

Alliterative Concord in Phonology-Free Syntax

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1 Introduction

Large gender agreement systems are frequently alliterative: for a given gender,¹ the agreement markers on various parts of speech tend to phonologically resemble the gender marker of the controller noun, and each other. A well-worn example is provided by Swahili:

- (1) *ki-kapu ki-kubwa ki-moja ki-lianguka*
7-basket 7-large 7-one 7-fell
'One large basket fell.'

Singular agreement markers for gender 7/8 are realized as *ki* (*ch* before vowels), mirroring the noun class prefix *ki-*. In this example it appears as if the first syllable of the controller noun, *kikapu*, is being copied to the prefixes of the adjective, numeral, and verb. But this is only an illusion; by changing the noun class it is easy to find examples of agreement that is not alliterative:

- (2) a. *embe kubwa i-angu li-lianguka.*
(5-)mango (5-)large 5-mine 5-fell
'My large mango fell.'
- b. *ma-embe ma-kubwa y-angu ya-lianguka.*
6-mango[es] 6-large 6-mine 6-fell
'My large mangoes fell.'
- (3) a. *kalamu n-zuri y-angu i-lianguka.*
pen 9-good 9-mine 9-fell
'My good pen fell.'

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¹I follow the practice, seemingly unanimous among today's linguists, of defining gender on the basis of the agreement categories that nouns trigger in other elements of the sentence, *not* on the basis of the morphology of the noun itself. In Hockett's (1958:231) formulation, genders are "classes of nouns reflected in the behavior of associated words".

Gender, then, is by definition dependent on agreement (Corbett 1991:4–5). For the classes defined by the morphology of the nouns themselves (that is, the singular and plural affixes appearing on them), I use the term *inflectional classes* (after Aronoff 1994). Note that the term "noun class", used here in the traditional sense, refers to the nouns associated with a single class morpheme; so that a typical inflectional class consists of two noun classes, a singular and a plural one. I also treat the term "concord" as a synonym for "gender agreement."

Agreement, including gender agreement, is a relation between two elements: a *controller*, in our case always a noun (or noun phrase), which is specified for gender independently of the agreement relation in question; and a *target* (or *agreeing element*), for example a verb, adjective, pronoun, etc., which receives its gender by virtue of this agreement relation.

- b. *kalamu n-zuri z-angu zi-lianguka.*
 pens 10-good 10-mine 10-fell
 'My good pens fell.'

Nouns of gender 5/6 have no prefix in the singular, but take the prefix *ma-* in the plural. Nouns of gender 9/10 are prefixless. All trigger various agreement forms on other parts of the sentence. (Nevertheless, notice that there are clear similarities between several of the agreement markers given above).

The Swahili facts highlight the commonly accepted conclusion that gender is a morphosyntactic characteristic. Gender agreement, and agreement in general, is accomplished by a process that goes somewhat like this: a noun is assigned to a gender, either arbitrarily (the gender is simply listed in the lexicon) or according to semantic or morpho-phonological criteria; the noun's gender is expressed as an abstract feature that is available to the morphosyntax; the syntax ensures that the value of this feature is shared by those parts of the sentence that must agree with this noun (or with the NP it heads);² the morphological component then causes the insertion of agreement morphology appropriate for each part of speech, whose phonological exponent may, or may not, be alliterative. The process can be illustrated schematically as follows:

$$(4) \quad \begin{array}{ccc} kikapu & & \underline{ki}\text{-lianguka} \\ \downarrow & & \uparrow \\ \left[\begin{array}{cc} \text{GENDER} & 7/8 \\ \text{NUMBER} & Sg \end{array} \right] & \longrightarrow & \left[\begin{array}{cc} \text{GENDER} & 7/8 \\ \text{NUMBER} & Sg \end{array} \right] \end{array}$$

Because agreement is achieved with the mediation of an abstract morphosyntactic category, there is no necessary resemblance between the exponents of a gender on different parts of speech. Gender features are abstract entities; they can be expressed by the number pairs used in Bantu linguistics just as well as by the labels MASC, FEM and NEUT. Neither set of identifiers has any inherent association with any phonological material: for example, there is no reason to expect that nouns, adjectives and verbs in Swahili would all use *ki* as the singular marker for gender 7/8. The phonological exponents of gender must be specified separately. Thus the tendency to alliterative agreement, although well-attested cross-linguistically, is not predictable from the mechanisms generally held responsible for gender agreement.

The same mechanism of gender assignment works in languages that determine noun gender on the basis of primarily phonological, rather than semantic or morphological, criteria: the phonological content of the controller noun is not carried along the chain of gender agreement relations. Yet, as Carstairs-McCarthy (1994) points out, the agreement systems of languages with transparently phonologically motivated gender are overwhelmingly alliterative. Carstairs-McCarthy argues that reasons of economy and learnability would favor alliteration in such languages; we can expect that they would tend to evolve toward alliterative systems. Another possible explanation of alliterative agreement is historical: if the exponents of a particular gender on various parts of speech are derived from the same grammaticalized lexical element, they may resemble each other. For example, Diyrbal (Australian) has

²It is immaterial at this point whether gender agreement is accomplished procedurally, by copying the value of the controller noun's gender feature to other elements, or declaratively, by requiring that agreeing elements must bear the same value for the gender feature.

demonstrative-like elements that agree with the noun they modify. Dixon (1982:171-3) argues that the agreement markers arose from nouns attached to these demonstratives as classifiers, such as *mayi* ‘non-flesh food’ which was reduced to the agreement marker *-m*. (Dixon 1982, Corbett 1991:140-141). If the same marker is employed on multiple parts of speech, an alliterative pattern will result.

Alliteration in gender agreement, then, may have functional and diachronic motivations but is an accident from the synchronic viewpoint. We are led to this conclusion by the belief that agreement is a morphosyntactic, rather than phonological, phenomenon, and by the assumption that phonological information cannot be carried along the chain of agreement relations illustrated in (4). This assumption, which is central to the concerns of the present paper, is not arbitrary: It is motivated by considerations of language architecture which, in various forms, are shared by a broad variety of theoretical approaches. In particular, it is based on considerations of *modularity*, which seek to constrain the types of information available to each component of the language faculty. As I will discuss in some detail in the next section, diverse theories and proposed architectures for language require, in particular, that syntactic rules should not have access to the phonological content of words. Among such rules are the rules that cause an adjective, verb, or other agreeing element to match the gender of its controller.

