and 3S IO generally syncretize but fail to for **ȩ́** and **á** because the external argument in ∅/2S/3S:1S:..., say, licenses special exponents of 1S IO agreement. However, this cannot be, as {∅, 2S, 3S} is not a natural class with respect to which vocabulary items could be contextualized.)

Instead, I suggest that first person singular $[_{\text{IO}}$ +author −hearer +singular −augmented] is rendered identical to third person singular $[_{\text{IO}}$ +singular −augmented] by deletion of the person features [+author −hearer]. In order to prevent syncretism of ∅/2S/3S:1S:... and ∅/2S/3S:3S:..., it is necessary to contextualize this deletion to non-singular EA.

(32) $$\begin{bmatrix}\text{+author}\\ \text{−hearer}\end{bmatrix} \rightarrow \emptyset \mid [_{\text{EA}}\ \text{−singular}]\ [_{\text{IO}}\ \_\_\ ]$$

(Since this rule affects prefixes of the form I:1S:..., observe that this is another instance in which I forms a natural class with [−singular] elements like 2D and 2P.)[5]

[4] The discrepancy with respect to the ∅ column is as explained following (8). 2D:1S:∅, for example, is used in, say, 'You two saw me', where 1S is a direct object. It is represented in the prefix notation as an indirect object, ':1S:', because first / second direct objects share certain syntactic, and, consequently, morphological properties with indirect objects (Adger and Harbour 2003). Third person direct objects do not display these syntactic properties and third person DO agreement is distinct from third person IO agreement. As a result, the agreement prefix for 'You two saw her' is 2D:S, not *2D:3S:∅, which is not a possible argument combination in Kiowa. Thus, it is not that the correlation 'x:1S:y = x:3S:y, for all non-singular x' breaks down for $y = \emptyset$. Rather, when one bears in mind the syntactic reality behind this generally useful morphological notation, one realizes that the empty cells are impossible, and so trivially exempt from such correlations.

[5] The deletion (32) competes with (22). That is, there are cases, such as 2P:1P:S, to which they either could apply. The correct results are achieved if (22) precedes (32). It is not clear

With this feature deletion in hand, the list of prefixes that must be derived diminishes, as we can conflate two sets of prefixes in (31) under the label ...:1/3s:....

(33) **Kiowa Agreement Prefixes** **Simplification 1**

to me that this ordering is intrinsically given, for instance, by Pāṇini's specificity principle—what is the precise definition of 'specific' according to which (22) is more specific than (32)? It is possible to avoid this problem by rephrasing (32) so that the rules do not compete, for instance, by making the context $[_{EA}$ −singular$]$ $[_{IO}$ __ +singular$]$. However, this is not overly satisfying.

A more exciting alternative, arising from discussion with Elena Anagnostopoulou—I do not pursue it here as it lies well beyond the scope of this inquiry—departs from the observation that external argument and indirect object in Kiowa never both agree for person. Indeed, when one is [−singular], neither agrees completely. In this chapter, this is treated as a purely morphological fact: whenever such argument combinations enter the morphology, some of their features are deleted. However, it is possible that the syntax itself never gives rise to structures of the relevant form, so that these morphological rules are superfluous, the true explanation stemming from a deeper syntactic fact. Interestingly, similar restrictions hold in two other rich agreement systems that I am familiar with, namely, Yimas (Foley 1991) and Georgian. To the extent that Yimas differs from Kiowa in this respect, it does so by use of portmanteau 1+2 agreement affixes, the syntactic nature of which is not entirely clear. In all three languages, there is a case to be made that, when the (in)direct object is second person and the external argument is first, second person, rather than first, agrees.

Subject:	Direct Object					
(Ind. Obj.:)	∅	S	D	P	I	A
1S:(A:)	a	gya	nen	gyat	dé	de
2S:(A:)	em	a	men	bat	bé	be
2D:(A:)	ma	má∗	mén	mán∗	mén∗	mé
2P:(A:)	ba	bá∗	bet	bát∗	bét	bé
3S:(A:)	∅	∅	ę	gya	é	em
3D:(A:)	ę	ę́∗	én	én∗	én	én
I:(A:)	e	é∗	et	ét∗	ét	ét
A:(A:)	á	á∗	et	gyá∗	et	ém
∅/2S/3S:1S:	ę́	ę́	né	yą́	nɔ́	né
2D:1/3S:	mâa∗	mâa∗	ménêi∗	mánîi∗	mɔ́nɔ̂ɔ∗	D∼I
2P:1/3S:	bâa∗	bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗	D∼I
3D:1/3S:	ę̂į∗	ę̂į∗	ę́nêi∗	ę́nîi∗	ę́nɔ̂ɔ∗	D∼I
I:1/3S:	êi∗	êi∗	édêi∗	égîi∗	édɔ̂ɔ∗	D∼I
A:1/3S:	âa∗	âa∗	dêi∗	gyâa∗	dɔ̂ɔ∗	D∼I
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D∼I
∅/1S:2S:	em	gyá	nén	yán	gɔ́	D∼I
other:2S:	gɔ	gɔ́	dét	gyát	gɔ́t	D∼I
any:2D:	mɔ́	mɔ́	mén	mán	mɔ́n	D∼I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D∼I
1S:3S:		gyá	nén	yán	gɔ́	D∼I
∅/2S/3S:3S		á	én	án	ɔ́	D∼I
any:3D:		mé	mén	mén	mén	D∼I
any:I:		bé	bét	bét	bét	D∼I

Summary

The effect of the morphological deletion operations simultaneously derives the desired syncretisms and helps to explain why the number of prefixes is significantly smaller than the number of possible argument combinations. Counting 1D and 1P as separate argument combinations, as they were when 1,110 was calculated, the reader may easily verify several hundred morphological distinctions have been neutralized. (I neglect an exact count as the figure of 1,110 was itself only approximate, neglecting person-case and binding-theoretic restrictions.)

5.2.2 Subregularities

By considering identity relations between prefixes corresponding to different argument combinations, we are able to reduce the total number of different forms that must be derived. The discovery of identity relations is not, however, the only way to reduce the explanatory burden. Another is to find relationships between classes of prefixes.

This section is concerned with systematic relations between argument combinations and prefixes such that, if argument combinations C and C' differ with respect to some feature [F], and if we know that C is realized by prefix p, then we can deduce the prefix p' that realizes C'. By establishing such correlations and tying them to specific syntactic features and their phonological exponents, the number of individual cells in (33) that require explanation is reduced still further.

Third person dual

For EA and IO (though not DO), third person dual is predictable from inverse, by nasalization of the entire prefix. For instance, consider the ditransitive *any*:I/3D:... prefixes.

(34)

Subject: / **Ind. Obj.:**	**Direct Object** ∅	S	D	P	I	A
any:3D:		mé	mén	mén	mén	mén
any:I:		bé	bét	bét	bét	bét

Assuming, uncontroversially, that **m/n** and the nasal correspondents of **b/d**, every prefix in the top row of (34) is obtained nasalization of the cell directly below it.

For the 3D:1/3S:... and I:1/3S:... prefixes, the same holds, modulo a phonological complication.

(35)

Subject: / **Ind. Obj.:**	**Direct Object** ∅	S	D	P	I	A
3D:1S:	ę̂į*	ę̂į*	ę́nêi*	ę́nîi*	ę́nɔ̂ɔ*	ę́nêi*
I:1S:	êi*	êi*	édêi*	égîi*	édɔ̂ɔ*	édêi*

Observe that nasalization yields all the correct forms except when the direct object is P. Here, it yields ***ę́ŋîi**, instead of **ę́nîi**. If we follow Merrifield (1959b) and Watkins (1984) in deriving the surface **g** and **n** from an underlying dental, then this problem is solved by assuming that nasalization precedes dental-velar switching.

For the transitives, the correlation nearly holds.

(36)

Subject: / **Ind. Obj.:**	**Direct Object** ∅	S	D	P	I	A
3D:	ę	ę́*	én	én*	én	én
I:	e	é*	et	ét*	ét	ét

The only difficulty here is with the D IO. Nasalization of I:D, **et**, yields **en**, rather than 3D:D **én**, which has high tone. We return to this below.

Thus, we can reduce the size of (8), the list of prefixes to explained, to (37), provided the vocabulary items for third person dual and inverse are so structured that dual licenses every one that inverse does and, in addition, the phonological feature [+nasal]. This desideratum is summarized in (38).

(37) **Kiowa Agreement Prefixes** **Simplification 2**

Subject: (Ind. Obj.:)	Direct Object					
	∅	S	D	P	I	A
1S:(A:)	a	gya	nen	gyat	dé	de
2S:(A:)	em	a	men	bat	bé	be
2D:(A:)	ma	má∗	mén	mán∗	mén∗	mé
2P:(A:)	ba	bá∗	bet	bát∗	bét	bé
3S:(A:)	∅	∅	ę	gya	é	em
I:(A:)	e	é∗	et	ét∗	ét	ét
A:(A:)	á	á∗	et	gyá∗	et	ém
∅/2S/3S:1S:	ę́	ę́	né	yą́a	nɔ́	né
2D:1/3S:	mâa∗	mâa∗	ménêi∗	mánîi∗	mɔ́nɔ̂ɔ∗	D∼I
2P:1/3S:	bâa∗	bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗	D∼I
I:1/3S:	êi∗	êi∗	édêi∗	égîi∗	édɔ̂ɔ∗	D∼I
A:1/3S:	âa∗	âa∗	dêi∗	gyâa∗	dɔ̂ɔ∗	D∼I
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D∼I
∅/1S:2S:	em	gyá	nén	yán	gɔ́	D∼I
other:2S:	gɔ	gɔ́	dét	gyát	gɔ́t	D∼I
any:2D:	mɔ́	mɔ́	mén	mán	mɔ́n	D∼I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D∼I
1S:3S:		gyá	nén	yán	gɔ́	D∼I
∅/2S/3S:3S		á	én	án	ɔ́	D∼I
any:I:		bé	bét	bét	bét	D∼I

(38) **Desideratum**
3D EA and IO should license [+nasal] and all the vocabulary items licensed by I (modulo tone of I/3D:D).

