

Hierarchies and Portmanteaux of Karuk Pronominal Affixes with Distributed Morphology and without Hierarchies or Portmanteaux

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Abstract

The pronominal verb affixes of Karuk have traditionally been identified as portmanteaux, expressing features of both subject and object. Following more recent approaches, I analyze each affix as reflecting a single referent, within the theoretical framework provided by Distributed Morphology (DM). I compare different ways DM could explain the Karuk pattern, but settle on five rules of Impoverishment, which all loosely conform to universal prominence hierarchies for person and number features. Noting the pattern's only-partial conformity to these hierarchies, I argue for a formal analysis that does not incorporate feature hierarchies as a theoretical object.

1. Introduction

Karuk is a moribund isolate traditionally spoken by the Karuk tribe of north-western California. The pronominal verb affixes of Karuk have traditionally been identified as unanalyzable portmanteaux, expressing features of both subject and object. Following the more recent approach of Macaulay (1992, 2000), I analyze each affix as reflecting a single referent, utilizing the formal theoretical framework provided by Distributed Morphology (DM; Halle and Marantz, 1993). Under DM, portmanteau is a rare phenomenon, and canonical analyses suggest the use of prominence hierarchies instead. However, these straightforward hierarchy effects in the Karuk paradigm are “defective” (Macaulay, 1992), so additional generalizations have to be made to capture the pattern.

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In the next section, I will outline the theoretical framework of Distributed Morphology; I will define a few key principles, and highlight particular theoretical issues this paper addresses. In section 3, I will outline the underlying structure that I propose for the Agree morphemes, a structure which precludes a hierarchy-driven analysis and instead supports one based on the operation of Impoverishment. In section 4, I will provide a formal identification within DM of each affix, propose the five rules of Impoverishment, and discuss the merits of this analysis as opposed to the hierarchy-based alternative. Section 5 provides a summary.

2. Theoretical Background

Throughout this paper, I assume the framework of Distributed Morphology (henceforth DM). DM was originally introduced by Halle and Marantz in 1993 and has three distinctive properties (following Harley and Noyer (1999)): **Late Insertion** – morphological pieces (called Vocabulary Items, henceforth VIs) are inserted after the creation of syntactic structure, in Spell-Out, the transition from abstract structure to phonological pronunciation; **Underspecification** – a VI corresponds to a *subset* of the features in the structure it spells out, so that often a VI is a default marker, not specified for some of the features in its syntactic location; and **Syntactic Hierarchical Structure All The Way Down** – elements of morphology are subject to the same kind of hierarchical constituent structure as elements of syntax.

Crucially, DM has functional VIs competing for Insertion into abstract heads (called morphemes) composed of morphosyntactical features¹. A VI can only be Inserted at a location when that location instantiates all features the VI is specified for – that is, when the VI's feature specification fully matches a subset of the head's features. When more than one VI matches a given head, the matching VIs compete for Insertion. Under this view, a paradigm is simply a set of VIs that have one or more features in common, making them a natural class of VIs appropriate to a corresponding natural class of Insertion contexts. This means DM has paradigms as an epiphenomenon of Insertion, not a theoretical primitive.² Competition within “paradigms” takes place based on Specificity, which determines which VI is the best match: If two VIs both match a subset of

¹I ignore content VIs, which play no role in this analysis.

²This is comparable with the set of candidates in Optimality Theory – trivially mismatched

features within a given head, the VI with the larger set of matching features is Inserted, being a more specific marker for expressing the head. However, two different VIs often match the same number of features, in which case quantity alone is no longer decisive. Here **feature hierarchies** come into play as a tie-breaker: When two appropriate VIs are specified for the same number of features, the features themselves are compared to see which set is composed of more specific features, a matter decided by universal or language-specific hierarchies.

I will adopt Müller's (2005, pp. 12-13) definitions of the Subset Principle and Specificity:

- (1) a. *Subset Principle:*
 A Vocabulary Item V is inserted into a functional morpheme F iff (i) and (ii) obtain:
- (i) The insertion context of V is a subset of the set of morphosyntactic features of F .
 - (ii) V is the most specific Vocabulary Item that satisfies (i).
- b. *Specificity of Vocabulary Items:*
 A Vocabulary Item V_i is more specific than a Vocabulary Item V_j iff there is a feature class \mathcal{J} such that (i) and (ii) obtain:
- (i) The insertion context of V_i has more features in \mathcal{J} than the insertion context of V_j .
 - (ii) There is no higher-ranked feature class \mathcal{J}' such that the insertion contexts of V_i and V_j have a different number of features in \mathcal{J}' .

Each VI is specified for the structure of feature instances which it spells out. This is sometimes called the VI's *Insertion context*. However, this is not to be confused with specification for context features: The Insertion context sometimes includes, besides the set of features spelled out, features which must be present in the syntactic context of a head they are Inserted in. Such context features are not spelled out by the VI, but merely serve as conditions limiting the VI's range of possible targets. To be explicit, I assume that the only features available for matching of context feature specifications are those which have not yet been expressed, and within the domain analyzed, I assume

candidates for output are ignored, and comparison only takes place within the natural class of potentially well-formed candidates.

that features available in context are only those which occupy an Agree head other than the target of Insertion. An additional possibility, relevant to this analysis but not used in this paper, is that the necessary context for one VI's Insertion is the presence of a certain other VI; in such cases, the VI with this specification can only be Inserted if the VI it depends on has already been Inserted adjacently (that is, in an other Agree head). Finally, some analyses, including this one, follow Noyer (1992, p. 69) in assuming *secondary expression* as an additional possibility for VIs' specifications. Secondary expression is similar to context specification, but in this case, the secondary features must match features *already spelled out* in the syntactic context. The present analysis uses this option for the paradigm's lone suffix, *-ap* (in section 4.2).