But as is usual in the field of linguistics, some languages fail to conform to the division of labor predicted by the theory, posing challenges to claims of modularity. One such challenge was identified by Dobrin (1995), and concerns a handful of languages with what she calls “literal” alliterative concord: the gender agreement (concord) systems of these languages appear to depend on the phonological form of the controller nouns, to an extent that seems impossible to reconcile with a strict separation between phonological content and syntactic operations. In Bainuk (West Atlantic; Sauvageot 1967), it can be shown that not all nouns have a noun-class prefix; for example, *si-dɛ:ɲo* ‘canoe’ has the class prefix *si-*, which is replaced by other prefixes when appropriate (e.g., when forming the collective plural). On the other hand, *kata:mango* ‘river’ can be shown to be prefixless: the class prefixes for derived forms (e.g., the augmentative) are prepended to the entire form. We can characterize the form *kata:mango* as having a null class prefix, similar to Swahili class 9. But there is a crucial difference: the unmarked way to express nominal concord in Bainuk is by “copying” the first syllable of the noun, whether that syllable is a prefix or not:

- (5) a. *si-dɛ:ɲ-o in-si* (with prefixed nouns)
 canoe this
 b. *kata:ma-ɲgo in-ka* (with prefixless nouns)
 river this

This process is applied to native prefixless Bainuk words (of which there are hundreds in Sauvageot’s (1987) 1200-word sample), as well as to loanwords, indicating that the set of agreement prefixes appearing on words is potentially unlimited. Dobrin refers to this phenomenon as “literal alliterative concord;” because its crucial property is the productivity of the agreement, I will use the term *productive alliterative concord*.

Descriptively, Bainuk marks gender agreement with prefix-less words through affixation, on the agreeing words, of a prefix that copies the *phonological* content of the first syllable of the controller

word. This process presents a challenge to strongly modular conceptions of language: Phonology can in principle copy the prefix of one word onto another, but phonological processes operate within prosodically delimited domains; on the other hand gender agreement, for example between a pronoun and its antecedent, can extend across sentence boundaries and is triggered by coreference, not by any prosodic or even structural relationship that the phonology could reasonably have access to. For example, coindexation of the pronoun with *John* in the following example forces masculine gender, a fact that can only be determined by examination of referential indices. A different indexing would license a feminine pronoun, with no change in syntactic structure or prosodic domains.

(6) John_i saw Mary_j. He_i/*she_i waved.

In the next section, I discuss in more detail the modularity considerations that productive alliterative concord seems to fly in the face of; but rather than conclude, with Dobrin (1995), that it is necessary to increase the power of the morphological component in order to account for such languages, I propose an analysis that derives such alliterative affixes without relaxing modularity constraints or increasing the power of morphosyntactic rules. This analysis treats the alliterative affixes as phonologically reduced classifiers, inserted by the syntax without explicit reference to the phonological form of the controller noun. This proposal is sketched in the next section; in section 3 we return to Bainuk for a detailed look, and section 4 presents the concord system of Abuq (a dialect of the Papua New Guinea language Arapesh), another language that figures prominently in Dobrin's discussion of productive alliterative concord. Finally, section 5 explores my proposal in more detail, showing that its component parts are independently attested in a number of languages around the world.

2 Gender agreement with a modular language architecture

Modular conceptions of language seek to constrain the types of information available to each component of the language faculty. Phonology, morphology and syntax should not have access to one another's internal structures. Indeed, our very belief in the existence of separate linguistic modules is based on being able to group a large number of processes and phenomena into relatively self-contained, independent units.

In the present context, our primary concern is with the ability of syntactic rules to refer to, or manipulate, phonological content. Earlier generative accounts (Chomsky 1965:84) assume that sentences are built out of formal parts, with phonological material only inserted at the end of syntactic derivation. It follows that phonological information is necessarily inaccessible during syntactic derivation, since it is not yet present at all.

In the framework of the Minimalist Program (Chomsky 1993, 1995), inflected words are inserted early in the derivation, and hence their phonological description is present during derivation. Thus it would be possible, in principle, for this framework to accommodate syntactic access to phonological material. Considerations of modularity, however, still militate against allowing such access, and the inaccessibility of phonological information is stipulated:

- (7) “We will make the [...] assumption that overt [syntactic] operations cannot detect phonological features at all. [...] For the $N \rightarrow \lambda$ [numeration to LF] computation, nothing would change if the phonological properties of *book* were coded in the lexicon as 23, with a rule of the phonological component interpreting 23 as the phonological matrix for *book*.” (Chomsky 1995:230)

Such constraints are part of any modular theory of the organization of language. Anderson (1992) offers the following explicit claim:

- (8) “The morphosyntactic representation of a word is the only aspect of it that is visible to/in the syntax.” (Anderson 1992:90)

Dobrin (1995) bases her argumentation on the following formulation of the same principle, due to Zwicky and Pullum (1986), who dubbed it the “principle of phonology-free syntax”, and made it the focus of an eponymous paper and several other works.

- (9) *The Principle of Phonology-Free Syntax (PPFS)*

No syntactic rule can be subject to language-particular phonological conditions or constraints. (Zwicky and Pullum 1986:71)

For similar conceptual reasons, the phonological component must be likewise be isolated from the internal details of syntax. However a certain amount of syntactic structure is evidently visible to the phonology, although there is no consensus yet on precisely what that is. For example, it has been argued by Chomsky (1981:21, 180–182) that the alternation *want to* \rightarrow *wanna* (“wanna contraction”) is due to an optional phonological rule that is blocked by the presence of a syntactic movement trace between *want* and *to*.³ Various purely phonological phenomena such as vowel harmony and tone sandhi are sensitive to syntactic structure, but again, there is no consensus on the details. Chomsky (1995) offers a rather strong assertion about the independence of phonology from syntax:

- (10) “PF [the representation at the syntax-phonology interface] is a representation in universal phonetics, with no indication of syntactic elements or relations among them (X-bar structure, binding, government, etc.)” (Chomsky 1995:194)

Although the amount of syntactic structure visible to the phonology is not clear, it is clear that phonological rules are restricted to particular *domains*; they operate only within a single word, or within a clitic group, or within a phonological phrase. Phonological phrases have been variously defined, and can be as large as a VP or a clause, but they cannot be arbitrarily large. In addition, for conceptual reasons we would expect that the phonology does not have access to the *identity* of syntactic indices.

