1. Introduction

Recent work exploring the evolution of human language (Berwick and Chomsky 2011; Chomsky 2005, 2007, 2010) presents the view that it is a one-time event that yielded unbounded Merge, with externalization of language as a subsequent secondary process that does not involve a genomic change. This hypothesis is embedded in the following version of the strong minimalist thesis (SMT) formulated by Chomsky (2010), slightly modifying the title of Sauerland and Gärtner (2007):

(1) Interfaces + Merge = Language

where language is understood to mean the faculty of language in the narrow sense (FLN) in the wording of Hauser, Chomsky, and Fitch (2002). Left out of this scenario is the status of Agree, which defines one of the two syntactic relations in a rather parsimonious computational system posited in the Minimalist Program (Chomsky 2004, 2008), the other one being set-membership given by Merge. What I would like to do in this article is to clarify how Agree fits the Merge-centered picture of language evolution. An obvious step is to link it to the process of externalization, but the problem is that externalization is regarded as a secondary process under the hypothesis summarized above. Is the emergence of Agree also a secondary process? My proposal is that Merge itself lays the foundation for the major players in the operation of Agree, namely, uninterpretable features, opening the door for externalization at the same time. In relation to this, I will also put forward a new conception of the Agree operation and pursue some of its consequences.

As an initial step in pursuing the idea, I begin in section 2 by summarizing the key properties that the Transfer operation must deal with in handing over the output of narrow syntax to the system that leads to the sensorimotor (SM) interface, called externalization above, focusing on uninterpretable features that drive the operation of Agree. A new conception of the Agree operation is presented next. The inventory of uninterpretable features and their theoretical status are also discussed. Section 3 applies the new conception of Agree to a rather rich empirical domain involving complex nominal morphology found in Jemez and Kiowa, reworking Harbour’s (2011) account. The result is a unified treatment of inverse in the two languages, which Harbour’s original account fails to achieve.

2. Agree and Externalization of LOT

FLN is a computational system that connects the conceptual-intentional (CI) interface to the SM interface, with narrow syntax sitting in its center. Lexical items are atomic units of narrow syntax computation, combined by the operation of Merge to form complex structure.

* I would like to thank the audience at GLOW in Asia IX for helpful discussion. The research reported here was supported by Grant-in-Aid for Scientific Research (C) 22520492 from the Japan Society for the Promotion of Science.
Semantic and phonological features are packed together in lexical items, to be used in the CI and SM systems, respectively. FLN must therefore include an operation of Transfer, which teases apart semantic and phonological information, sending the former to the CI interface and the latter to the SM interface.

It is not just phonological features that are handed over to the so-called PF branch of FLN, however. Narrow syntax contains an operation of Agree, which gives a value to originally value-less uninterpretable features by matching them with valued interpretable counterparts (Chomsky 2001). Once valued, uninterpretable features may be realized phonologically, a rather interesting property of natural language. This means that Transfer also picks out uninterpretable features that have undergone Agree and sends them to the morphological computational system that assigns to them phonological forms as in the theory of Distributed Morphology (Halle and Marantz 1993 and subsequent work). Thus, there are two sources of phonological information, namely, phonological features of lexical items and uninterpretable features valued by Agree.

What would be the form of FLN if we adopt the view put forth by Berwick and Chomsky (2011) and Chomsky (2005, 2007, 2010) that the system of externalization came later in the evolution of human language? They claim that FLN functioned as a system for a language of thought (LOT) at the earliest stage when human language emerged. This consequence is innocuous as far as lexical items are concerned. The research in the 1980’s emphasized the significance of empty categories, which are not realized phonetically, as strong evidence for the working of universal principles. Functional categories also often come without phonological content, perhaps reflecting the LOT nature of FLN. So it is perfectly natural to have a structure building system that dispenses with the link to the SM interface.

The computational system without externalization, however, cannot retain the operation of Agree in the form currently assumed. Agree outputs valued uninterpretable features that need to be taken care of by morphology. Without externalization, such features cannot exist. One might imagine handling them by brute-force deletion, but then, there is no point in throwing them into the computational system in the first place. Only with the potential of phonetic realization do uninterpretable features serve the purpose of establishing a link between the CI and SM interfaces through Agree, which matches interpretable features (CI entities) with their uninterpretable counterparts (see Watanabe 2008).

There are only two logical possibilities: the initial computational system of FLN is equipped with the Agree operation together with uninterpretable features, or it isn’t. I lean toward the affirmative answer here. At the same time, evidence for the primacy of the CI interface is considered to be robust, including the design optimization keyed to the CI interface and the lack of substantial differences between spoken and sign languages. How can one reconcile the CI primacy of FLN with the eventual linkage of Agree to the SM interface? I am not prepared to give a full story in this article, but hope to provide a plausible outline. I will concentrate on elucidating the nature of uninterpretable features by developing the suggestion made in Watanabe (2009) that they are recruited from semantic features. This suggestion locates the origin of uninterpretable features in the CI systems. I would like to elaborate it in this section.

2.1. Formal Features, Semantic Interpretation, and Agree

Uninterpretable features that drive the operation of Agree are classified as formal features in the typology of features proposed by Chomsky (1995), according to which there are two kinds of features that contribute to semantic interpretation in the CI systems. One is called semantic features, and the other interpretable formal features. The difference between the two is that semantic features are inert during narrow syntax whereas formal features enter into agreement when interpretable ones are matched with their uninterpretable counterparts.
under appropriate locality conditions. The proposal of Chomsky (2001), mentioned above, views this process as valuation.

Crucially, there are no formal features like [±consonantal]. For this reason, Watanabe (2009) argues that formal features are recruited from resources on the CI side even though there are uninterpretable versions of them. Furthermore, comparative study of different stages of English suggests that there is a parameter concerning feature classification allowing the definiteness feature to act as formal in some languages and as semantic in others, reinforcing the case for the idea that formal and semantic features share a common evolutionary origin. Then, precisely how are uninterpretable formal features created out of CI resources?

To answer this question, we need to sharpen the notion of uninterpretable features that receive a value through the Agree operation. For this purpose, we can make use of Harbour’s (2007, 2011) proposal that uninterpretable features are characterized by the presence of both the plus and minus values, as in [+F, –F] for the feature F. This specification is uninterpretable because it gives contradictory instructions. Now, observe that it is a small step from this conception of uninterpretability to identification of the evolutionary process that derives it: binary Merge. Harbour himself (2011: note 5) comments that given a combinatorial system such as syntax, the existence of [+F] and [–F] can automatically give rise to [–F, +F] unless a further stipulation blocks cooccurrence of the two. Since Merge forms a set, the uninterpretable version of F is {+F, –F}, strictly speaking.1

The prerequisite for this hypothesis is that conceptual resources for formal features must come in pairs. Harbour (2011) indeed argues for the bivalent nature of number features on the basis of the analysis of Kiowa and Jemez, which will be revisited in section 3. See also Watanabe (2010) for the same conclusion from different empirical material and Watanabe (to appear) for the binarity of the person feature system. Quite generally, the strictly privative feature system is incompatible with the use of valuation for agreement, as Adger and Svenonius (2011) point out, since valuation presupposes two distinct states of a feature. After the privative system is ruled out, there remain various logical possibilities for multi-valued features. Only the binary system, however, is compatible with the idea that Merge creates uninterpretable formal features.