Second person dual

Just as the third person dual prefixes are the nasalized versions of certain other prefixes, so the second person dual is the nasalized version of the second person plural. Typical examples are:

(39)

Subject: Ind. Obj.:	Direct Object ∅	S	D	P	I	A
any:2D:	mɔ́	mɔ́	mén	mán	mɔ́n	mén
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	bét

The two exception, both related to tone, are that 2D:D is **mén**, whereas the result of nasalizing 2P:D, **bet**, is **men**, and that 2D:I is **mén∗**, whereas the result of nasalizing 2P:I, **bét**, is **mén**. Thus, we can again reduce the list of prefixes to be explained to (40) if the desiderata (41) and (42) can be met.

(40) **Kiowa Agreement Prefixes** **Simplification 3**

Subject: (Ind. Obj.:)	**Direct Object**					
	∅	S	D	P	I	A
1S:(A:)	a	gya	nen	gyat	dé	de
2S:(A:)	em	a	men	bat	bé	be
2P:(A:)	ba	bá∗	bet	bát∗	bét	bé
3S:(A:)	∅	∅	ę	gya	é	em
I:(A:)	e	é∗	et	ét∗	ét	ét
A:(A:)	á	á∗	et	gyá∗	et	ém
∅/2S/3S:1S:	ę́	ę́	né	yą́	nɔ́	né
2P:1/3S:	bâa∗	bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗	D∼I
I:1/3S:	êi∗	êi∗	édêi∗	égîi∗	édɔ̂ɔ∗	D∼I
A:1/3S:	âa∗	âa∗	dêi∗	gyâa∗	dɔ̂ɔ∗	D∼I
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D∼I
∅/1S:2S:	em	gyá	nén	yán	gɔ́	D∼I
other:2S:	gɔ	gɔ́	dét	gyát	gɔ́t	D∼I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D∼I
1S:3S:		gyá	nén	yán	gɔ́	D∼I
∅/2S/3S:3S		á	én	án	ɔ́	D∼I
any:I:		bé	bét	bét	bét	D∼I

(41) **Desideratum**
2D should license [+nasal] and all the vocabulary items licensed by 2P.

(Note that (41) does not need restriction to EA and IO as that for the third dual and inverse (38) did, because first / second DO-agreement behaves morphologically as IO-agreement. See notes following (8).)

(42) **Desideratum**
2D:D should have high tone although 2P:D has not.
2D:I should be ∗ prefix although 2P:I has not.

Observe that, as with (38), the exceptions concern tone of transitive prefixes.[6]

. . . :1/3s:. . .

Prefixes of the form x:1S:∅ are identical to x:1/3S:S:

[6] A point of interest. In the justification by syncretism of the SII class (Section 2.3.9), some ink was spilled on why [+hearer inverse] (first inclusive) should be realized, like 2P, as **ba**, rather than as **be**. The puzzle can be phrased as: why does I behave like P in the context of 2? Well, I'm no nearer answering that, but notice that we now have a second instance of the puzzle: the relationship that D bears to I in the context of 3/∅ (nasalization) is the relationship that it bears to P in the context of 2.

(43)

Subject: Ind. Obj.:	Direct Object ∅	S
2P:1/3S:	bâa*	bâa*
I:1/3S:	êi*	êi*
A:1/3S:	âa*	âa*

The leads to the following desideratum:[7]

(44) **Desideratum**
In the context of 1/3S IO, S DO licenses no vocabulary items beyond those licensed by the EA and IO.

Beyond zero objects, any prefix of the form x:1/3S:y is predictable from the prefix x:y in a uniform fashion.[8] First, observe that all prefixes of the ...:1/3S:... type lower the tone of the verb that follows them, as indicated by '*'. To illustrate the other points, consider a concrete case, I:1/3S:... and I:...:

(45)

Subject: Ind. Obj.:	Direct Object S	D	P	I
I:	é*	ét	ét*	ét
I:1/3S:	êi*	édêi*	égîi*	édɔ̂ɔ*

The second row can be derived from first as follows. Lengthening of the I:S vowel into a falling tone yields I:1/3S:S.[9] Addition of **êi** to I:D yields I:1/3S:D. Note also the difference in voicing of the alveolar. I follow Watkins in assuming that the same vocabulary item is involved in both and that it is /d/, which nasalizes to **n** and devoices to **t** finally, options well in accord with general tendencies of Kiowa phonology (Watkins 1984). Addition of **îi** to I:P yields I:1/3S:P, once again voicing the alveolar, and switching it to velar before **i/y**. Lastly, addition of **ɔ̂ɔ** to I:I and voicing of the alveolar yields I:1/3S:I.

Now, the identity of the added vowels, **êi**, **îi** and **ɔ̂ɔ**, is not at all mysterious. **E** is a standard component of prefixes with D DO, as can be easily verified by scanning down the D column of (8). Similarly, **i** is a standard component prefixes with P DO, generally in its **ya∼a** allophones. And **ɔ** is a component of prefixes

[7]This generalization holds also for 2/3S:1S:∅ and 2/3S:1S:S. However, it cannot be taken for granted that the featural reality behind the notation ':1S:' is the same for these and the prefixes in (43), given that first person singular is subject to morphological simplification when the agent is non-singular. Recall that the motivation for morphological simplification was the syncretism of ...:1S:... and ...:3S:..., and observe that, e.g., 2S:1S:S, **ę́**, *versus* 2S:3S:S, **á**, are non-syncretic. Consequently, the morphological simplification affecting :1S: when the EA is non-singular does not appear to affect :1S: when the EA is singular. This means that the featural reality behind ':1S:' differs in the two cases.

[8]By 'uniform fashion' here, I intend the following. x:1S:∅ *is* predictable from the intransitive prefix x:∅. However, as we shall see, the correlation between x:1S:∅ and x:∅ is not the same as that between x:1/3S:y and x:y for non-zero y. Therefore, unless y = ∅ is considered separately, as above, it is difficult to draw general correspondences, of the kind sought here, between x:1/3S:y and x:y.

[9]The specification 'into a falling tone' is probably redundant, given that I:S lowers tones that follow it. A falling tone is simply a vowel that lowers itself in the middle. See Harbour (2002) for detailed discussion of such cases.

with I DO, when there is an IO. Consequently:

(46) **Desideratum**
In . . . :1/3S:. . . prefixes, there is a second vowel, determined by DO.

(Having derived I:1/3S:. . . , nasalization yields 3D:1/3S:. . . .)

Note that (46) does not mention I EA. This is because the correspondences just discussed apply, *mutatis mutandis*, to 2P:1/3S:. . . and 2P:. . . . There is, however, one minor difference.

(47)

Subject: / Ind. Obj.:	Direct Object: S	D	P	I
2P:	bá∗	bet	bát∗	bét
2P:1/3S:	bâa∗	bédêi∗	bágîi∗	bɔ́dɔ̂ɔ∗

The S form follows from lengthening of the vowel, and the D, P and I forms from respective addition of **êi**, **îi** and **ɔ̂ɔ**. The minor difference concerns the first vowel in 2P:1/3S:I, which is **ɔ́**, not **é**, as in 2P:I. This difference is discussed below.[10] (Again, the 2D forms are predictable by nasalization.)

Finally, consider:

(48)

Subject: / Ind. Obj.:	Direct Object: S	D	P	I
A:	á∗	et	gyá∗	et
A:1/3S:	âa∗	dêi∗	gyâa∗	dɔ̂ɔ∗

Again, for the S DO form, the vowel lengthens into a falling tone. For the other three, there is once again addition of the expected long falling vowel, though for P, it is in its **ya** allophone. However, the D and I forms present a minor wrinkle. Straightforward addition of the expected vowels yields the wrong forms, respectively, ***édêi** and ***édɔ̂ɔ**. In these cases, the initial vowel is no licensed, or, if licensed, does not survive the phonology.

Summarizing these patterns, we have:

(49) **Desideratum**
Prefixes of the form x:1/3S:y, for $y \neq \emptyset$, should license the same vocabulary items as x:y and, in addition, a vowel determined by y.

[10]Note, however, that in Mr Bointy's dialect, there is no difference in the vowel, both forms beginning **bé. . . .** An additional difference between his speech and that of Dr McKenzie, Watkins' primary consultant, is that the alveolar does neither voices intervocalically nor velarizes, as in Dr McKenzie's **bágîi**. For Mr Bointy, this was **bát.îi**, where the '.' indicates the syllable boundary. Mrs White Horse Taylor, who appears to speak as Dr McKenzie did, says **bá.gîi**. For convenience, I give the relevant variants below:

(i)

Subject: / Ind. Obj.:	Direct Object: D	P	I
2P:1/3S:	bét.êi∗	bát.îi∗	bét.ɔ̂ɔ∗
I:1/3S:	ét.êi∗	ét.îi∗	ét.ɔ̂ɔ∗

Some speakers from Carnegie appear to use the prefixes in (i).

Also, the following minor deviations should be explained:

(50) **Desideratum**
Absence of initial vowels from A:1/3S:... prefixes.
Change from **e** to **ɔ** of the medial vowel in 2P:1/3S:I.

Taking these desiderata into account, the list of prefixes to be derived can again be reduced.

(51) **Kiowa Agreement Prefixes** **Simplification 4**

Subject: Ind. Obj.:	Direct Object					
	∅	S	D	P	I	A
1S:(A:)	a	gya	nen	gyat	dé	de
2S:(A:)	em	a	men	bat	bé	be
2P:(A:)	ba	bá*	bet	bát*	bét	bé
3S:(A:)	∅	∅	ę	gya	é	em
I:(A:)	e	é*	et	ét*	ét	ét
A:(A:)	á	á*	et	gyá*	et	ém
∅/2S/3S:1S:	ę́	ę́	né	yą́	nɔ́	né
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D~I
∅/1S:2S:	em	gyá	nén	yán	gɔ́	D~I
other:2S:	gɔ	gɔ́	dét	gyát	gɔ́t	D~I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D~I
1S:3S:		gyá	nén	yán	gɔ́	D~I
∅/2S/3S:3S		á	én	án	ɔ́	D~I
any:I:		bé	bét	bét	bét	D~I

Third singular agent

There is an intriguing correlation between transitive 3S:x prefixes and intransitive x:∅ prefixes.