Vocabulary Insertion is the core mechanic of DM. The constraints and principles that govern its operation have far-reaching implications for analysis, and the precise behavior of Insertion is pivotal to any DM analysis, including the present work. Crucially for our purpose, standard approaches in DM assume that for every head, i.e., for every syntactic location, Insertion takes place only once – part of a principle called Uniqueness of Vocabulary Insertion, which I formulate in full in (2). (2-b) means that if an underspecified VI spells out a head, the remaining features therein are not available for expression by further Insertion – even if there is a VI that can spell out the precise subset of features that remain unexpressed.

(2) *Uniqueness of Vocabulary Insertion:*

- a. An instance of Vocabulary Insertion is the Insertion of *one* Vocabulary Item into *one* head.
- b. A given head may undergo no more than *one* instance of Insertion.

Despite this basic hypothesis, all DM approaches assume some strategy or another for overcoming Uniqueness in a principled and regular manner. For this purpose, and more generally in order to describe other phenomena that do not straightforwardly fit DM's model of Insertion, DM allows a series of language-specific morphological operations of a few types to apply to the morphosyntactical structure before Spell-Out (typically in a stipulated serial order). These operations are Impoverishment (elimination of feature instances), Fusion (the transformation of two morphemes into a single complex head, which undergoes Insertion as a single unit) and Fission (the separation of particular feature instances from others in the morpheme, allowing separate

Insertion). Additionally, many DM approaches include Readjustment Rules, which make phonological changes in specified morphosyntactic contexts. Most of these operations are usually modelled as classical transformational rules like those used in the phonology and syntax of the twentieth century. There is disagreement about the nature and indeed the existence of each of these operations. In the past decade, Minimalist approaches to DM have tried to boil down all operations to Vocabulary Insertion (the only operation undoubtedly necessary for all DM analyses). For one example, see Trommer (2003).

Although implementation may vary, the combination of a simple and restrictive system with operations for capturing divergences establishes a clear concept of what “normal” morphology is. Divergences are implicitly predicted to be less common because their derivation is more complex.

The morphological operations allow us to overcome part (b) of Uniqueness in a few ways, especially via Fission. One standard implementation of Fission (Halle and Marantz, 1993) is as a standard transformation rule; such a rule operates in a specific morphosyntactic context, separating specific features out into a new head which can separately undergo Insertion.

However, more important to this analysis is part (a) of Uniqueness, as it forbids a single VI spelling out multiple heads, meaning that portmanteau in the classical sense – in DM’s terms, a VI spelling out multiple syntactical heads – is not possible. This too can be overcome thanks to the rich assortment of operations at our disposal and the flexibility of DM’s Vocabulary. One standard solution is to say that a portmanteau marker actually consists of two VIs, one of which has no phonological content (a null VI) and can only be inserted in the context of the other, creating the precise effect of a portmanteau. Another standard solution (used for somewhat different situations) is to apply a rule of Fusion, creating one head with multiple feature matrices that undergo Insertion as one (Halle and Marantz, 1993). The Vocabulary-oriented treatment is generally more appropriate for cases where the portmanteau is an exception to the normal structure, whereas the Fusion-oriented treatment is more adept at describing situations where the portmanteaux are structural and regular, and subject to Specificity.

As a case where portmanteaux were traditionally taken to be the answer, Karuk pronominal affixes are an interesting test for Uniqueness, and for DM as a whole. Bright (1957) and others have treated the pronominal affixes as portmanteaux spelling out the features of both subject and object while also indexing mood. More recently, Macaulay (1992; 2000) has tried to tease apart

these categories and produce a paradigm of affixes each with a single referent (although still indexing mood). My analysis takes this approach to its logical conclusion within a formal framework, and provides a principled explanation for the irregularities.

3. Morpheme Structure

3.1. Features Assumed

My analysis deals with the distribution of pronominal agreement affixes on Karuk verbs. I will refer to person and number features using a highly simplified system of four binary features with no geometry, hierarchy, or other internal structure. Karuk possesses a relatively simple system of ϕ -categories, differentiating three person categories: 1st, 2nd and 3rd; and two number categories: singular and plural. The simple system used here can capture those distinctions and should allow the analysis to be easily translated into any more sophisticated feature system the reader may wish to assume.³

(3) *Binary ϕ -Feature System:*

Person: $\pm 1, \pm 2, \pm 3$

Number: $\pm \text{PL}$

Although binary features allow negative values, I assume such a specification (or any specification) is only present for a VI when it encodes information, i.e., when it makes a difference. So a simple first-person singular marker will have a negative value for [PL] and a positive value for [1], but will not be associated with any instance of, or value for, [2] and [3], because the value for these features is not distinctive in Karuk in combination with [+1]. A negative specification for a person feature will only be proposed when this is distinctive for the definition of a VI's use, i.e. if a VI is identified with the exclusion of the positive value for a person feature (a possibility that I will bring up in section 4.1, but reject as superfluous.)