Once uninterpretable features are made available for the FLN computation and are actually thrown into the derivation together with lexical items, the need to get rid of them immediately arises. The outlet must be the SM systems. Thus, we can conclude that the motivation for externalization comes from exploitation of the CI resources by the operation of Merge. One may say that this is another respect in which the CI interface enjoys the primary status. FLN is destined to develop the mechanism of externalization even though it is an instrument for LOT. This reasoning also suggests that the distinction between semantic features and interpretable formal features is superfluous and derivative. Uninterpretable features are created out of interpretable ones and therefore can always be matched with them (with one important exception that will be taken up in section 2.3).

It is an open empirical question whether the earliest stage of FLN already possessed the system for externalization. The availability of uninterpretable features could be only latent at the beginning. The question needs to be addressed together with whether the earliest stage of FLN already possessed the operation of Agree. One relevant consideration has to do with the fact that Agree serves as a search mechanism for the proper operation of Internal Merge. It is not clear whether Internal Merge can work in an optimal way without the help of Agree. Did

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1 I am not saying that Merge forms uninterpretable features as part of derivation. I assume that they are given for each individual language, with the precise inventory parametrized. My claim is that binary set formation is responsible for the phylogenetic origin of uninterpretable features.

Let me add that recursion is not needed for the creation of uninterpretable features. It would only give rise to monsters that the externalization system cannot handle.
the earliest stage of FLN lack Internal Merge, even though this mode of Merge is given for free (Chomsky 2004)? I will not resolve the issue here. Instead, I now turn to the formulation of Agree.

2.2. A New Theory of Agree

The idea that uninterpretable features come in the form of \{+F, –F\} allows us to reconsider the valuation mechanism of the Agree operation. Harbour (2007, 2011) takes the view that values matched with those of the interpretable counterpart are retained and become visible at PF, whereas unmatched values get deleted (or simply become invisible at PF). Under this conception, retention of the matched values is the core process of valuation.

I would like to propose instead that valuation is indeed deletion. The traditional intuition tells us that what happens in agreement is something like (2).

(2) a. Valuation of \{+F, –F\} with +F means deletion of –F, producing \{+F\}.
   b. Valuation of \{+F, –F\} with –F means deletion of +F, producing \{–F\}.

But if valuation deletes one of the two values, there is no logical necessity that things should work as in (2). Agreement can operate in the opposite direction, as in (3).

(3) a. Valuation of \{+F, –F\} with +F means deletion of +F, producing \{–F\}.
   b. Valuation of \{+F, –F\} with –F means deletion of –F, producing \{+F\}.

In other words, matching of \{+F, –F\} with +F (or with –F) itself does not dictate which value should go as a result of valuation. No matter which value is deleted, it is a stipulation made arbitrarily. And as long as valuation always involves deletion, this arbitrary choice must be made for each case of agreement, a locus of parametrization.

Is there any evidence that the option in (3) is needed? Actually, a mundane fact about English subject-verb agreement seems to require it. Commenting on data like (4), Chomsky (1975:234) remarks that the singular form of the verb is matched with the plural subject and vice versa, viewing the suffix -s as a marker of [–singular] both in (4a) and in (4b).

(4) a. The boys like apples.
   b. The boy likes apples.

The conventional treatment leaves the two -s suffixes in (4a, b) as completely unrelated. The new conception of agreement allows us to accommodate data patterns like (4) in a uniform account of what looks like a single morphological piece.

Option (2) is also needed, in view of the following Spanish data from Harris (1991:34):

(5) a. Mi sobrino es alto.
     my nephew is tall.m
   b. Mi sobrina es alta.
     my niece  is tall.f

Here, the feminine subject forces the feminine form of the adjective, and the masculine subject the masculine form.\(^2\) Given the conventional treatment of agreement, one may be led to think that option (2) is the unmarked choice. But the matter is entirely empirical. Future research should examine the distribution of options (2) and (3).

Anders Holmberg pointed out to me that the mechanism of valuation in terms of deletion

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\(^2\) See Watanabe (2011) for an account of agreeing predicative adjectives in terms of Multiple Agree.
finds an analogue in pairing of yes-no questions and answers. Yes-no questions denote a set of propositions of the form \( \{p, \neg p\} \), from which the answer is formed through deleting one of the propositions. Note the striking formal similarity. Valuation may have been designed on the model of the CI system that lies behind yes-no questions and answers.

### 2.3. CI Resources

Let us examine next whether the conceptual resources for the \( \phi \)-feature system were available at the birth of FLN.

To start with the number features, Hauser, Barner, and O'Donnel (2007) report that rhesus monkeys exhibit the sensitivity to the singular-plural distinction. There does not seem to be any obstacle to the assumption that [±singular] was recruited from pre-linguistic conceptual resources. For [±augmented], on the other hand, there is no comparative study, as far as I am aware. Watanabe (2010) suggests that [±augmented] is involved in licensing of numerals, linked to the natural number system. If the notion of natural numbers was made possible by the emergence of Merge along the lines suggested by Chomsky (2008), [±augmented] could not have existed prior to the appearance of FLN, at least in the form linked to natural numbers. The notion behind [±augmented], though, is simply the contrast between minimal and non-minimal, informally speaking. It is conceivable without assuming language. The rationale connecting [±augmented] to natural numbers in Watanabe’s (2010) discussion is that the hierarchical specification in the shape of \([-augmented]\) (\([+augmented]\)) serves as the successor function by yielding the minimal element of the non-minimal part. It is possible that only the linkage to natural numbers (and hence numerals) was established by the emergence of FLN. We also need to address whether the contrast between minimal and non-minimal is a notion available for non-human animals. The singular-plural distinction, which rhesus monkeys are sensitive to, may be due to [±augmented].

Turning now to the person features, a naïve reaction would be to say that notions like speaker and hearer are impossible without language. But person distinctions are deictic in nature. A member of a species facing another member is a commonplace event, especially for animals living in groups. The notions of speaker and hearer were probably transposed from situations of such social interactions. One may even talk about non-verbal communication. Only the verbal part is an innovation, then.

