

ON THE DESCRIPTION OF CONSONANT
GRADATION IN FULA

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1. Introduction

In a previous number of this journal, Skousen [1972] discusses the alternation of initial consonants in stems and suffixes in Fula.² This pattern of alternations, which is central to all areas of the phonology of the language, is an excellent example of a complex and highly structured pattern of morphologically-conditioned alternation which has arisen from a set of processes which were in all probability conditioned by purely phonological factors. The facts of the alternation in Modern Fula are well understood, and raise interesting descriptive problems. As such, the example is deserving of extended discussion both for its own sake and as a paradigm for the development of morphological processes. Skousen's treatment, which is the first to our knowledge in generative terms, challenges some of the assumptions of the traditional literature: first, that gradation in suffixes is distinct from that in stems, and second that lexical representations ought to be based

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²A substantial literature exists on this language, which is spoken by a large nomadic population over a large area of West Africa. It is generically known as Fula or Fulani (the latter properly the name of the people) in English, as Ful(isch) in German, and as Peul or Poul in French. The English and German literature tends to concentrate on the Central and Eastern dialect areas, while the French literature is largely devoted to the Western dialects. The language is a member of the West Atlantic family, surveyed by Sapir [1971]. Our principal sources in this paper are Arnott [1970] for the Gombe dialect and Klingenberg [1963] for the Adamawa dialect. Forms from these sources will be cited as "Arnott" and "Klingenberg," respectively. Gombe and Adamawa are closely related dialects of the Eastern group. Further references will be found below and in the bibliography at the end of the paper.

on the continuant grade form of the alternating item. While the factual material discussed by Skousen is of great interest, and we feel his relation of the various types of gradation to one another is basically correct, a closer consideration of the evidence confirms the traditional position concerning the lexical representation of alternating forms against his proposal. This fact, in turn, leads to an interesting consequence for the theory of distinctive feature systems.

2. Gradation in West Atlantic Languages

Consonant gradation (often called simply "alternation" though we prefer the more specific and descriptive term) in Fula can be illustrated by the variation in shape of initial consonants of most nouns. Fula is a class language, with 25 classes for the Gombe dialect (cited below by the numbers assigned in Arnott [1970:98-104]). Some of these serve to form plurals, two diminutives, augmentatives, and the plurals of these corresponding to a basic singular. The full paradigm of a noun thus contains seven forms, belonging to seven distinct classes. Root initial consonants vary with the class of the noun:

- (1)³
- | | | |
|----|---------|---------------------------------|
| a. | dim-o | '(free) man' (class 1) |
| b. | rim-be | plural (class 2) |
| c. | dim-el | diminutive (class 3) |
| d. | dim-um | derogatory diminutive (class 5) |
| e. | ndim-on | diminutive plural (class 6) |
| f. | ndim-a | augmentative (class 7) |
| g. | ndim-o | augmentative plural (class 8) |

³Prenasalized stops mb nd nj and ŋg are single segments, which we will denote this way rather than as b̥ d̥ j̥ g̥ (the practice of Klingenberg and some others). The alveopalatal affricates are written as c and j respectively; c corresponds to a palatalized dental (t') in some dialects, and to a continuant sh ([ʃ]) in others. The palatal nasal is ny; ɓ and ɗ are laryngealized stops, (often called implosives in the literature). ʔ a laryngealized glide, and ʔ the glottal stop. Long vowels are written as sequences of two short vowels (aa=[a:], etc.). These conventions conform generally to Fula orthography; further phonetic details will be found in the sources listed in the bibliography.

The stem *dim-/rim-/ndim-*, with three forms, shows the maximum amount of possible initial consonant alternation: some stems show only two forms, while others are invariant. Further examples of such alternations are given in (2):

- (2)
- | | | |
|----|-------------------|----------------------------------|
| a. | <i>waa-ndu</i> | 'monkey' (class 11) |
| | <i>baa-d̥i</i> | 'monkeys' (class 25) |
| | <i>mbaa-kon</i> | 'little monkeys' (class 6) |
| b. | <i>gim-do</i> | 'person' (class 1) |
| | <i>yim-ḃe</i> | 'persons' (class 2) |
| | <i>ngim-nga</i> | 'big person' (class 7) |
| c. | <i>gor-ko</i> | 'man' (class 1) |
| | <i>wor-ḃe</i> | 'men' (class 2) |
| | <i>ngor-ga</i> | 'big man' (class 7) |
| d. | <i>yardu-de</i> | 'calabash' (class 9) |
| | <i>jardu-d̥e</i> | 'calabashes' (class 24) |
| | <i>njardu-ga</i> | 'big calabash' (class 7) |
| e. | <i>finor-du</i> | 'jar for antimony' (class 11) |
| | <i>pinor-di</i> | 'jars for antimony' (class 25) |
| f. | <i>hufinee-re</i> | 'cap' (class 9) |
| | <i>kufinee-je</i> | 'caps' (class 24) |
| g. | <i>daag-el</i> | 'little sleeping mat' (class 3) |
| | <i>ndaag-on</i> | 'little sleeping mats' (class 6) |
| h. | <i>juul-d̥o</i> | 'Moslem' (class 1) |
| | <i>njuul-nga</i> | 'big Moslem' (class 7) |
| i. | <i>kod-ol</i> | 'necklace' (class 17) |
| j. | <i>mbos-am</i> | 'bone marrow' (class 23) |