Another domain in which I will assume simplified features is that of grammatical role. Throughout this paper, I will assume that Agree morphemes reflect an argument's grammatical role in the form of one of two privative case

³ Abbreviations used: >="acting on", <>="acting on, or being acted upon by", 1=1st person, 2=2nd person, 3=3rd person, ACC=accusative case, ITR=intransitive, NOM=nominative case, PL=plural, SG=singular, X=any category.

features, NOM(inative) and ACC(usative); the former represents all external arguments and arguments of intransitives (subjects), and the latter all internal arguments of transitives (e.g. direct and indirect objects). This is again an intentional simplification; this feature system is sufficient for this analysis, but not necessarily for the language as a whole.⁴

3.2. The Karuk Verbal Agreement Paradigm

In my analysis I will focus on the positive paradigm of pronominal verb affixes, shown below. The data here is adapted from Macaulay (1992, 2000), who draws upon Bright (1957).⁵ Karuk additionally possesses paradigms for the negative and optative moods; these are presented together with the positive paradigm for comparison. The reader may note that almost all syncretisms present in the positive paradigm are found in the others as well, even where different forms are used. Focussing on the positive paradigm will allow a more careful examination of the forms and syncretisms, which should be applicable to the other moods as well.

First Observations

Looking at the pattern of affixes in table 1, we readily observe a few things: (1) agreement is almost always expressed by a prefix (or two, as with *ka-ná*⁶); (2) forms generally do not reflect features of both arguments, but rather generally agree with the features either of subject or of object. The exception is *ka-ná* (XPL>1SG), in which case subject agreement is partial, for plural number only; (3) within the positive paradigm, some affixes are used only for subject agreement (such as *nu-*), or only for object agreement (such as *ná-*); only one prefix is used in both roles in this paradigm, *?i-* (2SG); (4) the suffix *-ap* only appears together with second-person markers *?i-* and *ki·k-*; (5) finally, note that

⁴This system is not likely sufficient for Karuk case as a whole; Bright (1957, pp. 92,112) lists at least two markers that appear to mark something like absolutive case, and Macaulay (2000) proposes to identify a certain postposition as a sort of ergative marker.

⁵The table form in which the affixes are organized is adapted with permission from slides presented by Sebastian Bank and Jochen Trommer at MOWL 2009.

⁶A note on diacritics: The acute accent in such prefixes as *ná-* marks a high pitch. Some of the prefixes examined also include a diacritical high pitch that is added to the following syllable; these are not distinctive within a paradigm, and are omitted here. The dot in *ki·k-* signifies a lengthened vowel.

Table 1: The verb affix paradigms. Subject on the left, object on top. Forms in the 3SG/ITR column are used for 3SG objects and for intransitives. Reflexive forms, which represent a different system, are omitted, following Macaulay. “∅” denotes a form with no affix material.

positive						
sub	object					
	1SG	1PL	2SG	2PL	3SG/ITR	3PL
1SG	–	–	<i>nu-</i>	<i>ki·k--ap</i>	<i>ni-</i>	<i>ni-</i>
1PL	–	–	<i>nu-</i>	<i>ki·k--ap</i>	<i>nu-</i>	<i>nu-</i>
2SG	<i>ná-</i>	<i>kín-</i>	–	–	<i>ʔi-</i>	<i>ʔi-</i>
2PL	<i>ka-ná-</i>	<i>kín-</i>	–	–	<i>ku-</i>	<i>ku-</i>
3SG	<i>ná-</i>	<i>kín-</i>	<i>ʔi--ap</i>	<i>ki·k--ap</i>	<i>ʔu-</i>	<i>ʔu-</i>
3PL	<i>ka-ná-</i>	<i>kín-</i>	<i>ʔi--ap</i>	<i>ki·k--ap</i>	<i>kun-</i>	<i>kín-</i>

optative						
	1SG	1PL	2SG	2PL	3SG/ITR	3PL
1SG	–	–	<i>nu-</i>	<i>ki·k--ap</i>	<i>kán-</i>	<i>kán-</i>
1PL	–	–	<i>nu-</i>	<i>ki·k--ap</i>	<i>nu-</i>	<i>nu-</i>
2SG	<i>ná-</i>	<i>kín-</i>	–	–	∅	∅
2PL	<i>ka-ná-</i>	<i>kín-</i>	–	–	<i>ki·k-</i>	<i>ki·k-</i>
3SG	<i>ná-</i>	<i>kín-</i>	<i>ʔi--ap</i>	<i>ki·k--ap</i>	<i>kám-</i>	<i>kám-</i>
3PL	<i>ka-ná-</i>	<i>kín-</i>	<i>ʔi--ap</i>	<i>ki·k--ap</i>	<i>kun-</i>	<i>kín-</i>

negative						
	1SG	1PL	2SG	2PL	3SG/ITR	3PL
1SG	–	–	<i>kín-</i>	<i>ki·k--ap</i>	<i>ná-</i>	<i>ná-</i>
1PL	–	–	<i>kín-</i>	<i>ki·k--ap</i>	<i>kín-</i>	<i>kín-</i>
2SG	<i>ná-</i>	<i>kín--ap</i>	–	–	∅	∅
2PL	<i>ka-ná--ap</i>	<i>kín--ap</i>	–	–	<i>-ap</i>	<i>-ap</i>
3SG	<i>ná-</i>	<i>kín--ap</i>	<i>-ap</i>	<i>ki·k--ap</i>	∅	<i>-ap</i>
3PL	<i>ka-ná--ap</i>	<i>kín--ap</i>	<i>-ap</i>	<i>ki·k--ap</i>	<i>-ap</i>	<i>kín--ap</i>

for intransitive verb forms, agreement is the same as for transitive forms with a 3SG object (these forms varying only by subject).