The interpretability of gender features itself is debatable in the first place, but Percus (2011) suggests that the problem can be sidestepped by providing an explicit interpretation procedure that specifically mentions the irrelevance of the masculine/feminine contrast for inanimate entities. He takes up Italian as the simplest case, which only has two classes of nouns. Though there does not seem to be any consensus on what are the possible noun classification systems for natural language, one can adopt a strategy similar to Percus’s for any classification system as long as it employs semantic notions as its basis. In principle, then, features of noun classification can be recruited from the CI systems. The real task is to identify and enumerate semantic notions that define possible noun classification systems. Chomsky (2007, 2010) stresses that concepts realized as lexical items are radically different in nature from those entering into representational systems of other animals.\(^3\) If any one of these concepts turns out to be crucially involved, that must be treated as an innovation. Much work remains to be done. To sum up so far, at least some of the \( \phi \)-features can be attributed to pre-linguistic conceptual resources. One can therefore construct a primitive agreement system on that basis.

The account of \( \phi \)-feature agreement cannot be complete without taking up the status of case, however. And here, we face a real difficulty. Structural case has been considered to be a

\(^3\) For detailed discussion of various examples, see Chomsky (2000b).
quintessential example of uninterpretable entities in FLN. Even if one can point to some abstract semantic correlates of structural case (see Svenonius 2007), it is simply impossible to organize relevant concepts into binary features. In a way, this status of structural case is reflected in the valuation system of Chomsky (2001), where case is simply assigned a value as a by-product of $\phi$-feature agreement, depending on the type of the probe, without being matched with an interpretable counterpart. Binarity requirements on conceptual resources put rather severe constraints on possible avenues for exploration. In this connection, inherent case, which is linked to thematic role interpretation (Chomsky 1986), must also be taken into account, because it is on a par with structural case in being reflected in morphological realization, at least in some languages. Important hints might be sought in the way externalization works. As shown by Hiraiwa (2010), realization of case is regulated by the OCP in a cyclic fashion. Given the theoretical origin of the OCP (Leben 1973), it might be fruitful to compare case with tone, though only future research can tell whether this promissory note can be cashed.

3. Inverse in Jemez and Kiowa

In the rest of this article, I would like to show how the new theory of agreement treats inverse marking in Jemez and Kiowa. One of the great achievements in Harbour’s (2011) work is to identify nearly identical sets of noun classes in Jemez and Kiowa. Previous work on Jemez such as Noyer (1997) classifies Jemez nouns somewhat differently, failing to recognize the unity of noun classification in Jemez and Kiowa. Harbour accomplishes a nearly complete unification by pointing to the special status of dual in Jemez. My account will inherit this insight. On the other hand, inverse is still characterized separately for Jemez and Kiowa under Harbour’s analysis, the difference between the two languages being treated as nothing but an arbitrary stipulation. I will show that the new theory of agreement allows us to capture the fact that inverse works in exactly the same way in Jemez and Kiowa, enabling us to make progress in this respect as well. The fact remains, though, that there is a difference between Jemez and Kiowa. The last key element in my proposal is the treatment of the special status of dual in Jemez pointed out by Harbour, which finds an independent cross-linguistic motivation, unlike the way Harbour handles it. Once the special status of dual in Jemez is correctly pinned down, the difference between the two languages follows.

The discussion proceeds in the following way. Section 3.1 reviews Harbour’s (2011) account, introducing at the same time the empirical material to be explained. Section 3.2 compares the new theory of agreement with Harbour’s execution of agreement. Section 3.3 presents a novel uniform analysis of inverse in Jemez and Kiowa, attributing the difference between Jemez and Kiowa to something other than inverse.


A very intriguing characteristic of Jemez and Kiowa is that the majority of nouns have an inherent number value and that when the actual number interpretation differs from the one expected from the inherent value, a special marker called inverse is suffixed to the noun. In this section, I will review how Harbour (2011) handles this phenomenon.

Jemez and Kiowa make a tripartite distinction of singular, dual, and plural in number. These number categories are defined in terms of elementary features as follows:

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4 Let me add that regulation is intended to cover even those cases where multiple instances of identically case-marked phrases are tolerated by the OCP in a local domain, as in the Japanese nominative case.

5 See Maling, Yip, and Jackendoff (1987) in this connection.
Informally speaking, [+augmented] designates non-minimal entities. Since [+augmented] is interpreted relative to [±singular], the combination [–singular, –augmented] picks out minimal elements in the [–singular] entities, namely, dual. Similarly, [+singular, +augmented] is a contradictory specification for the purposes of semantic interpretation and therefore is impossible. For a model-theoretic definition of these features, see Harbour (2011).

The function of inverse marking can be observed in the following Kiowa examples:

(7) a. Tógúl Ø-dó. (Harbour 2007: 26)
   young.man 3sg-be
   ‘It’s a young man.’

b. Tógúl e-dó.  
   young.man 3du-be
   ‘It’s two young men.’

c. Tógúúdó e-dó.  
   young.man.inv 3inv-be
   ‘They’re young men.’

   pencil.inv 3inv-be
   ‘It’s a pencil.’

b. Kútaa e-dó.  
   pencil 3du-be
   ‘It’s two pencils.’

c. Kútaa gya-dó.  
   pencil 3pl-be
   ‘They’re pencils.’

The suffixed noun in (7c) is interpreted as plural, whereas the bare form in (7a, b) means either singular or dual, depending on the verbal inflection. In (8), on the other hand, the suffixed form corresponds to singular, and the bare form either to dual or to plural. Note also that inverse-marked nouns trigger inverse agreement on the verb in (7c) and (8a). Harbour calls nouns like tógúl SDI nouns, and nouns like kútaa IDP nouns, to indicate the agreement type of each noun class for the singular-dual-plural triad in this order, where S is singular, D dual, P plural, and I inverse. The inherent number of SDI nouns is [–augmented], and that of IDP nouns [–singular]. Thus, noun classes are defined in terms of number features. Inverse marking is used when the intended interpretation refers to the opposite value: [+augmented] for SDI nouns and [+singular] for IDP nouns.

The Kiowa inverse can express dual, too, as illustrated in (9).

(9) a. Nóó a-dó. (Harbour 2007: 32)
   I 1sg-be
   ‘It’s me.’

b. Nóó e-dó.  
   I 1inv-be
   ‘It’s me and him/her.’ or ‘It’s me and them.’

According to Harbour, the first person pronoun is the only item whose inherent number is
characterized as [+singular]. It exhibits the SII behavior. (9b), where the verb shows inverse agreement, is ambiguous between dual and plural for that reason. Kiowa also has nouns whose cardinality is expressed transparently by the verbal agreement marker.

(10) a. X!óú Ø-dóó. 
    stone 3sg-be
    ‘It’s a stone.’

b. X!óú č-dóó.
    stone 3du-be
    ‘It’s two stones.’

c. X!óú gya-dóó.
    stone 3pl-be
    ‘They’re stones.’

This type of noun does not have an inherent number specification and lacks inverse marking. Nouns of this type belong to the SDP class.

Harbour (2011) presents (11) as the list of noun classes attested in Kiowa.