(52)

	S	D	P	I	A
...:∅	∅	ę	gya	e	á
3S:...:	∅	ę	gya	é	em

In the case of S, D and P, a 3S EA makes no difference at all to the prefix. Given this, it is tempting to imagine that $[_{\text{EA}}$ 3S] is simply deleted. Certainly, this would work well for 3S:1S:..., which is syncretic with ∅:1S:..., and for 3S:3S:..., which is syncretic with ∅:3S:.... However, it would not work for 3S:2S:..., which is not syncretic with ∅:2S:.... Nor would it work for I and A in (52). Intransitive I-agreement, I:, is **e**, but 3S:I, **é**, has high tone. And intransitive A-agreement, A:∅, is **á**, but 3S:A is **em**.

I am not sure how far this resemblance is to be pursued.

Summary

By applying a series of morphological operations, we have reduced both the number of argument combinations to be accounted for and the number of prefixes to be explained. Put in other words, (51) is much simpler than (8).

5.3 Segmentation

We now turn to the segmentation of prefixes. We begin with the ditransitive prefixes, where, with tone almost exceptionlessly high, segmentation is somewhat simpler. (Note: 'ditransitive' means prefixes without '(A:)'.)

5.3.1 Ditransitives

We are now concerned with the following prefixes.

(53) **Kiowa Ditransitive Agreement Prefixes**

Subject: Ind. Obj.:	**Direct Object**					
	∅	S	D	P	I	A
∅/2s/3s:1s:	ę́	ę́	né	yą́	nɔ́	né
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t	D~I
∅/1s:2s:	em	gyá	nén	yán	gɔ́	D~I
other:2s:	gɔ	gɔ́	dét	gyát	gɔ́t	D~I
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t	D~I
1s:3s:		gyá	nén	yán	gɔ́	D~I
∅/2s/3s:3s		á	én	án	ɔ́	D~I
any:I:		bé	bét	bét	bét	D~I

Let us first consider singular IO prefixes (from which *other*:2s:... is excluded on principled grounds, as explained below).

Singular IO

We now concentrate on the following prefixes.

(54)

Subject: Ind. Obj.:	**Direct Object**				
	∅	S	D	P	I
∅/2s/3s:1s:	ę́	ę́	né	yą́	nɔ́
∅/1s:2s:	em	gyá	nén	yán	gɔ́
1s:3s:		gyá	nén	yán	gɔ́
∅/2s/3s:3s:		á	én	án	ɔ́

Let us begin with the bottom row, ∅/2s/3s:3s:.... Observe that EAs, 2s/3s, make no phonological contribution beyond that of the ∅ EA. Consequently, I suggest that the phonological components of these prefixes are vocabulary items licensed by (some subset of) 3s IO and the relevant object.

(55) **Desideratum**

(A subset of) the features of:

a. $[_{\text{IO}}$ 3S] $[_{\text{DO}}$ S] should license **á**
b. $[_{\text{IO}}$ 3S] $[_{\text{DO}}$ D] should license **én**
c. $[_{\text{IO}}$ 3S] $[_{\text{DO}}$ P] should license **án**
d. $[_{\text{IO}}$ 3S] $[_{\text{DO}}$ I] should license **ɔ́**

This entails that the EA features for 2S/3S are either deleted or are realized by phonological zeroes. We will see when discussing the transitive agreement prefixes that there is a minor advantage in positing a zero vocabulary item for 2S; for 3S.[11].

Now, 1S:3S:... and ∅/1S:2S rows are identical (modulo **em**) and both are derivable from the last row of (54) by addition of **g-** and standard phonology. **G+á** → **gyá** by glide insertion; **g+én** → **nén** by dental-velar switching and nasalization; **g+án** → **yán** by glide insertion, nasalization, engma-deletion; and **g+ɔ́** → **gɔ́** transparently.

The question is whether the **g-** is the same in both cases, i.e., whether it is license by one and the same set of vocabulary items. If it is, then the features that **g-** realizes are those common to 1S:3S:... and ∅/1S:2S:.... I.e.:

$$\textbf{g-} \Leftrightarrow \left\{ \begin{array}{cc} \text{EA} & \text{IO} \\ \begin{bmatrix} +\text{author} \\ -\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \right\} \cap \left\{ \begin{array}{cc} \text{EA} & \text{IO} \\ \begin{bmatrix} \ \end{bmatrix} & \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \right\}$$

Equivalently:

$$\textbf{g-} \Leftrightarrow [_{\text{IO}}\ +\text{singular}\ -\text{augmented}\ ] = [_{\text{IO}}\ 3\text{S}\ ]$$

Given (55), this incorrectly forces the occurrence of **g-** in the last row of (54). Unless we wish to invoke further morphological operations, we should claim that 1S:3S:... and ∅/1S:2S:... license different, accidentally homophonous, **g-**'s. Since 1S:3S:... = 1S:+∅:3S:..., I attribute one **g-** to 1S EA.

(56) **Desideratum**

(A subset of) the features of $[_{\text{EA}}$ 1S] should license **g-**.

And since a zero agent, being featureless, licenses no vocabulary items, I attribute the other **g-** to 2S IO.

(57) **Desideratum**

(A subset of) the features of $[_{\text{IO}}$ 2S] should license **g-**.

When we turn to *other*:2S:... and to 1S:(A:)..., we will see that this accidental homophony is not theoretically problematic.

As for the top row, matters are more complicated. The row can be made to appear regular if we can somehow pretend (a) that there is a freaky rule of

[11] To a certain extent, the answer depends on an issue left open above, namely, the treatment given to the partial syncretism of x:0 and 3S:x

metathesis, so that really, were looking at **ę́, én, (y)án, ɔ́n**, and (b) that there's a [−singular] feature lurking somewhere—as if :1s: is really [+author -hearer *-singular* -augmented], instead of [+author -hearer *+singular* -augmented]—for then the nasality is explained and the fact that :1s:i has a consonantal part. I leave this open for the moment.

Non-singular IO

We now concentrate on the following prefixes.

(58)

Subject:	**Direct Object**				
Ind. Obj.:	∅	S	D	P	I
any:1D/P:	dɔ́	dɔ́	dét	gyát	dɔ́t
other:2S:	gɔ	gɔ́	dét	gyát	dɔ́t
any:2P:	bɔ́	bɔ́	bét	bát	bɔ́t
any:I:		bé	bét	bét	bét

Again, as in the cases considered above, the rhymes are nearly constant throughout the columns, with two exceptions. Working right to left, in the I column, the rhyme is **-ɔ́t** (except that the vowel for *any*:I:I is **e**); in the P column, the rhyme is **-át** (except that the vowel for *any*:I:P is **e** again); in the D column, the rhyme is **-ét**; in the S column, the rhyme is **-ɔ́** (except that the vowel for *any*:I:P is **e** again); in the ∅ column, the rhyme is **-ɔ́** (except that the tone for *other*:2S:∅ is low; *any*:I:∅ is, recall, an impossible argument combination).

Furthermore, and again as in the cases considered above, the onsets are constant across each row: **d-** for *any*:1D/P:... (with dental-velar switching for P); **g-** for *other*:2S:... (with dental-velar switching for D); **b-** for the other two rows.

What is the relationship between these regularities and those discussed for singular IO?

First, let us compare the rhymes of two groups (ignoring the problem cases of *any*:I:..., and ∅/2s/3s:1s:...).

(59)

	Direct Object			
	S	D	P	I
singular IO	á	én	án	ɔ́
non-singular IO	ɔ́	ét	át	ɔ́t

There are three differences between the two rows. The D rhymes and the P rhymes are nasal∼non-nasal counterparts of one another. The I rhyme has a **-t** coda in the non-singular case, though none in the singular. Third, the S rhymes are just different. We will see, when we turn to the transitive prefixes, that the first two differences hold there too, except that singular *versus* non-singular EA, rather than IO, is the crucial factor. The third difference does not hold of transitive prefixes for non-interesting reasons: the vowel **ɔ** is confined to IO prefixes. I suggest, therefore, that all three differences depend on the value of [±singular] on IO or EA—that is, [±singular] the higher argument conditions allomorphy of DO agreement.

(60) **Desideratum**
Three forms of DO agreement allomorphy should depend on the specification of [±singular] on a higher argument: **á∼ɔ́** for S, **∅∼-t** for I, and nasality.

A potential problem for these allomorphy relations is that *other*:2S:... conditions all the [−singular] allomorphs though 2S itself is [+singular]. Nor are all EAs compatible with *other* themselves [−singular], as *other* covers 3S. However, recall that the featural reality behind *other* is an EA node from which all features have been deleted (27). Following Noyer's argument that Universal Grammar permits the insertion of unmarked feature values Noyer 1998, Harbour (forthcoming 2003) argues that Kiowa too permits such insertion and that, in the case of number, the unmarked feature and value inserted is [−singular]. (This insertion is, I believe, responsible for I's forming a natural class with D and P.) Having deleted all but the EA head itself, which I take to be a root of a φ-structure (Chapter 3), the unmarked [−singular] is inserted:

(61)

$$\begin{array}{ccc} \text{EA} & \text{IO} & \text{DO} \\ [-\text{singular}] & \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} & \begin{bmatrix} \gamma\text{singular} \\ \delta\text{augmented} \end{bmatrix} \end{array}$$

Given (61) as the featural reality behind the notation *other*:2S:..., this class of prefixes will pattern with others that have non-singular EA/IO with respect to the allomorphs of DO agreement that they condition.

Consider now the two rhyme exceptions. First, the **e** in *any*:I:.... Observe, in (51), that the occurrence of the **e** irrespective of DO is also a characteristic of I:(A:).... Consequently, I assume that this is a property of (non-DO) I-agreement (and, by nasalization (38), D-agreement).

(62) **Desideratum**
Non-DO I should license **e**, irrespective of DO.

It should be noted that a number of technical means are *a priori* available to satisfy (62): there could be a specific vocabulary item **e** that I and D license and that 'dominates' the vowels licensed by the DO; **e** could be a default; or **e** could result from phonological readjustment (cf., Chomsky and Halle's (1968) treatment of **sing∼sang**, **tell∼told**, and similar).

The second rhyme exception is the low tone of **gɔ** *other*:2S:∅. Interestingly, the only other low tone prefix in this part system is **em** 1S:2S:∅. Given (32), the only features realized by **em** are $[_{\text{IO}}$ 2S]. So, one might think low tone a systematic property of $[_{\text{IO}}$ 2S]. Interestingly, the intransitive 2S:∅ of 'You arrived' is also **em**. This suggests that **em** realizes the features common to intransitive 2S-agreement and indirect object 2S-agreement. Consequently, the low tone of **em** is a fact about that vocabulary item *per se*, not about the pair *other*:2S:∅ / 1S:2S:∅ generally. Thus, the low tone of **gɔ** *other*:2S:∅ does not appear to correlate with anything else and may represent an idiosyncracy of this argument combination.