3.3. Structure

As shown in table 1, the Karuk verb shows no more than two agreement affixes in the positive mood. I propose to capture this in the following underlying structure:

$$(4) \quad \left[\begin{array}{c} \text{NOM} \\ \dots \end{array} \right]_{Agr} + \left[\begin{array}{c} \text{ACC} \\ \dots \end{array} \right]_{Agr} + \sqrt{\text{Root}}$$

I assume each Agree head holds a case feature and all person and number features of the corresponding argument. Assuming two distinct Agree heads implies expression of agreement with both arguments as default; this hypothesis is supported by the observation that each marker can clearly be identified with one argument's category or the other. On the other hand, we have observed that most cases realize agreement with only one argument; this suggests a quite different hypothesis: that there is only one Agree head, with Fission separating out the features needed to spell out a second affix. Syntax could output the agreement features already all in one head, or alternatively the two Agree heads could be Fused by default. Universal or language-specific feature-class hierarchies could be used to choose which argument's features are realized at Insertion. I reject these options, and argue that the present analysis works better. I defend this argument more extensively in section 4.5. First, let us see how each affix in the paradigm can be identified uniquely with one of the two Agree heads, starting with the simple, straightforward cases:

ná- and *kín-*, used consistently with 1st-person objects, must belong to the ACC head. (The other *kín-*, used for 3^{PL}>3^{PL} must be a separate, homophonous VI.)

ka- shows up only when the subject is [+PL], so it must spell out the NOM head.

nu- and *ni-* only occur with 1st-person subjects, so they must spell out the NOM head.

The cases of *?i-*, *ki-k-* and *-ap* are slightly more complicated. *-ap*, the paradigm's only suffix, only shows up together with *?i-* or *ki-k-* – it is found only in cases where the 2nd person is object, and only when the prefix agrees with that second-person object. *-ap* as a 2nd-person object marker would be problematic; the cases where object is 2 all necessarily have clearly identifiable

2nd-person prefixes, *ki-k-* and *?i-*. These prefixes already spell out object's [+2], making that feature unavailable for *-ap* to spell out directly. In section 4.2, after taking a closer look, I propose that *-ap* represents secondary expression of the feature.⁷ For now, I will assume the following functions for these affixes:

ki-k- marks a 2PL object, spelling out the ACC head.

?i- marks a 2SG argument of either role, and can express either Agree head.

-ap indirectly marks a 2nd-person object, expressing the NOM head in contexts where the ACC head has [+2] in it.

Finally, we have *ku-*, *?u-*, *kun-* and *kín-*, used for X>3 forms. The markers from the X>3SG column in table 1 are also those used for intransitive verbs. The same markers are used for plural third-person objects as well, except where both arguments are 3PL. Because these forms are used in the absence of an object, and because they appear to alternate based on subject's features, they cannot be spelling out the 3rd-person ACC head. The third-person *kín-* must be specific to the 3PL>3PL argument structure in some manner, out-competing *kun-* (which is clearly less specific, as it can appear even with only a single argument). In section 4.3, I will discuss how exactly this *kín-* can be specified. For now, we can safely say that it may potentially be spelling out either of the Agree heads.

In summary, I organize in table 2 a list of the VIs, the argument structure they show up in, and the Agree head(s) they can spell out. The argument structures here are to be understood as necessary, not sufficient, conditions.

In the next section, I will develop the above observations into a formal specification of the Insertion context for each affix, as well as examining the different explanations available for each problematic phenomenon in the pattern described above.

4. Formal Analysis

In this section, I identify the contexts and operations behind the distribution of the twelve affixes identified above. This is trivial for some affixes, but in

⁷I do not discuss extended exponence - the expression of a single feature instance more than once. However, analyzing *-ap* as an extended exponent of [+2] seems unlikely, considering the affix's use in the negative paradigm independently of second-person arguments; see Trommer (this volume) for a treatment of negative *-ap*.

Table 2: Summary of affix Spell-Out structure.

Affix	Arg-Structure	NOM?	ACC?
<i>ná-</i>	X>1SG		✓
<i>ka-</i>	PL>1SG	✓	
<i>kín-</i>	X>1PL		✓
<i>nu-</i>	1>X	✓	
<i>ni-</i>	1SG(>3)	✓	
<i>ki·k-</i>	X>2PL		✓
<i>?i-</i>	2SG<>X	✓	✓
<i>-ap</i>	X>2	✓	
<i>ku-</i>	2PL(>3)	✓	
<i>?u-</i>	3SG(>3)	✓	
<i>kun-</i>	3PL(>3SG)	✓	
<i>kín-</i>	3PL>3PL	✓	✓

other cases more challenging. I will look at different possible explanations and operations that may be relevant. In total, I propose five simple rules of Impoverishment, which all loosely conform to principles of a universal hierarchy.

The affixes are divided into three groups in table 2, based on person. In the next three subsections, I examine and analyze the paradigm and the problems therein. In section 4.1, I examine the affixes of group 1 used with first-person objects, in 4.2 the remaining affixes of group 1 (first-person subject markers) and the markers of group 2 with which they interact, followed in 4.3 by *ku-* and the markers of group 3, together with the syncretism between X>3 and intransitive forms. In 4.4 I put all of this together, fill the remaining holes in the analysis, and show how the operations interact. Finally, in 4.5 I discuss the role of hierarchies in the analysis.