(11) Kiowa noun classes (Harbour 2011: 578)

<table>
<thead>
<tr>
<th>class</th>
<th>class features</th>
<th>semantic characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDP</td>
<td>Ø</td>
<td>default</td>
</tr>
<tr>
<td>SII</td>
<td>[+singular]</td>
<td>first person only</td>
</tr>
<tr>
<td>SDI</td>
<td>[–augmented]</td>
<td>independently mobile objects</td>
</tr>
<tr>
<td>IDP</td>
<td>[+group]</td>
<td>vegetation; most non-SDI implements; most non-SDI body parts</td>
</tr>
<tr>
<td>IDI</td>
<td>[+singular, +group]</td>
<td>hair types; midsize fruit growing in clusters</td>
</tr>
<tr>
<td>SDS</td>
<td>[–group]</td>
<td>non-shape-inductive objects</td>
</tr>
<tr>
<td>IDS</td>
<td>[–singular, +group]</td>
<td>vegetation occurring in natural collections; implements that may act collectively</td>
</tr>
<tr>
<td>SSS</td>
<td>[+augmented, +group]</td>
<td>nongranular mass nouns</td>
</tr>
<tr>
<td>PPP</td>
<td>[+augmented, –group]</td>
<td>pluralia tantum nouns; granular mass nouns (for some speakers)</td>
</tr>
</tbody>
</table>

I will not bother the reader with further examples of each noun class. These are amply discussed in Harbour’s (2007) book. Our major concern in this article is how the inherent feature specification of each noun class is combined with the precise characterization of inverse to yield the attested agreement pattern. For this particular purpose, (11) suffices.

The list in (11) includes a feature [±group] that I have not explained yet. It plays a special role in agreement within DP in Harbour’s account. Its function will be taken up when Harbour’s featural characterization of inverse is reviewed below. Let me just say at this moment that the active role of [±group] is limited to pluralities (hence [+augmented]), where the presence ([–group]) or absence ([+group]) of salient subparts matters.

For Jemez, Harbour (2011) claims that its noun classification system can be summarized as in (12).

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6 The first person pronoun is not suffixed with an inverse marker (Harbour 2007: 88). Kiowa has a null inverse suffix that is used for nouns ending in /p/ or /t/ (Harbour 2007: 55), but the first person pronoun does not fall under this generalization. This fact may be due to the different morphological status of the D head associated with pronouns. As will be explained below, the inverse marker is considered to be located at D.

Note also that Kiowa distinguishes between exclusive and inclusive. (9b) exemplifies exclusive dual and plural. Inclusive dual and plural also trigger inverse agreement (Harbour 2007: 82).
(12) Jemez noun classes (Harbour 2011: 580)

<table>
<thead>
<tr>
<th>class</th>
<th>class features</th>
<th>semantic characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIP</td>
<td>Ø</td>
<td>default</td>
</tr>
<tr>
<td>SII</td>
<td>[–augmented]</td>
<td>animates</td>
</tr>
<tr>
<td>IIP</td>
<td>[–singular]</td>
<td>vegetation; artifacts; body parts</td>
</tr>
<tr>
<td>III</td>
<td>[–singular, –augmented]</td>
<td>weakly granular mass nouns</td>
</tr>
<tr>
<td>SIS</td>
<td>[+group]</td>
<td>collective counterpart of SIP</td>
</tr>
<tr>
<td>IIS</td>
<td>[–singular, +group]</td>
<td>collective counterpart of IIP</td>
</tr>
<tr>
<td>SSS</td>
<td>[+augmented, +group]</td>
<td>nongranular mass nouns</td>
</tr>
<tr>
<td>PPP</td>
<td>[+augmented, –group]</td>
<td>granular mass nouns</td>
</tr>
</tbody>
</table>

The behavior of a noun from the IIP class is illustrated below.

    that-inv box-inv I 1sg-3inv-lie.sg/du
    ‘That box is mine.’
    ‘Those [two] boxes are mine.’

    that box I 1sg-O-lie.pl
    ‘Those [several] boxes are mine.’

The suffixed form in (13a) is ambiguous between the singular and dual readings here. Some more Jemez examples will be presented later on when I propose a new analysis.

It is quite remarkable that the set of noun classes in Jemez is featurally almost identical to the Kiowa counterpart. The only difference is the absence of the [+singular] class from (12). This near identity is not a coincidence. Both Jemez and Kiowa are members of the Kiowa-Tanoan family.

Another observation to be made is that when inverse marking is available for a class, dual is always marked with inverse in Jemez, unlike in Kiowa. In fact, nouns with the same inherent number specification display different agreement profiles in the two languages. The Jemez noun t’ëtiba in (13), a member of the IIP class, is inherently marked with [–singular]. Kiowa nouns with the same inherent number specification, however, belong to the IDP class. Harbour (2011) attributes this difference to parametrization of the way inverse is characterized in terms of number features, a topic to which I will turn next.

Harbour (2011) posits the following structure for DPs:

(14)

```
    DP
       /\                  /
      /  \      \    /
   NumberP D   Class (Noun)  Number
```

Class is the locus of inherent number specification, hosting a subset of {±singular, ±augmented, ±group}. These features are chosen according to the conceptual content of the noun in question and do not contribute to model-theoretic interpretation. The semantic characteristics associated with each class in (11) and (12), which do not concern us here, are regarded as relevant to inherent number specification. Number consists of [±singular, ±augmented], determining the number interpretation of DPs as in (6). Inverse marking is associated with the D head, which hosts [±singular, ±augmented] as uninterpretable features.

7 Membership of each class differs slightly, too. Yumitani (1998) also notes speaker variation for Jemez.
that need valuation. Crucially, Class and Number are assumed to jointly value D.

According to Harbour’s analysis, inverse marking arises under the following conditions:

(15) Inverse
   a. Inv ⇔ [–F, +F] (Kiowa)
   b. Inv ⇔ [αF, αG] (Jemez)\(^8\)

As discussed by Harbour (2007) and Yumitani (1998), the inverse marker within DP has allomorphs, including zero mentioned in note 6. Thus, Inv in (15a) and (15b) is nothing other than a cover term for various morphologically realized forms, as noted by Harbour (2011). (15a) and (15b) should be taken as abbreviations for actual Vocabulary items in the framework of Distributed Morphology (Halle and Marantz 1993, Embick 2010).

Let us now turn to the mechanism of valuation that can yield the feature specifications in (15). Chomsky (2001) hypothesizes that uninterpretable features lack values and therefore need valuation. Harbour (2007, 2011) proposes instead that uninterpretable features take the form of [–F, +F], as we have already seen, and that they undergo valuation as described in (16).

(16) Valuation in agreement
   a. An uninterpretable feature is valued if and only if it is matched with an interpretable counterpart in the appropriate domain.
   b. A feature that has been matched is visible at PF. (Unmatched uninterpretable features are invisible.)

In other words, valuation functions as retention of the matched feature under this view.