Notice, however, that Desideratum (44) extends to nearly all prefixes of the form x:1/2S/D/P:∅, i.e., those used when the direct object is first or second person, as in 'x saw me/us/you'.

(63)

Subject: Ind. Obj.:	**Direct Object** ∅	S
2P:1/3S:	bâa∗	bâa∗
I:1/3S:	êi∗	êi∗
A:1/3S:	âa∗	âa∗
any:1D/P:	dɔ́	dɔ́
any:2P:	bɔ́	bɔ́
∅/2S/3S:1S:	ę́	ę́
1S:2S:	em	gyá
other:2S:	gɔ	gɔ́

The two 'exceptions', ruled off from the others, are 1S:2S:... and *other*:2S:.... The first may be disregarded for the reason given in the previous paragraph, namely, that 1S:2S:∅ is some form of default agreement and so irrelevant to generalizations concerning realizations of IO. Desideratum (44)—S DO licenses no vocabulary items beyond those licensed by the EA and IO—suggests an explanation for the second exception, *other*:2S:∅. If S DO licenses high tone in the context of IO, then every prefix of the form x:y:S will have high tone. And if every IO except 2S licenses high tone, then every prefix of the form x:y:∅ will have high tone, except x:2S:∅. Now, of course, there is considerable redundancy in the determining of tone here. However, as this affects only a single form, I am content to leave the exact solution open, noting only that a solution is possible.

Now let us consider the onsets. The onset **g-** for 2S IO is expected given the analysis of the singular IO prefixes; the same correlation was found there. The onset **d-** for 1D/P IO leads to:[12]

[12]The identification of the underlying form as dental necessitates a slight revision to earlier statements. Specifically, the rhyme for P DO cannot be simply **át**. Rather, it must begin underlyingly in a segment that causes dental to become velar. The options are **ia...**, **ya...**, or an underspecified [+front +high]**a**.

We can rule out **ya...** as follows. When initial, it simplifies to **a**, as in ∅:3S:P **án**. However, this is not because **ya** is an impossible onset in Kiowa, witness **Yál yáípɔ́ yâi** 'Hopefully the rope has vanished'. So, if the underlying form were **ya...**, as, presumably, it is in **yál** 'hopefully', *et cetera*, then ∅:3S:S would be **yán**.

However, if it is **ia...**, then there is no need for a specific rule to delete **i** word-initially, as the vowel-in-hiatus rule will do this automatically. Clearly, the vowel-in-hiatus rule must then be ordered after the glide formation rule, i.e., the rule responsible for turning **i** into **y** before velars. (Note that **i** also deletes before **b**, as in 2S:P **bat**, though not because **by** is an impossible onset in Kiowa, witness **paabyôi** 'brother.INV'.)

Observe that 1S:3S:P and ∅/2S/3S:2S:P **yán** have initial **y-**, in contrast to ∅/2S/3S:3S:P **án**, owing to opaque phonological processes. **Yán** derives from **g+ián** by glide formation, **gyán**,

(64) **Desideratum**
(A subset of) the features of $[_{\text{IO}}$ 1D/P $]$ should license **d-**.

Finally, there is the onset **b-**. Given that this occurs for both 2P and I, it is either a default or an accidental homophone. Amongst prefixes with second person EA, **b-** is frequent; however, it does not occur in prefixes with I (or third person) EA. Thus, the *approximate* distribution is:

(65)

	2	I
EA	b-	∅-
IO	b-	b-

Given this distribution, some accidental homophony may be unavoidable. Either **b-** generally realizes second person, in which case it is too highly specified to be the elsewhere form I IO agreement, so that a second **b-** must be provided. Or it is the elsewhere form for IO agreement, in which case it is unlicensed for second person EA, for which a second **b-** must be provided. The only homophony-free possibility is to make **b-** a universal default, with the zero in (65) representing a more highly specified vocabulary item. Surprising though this situation would be, it is not impossible. However, it should be noted that it does not obviate the need for accidental homophones, as we will need more than one zero, it seems, to deal with 3S:∅ and with 2S:S. So, it is unclear at this stage whether anything is to be gained by regarding *any*:2P:... and *any*:I:... as licensing the same **b-**.

(66) **Desideratum**
(Subsets, possibly distinct, of) the features of $[_{\text{IO}}$ I $]$ and $[_{\text{IO}}$ 2P $]$ should license **b-**.

Summary

Kiowa's verb agreement prefixes decompose, not just into traditional categories such as 'singular', 'dual', 'first', 'second', but into more finegrained ones. For instance, observe that allomorphy relations and deletion operations are stated with respect to, e.g., [−singular], [+augmented], the specific features-cum-values argued for in Chapter 3.

5.3.2 Transitives

We are now concerned with the following prefixes. (The notation '(:A):' is dispensed with, in virtue (30).)

(67) **Kiowa Transitive Agreement Prefixes**

nasalization, **ŋyán**, and ŋ-deletion, **yán**. By contrast, in ∅/2S/3S:3S:P **án**, there is never a consonant before **ián**, so that vowel-in-hiatus deletion applies, yielding **án**.

Subject:	Direct Object				
	S	D	P	I	A
1S:	gya	nen	gyat	dé	de
2S:	a	men	bat	bé	be
2P:	bá*	bet	bát*	bét	bé
3S:	∅	ẹ	gya	é	em
I:	é*	et	ét*	ét	ét
A:	á*	et	gyá*	et	ém

Singular EA

3S:... prefixes were discussed towards the end of section. Therefore, here, attention is confined to 1S:... and 2S:.... Observe that these two are identical with respect to rhymes. Moreover they are strongly reminiscent of the IO rhymes of (59), which are included below:

(68)

	Direct Object				
	S	D	P	I	A
singular EA	a	en	at	é	e
singular IO	á	én	án	ɔ́	
non-singular IO	ɔ́	ét	át	ɔ́t	

The points of difference are tone, nasality for P, the vowel for I, and the existence of distinct A forms.

First, with regard to tone, observe that the EA rhymes have low tone throughout, except for I. Here, instead of **ɔ**, which one might expect, extrapolating from the ditransitive rhymes, we have **é**. As both vowel and tone are unpredictable, I assume that they are idiosyncratic properties of the vocabulary item.

(69) **Desideratum**
(A subset of) the features of $[_{\text{DO}}$ I $]$ should license **é** when there is no IO.

Second, with regard to existence of distinct A DO forms, two explanations are possible. Either A-agreement is prevented from arising when there is an IO because IO conditions morphological deletions. Or A-agreement depends on adjacent conditioning by an EA; where there is none, because an IO intervenes, the vocabulary items are not licensed. Harbour (forthcoming 2003) ties the possibility of D-agreement for animate plurals, when there is IO agreement, to the action of morphological operations. Therefore, I shall assume that the realization of A-agreement depends on these morphological operations not having occurred.

(70) **Desideratum**
(A subset of) the features of $[_{\text{DO}}$ I $]$ should license **e**.

With regard to the final difference, nasality, I regard nasality for D and non-nasality for P as the normal case. The reader will recall, from (38) and (41), that dual EA and IO forms are derived by nasalization of a non-dual form. Subsuming these two desiderata, we have:

(71) **Desideratum**
(A subset of) the features of [−singular −augmented] should license [+nasal].

So, we expect D DO to be nasal, as are 1S:D **nen** and 2S:D **men**, and P DO are be non-nasal, as are 1S:P **gyat** and 2S:P **bat**. The total lack of nasality in the non-singular IO row of (68) follows from (60). The nasality of P DO forms in the middle row of (22) requires additional explanation, however.

(72) **Desideratum**
(A subset of) the features of $[_{\text{DO}}$ P] should license [+nasal] in the context of S IO (and no non-singular EA).

The details of all of these allomorphic variations should not obscure the main point, namely, that many of the regularities and patterns from the ditransitive prefixes carry over in large measure to the transitive system.

So saying, let us consider the onsets.

(73)

	Direct Object				
Subject:	S	D	P	I	A
1S:	gy-a	n-en	gy-at	d-é	d-e
2S:	∅-a	m-en	b-at	b-é	b-e

The second person onset are reminiscent of the ditransitive system (see the discussion preceding (66)), and so one is led to:

(74) **Desideratum**
(A subset of) the features of $[_{\text{EA}}$ 2S] should license **b-**.

(The **m-** in 2S:D arises standardly by nasalization.) However, observe that 2S:S has no **b-**. It, **a**, consists of the expected rhyme without an onset. As always, faced with an absence of phonology, two options are open: zero or nothing. That is, either there is a zero vocabulary item licensed by 2S EA in the context of S DO, or the features in (74) that ordinarily license **b-** have been deleted by a rule, contextualized by S DO, prior to vocabulary insertion. I am not aware of a general principle to decide between the allomorphy- and the deletion-based solutions, but for concreteness adopt the latter.[13]

[13]That allomorphy and deletion can achieve the same surface result may point to a deficiency in the system: how, one might imagine, is the child to decide between them? The only attempt I am aware of to address this redundancy is Trommer's formalization of Distributed Morphology, in which all morphological operations are reduced to vocabulary insertion (Trommer 1999). Two morphological operations deployed above—feature insertion and node (as opposed to mere feature) deletion—are not obviously replicable as vocabulary insertion; nor are non-structure-preserving morphological operations, which may establish or disestablish the adjacency relations taken to be central to suppletion in Chapter 4. Given the inherent interest of Trommer's proposal and of the issue that motivates it, I hope that these criticisms will lead to refinement rather than abandonment of the work.

$$
\begin{array}{c} | \\ \text{EA} \\ \begin{bmatrix} -\text{author} \\ +\text{hearer} \\ +\text{singular} \\ -\text{augmented} \end{bmatrix} \end{array} \rightarrow \emptyset \mid \underline{\quad} \, [\,\text{S}\,] \qquad (75)
$$

Observe that, in (75), there is no requirement that the *direct object* be S. Thus, (75) will affect prefixes of the form 2S:3S:... and 2S:1S:..., which also lack the onset **b-**.