It follows that gender agreement between a pronoun and its antecedent could not possibly be a

³The properties of *wanna*-contraction can be seen in the reported contrast between (i), which prohibits *wanna*-contraction, and (ii), which allows it. Sentence (i) is said to involve a null pronominal PRO that is invisible to the phonology, while (ii) involves a movement trace e_i that is visible to it.

- (i) Who_{*i*} do they_{*j*} want [[_{NP} e_i] to visit Paris].
(ii) They_{*i*} want [PRO_{*i*} to visit Paris].

Chomsky’s account of the source of the contrast, which is not germane to the present discussion, is that e_i may be visible to the phonology because it is Case-marked, Case being a feature that “acts as a ‘marker’ for empty categories, marking them as ‘visible’ to rules of both interpretive components of the grammar.” (Chomsky 1981:182)

purely phonological process. Gender agreement can extend across sentence boundaries and is dependent on coindexation, not on structural or prosodic information that might be accessible to the phonology. Consider Swahili example (11) (an alliterative analogue of (6)). If in the second sentence the class 7 prefix *ki-* is used on the verb, the sentence can only mean that *the basket* fell. If it is to have the meaning *the person fell*, then the class 1 prefix *a-* must be used. Even if the two sentences in (11a) could be said to constitute a single phonological domain, there would still be no way for the phonology to select the proper form of the pronoun without access to the identity of the referential indices.

- (11) a. *Mtu_i a-li-ona ki-kapu_j. Ki_j-li-anguka.*
 person 1-Pst-see 7-basket 7-Pst-fall
 ‘A person_i saw a basket_j. It_j/*he_i fell.’
 b. *A_i-li-anguka.*
 ‘He_i/*it_j fell.’

Similar considerations apply to agreement between a pronoun and its antecedent. Consider the division of labor between syntax, morphology and phonology in example (12). The pronoun *her* has feminine gender because it refers to the NP *Mary*, which also has feminine gender. The anaphoric relation between the pronoun and its antecedent belongs to the domain of syntax: it is realized by the binding of the pronoun by its antecedent, indicated in (12) as coindexation. As a result of the coindexation, the syntax arranges for certain features of the controller *Mary* to be copied to (or matched by) the target, the pronoun *her*, as described for sentence (6). We can tell the pronoun is feminine because it has the form *her*, not *his* or *its*. This form is constructed by the morphology, on the basis of features which in this case include gender, number, and Case, and is then passed to the phonology.

- (12) *Mary_i waved her_i hand.*

The process just described does not depend on the phonological content of the antecedent. Nothing in the phonological form of *Mary* identifies it as feminine; indeed, in many dialects of English it is phonologically indistinguishable from the masculine *Murray*.

Although the above suggests a unidirectional flow of information from the syntax to the morphology and then to the phonology, this is not the only form of interaction we find. Many morphological operations are demonstrably dependent on the phonological form of the word they are applied to. For example, the inchoative-causative suffix *-en* in English attaches only to monosyllabic adjective stems that end in an obstruent, optionally preceded by a sonorant. (Spencer 1991:77).

- (13) a. quicken, redden, roughen, shorten.
 b. *slowen, *greenen, *apten, *laxen.

In many languages the gender of nouns is predictable from their phonological content. In Swahili nouns, gender is generally associated with specific noun prefixes, which can be treated as morphemes added to the noun root by the morphology and spelling out an already specified gender feature. But in other languages, the phonological content of the noun root itself appears to determine its gender. For example, in Qafar (East Cushitic) there are two genders; male humans and sexually differentiable animals are placed in one gender, females in the other. Other nouns are classified according to their

phonology: those ending in an accented vowel are in the female gender, those ending in a consonant or unaccented vowel are in the male gender (Corbett 1991:51). Thus gender assignment in Qafar, when not semantically based, is determined by phonological information.⁴

Morphology, then, must evidently have access to the segmental content of words; and it must also have access to the abstract gender features inserted by the syntax, in order to generate the appropriate forms of agreeing words. If we are to maintain a strong theory of modular structure for language, its empirical weight will have to fall on the separation of syntax and phonology.

If morphological rules can refer to morphosyntactic features as well as to phonological properties, what is to prevent linguists from positing a mediating, phonologically-triggered morphosyntactic “feature” whenever the syntax seems too closely linked to phonological form? A significant source of constraint is in the finiteness assumed to be inherent to morphosyntactic systems: the values of a morphosyntactic feature ought to be drawn from a predetermined, closed set. For example, Swahili only has a fixed set of genders, alliterative or otherwise. Any new word coined or borrowed into the language must be assigned one of them, that is, it must trigger the agreement affixes for one of these pre-existing genders. Languages frequently have a so-called “default gender,” assigned to loanwords and other nouns not meeting any of the explicit gender-assignment rules.

The problem posed by Bainuk and any other languages found to have productive alliterative concord, then, is that novel agreement affixes can be generated, in potentially unlimited numbers. Dobrin (1995) suggests, following Dixon (1982:165-166), that all unprefixes words triggering alliterative agreement should be treated as belonging to a single gender. Since all alliterative agreement markers would then be associated with the same gender feature, they cannot be said to be generated as the spellout of a morphosyntactic feature; hence this gender should involve “an agreement rule that deals not with a grammatical affix, but instead with the first two phonological segments of a nominal stem.” In other words, there should be a single gender marked “alliterative,” which causes the first minimal syllable (CV) of the controller noun to be copied onto agreeing elements.