To see how this mechanism works, consider the Jemez IIP noun ê·têbaby in (13), which is [–singular]. The input to agreement has the following options, where uF is used as a shorthand notation for [–F, +F] to save space:

(17) a. [[[Class –singular] [Number +singular, –augmented]] [D usingular, uaugmented]]
   b. [[[Class –singular] [Number –singular, –augmented]] [D usingular, uaugmented]]
   c. [[[Class –singular] [Number –singular, +augmented]] [D usingular, uaugmented]]

The fact that both Class and Number value D means that the result of valuation is the union of the two sets of features. The resulting content of D is shown below.

(18) a. [D +singular, –singular, –augmented] <= (17a)
   b. [D –singular, –augmented] <= (17b)
   c. [D –singular, +augmented] <= (17c)

(15b) predicts that (18a) and (18b) lead to inverse marking while (18c) does not. This is the correct result, as can be seen from (13) or the class label of the noun, which is IIP. All the other Jemez nouns that do not involve [±group] are also accounted for correctly. Since dual is [–singular, –augmented], the retention view of valuation makes sure that dual nouns will always be marked with inverse, given (15b), as long as there is no other interfering factor.

The presence of [±group] can constitute such an interfering factor. Harbour (2011: 572) posits special provisions in (19).

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\(^8\) Since the features in question are [±singular] and [±augmented], a more accurate specification of the Jemez inverse under Harbour’s account should be [αsingular, αaugmented].
(19) Effect of [+group] on valuation of D
   a. In presence of [+augmented], [+group] causes D to be valued as [+singular, –augmented] (i.e., as a singularity).
   b. In presence of [+augmented], [–group] causes D to be valued as [–singular, +augmented] (i.e., as a plurality).
   c. In absence of [+augmented], [±group] is inert.

Nouns inherently marked as [+augmented, ±group] are either SSS or PPP, depending on the value of [±group]. For the classes of SIS and IIS in (12), the effect of [+group] shows up only when Number contains [+augmented], namely, in plural.

Consider Kiowa next. Combined with the mechanism of valuation in (16), (15a) predicts that inverse marking will be used whenever a value of the inherent number specification is in conflict with one of the features in Number, again, as long as [±group] is absent. This prediction is borne out in (11). The effect of [±group] appears in the same way as in Jemez.

This wraps up the review of Harbour’s (2011) account of Jemez and Kiowa. Despite the almost complete unification of noun classes, two different characterizations of inverse are offered for Jemez and Kiowa. This move is forced because the two languages differ in the distribution of inverse marking. To account for the difference, one must posit some source of variation, which under Harbour’s account is the characterization of inverse. Though the divergent treatments of inverse may not be necessarily problematic, I will show below that a single formulation of inverse suffices for the two languages. Two key ideas are the new theory of agreement introduced in section 2.2 and an independently motivated way to explain away the difference between Jemez and Kiowa in the distribution of inverse.

3.2. Valuation in Agreement

In this section, I will elaborate on the new theory of agreement, especially, with regard to the mechanism of valuation. My proposal capitalizes on Harbour’s new conception of uninterpretable features, as mentioned above. Harbour presents his own theory of valuation on the basis of the assumptions in (16). In order to explore what other possibilities are available, let us reconsider how valuation works under Harbour’s analysis.

The kind of agreement involved in inverse marking is multiple Agree in the sense of Hiraiwa (2005), where a single probe is matched with multiple goals. Under the retention view on valuation adopted by Harbour (2011), (17a) leads to (18a), both repeated below.

(17) a. [[[Class –singular] [Number +singular, –augmented]] [D usingular, uaugmented]]

(18) a. [D +singular, –singular, –augmented]

Here, D is the probe, and Class and Number the goals. Note that deletion is involved in the process, if deletion is taken to be the means of rendering features invisible as described in the parenthesized portion of (16b). The algorithm for valuation is as follows:

(20) Valuation algorithm (retention version)
   a. Step 1: Form the union of the features contained in the goal(s).
   b. Step 2: Delete from the probe the feature(s) not contained in the union formed in Step 1.

And this is the only way of carrying out valuation, if we do not want to introduce an additional mechanism of stamping a validation mark on matched features that keeps them visible till Vocabulary Insertion takes place.
In the case of (17a), Step 1 gives \{+singular, –singular, –augmented\}. Deletion is carried out in relation to this set.

A conceptually simpler way of handling valuation is to do away with union formation. It is formulated in (21).

(21) Valuation algorithm (new version)

Delete from the probe the feature(s) whose value is opposite to that of the features in the goal(s).

According to the algorithm in (21), one only needs to examine individual features of the goal(s) to carry out deletion. In the case of (17a), valuation therefore means deletion of [+singular], [–singular], and [+augmented].

It should be observed that under Harbour’s account, the new conception of uninterpretable features plays no significant role in the valuation of the features at D. The same result can be obtained by simply copying feature values from the two goals at Class and Number, instead of following (16) or (20). The only role of the new conception in his account I can see is to remove from researchers’ mind psychological barriers to accepting [–F, +F] as the characterization of inverse in Kiowa. The idea, I conjecture, is that since the probe starts out with [–F, +F], there should not be anything wrong with [–F, +F] being the result of valuation. The deletion algorithm in (21), on the other hand, captures effectively the essence of valuation under the new conception of uninterpretable features. If the probe is initially provided with [–F, +F], valuation needs to take the form of deletion.

Let us now return to (17a) by adopting the official set notation for uninterpretable features, namely, \{–F, +F\}, whose conceptual foundation is given by Merge. The content of D prior to valuation is \{ [+singular, –singular], [+augmented, –augmented] \}. Deletion of [+singular], [–singular], and [+augmented] then results in \{ {}, [–augmented] \}. {} is an empty set, which is an entity that has a special status in set theory, since it is a unique set that has no member.

More generally, the valuation algorithm in (21) produces the following results:

(22) a. valuation of \{–F, +F\} with +F = deletion of –F, producing \{ +F \}
    b. valuation of \{–F, +F\} with –F = deletion of +F, producing \{ –F \}
    c. valuation of \{–F, +F\} with +F and –F = deletion of –F and +F, producing \{ \}

(22a, b) repeats (2a, b). Note that the empirical difference between (20) and (21) shows up only when multiple goals possess conflicting values as in (22c). That is why Jemez and Kiowa provide crucial evidence for this theory of agreement. With the new mechanism of agreement/valuation in hand, let us take a fresh look at the data.