4.1. First-person Object Markers: *ka-ná-* and *kín-*

Identifying Insertion contexts for *ná-* and *kín-* is straightforward; they spell out, respectively, singular and plural 1st-person object agreement. I assume the following contexts:^{8,9}

- (5) a. *ná-* ↔ [ACC +1 -PL]
 b. *kín-* ↔ [ACC +1 +PL]

However, three things require explanation: (1) that *kín-* never shows up together with a subject affix, (2) that no subject affix appears together with *ná-* for singular subjects, and (3) that *ka-* spells out the subject head but only expresses some of its features, excluding person; a marker with a full set of features (including person) would be more specific, and hence a better candidate for Insertion.

ka- apparently spells out [NOM +PL]. But one possible explanation for *ka-*'s distribution would be that *ka-* is actually more specific: We could posit that *ka-* is specified for person, with [-1] added to make a total of three features. However, as we will see throughout the analysis, most of the VIs express exactly three features (one each for role, person and number). The competing VIs in the cases where we get *ka-* would still need to be ruled out by some other mechanism, even after we have specified the Insertion context with one feature more than strictly necessary. One such mechanism would be feature hierarchies, which, one speculates, might universally consider an instance of [±1] more specific than [±2] or [±3], and/or any [-F] more specific than any [+F] (a problematic assumption, one should note, when [-1] denotes the union of the denotations of [+2] and [+3], making it logically less specific; cf. Henze & Zimmermann (this volume)). Fortunately, we may leave these questions open, because expanding *ka-*'s specification is a non-solution – it could have potentially helped explain the affix's distribution, but it does nothing whatsoever

⁸In these specifications and those that follow, I ignore features for mood and features identifying VIs and heads as Agree VIs and Agree heads. These are relevant and define the “paradigm” in question, but they are never distinctive in this discussion of positive-mood Agree morphology.

⁹It is worth exploring an underspecification of either *kín-* or *ná-* for number. However, they appear to be equally specific within the positive paradigm.

to explain the non-presence of singular subject agreement in those cases where we get *ná-* alone.¹⁰

At this point it looks like a good idea to analyze this configuration of markers as a structural phenomenon, rather than a lexical one. Fortunately, DM has a canonical solution for this sort of problem: Impoverishment (cf. Frampton, 2002, for example). We can posit a rule of Impoverishment that deletes some of the features in the NOM head, paving the way for Insertion of a less specific VI by removing features from the context that other markers could be inserted for; by removing the features, those VIs are no longer eligible for Insertion. As we noted, subject's person is irrelevant to *ka-*, and, as it were, all of subject's features are irrelevant in the cases with *kín-*. As such, we can introduce a rule of Impoverishment that simply removes subject's person when object is in the first person; this rule is relatively simple:

- (6) *Person Impoverishment Rule:*
 $\pm 1 \pm 2 \pm 3 \rightarrow \emptyset$ / [____][ACC +1]

For $X > 1PL$ cases, we need an additional measure to prevent *any* expression of the NOM head, even *ka-*. We could specify *ka-* as being “parasitic” to *ná-*, but this would mean it is a coincidence of Vocabulary that there is no other subject marker in these forms; subject's number feature would be available but left unused for no apparent reason. It would be better to further Impoverish the NOM head, or alternatively, to Fuse together the two Agree heads in these contexts. There is no obvious reason to prefer Impoverishment over Fusion or vice versa, especially when the context of their application will apparently be equally specific. Further strategies are possible but no less complicated: A highly specific null VI could express the NOM head and block other candidates, for example. However, evidence from the next sub-sections will give us a reason to prefer an additional rule of Impoverishment. I leave the rule and the rest of the reasoning for section 4.4; first we will deal with the other affixes.

¹⁰This applies to expanded specifications of a less unlikely sort, such as $[NOM + PL][(+1)]$. This specification, using the mechanism of secondary expression, would not require the extra mechanics of feature hierarchies. It would only require an assumption that such a specification is more specific than a specification limited to a single head's features – whether because of [+1] being a secondary feature or because of the presence of two heads in the Insertion context. However, it would still be a solution in Vocabulary and insufficient for blocking subject agreement for singular subjects.

4.2. First-person Subject Markers and Second-person Markers: *nu-*, *ni-*, *?i-*, *ki·k-* and *-ap*

When we turn to this group of markers, things get complicated. The problems here are intertwined: (a) *-ap* is the only NOM VI that shows up together with 2nd-person object markers *?i-* ↔ [+2 -PL] and *ki·k-* ↔ [ACC +2 +PL]¹¹ despite the existence of more specific subject-agreement VIs. (b) *nu-*'s usage context is less specific than *ni-*, but we get the former for 1SG>2SG, where we would expect the latter. (c) Where *nu-* expresses subject agreement, there is no object marker – *?i-* would fit for 1>2SG.

Table 3: Summary of affix Spell-Out structure, some markers of groups 1 and 2 (repeated).