The first person onsets are less complicated. Indeed, given (57), they are wholly predictable. Simply adding **g-** to the rhymes in (68) yields the correct results by standard phonology: **gya(t)** from **g+ia(t)** by glide formation, **d⁽é⁾** from **g+⁽é⁾** by dental-velar switching, **nen** from **g+en** by dental-velar switching and nasalization.

Thus, many of the generalizations over ditransitive prefixes apply to S EA transitive prefixes, and some further generalizations apply equally well to the ditransitive.

Non-singular EA

We are now concerned with the following prefixes.

(76)

	Direct Object				
	S	D	P	I	A
2P:	bá∗	bet	bát∗	bét	bé
I:	é∗	et	ét∗	ét	ét
A:	á∗	et	gyá∗	et	ém

Little beyond what has already been said is required here.

The most striking fact here is the distribution of ∗, that is, the propensity of some prefixes to lower the tone of the verb that follows them. It is to be noted that there are no prefixes with low and ∗. This (notationally possible) phonological gap follows from the treatment of tone given by Harbour (2002). According to this analysis, prefixes may have high tone in virtue of three different metrical configurations: forming a tonal (metrical) domain separate from the verb, forming an independent metrical foot, or forming both. As detailed in a footnote,[14] the second of these are tone lowering, or ∗, prefixes. The first and third are simply high tone prefixes that do not affect tone on the verb. This typology constrains the analysis that should be given of prefixal tone. It is not the case that we need find some syntactic feature F with respect to which all

[14]Technically, a prefix that forms a metrical domain separate from the verb comprises one or more timing slots, ×, and a metrical domain demarcator, |, i.e., ×|. These prefixes have high tone but do not affect the tone of the following verb. An example is 3S:3S:S, as in **Xégún á-ɔ̧́ɔ̧́** 'She gave him a dog'. A prefix that forms its own foot is of the form ×), where) causes high tone to be assigned to all ×'s to its left and none to its right. ∗ prefixes are of this form, as is A:S **á∗**, as in **Xégún á-ɔ̧ɔ̧** 'They gave them a dog'. Combining these two prefix types yields ×)|, which has the same phonological effect as ×|. Low tone prefixes always form a single tonal (metrical) domain with the verb; they are simply of the form ×.

and only * prefixes, say, form a natural class. That is, it is not the case that tonal patterns are not to be regarded as the exponents of particular syntactic features. Rather, the underlying metrical structure,) and |, are the elements to be correlated with particular features.

Moving on to non-tonal segments, consider I:.... Recall that non-singular higher arguments block nasalization of D and that license a coda on I DO agreement (60). Here, we see this again, with the I:D **et** being non-nasal and with I:I **ét** having a coda. Recall also (62), according to which, if a higher argument is I, then **e** is licensed, instead of the usual DO vowel. This applies here too. (We return to I:A, momentarily.)

Consider 2P:.... The onset is predictably **b-**, given (66) and the restriction of (27) to singular. Contrast the rhymes of 2P:... and 2S:...:

(77)

	Direct Object				
	S	D	P	I	A
2S:	-a	-en	-at	-é	-e
2P:	-á*	-et	-át*	-ét	-é

Again, (60) effects are in evidence in the non-nasality of 2P:D and the coda on 2P:I. Further changes concern the tone of the 2P:S and 2P:P, which have high tone and * where the 2S:S and 2P:P have low tone. This suggests:

(78) **Desideratum**
(A subset of) the features of $[_{\mathrm{DO}}$ S $]$ and of $[_{\mathrm{DO}}$ P $]$ should license high tone and *.

(Note that this tonal pattern cooccurs with the vowel **a** (which arises, it was suggested above, from underlying **ia**). I leave open for a moment whether these should be regard as inhering in a single vocabulary item.)

For A DO, observe that 2P:A, **bé**, is simply 2S:A, **be**, with high tone. Interestingly, a similar relation holds form A:A. It, **ém**, is simply 3S:A, **em**, with high tone. This suggests:

(79) **Desideratum**
The features of $[_{\mathrm{EA}}$ −singular ...$]$ $[_{\mathrm{DO}}$ A $]$ should license high tone and the same features as $[_{\mathrm{EA}}$ +singular ...$]$ $[_{\mathrm{DO}}$ A $]$.

Given that I patterns with [−singular] agreement, (79) raises questions as to what the singular correspondent of I:A could be; nothing, so far, would lead us to expect it to have singular correspondent. Fortunately, the form of the prefix, **ét**, suggests that we need not answer this question. Observe that this is only A DO prefix with a coda. Others, by contrast, derive from a regular onset plus a predictable vowel plus predictable tone. For instance, 1S:A is **g+e**; 2S:A is **b+e**; 2P:A is **b+e+ ´**; for 3S:A, the form is unexpected, but given it, **em**, A:A is predictable as **em+ ´**. With its coda, I:A **ét** looks quite different. In fact, its form is predictable, if we apply in the current case a morphological operation that is required elsewhere, namely, the mechanisms that account for

A-agreement's D∼I alternation when there is an IO. If these mechanisms apply to the prefix I:A, then the result will be I:D/I, which, correctly, is **ét**.

(80) **Desideratum**
The mechanisms of the D∼I alternation apply to I:A.

Observe that, in the preceding paragraph, 3S was treated as the singular correspondent of A, for the purposes of applying (79). The P DO prefixes reinforce this correlation. Consider the relationship between 2S:P and 2P:P, **bat** and **bát∗**, which vary only with respect to tone. Exactly the same relationship holds between 3S:P and A:P, **gya** and **gyá∗**. However, for other prefixes, any correlation is less obvious:

(81)

	Direct Object				
	S	D	P	I	A
3S:	∅	ẹ	gya	é	em
A:	á∗	et	gyá∗	et	ém

If the onset for A EA is ∅, then A:D is as expected: **∅+et** is **et**. (Note that A, being [−singular], conditions the non-nasal allomorph of D DO agreement.) Given this, A:I has the expected onset, vowel and coda **∅+e+t**, and is surprising only in lacking high tone.

5.3.3 Intransitives

We now turn to the last prefixes in the system, namely, the intransitive.

(82)

	Direct Object
Subject:	∅
1S:	a
2S:	em
2P:	ba
3S:	∅
I:	e
A:	á

Given the preceding discussion, there is little to surprise us here. 2S:∅ **em** is, as discussed above, a special realization of the features common to 2S intransitive and 2S indirect object agreement. The correlation between intransitive and indirect object agreement is suggestive also for 1S:∅ and 3S:∅, neither of which was realized by an onset as IO. Here, again, we find them onsetless. This correlation cannot be extended, however, to non-singular intransitives. If it could, I:∅ would have onset **b-**, as *any*:I:... prefixes have. Nonetheless, the non-singular prefixes are reminiscent of others. Specifically, for non-singular x, x:∅ is nearly predictable from x:S.

(83)

Subject:	Direct Object $\emptyset$	s
2P	ba	bá*
I:	e	é*
A:	á	á*

If the x:$\emptyset$ forms are taken as basic, then addition of $*$ yields x:S. (Recall that the metrical reality behind $*$ entails that, if a prefix is $*$, then it has high tone.) This suggests that the x:$\emptyset$ forms are, for non-singular prefixes, (near to the) the basic vocabulary items for these persons.

If this reasoning is more or less correct, then the only additional explanation required for intransitive prefixes is the occurrence of **a** for 1S:$\emptyset$.

5.4 Vocabulary Items

The point of the foregoing *grüblerische Argumentation* is that it places us in a position to give a vocabulary list with allomorphic variants which map prefix structures that have been acted on by morphological rules into phonological segments which yield familiar prefixes by regular phonology.

At this point, though we are clearly nearing a solution, I leave the matter to rest. As emphasized above, the analysis of the agreement prefixes is relevant to the dissertation as a means of justifying the existence of the features and value argued for herein. That has been achieved above.

Chapter 6

Conclusions and Consequences

Despite its crosslinguistic frequency, noun classification is commonly conceived of as an arcane and arbitrary feature of language, something possessed of little less arbitrariness than the Saussurean sign itself. The preceding chapters, investigating one such system, Kiowa's, have shown that, far from being an isolated fact about individual lexical items, then mechanisms of noun classification are deeply embedded in the grammar, exhibiting effects in the morphology, the semantics and the syntax. In this chapter, I wish to explore the implications of these results the theory of grammar more generally.

After presenting a summary of the results from preceding chapters, I consider these tell us about noun classification in general, ...

6.1 Noun Classification

To what extent does Kiowa's noun class system resemble that of other languages? To answer this, let us consider the types of noun classification systems exhibited by other languages, such as gender, declension class, and gender-number (Bantu) systems. `How about classifier systems? What's is a good laying out of such a system to compare to Kiowa?`

6.1.1 Gender and Declension Class

An important distinction inherited by generative grammar from traditional grammar is that between gender and declension class (see, e.g., Aronoff 1994). Though both are (mostly) arbitrary properties of individual lexical items, they are crucially different. Gender 'propagates' throughout the syntax, whereas declension class is confined to the individual noun itself. For instance, consider the three Sanskrit noun phrases below (based on Coulson 1992).

(1) rājā kāntaḥ *-an* class
king.NOM.S beloved.MASC.NOM.S
'beloved king'

(2) ātmā kāntam *-an* class
self.NOM.S beloved.NEUT.NOM.S
'beloved self'

(3) suhṛt kāntaḥ consonant-final class
friend.NOM.S beloved.MASC.NOM.S
'beloved friend'

The notion of gender is illustrated by the adjectives, that of declension class by the nouns. The nouns **rājan** 'king' and **ātman** 'soul' belong both to the *-an* declension class. Accordingly, in the nominative singular, they end in ā. By contrast, **suhṛd** 'friend' belongs to the consonant-final declension class, and so, in the nominative singular, ends in zero, with the consonant devoicing. Thus, from the point of view of case endings, 'king' and 'soul' form a natural class to the exclusion of 'friend'.