3.3. A Uniform Treatment of the Kiowa-Tanoan Inverse

As the discussion in the previous section shows, the new theory of valuation produces different results for the uninterpretable features of D. This inevitably forces us to look for a new featural definition of inverse. Let us start pursuing consequences of the new theory by

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10 The mode of valuation in (3) produces the same result as (22c) in the case of agreement with multiple goals having conflicting values. And (22c) is what matters in the account of Jemez and Kiowa. For the account of Jemez and Kiowa below, however, I will assume the mode in (2), since the alternative mode in (3) produces \{ [+singular], [+augmented] \} instead of (25b) for (24b). It is not obvious whether such a combination is allowed as the feature content of inflectional morphology, even though \{ [+singular], [+augmented] \} should in principle be ok as long as semantic interpretation is not at stake.
analyzing Kiowa, which does not involve an additional complication related to dual. As promised above, I will stick with a single, unified characterization of inverse, which turns out to be (23).

(23) Inverse in Jemez and Kiowa

\[ \text{Inv } \equiv \{ , \} \]

This is the formal expression of the idea that inverse indicates the number information opposite to the inherent specification of the noun, under the theory of valuation formulated in (21). When the value of Class and that of Number differ with respect to \([\pm F]\), valuation necessarily produces an empty set for that feature in \(D\).

To show that (23) yields the correct result for Kiowa, let us consider an IDP noun illustrated in (8), repeated below.

(8) a. Kútaad₅ e-dɔ.  
    pencil.inv 3inv-be  
    ‘It’s a pencil.’

b. Kútaa e-dɔ.  
    pencil 3du-be  
    ‘It’s two pencils.’

c. Kútaa gyadɔ.  
    pencil 3pl-be  
    ‘They’re pencils.’

Since IDP nouns in Kiowa are inherently marked with \([-\text{singular}]\), we have the following representations for singular, dual, and plural:

(24) a. \([\{\text{Class } –\text{singular}\} \{\text{Number } +\text{singular}, –\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

b. \([\{\text{Class } –\text{singular}\} \{\text{Number } –\text{singular}, –\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

c. \([\{\text{Class } –\text{singular}\} \{\text{Number } –\text{singular}, +\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

The content of \(D\) becomes (25) after valuation.

(25) a. \([\text{D } \{\}, \{–\text{augmented}\}]\]

b. \([\text{D } \{–\text{singular}\}, \{–\text{augmented}\}]\]

c. \([\text{D } \{–\text{singular}\}, \{+\text{augmented}\}]\]

Only (25a) is realized as inverse, a correct result.

Other classes work in a similar way. Take the first person pronoun, which is inherently \([+\text{singular}]\). (26) gives rise to (27), which predicts correctly that this noun will exhibit the SII behavior.

(26) a. \([\{\text{Class } +\text{singular}\} \{\text{Number } +\text{singular}, –\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

b. \([\{\text{Class } +\text{singular}\} \{\text{Number } –\text{singular}, –\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

c. \([\{\text{Class } +\text{singular}\} \{\text{Number } –\text{singular}, +\text{augmented}\}] \{\text{D } u\text{ingular}, \text{uaugmented}\}\]

(27) a. \([\text{D } \{+\text{singular}\}, \{–\text{augmented}\}]\]

b. \([\text{D } \{\}, \{–\text{augmented}\}]\]

c. \([\text{D } \{\}, \{+\text{augmented}\}]\]

The function of \([\pm\text{group}]\) is retained as before. The statements in (19) are brute-force instructions, overriding the general mechanism of valuation both in my account and in
Harbour’s. One might want to improve on (19), but that project would go far beyond the scope of this article.

(23) handles the rest of the classes in (11) correctly, as can be verified easily. I will leave the task to the reader.

Since the noun classes in Jemez are featurally identical to those in Kiowa minus the [+singular] Kiowa first person pronoun, the assumptions adopted so far predict that the pattern of inverse marking will be essentially the same, which is of course not the case. What is responsible for the difference between Jemez and Kiowa?

The clue is found when the lists in (11) and (12) are compared carefully. Recall Harbour’s (2011) observation about Jemez that when a class allows inverse marking, dual is always inverse-marked. The special status of dual is not limited to that point, however. Note that there is a systematic correspondence between Kiowa classes and their Jemez counterparts. When Kiowa has an XDY class, Jemez has an XIY class, and vice versa. To see this correspondence, let us put noun classes in Kiowa and Jemez side by side.

(28) Noun classes in Kiowa and Jemez

<table>
<thead>
<tr>
<th>Kiowa class features</th>
<th>Jemez class features</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDP</td>
<td>SIP</td>
</tr>
<tr>
<td>SII [+]singular</td>
<td>SIP [+]singular</td>
</tr>
<tr>
<td>SDI [–augmented]</td>
<td>SII [–augmented]</td>
</tr>
<tr>
<td>IDP [–singular]</td>
<td>II [–singular]</td>
</tr>
<tr>
<td>IDI [–singular, –augmented]</td>
<td>III [–singular, –augmented]</td>
</tr>
<tr>
<td>SDS [+]group</td>
<td>SIS [+]group</td>
</tr>
<tr>
<td>IDS [–singular, +group]</td>
<td>IIS [–singular, +group]</td>
</tr>
<tr>
<td>SSS [+]augmented, +group</td>
<td>SSS [+]augmented, +group</td>
</tr>
<tr>
<td>PPP [+]augmented, –group</td>
<td>PPP [+]augmented, –group</td>
</tr>
</tbody>
</table>

The correspondence in question has no exception. Furthermore, it should also be pointed out that except for the SII class, which is absent in Jemez, Kiowa nouns never mark dual with inverse. The almost complete absence of inverse-marked dual in Kiowa is due to the fact that putting aside the SII class, constituted by the first person pronoun alone, and the [+augmented, ±group] classes, which are taken care of by the special provisions in (19), inherent class specification employs only negative values of [±singular] and [±augmented]. Since dual is defined as [–singular, –augmented], Class and Number always share negative values in dual, producing no empty set in D after valuation.

So, if there is a way of converting the representation for dual into the one appropriate for inverse marking as defined in (23), we can account for the systematic correspondence between Kiowa and Jemez noun classes. And indeed, there is an independently motivated mechanism that can achieve our goal. Let us make some detour to review it.

Nevins (2011) discusses cases where the special dual form ceases to be used and is replaced by the plural form, as schematically shown in (29).

(29) Obliteration of the dual form in a certain environment

i. Environment X \( \Rightarrow \) ii. Environment Y
   a. dual: A \( \Rightarrow \) a. dual: B
   b. plural: B \( \Rightarrow \) b. plural: B

He accounts for this extension of the plural form B to dual by means of impoverishment, which is posited in Distributed Morphology to delete features prior to Vocabulary Insertion, affecting the way Vocabulary items are inserted (Bonet 1991, Halle 1997, Harley 2008, and Noyer 1997, among others). He treats the impoverishment operation in question as
markedness-targeted, formulating it as follows:

(30) Impoverishment in environment Y
    Delete marked [–augmented] in the context of [–singular] in environment Y.

The crucial markedness statement is (31).

(31) Context-sensitive markedness statement
    In the context of [–singular], the marked value of [±augmented] is –.