Affix	Arg-Structure	NOM?	ACC?
<i>nu-</i>	1>X	✓	
<i>ni-</i>	1SG(>3)	✓	
<i>ki·k-</i>	X>2PL		✓
<i>?i-</i>	2SG<>X	✓	✓
<i>-ap</i>	X>2	✓	

Starting with problem (a), how can we explain *-ap* spelling out the NOM head, apparently counter to Specificity? Macaulay (1992) developed an analysis in which *-ap* is identified as an inverse direction marker, meaning it expresses the fact that the object of the verb is higher on a language-specific prominence scale than the subject. However, her attempt shows that only a small fraction of the paradigm straightforwardly conforms to such a pattern. I prefer the conclusion which Macaulay dismisses (in section 3 of that paper), that *-ap* in the positive mood is a second-person object marker.¹² However, it cannot spell out [+2], because this feature is evidently already spelled out by *ki·k-* or *?i-* in these cases. Specifying *-ap* for Spell-Out of other features *in the context of* [+2] would be a start, but it would erroneously predict that for 1>2SG, *-ap* would be

¹¹ Actually, *ki·k-* is probably not specifically an object marker, as it is used for 2PL subjects in the optative mood. However, inclusion or exclusion of that feature in *ki·k-*'s specification does not affect the present analysis.

¹² *-ap* apparently takes on an additional function in the negative paradigm.

more specific than *nu-*, which we saw above is rather unspecific. In the view that *-ap* is indeed a second-person object marker, I will assume secondary expression: that *-ap* can only be inserted when [+2] has already been spelled out adjacently.

$$(7) \quad -ap \leftrightarrow [\text{NOM}][(+2)]$$

This is a somewhat problematic specification for *-ap*, because if it is an object marker it should not be spelling out [NOM], a feature denoting the role of subject. It can perhaps be understood as marking the presence of an external argument. At any rate, the case features are to be seen more as markers of structure than bearers of meaning, particularly the core cases, and especially in the simplified system of the present analysis.

The specification in (7) does not entirely solve problem (a) on its own, because there may still be other markers that can spell out the NOM head features more specifically. This lack of information about the subject is suspiciously similar to problem (b), *nu-* winning out over the more specific *ni-* for 1SG>2SG, and appears to be a mirror image of the *ka-* problem in the previous subsection. Here *nu-* is unspecific for subject's number, much like *ka-* is unspecific for subject's person. This pattern allows us to neatly kill birds (a-b) with one stone: the Number Impoverishment Rule, closely patterned after Person Impoverishment above:

$$(8) \quad \text{Number Impoverishment Rule (for 2}^{nd}\text{-person objects):}$$

$$\pm\text{PL} \rightarrow \emptyset \quad /[______][\text{ACC} +2]$$

The deletion of subject's number feature means that *ni-*, evidently a marker for 1SG, is too specific for insertion in 1SG>2SG cases, and also that, as we shall see, *-ap* is the most specific marker that can spell out the remaining subject features.

All of this, of course, does nothing to eliminate problem (c), the complete non-realization of the ACC head for 1>2SG, where we get subject marker *nu-* after Impoverishment. Here too we could try Fusion, but this would result in *?i-* being as eligible as *nu-* \leftrightarrow [NOM +1] for Insertion into the compound head, as *?i-* must be specified for two features as well, [+2 -PL]. We would then have to further posit a hierarchy or multiple hierarchies to account for the choice of *nu-* over *?i-*. Or, again, we could introduce a specific null VI that blocks *?i-* or any other VI from Insertion in this specific context. Finally, we can turn again to Impoverishment, and I do. As in the previous subsection, the reasoning and

rule will be found in section 4.4; first we have to look at the remaining prefixes, in the next subsection.

4.3. The Third Person: *ku-*, *ʔu-*, *kun-*, *kín-* and Intransitives

This final group of affixes provides an interesting puzzle. When the object of a transitive verb is 3SG, the same affix is used as when there is no object. In each case, that same affix is used when the object is 3PL, except when both arguments are 3PL, in which case we get a special form, *kín-*.

Table 4: Summary of affix Spell-Out structure, remaining markers (repeated).

Affix	Arg-Structure	NOM?	ACC?
<i>ku-</i>	2PL(>3)	✓	
<i>ʔu-</i>	3SG(>3)	✓	
<i>kun-</i>	3PL(>3SG)	✓	
<i>kín-</i>	3PL>3PL	✓	✓

A possible, but weak, explanation, would be conspiracy of VIs: The non-expression of the ACC head as the incidental result of no 3rd-person ACC morpheme being lexicalized (receiving a Vocabulary entry). It would seem more reasonable to propose that the *sameness of form* between X>3SG transitives and intransitives implies *sameness* (or at least *similarity*) of *structure*; either agreement with the third person objects never takes place, or it is simply deleted by Impoverishment in all cases.

Assuming that this Agree operation never takes place is problematic, because of the difference between *kín-* and *kun-*, which indicates these object features are available for Insertion, albeit in a limited manner. Instead, I turn to Impoverishment yet again. Impoverishing the object morphemes partially could leave [+PL] available in the syntactic context, for Insertion to differentiate the contexts for *kín-* and *kun-*. This rule will remove key features from the object head in these cases, and as we will see, it will also have to block one of the others; I will formulate the rule precisely in the next subsection, when we discuss the interaction between the rules. Assuming object's number will remain available – and we shall see that it does – we can specify *kín-* as follows:

- (9) *kín-* ↔ [NOM +3 +PL] / ____ [+PL]

Given (9), the other affixes in this group no longer represent a challenge. They each straightforwardly spell out the subject of their respective context.

4.4. Putting Together the Pieces

We have seen that for the most part, the distribution of affixes can be explained unproblematically using Subset-Principle, Specificity and Impoverishment.

Table 5: Vocabulary Items.