But such a rule, as Dobrin points out, violates the principles of modularity, such as the Principle of Phonology-Free Syntax, discussed earlier in this section: The syntactic component should not have direct access to the phonological content of the controller word, and therefore should not be able to produce agreement markers by directly copying phonological material. The phonology can copy segmental material, but is limited in its domain of application and should not be sensitive to the coindexing facts that actually determine agreement. Finally, the morphology can of course insert phonological material according to morphosyntactic features; but it cannot copy phonological material directly.

Dobrin concludes that modularity principles such as the PPFS are too strong, and must be relaxed in the face of phenomena like productive alliterative concord. But because the agreement system of Bainuk

⁴Gender assignment systems appear to always include a “semantic core” of rules assigning nouns to genders on the basis of their meaning. Such rules tend to have primacy over formal (morphological or phonological) criteria, but there is always considerable overlap; so that semantic and formal rules predict the same gender for many nouns. (Corbett 1991:62-69).

In Qafar, mismatches between the semantic and phonological criteria are particularly rare: Nouns denoting females almost always end in an accented vowel, and nouns denoting males almost never do.

The role of semantic criteria has been suppressed in the present discussion, since they do not enter into the question of the syntax-phonology interaction.

is—crucially—alliterative, I will show that it can be analyzed without involving either extensions to the notion of morphological features or access by the syntax to phonological form.

What is needed is a way for the syntax to copy part of the noun without knowing what it is. In section 5, we will see that this can be accomplished by means of a division of labor between syntax and phonology: the syntax places a copy of the controller noun near the agreeing word, so that the two are in the same phonological domain; and the phonology does the rest. Syntactically, the analysis I propose treats Bainuk agreement as a sort of classifier construction: the occurrence, but not the content, of the agreement markers is controlled by the syntax. The agreement markers themselves are phonologically reduced copies of the controller noun, surfacing in reduced form as all or part of a pronoun or agreement marker.

I will show that all components of this analysis are independently motivated. Classifiers have been linked to the formation of concord systems (Dixon 1982, Greenberg 1978), while productive phonological reduction of the sort required by the proposed analysis is well attested (McCarthy and Prince 1986, Steriade 1988). We thus obtain the following schematic for productive alliterative concord.

(14) N ... [N]-Adj ... [N]-V

Here the brackets denote an underlying complete noun (typically a copy of the controller noun N) surfacing in reduced form as a class prefix or suffix. Bainuk example (5b), which involves productive alliterative agreement with a prefixless noun, is analyzed underlyingly as follows:

(15) *kata:ma-ngo in-[ka ta:ma]*
 river-PROX this [river]

We now turn to a detailed look at two languages with apparently productive alliterative concord, Bainuk and Abuq. We return to the proposed analysis in section 5.

3 Alliterative Concord in Bainuk

Bainuk or Banhum⁵ is a West Atlantic language spoken in Senegal and Guinea. The most extensive description of Bainuk known to me is that of Sauvageot (1967). Other descriptions or discussions of the language have been contributed by Ducos (1977), Sauvageot (1987), Sapir (1971), Dixon (1982) and Dobrin (1995). I will focus on the northern (Gu-ñamɔ̀) dialect, spoken in Bignona, which is the one described by Sauvageot.⁶

Bainuk nouns fall into two structural classes, those with noun class prefixes and those without (consisting of just a stem, with no prefix). Let us consider first the prefixed nouns: Sauvageot (1967) lists eighteen class prefixes, of which the first fourteen pair up (with repetitions) as singular/plural pairs to give eleven agreement classes (genders). The relationship of noun classes to genders is given in (16).⁷

⁵Or Bagnoun or Bainouk or Banhun or Banyuk or Banyun or Banyung or Bajun or Ban'un or Baynuk or Elomay or Elunay...

⁶Sapir (1971) focuses on southern Bainuk (Gu-jaaxət) with which he compares Gunyamolo, finding “considerable variation” within Bainuk.

⁷Sauvageot uses the non-standard symbols \bar{n} and \bar{d} , transcribed here as \bar{n} and \bar{d} , respectively (following Sapir 1971). I also follow Sapir in referring to Sauvageot’s “unlimited plural” as *collective plural*.

(16)	Singular		“Limited” plural
	cl. 1	<i>u-</i>	
	cl. 2	<i>i-</i>	
	cl. 3	<i>ra-</i>	
	cl. 4	<i>si-</i>	
	cl. 7	<i>gu-</i>	
	cl. 9	<i>bu-</i>	
	cl. 11	<i>kɔ- ~ ko-</i>	
	cl. 13	<i>da-</i>	
			cl. 5 <i>ñá-</i>
			cl. 6 <i>mu-</i>
			cl. 8 <i>há-</i>
			cl. 10 <i>i-</i>
			cl. 12 <i>nɔ- ~ no-</i> ⁸
			cl. 14 <i>dĩ-</i>

Unlimited plural: cl. 15 *ba-*, cl. 16 *dí-*, cl. 17 *tí- ~ pí- ~ bí-*, cl. 18 *ja-*.

The plural forms paired to singulars above are the “limited plural (pll.)” distinguished in Bainuk from *unlimited plural*, i.e., collective (coll.), which is expressed by the remaining four prefixes (classes 15 to 18). For example:

(17) a.	<i>bu-sumol</i>	‘a serpent’	cl. 9/10, 15
	<i>i-sumol</i>	‘serpents’ (pll.)	
	<i>ba-sumol</i>	‘serpents’ (coll.)	
b.	<i>bu-domel</i>	‘a papaya’	cl. 9/10, 16
	<i>i-domel</i>	‘papayas’ (pll.)	
	<i>di-domel</i>	‘papayas’ (coll.)	

Prefix 18 (*ja-*) is at once a diminutive and a marker of unlimited plural.

(18)	<i>ja-kat</i>	‘many small fish’ (coll.)
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Other noun prefixes have a derivational function: the inflectional class consisting of noun classes 13/14 (*da-/dĩ-*) functions as augmentative prefixes, while class 11/12 (*kɔ-/nɔ- ~ ko-/no-*) functions as diminutives; these appear in place of the class prefix appropriate to the unaugmented (or undiminished) noun:

(19) a.	<i>si-dēn</i> / <i>mu-dēn</i>	‘a canoe’ / ‘canoes’	cl. 4/6
b.	<i>da-dēn</i> / <i>dĩ-dēn</i>	‘a large canoe’ / ‘large canoes’	cl. 13/14
c.	<i>ko-dēn</i> / <i>no-dēn</i>	‘a small canoe’ / ‘small canoes’	cl. 11/12

The second group of nouns, those that Sauvageot (1967) classifies as prefixless, have an invariant stem and form the limited plural by affixation of a special *suffix* \tilde{V} (əŋ in the southern dialect): These according to Sauvageot include all, or almost all, loanwords.