The syncretism of dual and plural in environment Y in (29) is accounted for by the operation in (30), on the assumption that the relevant Vocabulary items are defined as in (32).

(32) a. A $\leftrightarrow$ [–singular, –augmented]
b. B $\leftrightarrow$ [–singular]

After deletion of [–augmented] in environment Y, the Vocabulary item in (32a) becomes ineligible for insertion due to the Subset Principle in (33), the one in (32b) taking over instead.

(33) The Subset Principle (Halle 1997: 428)
    The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

In environment X, where [–augmented] is not deleted, the item in (32a) has more matching features for dual than the one in (32b), and hence is chosen for insertion in dual. For concrete examples from Northern Sámi and Warlpiri manifesting the abstract pattern just illustrated, see Nevins’s article.

What is crucial for our purposes is the impoverishment operation in (30). Let us consider the representation of D for dual right after valuation, which is (34) for all the classes in Jemez and Kiowa except for the [+singular] SII pronoun in Kiowa and the two [+augmented, ±group] classes.

(34) $[D \{–\text{singular}\}, \{–\text{augmented}\}]$

Suppose that impoverishment deletes $\alpha F$, not the set whose member is $\alpha F$. If (30) applies to D in Jemez, we get from (34):

(35) $[D \{–\text{singular}\}, \{\} ]$

Since an empty set is created, inverse is expected, correctly. Thus, the difference between Jemez and Kiowa boils down to Jemez making use of the operation in (30).\textsuperscript{11}

Significantly, the uniform characterization of inverse based on an additional operation of impoverishment in Jemez is made possible by the hypothesis that inverse is the exponent corresponding to the empty set as in (23). If [–F, +F] characterizes inverse as in Harbour’s

\textsuperscript{11} Demonstratives in Jemez pattern with the head noun in inverse marking, as can be seen from (13). This means that (30) applies to demonstratives as well.
original analysis, either [+singular] or [+augmented] must be added to (34) to turn the syntactically dual representation into the one appropriate for inverse. But there is no independently motivated mechanism that adds to (34) either [+singular] or [+augmented]. In this respect, the new theory of agreement plays a pivotal role in uncovering the fact that the nature of inverse is identical in Jemez and Kiowa. Note also that by adopting (23), the α-notation used in (15b) can be done away with. The uniform treatment of inverse in (23) is a definite improvement over Harbour’s analysis in this respect, too.

3.4. Verb Agreement

We have seen that a single uniform characterization of inverse suffices for Jemez and Kiowa, the difference in the number profile of noun classes with regard to dual being attributed to an operation of impoverishment deleting [–augmented] in Jemez. Since impoverishment applies after narrow syntax computation is over, the proposed analysis predicts that dual is not inverse-marked in narrow syntax in Jemez. This prediction is borne out by the behavior of verbal agreement. Let us consider relevant data.

Third person intransitive prefixes in Jemez are as follows:

(36) Third person intransitive prefixes in Jemez (based on Noyer 1997: 170–171)

<table>
<thead>
<tr>
<th></th>
<th>singular</th>
<th>dual</th>
<th>plural</th>
<th>inverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø-</td>
<td>ñl-</td>
<td>ñ-</td>
<td>e-</td>
<td></td>
</tr>
</tbody>
</table>

Interestingly, apart from the SSS and PPP classes, the dual subject always triggers dual agreement, even though it is inverse-marked, as illustrated in (32) with an SII noun.

(37) a. Pë- Ø-ší. (Yumitani 1998: 100)
    deer 3sg-fall.off.sg/du
    ‘A deer fell off.’

b. Pë-şš iñ-ší.
    deer-inv 3du-fall.off.sg/du
    ‘Two deer fell off.’

c. Pë-şš e-tʼí.
    deer-inv 3inv-fall.off.pl
    ‘Deer fell off.’

Harbour (2011) accommodates this fact by positing a special dual agreement marker corresponding to [–singular, –augmented]. Under his approach, the feature content of the clausal probe becomes identical to that of the D head after valuation. He claims that Pāṇini’s principle chooses the form for [–singular, –augmented] over the one for [αF, αG], which is less specific, attributing the use of the dual agreement marker for inverse-marked dual subjects in Jemez to the accidental existence of a special exponent for dual.12

12 If the Subset Principle in (33) is the technical rendition of Pāṇini’s principle, though, it is not obvious whether this result is guaranteed, since (33) only cares about the number of matching features. An additional clause needs to be added.

More seriously, it may not be correct to characterize both the nominal inverse marking and the verbal inverse agreement marker as [αF, αG] even under the set of assumptions adopted by Harbour. Inverse-marked nominals always contain [–singular, –augmented] at D under Harbour’s analysis, including duals, given that only the minus value of [±singular] or [±augmented] is used to define noun classes in Jemez, except for the [±augmented, ±group] classes. Then, the nominal inverse marking in Jemez should be characterized as [–singular, –augmented]. Furthermore, a more appropriate treatment of inverse verbal agreement under Harbour’s theory of agreement would be to posit the item
Under our new analysis, the persistent use of the dual agreement marker is simply due to the fact that the D head of dual subjects lacks the feature content corresponding to inverse marking in narrow syntax. The clausal probe is matched with the dual marking of D and is valued as such. Inverse marking of dual subjects is made possible by application to D (as well as to demonstratives) of the impoverishment operation that deletes [–augmented] in the post-syntactic morphological computation, which does not have any impact on the working of the agreement operation in narrow syntax. Therefore, apart from this impoverishment operation, nothing special needs to be said about why inverse-marked dual subjects in Jemez do not trigger inverse agreement, unlike inverse-marked non-dual subjects.

But let us be more explicit about how valuation is executed at the clausal level. Take the sii noun in (37) again. Its inherent class specification is [–augmented]. In narrow syntax, only its plural form carries the feature content that induces inverse marking at D, which is valued as [{–singular}, { }]. The question is what feature specification the probe for clausal agreement ends up with when it agrees with [{–singular}, { }]. More generally, how does { } value the uninterpretable counterpart of the probe? I would like to suggest that a natural interpretation of the deletion algorithm in (21) dictates that no deletion be allowed. Given an empty set as the goal, it is impossible to define the feature whose value is opposite to that of the goal. This means that no number feature can be deleted from the probe. For (37), then, the probe for clausal agreement is valued as:

(38) a. [{+singular}, {–augmented}] = (37a)
   b. [{–singular}, {–augmented}] = (37b)
   c. [{–singular}, {+augmented, –augmented}] = (37c)

I posit the following agreement prefixes for third person intransitive subjects:

(39) a. /il-/~ [-singular, –augmented]
   b. /il-/~ [-singular, +augmented]
   c. /e/- ~ [+F, –F]

I attribute the zero marking for singular to the absence of the corresponding exponent. Note that the item in (39c) is correctly prevented from being inserted in the representation of dual in (38b). Only (39a) is eligible.