<i>ná-</i>	↔	[ACC +1 -PL]
<i>ka-</i>	↔	[NOM -PL]
<i>kín-</i>	↔	[ACC +1 +PL]
<i>nu-</i>	↔	[NOM +1]
<i>ni-</i>	↔	[NOM +1 -PL]
<i>ki-k-</i>	↔	[ACC +2 +PL]
<i>?i-</i>	↔	[+2 -PL]
<i>-ap</i>	↔	[NOM][(+2)]
<i>ku-</i>	↔	[NOM +2 +PL]
<i>?u-</i>	↔	[NOM +3 -PL]
<i>kun-</i>	↔	[NOM +3 +PL]
<i>kín-</i>	↔	[NOM +3 +PL] / ____ [+PL]

There are three cases still for which a rule needs to be formulated: X>1PL (no subject agreement), 1>2SG (no object agreement), and X>3SG (also no object agreement). Notice now that in the first two, the 1st-person argument is expressed while the other argument is not. Recall (6), the Person Impoverishment Rule, by which the subject agreement of a verb loses its person features where the object is in the first person. Consider now the following rule:

- (10) *Singular Impoverishment Rule:*
 $-PL \rightarrow \emptyset$ / [____][+1]

Although this rule is rather unspecific and applies to a variety of cases, it neatly solves the 1>2SG problem without deleting any features which are expressed – the XSG>1SG and X>1PL cases show no subject agreement. And although the rule only deletes (singular) number, no VI is available to spell out [+2]

without [\pm PL] under the current analysis, producing the correct pattern (a separate account is needed to explain why no such VI exists.)¹³ But plural subjects where 1PL is object could still be spelled out, e.g. by *ka-*. Instead we get *kín-* alone. Consider now the following observation: When object is plural, subject agreement is always partial or absent – unless object is in the third person. Now consider the following:

(11) *Object Impoverishment Rule:*
 $[\text{ACC} + 3] \rightarrow \emptyset$

(12) *Number Impoverishment Rule (for plural objects):*
 $\pm\text{PL} \rightarrow \emptyset \quad / [____] [\text{ACC} + \text{PL}]$

Assuming (11) operates before (12),¹⁴ the former stops the latter from operating with third-person objects, producing just the pattern observed.

Taken together, these two additional rules explain the last problems of the paradigm, blocking *ka-* where the object is 1PL and creating the syncretism between $X > 3$ and intransitive verb forms. (12), like most rules of Impoverishment proposed in this paper, is only needed for a subset of the contexts in which it could operate. These rules become more redundant the later they operate, removing only the features left over from previous Impoverishments. But together, the five rules suppress the features that remain unexpressed and pass over those features which are evidently spelled out, capturing the entire affix pattern.

(13) **Rules of Impoverishment (collated)**

a. *Person Impoverishment Rule:*
 $\pm 1 \pm 2 \pm 3 \rightarrow \emptyset \quad / [____] [\text{ACC} + 1]$

¹³ Actually, there are other such cases in the analysis as well. For example, subject's case in $\text{XSG} > \text{1SG}$ is spared and simply unrealized. A unified account of these non-realizations would be best. One such account could be to posit a null VI specified for the empty set of feature. Additional rules of Impoverishment would be an alternative, but one rule could not capture all of the cases at once. Lacking a unified structural solution (i.e. one that does not boil down to conspiracy of Vocabulary), I prefer to leave this issue unresolved for the time being. Comments are especially welcome on this matter.

¹⁴ This is a problematic assumption, as Object Impoverishment has a very simple structure compared to the other rules, and DM generally has the more complex, specific rules operating first. This might be solved by using a different feature system.

- b. *Number Impoverishment Rule (for 2nd-person objects):*
 $\pm\text{PL} \rightarrow \emptyset \quad /[\text{____}][\text{ACC} + 2]$
- c. *Singular Impoverishment Rule:*
 $-\text{PL} \rightarrow \emptyset \quad /[\text{____}][+1]$
- d. *Object Impoverishment Rule:*
 $[\text{ACC} + 3] \rightarrow \emptyset$
- e. *Number Impoverishment Rule (for plural objects):*
 $\pm\text{PL} \rightarrow \emptyset \quad /[\text{____}][\text{ACC} + \text{PL}]$

4.5. Discussion: Hierarchy?

I have shown that the above analysis, which uses only Vocabulary Insertion and Impoverishment, can explain the pattern of affixes we observe. But in light of Macaulay (1992), where the same phenomenon is explained instead using a single prominence hierarchy (reproduced in (14)), it is worth questioning my choice not to appeal to hierarchies at all. Is my approach unnecessarily complicated? In this subsection, I argue that it is not.

- (14) *Karuk Person/Number Hierarchy:*
 $2\text{PL} > 1 > 2\text{SG} > 3 \quad (\text{Macaulay, 1992})$

Compared to Bright’s (e.g. 1957) portmanteau-based approach, Macaulay’s approach significantly improves learnability (or teachability). But (14) is not an absolute hierarchy; as Macaulay readily admits, there are many exceptions (Macaulay, 2000, §6). Appeal to this hierarchy does not sufficiently explain the intricacies of the paradigm. Macaulay (1992) suggests that a pattern is present that is known from some Algonquian languages (amongst others), where transitive agreement takes place with the more prominent argument; where agreement is with the object, an additional affix marks that the relation is “inverse”. Following Macaulay, we find this pattern in the cases with *-ap*, in that view an inverse marker. But we expect also, for example, a 2PL marker for 2PL>1PL; instead we get *kín-*, referring to the 1PL object. You may also note that for all cases where 1PL is object we get the same lone affix, *kín-*, regardless of whether under (14) the relation is direct or inverse (and in the negative paradigm, we see again that *-ap* is invariably suffixed in these cases, regardless of the subject’s prominence). Putting 1PL above 2PL only creates the opposite problem, where we unexpectedly get *ki-k-* and *-ap* for 1PL>2PL. In the final count, only a minority of cases neatly comply with the expected pattern, and

the proposed hierarchy can only be motivated for a subset of the affix paradigm. Although (14) captures significant generalizations about a part of the paradigm, it is insufficient on its own.