However, when we turn to the adjectives, we find that 'king' and 'friend' form a natural class to the exclusion of 'self'. For the former, 'beloved' ends in **-aḥ**, but, for the latter, it ends in **-am**. According to the traditional designations, 'king' and 'friend' are 'masculine', 'self' 'neuter'. Clearly, these genders are independent of declension class, as the two classificatory schemes crosscut.[1] Declension class determines only the form of the morpheme that realizes nominative singular, other other case-number combinations, *on the noun itself*, ā for the *-an* declension class *versus* zero for the consonant-final declension class. Gender determines the form of the morphemes that realize nominative singular, or other case-number combinations, *on things beyond the noun* that the noun agrees with, such as **-aḥ** for masculine and **-am** for the neuter.[2]

With this distinction in mind, we can now ask:

[1]The fourth combinatorial possibility, a neuter noun of the consonant-final declension class, is **manas** 'mind'. By regular phonology, we have:

(i) manaḥ kāntam consonant-final class
mind.NOM.S beloved.NEUT.NOM.S
'beloved mind'

with zero for nominative singular on the noun and **am** for nominative singular neuter on the noun.

[2]An example of other things the endings of which are determined by gender, consider a past participle, such as **pratibuddha** 'awoke'. With the masculine singular nominative ending, **pratibuddhaḥ** may be combined with the earlier masculine DPs to yield the sentences **Rājā / Suhṛt kāntaḥ pratibuddhaḥ** 'The beloved king / friend awoke'; with the neuter singular nominative, **pratibuddham** may be combined with the earlier neuter DPs to yield the sentences **Ātmā / Manaḥ kāntam pratibuddham** 'The beloved soul / mind awoke'.

Does Kiowa have a gender or declension class system?

Kiowa does not have a gender or declension class system. The easiest way to see this is by sketching languages, Kiowa′ and Kiowa″, that combine Kiowa's noun class system with a declension class and a gender system, respectively.

To sketch Kiowa′, let us first simplify Kiowa by removing all allophony of the inverse marker (described in Section 2.6.1), replacing them with two allomorphs **-inv** and **-erse**. We now define two declension classes, the **-inv** declension class and the **-erse** declension class, as follows. Take all the nouns in Harrington (1928) and assign them to the *-inv* class. All other nouns are assigned to the *-erse* class. This information is represented on the vocabulary entries. For example, Harrington gives the Kiowa for 'stick' but not 'walking stick'. Consequently, 'stick' belongs to the **-inv** and 'walking stick' to the **-erse** declension class in Kiowa′. The vocabulary items are:

(4) $\sqrt{\text{STICK}} \Leftrightarrow$ áá$^{\textit{-inv}\text{ class}}$

(5) $\sqrt{\text{WALKING\_STICK}} \Leftrightarrow$ t!optę́aa$^{\textit{-erse}\text{ class}}$

The superscripts are 'class diacritics' (cf., Harris 1991) that condition the realization of [inverse] on D, i.e., the nominal inverse marker:

(6) [inverse] $\Leftrightarrow$ -inv | [N$^{\textit{-inv}\text{ class}}$] [D ___]
$\Leftrightarrow$ -erse | [N$^{\textit{-erse}\text{ class}}$] [D ___]

Note that the assignment of nouns to declension classes affect only the form of INV the inverse suffix on nouns. It does affect not when or where INV occurs, i.e., the noun classes themselves, such as SDI, IDP, and so on are unchanged; nor does it affect the form of I-agreement on the verb. Combining Kiowa's noun class system with declension classes that crosscut them, Kiowa′ shows that Kiowa noun classification is distinct from declension classes.[3]

By way of illustration, consider the IDP nouns 'stick' and 'walking stick' in the sentence frame 'It's a ___'. Consequently, the Kiowa′ sentences are:

(7) Ááinv e-dɔ́ɔ́ — Kiowa′, *-inv* class
stick.INV I-be
'It's a stick'

(8) T!optę́aa**erse** e-dɔ́ɔ́ — Kiowa′, *-erse* class
walking_stick.INV I-be
'It's a walking stick'

(These sentences are analogous to Sanskrit DPs (1) and (3), the *-an* and consonant-final masculine nouns.)

[3]Note that the claim here is that Kiowa′ is a logically possible language and (plausibly) generable by UG. However, the class of humanly possible languages is constrained by more than UG alone: parsing and learning procedures also constrain the space of possible languages. I make no claim as to whether Kiowa′, or any other of the grammatical hybrids below, could actually exist.

To sketch Kiowa″, we define two genders, *inv* and *erse*, by assigning all nouns in Harrington (1928) the gender *inv* and all others *erse*, where the phonological reflexes of these genders are, say, creaky voice and lip rounding, respectively. That is, if N, a Kiowa noun, has gender *inv* in Kiowa″, then, wherever N triggers the inverse marking or agreement form ψ in Kiowa, it will trigger ψ + creaky voice, $\underline{\psi}$, in Kiowa″. For example:

(9)	[Áádɔ	e̱-	ét	]-g̱ɔ̱	d̲é̲-	hɔ́ɔ́gya	Kiowa″
	table.INV	I.*inv*-big.S		-INV.*inv*	1S:I.*inv*-get.PF		
	'I got a stick that is big'						

And if N has gender *erse* in Kiowa″, then, wherever N triggers the inverse marking or agreement form ψ in Kiowa, it will trigger ψ + rounding, $\overline{\psi}$, in Kiowa″. For example:

(10)	[T!optę́aadɔ	ē-	ét	]-$\overline{\text{gɔ}}$	$\overline{\text{dé}}$-	hɔ́ɔ́gya	Kiowa″
	walking_stickINV	I.*inv*-big.S		-INV.*inv*	1S:I.*inv*-get.PF		
	'I got a walking stick that is big'						

Observe that in both (9) and (10), the inverse marking on the noun is exactly as it would be in Kiowa and, moreover, that this marking is unrevealing of gender, as in (1) and (2).[4] Combining Kiowa's noun class system with a gender system that crosscuts these classes, Kiowa″ shows that Kiowa noun classification is distinct from gender classification.

6.1.2 Gender-Number Systems

A system more similar to Kiowa's than those considered above is that of Bantu, or, more precisely, Kiswahili on Carstens' (1991) analysis.[5]

Kiswahili is typical of Bantu languages is possessing a large number of noun classes. Each class is associated with a class-particular nominal prefix and with 'a distinctive pattern of agreement borne by modifiers and arguments of the noun, and on auxiliaries and predicates in the relevant syntactic relations to it' (pp. 2–3). Some classes and examples are provided below (cf., Carstens 1991, p. 3).

(11) **Kiswahili Class Prefixes**

[4]The syntactic mechanisms that give rise to the different forms of agreement and inverse marking in Kiowa″ are, I assume, the same as in Sanskrit, and other languages, in which adjectives, verbs and so on agree for gender and number. This would be implemented by having D bear number and gender features simultaneously, rather as it bore person and number features in the treatment of SII syncretisms. Thus, in the preceding examples, D would bear [inverse *inv*-gender] or [inverse *erse*-gender]. Other gender-number combinations are easily representable: for example, for an SDI noun of gender *inv* and referential cardinality 2, D would be [−singular −augmented *inv*-gender].

[5]The language is more commonly called 'Swahili' in English. I follow Carstens' terminology; see her footnote 1, p. 1.

Class	Example	Gloss
1	m-tu	person
2	wa-tu	people
3	m-ti	tree
4	mi-ti	trees
5	gari	car
6	ma-gari	cars
7	ki-atu	shoe
8	vi-atu	shoes
9	n-yumba	house
10	n-yumba	houses
11	u-bao	board
⋮	⋮	⋮

(12) **M**toto **huyu** wangu **m**zuri **a-** me-anguka
1.child 1.this 1.my 1.good 1.AGR-PF- fall
'This my good child has fallen down'

(13) **Wa**toto **hawa** wangu **wa**zuri **wa-** me-anguka
2.child 2.this 2.my 2.good 2.AGR-PF- fall
'These my good children have fallen down'

(14) **M**ti **huu** wangu **m**zuri **u-** me-anguka
3.child 3.this 3.my 3.good 3.AGR-PF- fall
'This my good tree has fallen down'

(15) **Mi**ti **hii** yangu **mi**zuri **i-** me-anguka
4.child 4.this 4.my 4.good 4.AGR-PF- fall
'This my good tree has fallen down'

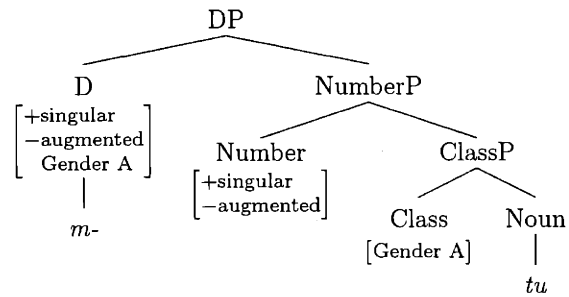
The traditional view in Bantu and Kiowa linguistics make the two languages' noun classification systems seem quite dissimilar. Bantuists have considered 'Class, an amalgam of number and gender, ... to be a lexical property of Bantu nouns and/or their prefixes' (p. 6). Generalizations about Classes are then of the form 'If a noun is singular in 1, it is plural in Class 2', or (cf., p. 28) 'If a Class 11 noun triggers Class 3 agreement in the singular, it triggers Class 10 agreement in the plural'. Traditional Kiowa descriptions, e.g., Wonderly, Gibson, and Kirk (1954), view referential cardinality as part of the inherent meaning of the noun, e.g., **tógúl** *means* 'one *or* two young men', with the inverse suffix giving the inverse number.[6] So described, Kiowa and Bantu seem oceans apart.

Carstens, however, gives an analysis of the morphology and syntax of Kiswahili DPs that solves several problems in traditional Bantu linguistics and at the same time makes Bantu DPs reminiscent of the analysis of Kiowa DPs offered above. Specifically, she claims that there is no primitive notion of Class that amalgamates gender and number. Rather, these belong to distinct projections in the

[6]Such approaches, of necessity, deemphasize mass nouns and pluralia tantum.

syntax. Modifying her structure slightly, to emphasize commonalities between her analysis and mine, **mtu** 'a person' has the structure below:[7]

(16)



On Carstens' analysis, prefixes like **m-** are the realization of gender. What accounts for the singular∼plural alternation **m-∼wa-** is simple contextual allomorphy:[8]

(17) [Gender A] ⇔ m- | [D +singular __]
⇔ wa- | [D −singular __]

The point of contact between Carstens' analysis of Bantu and the current analysis of Kiowa is that, in both cases, what has been traditionally treated as class-specific morphology is analyzed instead as the realization of features on D. Moreover, these features come to be on D by copying from lower heads, Class and Number. Kiowa and Kiswahili differ, however, in that the classifying features of Kiswahili are not number features. Consequently, copying Class and Number onto D cannot result in mismatch problems.