(20)	<i>jareg</i> / <i>jareg-ē</i>	‘crocodile’ / ‘crocodiles’ (pll.)
	<i>saha</i> / <i>saha-ã</i>	‘sheep’ / ‘sheep’ (pll.)
	<i>fajamen</i> / <i>fajamen-ē</i>	‘goat’ / ‘goats’ (pll.)

It is crucial for what follows that these words are not treated by the grammar as having a prefix. This can be seen by noting that the unlimited plurals of these words, as well as their augmentatives and

⁸Sauvageot’s table gives the class 12 prefixes as *kɔ- ~ ko-*. From his examples, these forms appear to be a typographical error.

Prefixless nouns whose initial syllable is of the form *CV* may instead trigger alliterative agreement, as if this syllable was a noun class prefix. But the \tilde{V} affix must also appear on elements agreeing with a plural noun, as with the first class of unprefixing nouns.

- (26) a. katama ka-wayi / katam-ã (< *katama-ã*) ka-wayi-ẽ
 river large / rivers large/pl
 b. katama-ŋɔ in-ka / katam-ã-ŋɔ in-ka-ã
 river-prox. this / river-pl-prox. these
 c. in-ka / in-ka-ã
 this one (river) / these (rivers)

It is this second class of nouns that challenges the modularity of syntax and phonology: Since the initial syllable of such nouns is part of the noun root, not a gender-marking morpheme, there should be no way to copy its phonological content to agreeing elements. To recapitulate, we have two sources of evidence that such nouns are prefixless: First, because collective prefixes are prepended to the entire form, while a class prefix would have been subtracted. And second, because the \tilde{V} suffix is not used for agreement with prefixed nouns. Thus alliterative agreement with a prefixless noun is not quite identical to agreement with a prefixed noun. The three types of adjective agreement are repeated here together:

- (27) a. i-luhun i-fer ‘white vases’ (prefixed, cl. 10)
 b. tuhun-ẽ a-fer-ẽ ‘white turtles’ (prefixless, non-alliterative)
 c. katama-ã (< *katama-ã*) ka-wayi-ẽ ‘large rivers’ (prefixless, CV-copying)

Whether a prefixless noun will trigger alliterative agreement or agreement with *a-/nɔ* does not appear to be predictable. Sauvageot (1967) provides the subminimal pair *japɔñ ja-wuri* ‘long grass’, which triggers alliterative agreement, and *jiboñ a-fer* ‘white horse’, which does not.

Sauvageot (1987) reports that of a list of 1200 Bainuk nouns, almost a third lack a prefix, including 68 positively identified as borrowings. Although he does not say how many of the unprefixing words trigger alliterative agreement, it appears that a sizable class of Bainuk nouns, including a large proportion of loanwords, trigger agreement by literal alliteration. Because the copied element is an entire syllable rather than just a segment, there are very many possible combinations.

4 Gender and phonology in Abuq

Abuq (Abu?) is a dialect of Mountain Arapesh, a Papuan language spoken on the coast of New Guinea. Abuq has been described, briefly, by Nekitel (1986).¹⁰ Like Bainuk, Abuq appears to have a productively alliterative gender system. Although Abuq has only recently acquired the sound /p/ through contact with Tok Pisin, loanwords ending in /p/ trigger alliterative agreement: the prefix *p-* appears on agreeing verbs, and agreeing demonstratives are built around the segment /p/. Nekitel, a native speaker of Abuq, specifically states:

¹⁰Arapesh proper was described in detail by Fortune (1942) and figures prominently in Aronoff’s (1994) discussion of nominal concord systems. Nekitel describes Abuq as a separate, but closely related language.

(28) ... [T]he demonstrative reduplicates the ultimate syllable of the noun it qualifies and it is obvious that if a new phonemic sound is introduced into the Abuq phonetic system, the demonstrative would inflect that sound thus increasing the number of noun classes as instanced by the Tok Pisin word *pater* ‘priest’. (Nekitel 1986:193)

Fortune was careful to define his “noun classes” on the basis of the agreement they trigger in other elements, rather than their own inflection; i.e., they correspond to genders under the modern definition. Unfortunately, although Nekitel was familiar with Fortune’s work, he has conflated gender and inflectional class: His list of nineteen “noun classes” includes the two large, semantically motivated agreement classes denoting male and female humans regardless of the noun morphology; but the remainder actually lists the inflectional classes of Abuq nouns, even giving “subclasses” when a single noun suffix corresponds to two different agreement affixes on verbs. Since in addition Nekitel made no effort to be consistent with Fortune’s numbering of Arapesh genders, I have been unable to reconstruct the full paradigm of Abuq genders.¹¹

From the information provided by Nekitel, it is apparent that Abuq differs in some significant respects from Arapesh. Like Arapesh, it has a semantically defined gender consisting entirely of the nouns referring to males, and a gender that properly contains the nouns referring to females. I will refer to these genders using the labels of their Arapesh equivalents, *vii* and *iv* respectively. But while in Arapesh (at least at the time of Fortune’s study) all words in the masculine gender (*vii*) apparently ended with *n* in the singular and *m* in the plural, Abuq assigns to the masculine gender all words denoting male persons, including proper names like *Nekitel* and borrowings like *pater/paterimi* ‘priest/priests’. Nekitel lists the singular endings *-n*, *-a*, and (for borrowings) *-C*, an arbitrary consonant. Some of these words apparently take a plural specific to the male gender, for example *pater/paterimi* ‘priest’ and *ufu?al/ufu?elim* ‘male spirit’ (not a borrowing); others take *-has* or *-hes*, which is a common plural for borrowings (cf. Arapesh *-has*, one of the plural endings for the default gender *viii*); e.g., the plural of the Tok Pisin borrowing *tultul* ‘village chief’ is *tultulimi* or *tultulihes*.