Nonetheless, hierarchy effects are present under the current analysis. Consider the apparently universal prominence hierarchies of person and number: First and second person are prominent as compared to the third, and plural number is prominent as compared to the singular. Linguists at least as far back as Greenberg (1966) have noted this hierarchy in terms of markedness, and Silverstein (1976) famously established the notion of universal prominence hierarchies for these features. When considering the rules of Impoverishment in (13), we may observe a certain regularity: Features are deleted either when the other argument is of a prominent category, or when they are of low prominence, or both. Where the rules in (13) match (unaffected) features in the context, a prominent category in this sense provides the context for Impoverishment of the other argument (its prominence “eclipsing” that of the opposite argument, perhaps). When a specifically-valued feature instance is deleted, it is always the lowest on one of the scales – singular or the third person. This property or pattern emerges from the data, suggesting the notion of hierarchies, even within an analysis that does not utilize prominence scales.

But remarkable as this pattern may be, the hierarchies are reflected in the Rules of Impoverishment only weakly. The pattern of affixes conforms to the hierarchies only in part, regardless what status these may have; they could be considered a theoretical primitive driving Impoverishment (reminiscent of the filters of Noyer (1992)), mere emergent tendencies driven by pragmatic effects (singular nouns being more frequent or plural nouns more notable, for example), or perhaps the result of language contact. In any case, the pattern is only partially there.

An analysis driven by feature hierarchies is possible in DM. However, it would have to explain the many divergences from the pattern the hierarchies predict; no simple, straightforward hierarchy of features can capture the entire pattern, as demonstrated so clearly by the opposition of $X>1PL$ and $X>2PL$ forms (amongst other “divergent” cases). If the divergences were few, this would be no different from the present analysis, which proposes that both arguments may be realized and seeks to explain the cases where the data diverges from this pattern. The complex pattern of Karuk diverges starkly from both hypotheses, but the present analysis shows that assuming agreement with both arguments is not entirely unreasonable as a default. A DM analysis that begins by Fusion of

both agreement heads – in order for a hierarchy to select which single head is expressed – would have to explain the multiple cases where we see two affixes. In fact, some of the problems above would be just as problematic under such an analysis. At the cost of leaving the hierarchy effect unexplained, the current approach provides an altogether neater analysis.¹⁵

5. Summary

I have presented a systematic analysis of the Karuk positive-mood agreement affixes within Distributed Morphology. I assumed agreement with both arguments as default and subsequent Impoverishment through five simple and general rules, producing the pattern observed. My analysis showed that the affixes in question can be clearly identified as referring each to a single referent, following Macaulay (1992, 2000) and contra to Bright (1957) and other traditional analyses. I have pointed out that the patterns of Impoverishment loosely conform to the universal prominence scales for person and number of Silverstein (1976), although the rules are independently motivated, without recourse to feature hierarchies. But I argued that it is preferable for a DM analysis of Karuk not to assume the hierarchy-driven agreement as default, given the limited extent of such effects in the data. It remains to be seen how smoothly my analysis can be extended to the optative and negative moods, and whether or not it may benefit from the addition of more sophisticated technology of morphological analysis, such as feature geometries.

References

- Bright, William. 1957. *The Karok language*, volume 13 of *University of California Publications in Linguistics*. Berkeley: University of California Press.
- Frampton, John. 2002. Syncretism, impoverishment, and the structure of person features. In *Papers from the Chicago Linguistics Society Meeting*, volume 38, 207–222.
- Greenberg, Joseph H. 1966. *Universals of language*. MIT Press Cambridge, MA.
- Halle, Morris, and Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In *The view from building 20*, ed. K. Hale and S. J. Keyser, 111–176. MIT Press.
- Harley, Heidi, and Rolf Noyer. 1999. Distributed Morphology. *Glott International* 4.

¹⁵A further approach, taken by Bank (this Volume), is to implement hierarchy effects as more of a gradient.

- Macaulay, Monica. 1992. Inverse marking in Karuk: the function of the suffix -ap. *International Journal of American Linguistics* 58:182–201.
- Macaulay, Monica. 2000. Obviative marking in ergative contexts: The case of Karuk ʾiin. *International Journal of American Linguistics* 66.
- Müller, Gereon. 2005. Syncretism and iconicity in Icelandic noun declensions: A Distributed Morphology approach. *Yearbook of Morphology* 2004.
- Noyer, Rolf. 1992. Features, positions and affixes in autonomous morphological structure. Doctoral Dissertation, Massachusetts Institute of Technology, Cambridge, Massachusetts.
- Silverstein, Michael. 1976. Hierarchy of features and ergativity. *Grammatical categories in Australian languages* 112–171.
- Trommer, Jochen. 2003. Feature (non-)insertion in a minimalist approach to spellout. In *Proceedings of CLS* 39.