A different problem arises, however. Given the Vocabulary items in (39), it is not a trivial task to make sure that (39c) rather than (39a) or (39b) will be inserted into the probe valued as (38c). In terms of the matching features, (39a) and (39b) do not differ from (39c) in the case of (38c). What is going on?13

I would like to point out that the principle that ensures this result is cyclicity. Note that the correct result will be obtained if the most deeply embedded feature set, {+augmented, –augmented}, is picked out for Vocabulary Insertion in (37c) = (38c). Embick (2010) claims that Vocabulary Insertion takes place cyclically. The analysis of Kiowa-Tanoan proposed in this article demonstrates that the domain of cyclic computation starts at the level of feature corresponding to [–singular, –augmented, +F] rather than to [αF, αG], since the non-dual inverse agreement marker always contains either [+singular] or [+augmented]. The form for [–singular, –augmented, +F] is simply ineligible for agreement with dual subjects. Conversely, the dual agreement marker is discarded for non-dual inverse by the straightforward application of (33).

13 Incidentally, the plural marker in Jemez cannot be assumed to be simply [–singular], unlike in the cases studied by Nevins (2011). Notice that [–singular] is not consumed by the inverse agreement marker in the case of (37c) = (38c). It is then unclear why the exponent for [–singular] is blocked from insertion in (37c) = (38c), if there is such an item available.
structure.

To see that if cyclicity is put aside, all the three items in (39) are eligible for (38c), consider a different agreement system in Jemez. Harbour (2011) notes syncretism of dual and inverse for what Yumitani (1998) calls intransitive benefactive prefixes, which are used in examples like those in (13), repeated below.

(13) a. Ní-t'ae t'ëtibę-ë ní Ɂ-l-k'á.  
    that-inv box-inv I 1sg-3inv-lie.sg/du  
    ‘That box is mine.’

b. Ní t'ëtibę ní Ɂ-Ø-g'ó.  
    that box I 1sg-Ø-lie.pl  
    ‘Those [several] boxes are mine.’

The prefix consists of two pieces, as indicated in the gloss. The first part encodes the possessor, and the second the possessed. The alternation of the latter is characterized as /l/ for inverse versus zero for non-inverse by Yumitani (1998: 186), where inverse is understood to correspond to the actual marking on the noun, unlike in the account proposed in this article. Since the head noun in (13) belongs to the II class, which is inherently [–singular], the probe for the possessed is valued in narrow syntax as:

(40) a. [{+singular, –singular}, {–augmented}]  = (13a) with the singular reading  
    b. [ {–singular}, {–augmented} ]  = (13a) with the dual reading  
    c. [ {–singular}, {+augmented} ]  = (13b)

{+singular, –singular} in (40a) arises from agreement with { } on the goal. Recall that dual nominals behave as non-inverse in narrow syntax and are morphologically inverse-marked due to the operation of impoverishment.

I would like to suggest that /l/ is not the inverse agreement marker but the exponent for dual, as defined in (41).

(41) /l/ ⇔ [–singular, –augmented]

The Subset Principle in (33) straightforwardly allows (41) to be inserted in the context of (40a) as well as (40b).

Essentially the same thing happens with SII nouns, as illustrated in (42).14

(42) a. Në-dëfì nì Ɂ-Ø-k'óá.  
    that chicken I 1sg-Ø-lie.sg/du  
    ‘That chicken is mine.’

b. Ní-t'æ défì-š ní Ɂ-l-k'óá.  
    that-inv chicken-inv I 1sg-3inv-lie.sg/du  
    ‘Those [two] chickens are mine.’

c. Ní-t'æ défì-š ní Ɂ-l-g'ó.  
    that-inv chicken-inv I 1sg-3inv-lie.pl  
    ‘Those [several] chickens are mine.’

The result of agreement at the clausal level is shown in (43), which is no different from (38).

---

14 Though the prefix in question is glossed as 3inv, it should be understood as in (41).
(43) a. [$\{+\text{singular}\}, \{-\text{augmented}\}$] = (42a)
b. [$\{-\text{singular}\}, \{-\text{augmented}\}$] = (42b)
c. [$\{-\text{singular}\}, \{+\text{augmented}, -\text{augmented}\}$] = (42c)

(43c) as well as (43b) is qualified for being realized by (41). And this is exactly the source of the problem for intransitives discussed above, which calls for the cyclicity solution.

The difference between simple intransitive agreement in (37) and benefactive intransitive agreement in (42) in the behavior of the dual marker, then, comes from whether Vocabulary Insertion faces competition (37) or not (42). For benefactive intransitives, there is only one Vocabulary item encoding the number marking of the possessed noun. For simple intransitives, on the other hand, the item for dual must compete with another prefix (and loses in the case of non-dual inverse).

The verbal agreement in Kiowa requires no comments. The presence of \{\} on D values the probe as \{+F, –F\}, giving exactly the same results as Harbour’s account. In other words, our theory of agreement and Harbour’s do not differ empirically in the verbal domain, as far as the valued feature content of the clausal probe is concerned. The discussion in this section is therefore nothing more than a suggestion as to how Vocabulary items for verbal agreement should be handled in Jemez on the basis of the output of the narrow syntax computation, which does not differentiate between the two theories of agreement.\(^{15}\) This also means that the problem requiring the cyclicity solution, noted for Jemez above, arises for Kiowa as well, if Vocabulary items analogous to those in (39) are posited for Kiowa. My basic point in any case is that the relation between inverse marking on nominals and inverse agreement is made less transparent in Jemez by the operation of impoverishment in the nominal domain.

4. Conclusion

I have put forward a new theory of agreement that employs a simple algorithm of deletion for the purposes of valuation, building on Harbour’s (2007, 2011) recent proposal concerning uninterpretable features, which is promising as part of the principled account of the evolutionary foundation of the Agree operation. The new theory makes it possible to provide a novel, uniform characterization of inverse in Jemez and Kiowa. It also sheds new light on how clausal agreement works in Jemez. Thus, it is empirically attractive, too.

The discussion of verbal agreement leads to the discovery that the cyclic nature of linguistic computation can be observed even at the level of feature structure. Though not noted by Harbour, his conception of uninterpretable features suggests some degree of hierarchical organization in the feature matrix. The cyclic Vocabulary Insertion made use of in this article rests on that structural property. It is an interesting topic for future research to explore whether further structure can be found in the organization of $\phi$-features.

References


\(^{15}\) These conclusions entail that a more appropriate alternative for the Jemez verbal agreement marker under Harbour’s account pointed out in note 12 can in principle be adopted for our account of Jemez. Then, one needs to ask whether there are any reasons for preferring (39c) to the possibility raised in note 12. One major consideration is that (39c) uses fewer features for the characterization of the inverse agreement marker than [$\{-\text{singular}, -\text{augmented}, +\text{F}\}$]. Another is that (39c) transparently reflects the result of agreement with an empty set.