It should be mentioned that the verb prefixes for the male gender in Abuq are *n-/m-* (the same as the regular male noun endings); in Arapesh, the verb prefixes are *na-/ha-*, while the noun class suffixes are *-n/-m*. Thus Abuq, even in its core vocabulary, is more strongly alliterative than Arapesh.

Similarly, the regular ending for nouns of the female gender is *-?/-wa*. But the gender includes the borrowings *tisa/tiseiwa* ‘female teacher’, *nes/nesiwa* ‘nurse’, and *hostes/hostesiwa* ‘air stewardess’. In all examples provided for this gender, plurals are formed by adding the regular plural suffix to the singular form of the noun, which can therefore be considered suffix-less.

Abuq differs saliently from Arapesh in its treatment of loanwords; many of them are apparently assigned to Abuq genders according to their phonological form (or meaning, if they denote males or females). But according to Nekitel, Abuq does not assign irregular borrowings to a default gender like Arapesh does; rather, concord is based on the phonological shape of the word.

¹¹Dobrin (1995) may have been more successful; she reports that “nouns divide into 17 agreement categories on the basis of their final consonants”.

- (29) a. *paip apa p-ahē?*
 pipe this went
 b. *paip papi p-ahē?*
 pipe that went

Words containing /p/ figure prominently in demonstrating the extensibility of the gender system, since this sound was recently imported to Abuq through contact with Tok Pisin.

Nekitel, in the passage quoted as (28) at the beginning of this section, also mentions *pater* ‘priest’ as an example of a word that demonstrates the extensibility of the paradigm of pronominal forms; presumably the appropriate pronoun form would be *ara* (there are no native r-final noun classes in Abu). This is rather peculiar, since *pater*, referring to a male human, triggers male-class verbal agreement. Dobrin (1995) postulates the following form, constructed on the basis of Nekitel’s description:

- (30) *pater ara n-ahē?*
 priest this went

If this example is correct, it would seem to demonstrate that there are actually two agreement systems operating in Abuq: the verbal agreement system conforms to a partly semantic gender system, but has also been extended by the introduction of the prefix *p* (as shown by example (29)); while demonstrative agreement follows a strictly phonologically-motivated, productively alliterative system that overrides semantic gender assignment rules. The behavior of other agreeing forms is anybody’s guess; Dobrin (1995) gives the following examples (which I could not reconstruct with confidence from Nekitel (1986)), showing adjectives with the masculine agreement markers. This is reasonable at any rate, especially since several adjective markers (including the sg. masculine *-neri*) are not alliterative.

- (31) a. *aleman afu-neri n-ahē?* (regular ending)
 man good went
 b. *baah afu-neri n-ahē?*
 grandfather good went
 c. *katekis afu-neri n-ahē?*
 catechist good went

With the exception of the quoted passage, Nekitel makes no reference, or even allusion, to the existence of a split agreement system. His description of gender in Abuq is wholly along the lines of what I called the “verbal” agreement system. Another reason to suspect a misstatement is the fact that Nekitel refers to “a new phonemic sound [being] introduced;” but the pronoun agreeing with *pater* in (30) is *ara*, involving a new concord class but not a new sound. Thus he might have meant to write *paip* rather than *pater*, which involves agreement with the new sound /p/.

For these reasons I find it doubtful that Abuq has such a split concord system. If it really does, however, it would not be the only language on record. It is common for the pronouns of a language to make distinctions not present in the remainder of the agreement system; English pronouns, for example, show gender agreement while the rest of the language does not. Dixon (1982), reporting on work by Tucker and Bryan (1966:108ff.), states that

... the Mba languages have six noun classes (with bound morphemes that combine information about number and class), of mixed semantic content; in addition, pronouns have distinct mascu-

line, feminine, (non-human) animate, and inanimate forms. (Dixon 1982:169)

Even if loanwords denoting humans are always assigned to genders *iv* and *vii*, Nekitel, a native speaker of Abuq, leaves no doubt that the pronominal system, at least, can reflect the novel segmental content of loanwords (at least the non-human ones); and he does provide an example where a verb prefix is the imported sound /p/:

- (32) *paip p-ahē?*
pipe went

It is unfortunate that Nekitel's treatment of Abuq is too elliptical to allow more confidence in our reconstruction of its agreement system. But allowing that borrowings into Abuq will productively result in novel agreement affixes, we have another instance of productive alliterative concord. It is not possible to write an agreement rule that would copy an arbitrary novel suffix without violating the principles of the modularity of grammar.

5 Alliterative concord as classification

Abuq and Bainuk can evidently express agreement by copying parts of the controller noun. This form of agreement is demonstrably non-local: for example, it is used with demonstratives that refer to a noun in another sentence; thus, it cannot be treated as a strictly phonological process.¹² And as we have seen, the productive nature of the Abuq and Bainuk agreement systems means that it cannot be accounted for in the morphology, either. Maintaining modularity then requires a way for the syntax to copy parts of a noun without making reference to segmental form.

I have suggested that this is accomplished through a type of classifier construction: a copy of the controller noun is placed near the agreeing word, surfacing in appropriately reduced form. The construction is akin not so much to numerical classifiers as to the phenomenon called "classifier incorporation." The following examples and discussion are based on Rosen (1989). Example (33), from Tuscarora (Iroquoian), involves the specific noun *tsir* 'dog', classified as a type of animal by the incorporated *taskw* 'animal'.

- (33) *ŋe-hra-taskw-ahkw-ha? ha? tsir.*
du-M-animal-pick.up-SERIAL EMPH dog
'He picks up domestic animals.'