A further point of contact between Kiowa and Kiswahili is that both are compatible with a declension class system. This was shown above for Kiowa and similar facts are found in Kiswahili. Animate nouns provide one example of this. All animates trigger, on their modifiers, arguments and predicates, 1-agreement forms in the singular and a 2-agreement forms in the plural. However, animate nouns themselves do not always bear the prefixes 1∼2 prefixes **m-∼wa-**. For instance, **vifaru** 'rhinos' displays the Class 8 prefix **vi-**. However, it triggers Class 2 agreement on its modifiers and predicates, as in:

(18) **Vifaru** **wa**wili **wa-** na- pigana
8.rhino 2.two 2.AGR-PRES-fight.RECIP
'Two rhinos are fighting'

[7]The differences are (a) that Carstens writes 'Group A' where I have 'Gender A'—the introduction of this extra term does not strike me as beneficial to the discussion here; (b) that Gender/Group is located on the noun, rather than in a separate head, Class—recall, from Chapter 3, that my use of this head was more expository device than syntactic claim; (c) that the projection in Carstens' tree are labelled category-neutrally—the functional structure of the DP is dealt with a later chapter of Carstens' dissertation; (d) that the content of the Number head is not represented as [+singular −augmented]. This last alteration is the only mildly controversial one. I believe that the content of Number may be subject to crosslinguistic variation; in Kiswahili, it might be restricted to [±singular], for instance.

[8]Alternatively, one could regard, say, **m-** as the realization of [+singular Gender A] on D.

These facts are reminiscent of the Sanskrit cases treated above, where marking on the noun is not a reliable predictor of agreement forms elsewhere. Carstens' analysis is that all animates have Gender A (i.e., are Class 1 when singular, Class 2 when plural), but that some, such as 'rhino', are lexically marked as conditioning prefixes from different classes on themselves—i.e., the noun imposes a declension class on its own prefix, above and beyond any morphological forms that it imposes elsewhere in the sentence.

Note further that the Kiowa and Kiswahili systems are not wholly mutually compatible, as is expected if they represent different uses of the same mechanisms. Given that D in Kiowa does not always have number features that reflect the content of Number, there can be no language Kiowa‴ in which nouns bear inverse morphology for certain referential cardinalities and where agreement forms of nouns' modifiers, arguments and predicates consistently reflects referential cardinality.

Thus, Kiowa's noun classification system is akin to those of the Bantu languages.

6.2 On Privativity

The semantically interpreted features assumed above—[±singular], [±augmented], [±group]—were all binary. Given Kiowa-Tanoan data, is this ineluctable, or are the same results replicable only with privative features?

In a binary feature system, there is a difference between [+F], [−F] and absence for [±F]. Consider, for instance, the IDP class has a minus specification for [±singular], the SII class, a plus specification for [±singular], and the SDP class, a zero specification. I take the hallmark of a privative feature system to be that only a two-way distinction is possible. This amounts to neutralizing the unmarked∼zero opposition, which can be achieved in two ways. For concreteness, suppose that plus is the marked value of [±F] in a binary feature system, which we want to transform into a privative system. One possibility is to define a new feature [F′] corresponding to [+F], the marked binary value, with [−F] corresponding to zero:

(19)

Binary →	**Privative**
[+F]	[F′]
[−F]	∅
∅	∅

Let us call this 'presence∼absence privativity'. The alternative is to define a new two-valued feature [±F″], with one value, plus (for notational homogeneity), say, being the marked one, and the other being redundantly supplied (cf., Chomsky and Halle 1968/1991).

(20) **Binary → Privative**

Binary	Privative
[+F]	[+F′]
[−F]	[−F″]
∅	[−F″]

Let us call this 'plus∼minus privativity'.

Observe that neither presence∼absence nor plus∼minus privativity permits a three-way distinction between marked, unmarked, and zero.[9] The fundamental difference between the two is that the plus∼minus privativity permits reference to more natural classes than the presence∼absence privativity does. {[−F], ∅}, which is not a natural class in the binary system, is mapped onto a natural class, {[−F″]}, in the second system, and so may be referred to by morphological rules and vocabulary items. This is not possible given (19). Let us proceed with the first, more restrictive option.

6.2.1 Presence∼absence privativity

Given the natural classes of referential cardinalities, {**1**, **2**} and {**2**, **3**}, we require two features, which I shall simply call [F] and [G]. These compose the referential cardinalities and correspond to agreement types as follows:

(21)

Feature Combination	Referential Cardinality	Agreement Type
[F]	**1**	S
[F G]	**2**	D
[G]	**3**	P

The challenge is to use these features to generate the classes observed in Kiowa (and other Tanoan languages). This involves specifying the featural content of Class and Number and the conditions under which they give rise to [inverse].

The best solution I can devise is summarized below.[10] It has two major shortcomings, namely, that it predicts a wider variety of facts than is attested and that it does not derive those facts that are attested. The reader may wonder, therefore, why I present it. The answer is that, in that absence of a general proof that privative features cannot handle Kiowa's complexities, the case for bivalent features and against privative ones is only that a bivalent analysis has been more successful than any privative one. This leaves open the possibility

[9] Observe the possibility of the following correspondence:

(i) **Binary → Privative**

Binary	Privative
[+F]	[F′]
[−F]	[F″]
∅	∅

Although the resulting notation—features without values—is identical to the first option, it merely disguises a three-way distinction, rather than disposing of it. Consequently, it is not considered further.

[10] Mass nouns, though not pluralia tantum, are ignored.

that a better privative analysis will be invented and that what follows might even be its starting point.

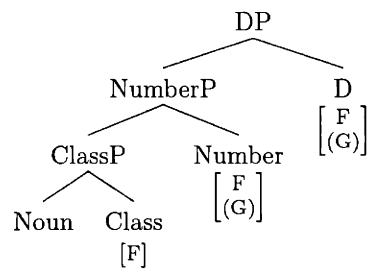
The simplest class is again the SDP. Class is empty and so agreement directly reflects the feature content of Number.

The next simplest cases are SDI, IDP and IDI. Consider SDI. We claim that Class is [F] and invoke the following condition on [inverse]:

(22) **Inverse by exclusion**
[inverse] arises on D when Class $\not\subseteq$ Number

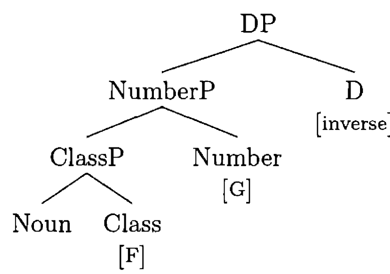
To illustrate, for referential cardinalities $\mathbf{1} = [\text{F}]$ and $\mathbf{2} = [\text{F G}]$, we have (23), in which Class $\subseteq$ Number and the content of Number (and Class) has been copied onto D.

(23)



For referential cardinality $\mathbf{3} = [\text{G}]$, however, Class $\not\subseteq$ Number: $[\text{F}] \not\subseteq [\text{G}]$. By (22), we have:

(24)



It is easily verified that, given (22) the correct inverse marking and agreement types result if we classify IDP nouns as [G] and IDI nouns as [F G].

Before proceeding to other classes, it should be noted that the alternative account already appears inferior to that of Chapter 3. Both require that D be valued by copying of features, to deal with the SDP class; and both require that this copying be sensitive to more than Number alone, otherwise every class would be SDP. On Chapter 3's account, the existence of inverse marking is all but forced, as something special must be done at D when Class and Number clash. On the current account, there is no reason to expect inverse marking at all. Rather, in (24), we would expect [F] to be copied from Class and [G] to be copied from Number, so that D would be [F G]. This would lead to a non-inverse marked noun that triggers daa (i.e., an SDD class). It is clear that an inverse condition can be expressed, as in (22), but its motivation is unclear.

The lack of motivation for (22) becomes more problematic when we consider the SII class. The SDP, SDI, IDP and IDI classes between them exhaust the possible classes generated by {F, G}. However, we can capture the SII class if we admit a second inverse condition:

(25) **Inverse by inequality**
[inverse] arises on D when Class $\neq$ Number

To capture the behavior of a class, we must specify both the content of the Class head and whether its inverse forms arise by exclusion (22) or by inequality (25). That is, for SII, we specify that Class is [F] and that (25) applies. So, for referential cardinality **1**, Number is [F], therefore Class = Number, (25) does not apply, and D is valued as [F]. However, for referential cardinalities **2** and **3**, [F] = Class $\neq$ Number = [(F) G]. Consequently, (25) applies and D is valued as [inverse]. The four classes considered above, SDP, SDI, IDP and IDI, are specified as being subject to (22). The analyses are as before.

Now, (25) would be required in order to account for classes, such as IIP, that are absent from Kiowa but present in Tanoan. Specifically, IIP has the class feature [G] and is subject to (25). However, this inverse condition is no less motivated than the first. One might suggest that Class must be 'licensed' by Number and that failure to 'license' Class results in D's being valued as [inverse]. However, it is not clear that this improves matters, as one must still explain why Class needs licensing, why there are two different licensing condition, and why some classes require one rather than the other.[11]

Leaving these matters outstanding, let us move on to other classes, to see whether the system is at least descriptively adequate. Nothing posited so far is sufficient to generate the SDS and PPP (pluralia tantum) classes. These were handled in Chapter 3 by means of the feature [±group], both values of which were crucial and both distinct from absence of the feature. Unfortunately, we cannot posit a feature [Gr] meaning the same as [+group] and a second feature [ɹ⅁] meaning the same as [−group]; it defeats the purpose of 'going privative' by merely dressing up a binary distinction in the notation of privativity.

An alternative solution is to introduce a diacritic on class features, which I shall call '^{x}-notation'. Its function, simply put, is to value D as the class feature in exactly those cases where it would normally be valued as [inverse]. That is:

(26) **^{x}-notation**
Let [C] be a feature on Class and [N], a feature combination on Number. Then:

a. $[C^{x}] \subseteq [N]$ if and only if $[C] \subseteq [N]$ /
$[C^{x}] = [N]$ if and only if $[C] = [N]$,[12]

[11]This last issue must be addressed if it is to be maintained that noun class mnemonics follow naturally from semantic properties of the noun and the meaning of the number features.
[12]That is, if (22)/(25) do not apply $[C^{x}]$ behaves identically to [C].

b. and if $[C^x] \not\subseteq [N]$ / $[C^x] \neq [N]$, D is valued as [C] (not as [inverse]).[13]

Before commenting on this, let me illustrate how it works.