In this case the classifier gives a generic class to which the controller noun belongs. The Northern Australian language Rembarnga does not require the controller noun to be more specific than the incorporated classifier, allowing the same word to appear in both roles as in example (34).¹³ We might call

¹²We have seen that productive alliterative agreement is also found in noun-adjective agreement in Bainuk. This rules out a technical objection that could defend Zwicky and Pullum's (1986) formulation of the Principle of Phonology-Free Syntax: namely, that pronominal agreement is a "morphological," not "morphosyntactic," phenomenon, and that only morphosyntactic rules are subject to the PPFS. Whether or not such a distinction between morphology and morphosyntax is justifiable, productive alliteration in Bainuk is found both within the noun phrase (proving that it is morphosyntactic) and, pronominally, across clauses (proving that it cannot be a purely phonological harmony phenomenon).

The reader is referred to Dobrin (1995) for further discussion.

¹³Rosen reports that incorporated classifiers can never be *more* specific than the noun they classify.

this usage *self-classification*.

- (34) *kata*²- ϕ *par-kata*²-*ta-nij*.
 paperbark-NOM 3sg.OBJ.3pl.TRANS.S-paperbark-stand-(CAUS)-PST.CONT
 ‘They would spread paperbark (on the ground).’

I propose, then, that truly productive alliterative agreement operates by incorporating a copy of the controller noun (in its entirety) to the word that is to carry the agreement. The overt agreement marker is constructed through phonological reduction of the copied noun according to an appropriate template (or any other general mechanism for phonological reduction). For example, the Abuq phrase (29b) would have the underlying form (35):

- (29b) *paip papi p-ahe?*
 pipe that went
- (35) *paip* *paip* (underlyingly complete classifiers)
 \wedge |
 paip papi *p-ahe?* (phonologically realized form)
 (pipe that went)

This diagram shows the self-classifier *paip* prefixed to the verb and phonologically reduced to its final consonant, surfacing as the prefix /p-/. A separate self-classifier is associated with the demonstrative; the final letter of the controller noun appears twice in Abuq demonstratives, a fact which I indicate descriptively by showing two lines of association between the final segment of *paip* and the appropriate positions in the demonstrative skeleton (*CaCi* → *papi*).

To flesh out this analysis, we need to consider the following questions: (a) how the process just described integrates with the remainder of the agreement system; (b) how the phonological reduction is accomplished; and (c) how such a system could have arisen. These questions are now considered in the following sections.

5.1 Productive alliteration in context

The mechanism for productive alliterative concord that I have just described allows part of the controller noun’s phonological content to appear on agreeing words. But what about nouns that belong, or appear to belong, to the ordinary agreement classes? If these agreement classes are also alliterative there are two possibilities here, and I suggest that the indeterminacy in deciding which one applies may be instrumental to giving rise to a productive alliteration system.

The first possibility is that agreement with such nouns simply proceeds in the usual manner for gender agreement. Target words agreeing with these nouns do not take classifiers, just ordinary gender agreement affixes; productive alliteration is only active with nouns that do not fit the criteria for inclusion in any of the ordinary agreement classes, more or less as proposed by Dixon (1982). The second possibility, which would give indistinguishable results to the extent that the agreement morphemes for a particular group of nouns are alliterative, is that such nouns may be reanalyzed to trigger agreement by means of classifiers. We can imagine that by reanalyzing morphological alliteration as a productive process involving classifiers, speakers can create an agreement rule that applies to existing alliterative

genders as well as to nouns that belong to no recognized gender.

This second possibility is also open, to a certain extent, to nouns whose phonological form does not match the agreement affixes for their gender: Agreement targets for these might base their agreement markers on generic classifier nouns, thereby involving a (more common) “generic” classifier instead of the self-classifier system proposed. For example, words denoting males in Abuq trigger the agreement prefix *n-* but need not end in *-n* themselves; such nouns might cause the insertion of the generic classifier *aleman* ‘man’, which provides the segmental material for the appropriate gender *vii* endings:

- (36) *pater* [~~aleman~~]-*ahe?*
 priest [man] went

5.2 Phonological reduction

Let us now consider how the requisite phonological reduction could be carried out. It was mentioned in section 1 that Dyrbal has demonstrative-like elements whose agreement morphology may derive from classifier nouns once attached to these demonstratives; for example *mayi* ‘non-flesh food’ may have been reduced to the agreement marker *-m*. My proposal requires that such a process of phonological reduction must be synchronically, and productively, available. Fortunately, there is ample reason to accept the existence of such processes; the phonological literature provides numerous proposals for ways to productively extract a reduced part from a full word. McCarthy and Prince (1986) and Steriade (1988) have argued that reduplication, and various non-local “modified copying” processes, are accomplished by copying the target word in its entirety and then “parsing” only the amount that actually appears.

McCarthy and Prince (1986) discuss examples of non-reduplicative stem truncation; for example, certain compounds in Madurese involve the reduction of a stem to its last syllable.

- (37) a. *sap-lati* ‘handkerchief’ < *usap* ‘wipe’ + *lati* ‘lip’
 b. *sar-suri* ‘afternoon market’ < *pasar* ‘market’ + *suri* ‘afternoon’

A similar example, cited by Steriade (1988), is the case of French hypocoristics such as *zabel* < *Isabelle*.¹⁴

Similar mechanisms can be employed to extract an alliterative affix from a complete copy of the agreed-with noun. For example, compare the forms in (37) with the proposed derivation of the Abuq form *p-ahe?* ‘went’ when it agrees with *paip* ‘pipe’.

- (38) *p-ahe?* ‘went’ < ~~*paip*~~ + *-ahe?*

For our present purposes the specific mechanism we adopt is not important, as long as it provides a productive mechanism for the reduction of complete nouns to the required segments. I assume that it is possible for a single segment of the reduced classifier to surface in multiple positions; so that in (35), both *p*’s in the demonstrative *papi* are manifestations of the final segment of *paip* ‘pipe’. But this is not necessary: It would be just as simple, for example, to derive one of the *p*’s in *papi* by reduction of the

¹⁴Steriade differs from McCarthy and Prince on whether just the segmental content or the entire word, including syllabic structure, is copied and matched against a template.

classifier, and the second *p* by reduplicating the first one.

5.3 Gender and classifiers

I have shown that productive alliterative agreement can be triggered (set in motion, as it were) by the syntax, which places the appropriate self-classifier next to the agreeing element; the alliterative marker is then realized by the phonology through phonological reduction. The purely phonological reduction step is made possible by the locality of the relation between the classifier and the verb, demonstrative or other agreeing target. At the level of the syntax, the whole process can be set up without the syntax having access to the segmental content of the words involved. The phonology can then take over and derive the alliterative affix from the copy of the controller noun.