The SDS class is $[F^x]$, subject to inverse by exclusion (22). So, for referential cardinalities **1** and **2** = [F (G)], D simply replicates Number.[14] However, for referential cardinality **3**, Number = [G]. As $[F] \not\subseteq [G]$, it follows that $[F^x] \not\subseteq [G]$, and so that Class $\not\subseteq$ Number. So, (22) applies. Ordinarily, this would value D as [inverse]. But, because of the ^{x}-notation on Class, $[F^x]$, D is valued instead as the class feature [F]. Thus, we have S-agreement when referential cardinality is **3**. The resulting mnemonic is SDS.

The PPP class behaves similarly. It is $[G^x]$, subject to inverse by inequality (25). So, the straightforward is referential cardinality **3**. Number is [G]. Given that [G] = [G], it follows that $[G^x]$ = [G] and so that Class = Number. As a result, (25) does not apply and D is valued as [G]. However, for referential cardinalities **1** and **2**, Class $\neq$ Number.[15] So, (25) applies. But, because of the ^{x}-notation on Class, $[G^x]$, D is valued instead as the class feature [G]. Thus, we have P-agreement when referential cardinality is **1** or **2**.

Now, there is something rather elegant about this solution, as one and the same mechanism specifies both when D is not valued as [inverse], despite applicability of (25)/(22), and how it is valued instead. However, the implications of ^{x}-notation are potentially problematic. First, it is not clear why should the language permit or even what such a device is: what other uses might language make of the formal underpinnings of ^{x}-notation? Second, one must wonder whether the introduction of ^{x}-notation is in the spirit of 'going privative', the point of which was to show that the marked~unmarked~zero distinction permitted by bivalent features is superfluous. If we need compensatory devices, then this suggests that privative features alone are too restrictive. Moreover, ^{x}-notation makes pure privativity seem too restrictive in a particularly suspicious fashion. The feature must be enriched by a form of diacritic notation. Given that '+' and '−' are themselves feature diacritics of a sort, ^{x}-notation points the way back to bivalence.

Let us finally consider IDS. Given that:

(27) IDP is [G] subject to inverse by exclusion (22)

and that:

(28) SDS is $[F^x]$ subject to inverse by exclusion,

a reasonable guess at IDS's class features would be that:

(29) IDS is $[F^x\ G]$, subject to inverse by exclusion.

[13] That is, if (22)/(25) apply.

[14] (22) does not apply since Class = Number if and only if $[F^x] \subseteq [F\ (G)]$ if and only if $[F] \subseteq [F\ (G)]$, which is, of course true.

[15] $[G] \neq [F\ (G)]$, so $[G^x] \neq [F\ (G)]$.

However, given (29), (22) applies whenever Class $\not\subseteq$ Number, that is, whenever [F^x G], or equivalently, [F G] $\not\subseteq$ Number. Thus, (22) applies whenever referential cardinality does not equal **2**. By the definition of ^{x}-notation, D is valued in these cases as [F], resulting in the class SDS again.

To avoid this problem, we must relativize (22) so that 'only problematic features count'. That is, for referential cardinality **1**, Number = [F] and the problematic feature is [G], not [F^x]; so the latter is ignored and D is valued as [inverse]. Similarly, for referential cardinality **3**, Number = [G] and the problematic feature is [F^x]; so [G] on Class is ignored, and D is valued as [F]. It is easily verified that the IDI class [F G] still functions as desired.

Assuming the revision of the previous paragraph, the valuation of D proceeds, in anthropomorphized summary, as follows.

(30) a. If Class $=/\subseteq$ Number, replicate Number on D.
b. If Class $\neq/\subseteq$ Number, consider the problematic Class feature, i.e., the feature of Class the removal of which would ensure that Class $=/\subseteq$ Number. Value D in accord with that feature, i.e., as the feature if it is ^{x}-notated, as [inverse] otherwise.[16]

Leaving aside the various shortcomings of this analysis already outlined, let us consider the inventory of classes that it predicts. To generate the space of possible classes we consider each instantiation of the generalized class feature [(F(^{x})) (G(^{x}))] under each or (22) and (25).[17]

(31)

Class	Inverse by Inequality	Inverse by Exclusion
$\emptyset$	III	SDP
[F]	SII	SDI
[G]	IIP	IDP
[F G]	IDI	IDI
[F^x]	SSS	SDS
[G^x]	PPP	PDP
[F^x G]	IDS	IDS
[F G^x]	PDI	PDI
[F^x G^x]	PDS	PDS

Given that there are only eighteen possible classes in this system, as opposed to the twenty-seven considered in Chapter 3, one might expect a rather better fit from the privative system than it, in fact, offers. Although it generates all classes attested in Kiowa and others familiar from other Tanoan languages, such as IIP, it generates classes which are, to my knowledge, entirely absent from Kiowa-Tanoan, a defect the system in binary-based theory does not have.

[16] Talk of 'the problematic feature' assumes that there is only one. This is true except on one occasion: when Class is empty, inverse by inequality applies, and Number = [F G]. In this case, D is valued as [inverse].

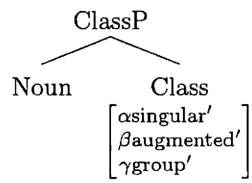
[17] Number is assumed to be maximally specified in each case; i.e., mass nouns and the like are ignored.

6.2.2 Plus~minus privativity

Given the problems with presence~absence privativity, it is natural to reexamine the plus~minus system again. However, it is quickly shown that this system is even more problematic. It is not descriptively adequate for Kiowa, because it fails to provide the requisite number of classes.

Let us call the privative correspondents of the features in Chapter 3 [±singular′], [±augmented′] and [±group′]. The paucity of classes in this system is quickly appreciable. Class in this privative system is as shown below:

(32)



where α, β, and γ are plus or minus but not zero. This yields eight possible feature combinations. These are:

(33)

[±singular′]	**[±augmented′]**	**[±group′]**	**Mnemonic**
+	+	+	SSS
+	+	−	PPP
+	−	+	SIP
+	−	−	SIS
−	+	+	SSS
	+	−	PPP
−	−	+	IDP
−	−	−	IDS

Even if we we permit the absence of Class, thus generating SDP, there still are not the requisite number classes for Kiowa, let alone broader Tanoan.[18] It may be possible to enrich the system with further features, so generating all the desired classes. However, the semantic motivation of these extra features will be moot, given how neatly the features of Chapter 3 correspond to actual semantic properties of nouns and numbers.

Summary

The foregoing considerations do not demonstrate that no privative analysis of Kiowa at all can be made to work. However, they do cast doubts on the value of seeking one that does. Both accounts quickly run into what one might call purely formal difficulties, that is difficulties in generating a space of possible mnemonics that neatly fits those attested. Consequently, both require some form of enrichment.

[18] Zero specifications of the features is not possible; however absence of the Class head, which is possible, is equivalent to zero specifications for all three features at once.

In the case of plus~minus privativity, the required enrichment is one or more extra features. However, for such features to be anything more than a morphological convenience, they must be shown to correlate with some semantic property, and it is not clear what this is.

In the case of presence~absence privativity, the required enrichment is a form of feature embellishment which points the way back to binarity, as values can themselves be thought of as embellishments of a basic feature. (Foregoing embellishments like $^{\pi}$-notation, this form of privativity will likely also require further features, if so raising the same semantic issues as plus~minus privativity.)

In the face of these problems, it is to be concluded that, to the best of our understanding, not all morphosyntactic features are privative and that Kiowa-Tanoan noun classes provide a crucial test case for any claim to the contrary.[19]

6.3 Parting comments

This dissertation has both empirical and theoretical aims.

At the empirical level, it has sought to provide an analysis of a variety of seemingly unrelated phenomena in Kiowa grammar: the distribution of agreement types and inverse marking, the semantic characteristics of noun classes, the structure of adjectivally or deictically modified DPs, the inventory of noun classes, the motivation and nature of agreement~suppletion mismatches, the nature of Kiowa's agreement prefixes.

At the theoretical level, however, it is merely programmatic, suggesting a line of inquiry that strikes me as important and interesting and offering some elements of what a fuller morphosemantic theory of number might comprise. If this program is on the right track, then several avenues of inquiry open up.

Most obviously, one would wish to test and refine the incipient theory offered here against similar phenomena in other languages—the inventory of syntactic features ought, after all, to be universal.

Second, one would want to extend the analysis of classic semantic number problems, deepening both the treatment of mass nouns and collectivity, and, hopefully, broadening the domain of inquiry to, say, distributive marking on nouns and verbs. (In fact, Kiowa has two verbal distributive markers, in mostly complementary distribution, which are the topic of my ongoing research.)

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[19]Equally interesting is whether person features are privative or binary. As Harley and Ritter (2002), who use privative features, appear able to derive much the same pronoun inventory as Noyer (1992), who uses binary ones, the best source of such evidence will be α-rules. Noyer presents one such case, from Mam. Though this has been reanalyzed without resort to α-rules, such reanalyses are themselves theoretically innovative, i.e., they force one to choose between binary person features or some thing else. For Harley (1994), the innovation is an hierarchical feature geometry in which number is embedded below person. McGinnis (2003) points out that the revised geometry of Harley and Ritter (2002) does not explain these facts, however. For Nevins (2003), the innovation is the interleaving of morphological operations with vocabulary insertion, an idea reminiscent of Trommer's (1999) proposed reduction of morphological operations to vocabulary insertion.

Third, one would want to extend the general methodology of the inquiry here to other languages. That is, one would want to find other instances in which morphological and semantic analyses clearly impinge on one another.

By thus widening the domain of inquiry of both morphologists and semanticists, we will bring to bear on core problems a wider range of data than have until now been considered relevant. Affording the total theory of Universal Grammar one theory number, the morphosemantic, rather than two, the morphological and the semantic, we make it ontologically more constrained whilst at the same time making descriptively more adequate and explanatorily more powerful. This, I believe, is what linguistics should be about.

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