This analysis, as I have shown, relies solely on independently attested processes; and its plausibility is considerably strengthened by the fact that noun class markers can apparently arise from classifier systems. Corbett (1991:310–312), while reporting that the most widely held view is that agreement markers on verbs develop from anaphoric pronouns, also presents evidence suggesting that gender agreement markers can be derived from classifier constructions; the connection to demonstratives is especially strong. Reporting on the work of Greenberg (1978) and others, Corbett notes that in the Daly languages of North-West Australia, a small number of nouns have come to be used as classifiers. These languages appear to be in various stages of converting these classifiers into agreement prefixes.

“In languages of the Maranunggu subgroup, like Ami, the words for ‘meat’, ‘vegetable food’ and ‘tree/stick’, which occur as free forms, also occur as prefixes on nouns, and they denote in turn animals hunted for food (*awa-wanka* ‘shark’, lit. ‘animal-shark’), vegetable food and plants (*miya-mimi* ‘round yam’, lit. ‘plant-round yam’) and weapons and wooden implements [...]. In the Brinken subgroup, [...] the prefix is a reduced form of the original noun in some cases, and it occurs not just on the noun but also on the adjective or possessive adjective, both of which stand after the noun: thus in Miritiyabin we find *yeli-meltem yeli-yikin* ‘my digging stick’ (lit. ‘stick+digging-stick stick+my’). Some might argue that this is already an agreement system; others would prefer to analyse it as having repeated classifiers.” (Corbett 1991:140)

Dixon (1982) reports that many languages of the Northern Territories and Western Australia have a gender consisting entirely or almost entirely of vegetable foodstuffs. The prefix denoting this gender has, in the various languages, the form *ma-*, *m-*, *mi-* or (in one language) *mu-*. Dixon argues that this class marker must be derived from the word ‘vegetable foodstuff’, which has the form *mayi* or something like it over much of North Australia. This word is also the most widely attested classifier in the Australian languages that have generic classifiers rather than noun classes.

Dixon also reports a similar situation for Olgolo, spoken in the Cape York Peninsula of Australia. Olgolo has undergone a number of phonological changes that have caused all word-initial consonants to be dropped. This typologically unusual situation is evidently unstable, for Dixon found that the language appears to be moving toward correcting it: many nouns can occur, optionally, prefixed with a consonant

evidently drawn from a classifier noun. Thus animals and insects select initial η (corresponding to $\acute{i}\eta a$ ‘animal’), oyster and eel select y - (< $\acute{u}yu$ - ‘fish’), and certain inanimates such as trees, grasses, sun, fire, language select initial w - (perhaps from $\acute{u}gu$ ‘tree, wood’). The prefixes could not have arisen through analogical extension of the form of the words they resemble: the classifier words do not have a prefix consonant, and need to be themselves prefixed.

The above examples highlight the connection between classifiers and gender agreement. Australian languages tend to have rather small systems of classifiers; but languages with well-developed classifier systems can have hundreds of classifiers, and classifiers often constitute a semi-open set. In Burmese, there are about 200 classifiers, many of which are commonly used to modify themselves used as nouns (Corbett 1991). Moreover, classifier nouns in Burmese appear to be an open class, and their number has been growing in recent decades.

There is evidence, then, supporting a process of grammaticalization that can turn classifiers into agreement markers; and, indirectly, supporting a connection between classifiers and gender agreement in general. But in order for the proposed alliterative concord mechanism to work productively, it is necessary that all the required steps be available synchronically. Note that I make no claim that all steps of the mechanism have been available throughout the development of the concord systems of the languages in question. Rather, I assume that such a mechanism could arise through what we might call *degrammaticalization*: The reanalysis of agreement markers as reduced classifiers.

This step, although unusual typologically, can be motivated by reference to the extraordinary conditions facing speakers of the two languages under consideration, Bainuk and Abuq. Both languages had been subject to a large influx of loanwords that were difficult to integrate into a strongly alliterative, phonologically-driven gender system. Sauvageot (1987) argues that the mixed system of prefixed and unprefixed nouns in Bainuk arose as a result of prolonged contact of Bainuk with Mandinka; and the evidence for echoic concord in Abuq is intricately tied to the large influx of loanwords and non-native sounds from Tok Pisin.

We may speculate, then, that the proposed mechanism for productive alliterative concord is a strategy of last resort: as a language with a well-developed alliterative concord system is presented with more and more borrowing-induced irregularities of this sort, it may seek to achieve some regularity by reanalyzing a rigid, affix-based concord system as the more flexible, self-classifier system I have described. Since unsuffixed borrowings can then be treated identically to the native forms, the result is a sizeable reduction in the number of irregular and idiosyncratic forms. Presumably in a stable situation the inventory of agreement markers will once again become grammaticized and frozen.

6 Conclusion

Alliterative concord in Bainuk and Abuq appears to be based, in some cases, directly on the phonological content of nouns. I have suggested that such behavior could be achieved, without violating the separation of syntax from phonology, by generating agreement markers productively from an incorporated copy of the controller noun. I have attempted to show that the component parts required for such a mechanism

are attested, according to independently-motivated analyses, in a variety of the world's languages.

The mechanism of incorporated classifiers that I propose, then, is not intended to be a general theory of gender agreement. Plainly it is a long way from being able to account, by itself, for the full range of alliterative concord phenomena. Rather, the proposal addresses an extreme type of alliterative concord, by treating it as being unlike ordinary gender agreement: while ordinary agreement is a morphosyntactic phenomenon, productive alliterative concord demonstrably implicates the phonology. The exceptional nature of this construction is reflected directly in a mechanism through which productive alliterative concord, and only that, can indeed operate with the help of the phonology.

My account is intended to be conservative, in the sense that it does not increase the power of the morphological (or any other) component, or allow the modules of the language faculty to interact more freely than is currently believed. For this reason it is a viable alternative to the analysis of Dobrin (1995), who argues that an increase in the power of morphology is unavoidable.

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