Stems such as those in (2a-d) have three distinct forms; stems such as those in (2e-h) have only two, with one of these appearing in environments where a third form might be expected; and stems such as (2i-j) show the same form in all environments. Similar alternations can be found in the paradigms of adjectives and (at least for the Eastern and Central dialects) verbs. We will discuss the conditions under which the alternations occur in more detail below.

We can note that the alternations are among consonants which can be assigned to three classes: "continuants", including *r w y f s* and *h*; "stops", including *b d j g p c*⁴ (dialectally *t'* or *sh*), and *k*; and "nasal(ized stop)s", *mb nd nj* and *ŋg*. Other consonants do not participate in the alternation: these include the primary nasals *m n ny* and *ŋ*; glottalized *ʔ d⁵ʔ y ʔ*; and *t l*.

While the alternation in Fula is clearly conditioned by morphological rather than purely phonological factors, it is quite probable that it developed from an originally phonological set of processes. Similar alternation systems are found (at least vestigially) in most of the West Atlantic languages. A full spectrum of conditioning factors can be found in the various languages of the group: completely phonological rules, partly phonological - partly morphological rules, fully morphological rules (as in Fula), morphological rules of restricted productivity, and fully lexicalized alternations that can only be recovered by comparative procedures or historical reconstruction.

Manjaku (cf. Doneux [1969]) displays a gradation process which is (for at least one dialect) fully phonological, and probably represents the shape of the process as it appeared originally in an early stage of (at least the northern Branch of) Common West Atlantic.⁶ In the Cur dialect of this language, the consonants *b d j g* appear only in initial

⁴In Gombe, *c* only occurs in the realization of geminate *sh* and in ideophones, and hence does not participate in gradation.

⁵*d* participates in a related alternation, appearing in suffixes, which will be discussed below.

⁶We do not mean to imply that the Manjaku phenomena are a direct survival of a Common West Atlantic feature, but only that they present the same essential features as those which the CWA system probably had.

position. In intervocalic position they are replaced by v r z , and γ , respectively. When following a nasal, they are prenasalized. The nasality here sometimes arises by rule: when a pre-verbal pronoun has the form $mV+$, the nasality of the initial is extended over the vowel and results in an epenthetic nasal consonant before stop-initial roots. We illustrate the resulting alternations from verb forms such as those in (3):

- | | | | | | | | | |
|-----|----|--------|----------|--------|-------|---------|-------|----------|
| (3) | a. | bandi | (imper.) | avandi | (3sg) | mabandi | (1sg) | 'arrive' |
| | b. | dɔl-an | (imper.) | arɔ | (3sg) | mandɔ | (1sg) | 'do' |
| | c. | jɔn-an | (imper.) | aʒɔn | (3sg) | maɲjɔn | (1sg) | 'last' |
| | d. | gac-an | (imper.) | aɣac | (3sg) | maŋgac | (1sg) | 'vomit' |

Here, as in Fula, roots appear in three grades: with stop, continuant, or prenasal stop. In this case, however, the conditioning factors are clear and completely phonological in character.

In the other West Atlantic languages, however, gradation phenomena are generally non-phonologically conditioned. In the Bok dialect of Manjaku, indeed, only the alternation between d and r is purely phonological: the occurrence of other continuants in intervocalic position is apparently only a rapid-speech phenomenon, and the occurrence of a nasal grade is conditioned by morphological factors of noun-class membership.

In Fula, the conditioning in nouns (and in verbs as well, as will be discussed below) is entirely morphological. Each of the noun classes has associated with it a particular grade of the stem, and when occurring in a given class a given stem appears in the appropriate grade. Adjectives agree in class with the noun they modify, and display the same correlation of class and initial consonant grade. It should be recalled that in some cases, two grades of the stem are homophonous: thus, some stems show stops in both stop and continuant environments. Stems like (2g,h) show initial d and j respectively even when they appear in forms like $daag-o$ 'sleeping mat' (class 14) and $juul-be$ 'Moslems' (class 2), where continuants would normally be found. Similarly, all stems with voiceless initials show the same form in both

stop and nasal environments: thus, the augmentative forms of (2e,f) appear as *pīnor-ga* 'big jar for antimony' and *kufinee-wa* 'big cap', class 7 forms which would normally take prenasal grades of the stem. More will be said of this below. For the present, we simply wish to point to an interesting consequence of this sort of homophony in the corresponding gradation system of the related language Bedik (cf. Ferry [1968]), which reinforces the observation that morphological conditioning is involved.

Whenever in Bedik a noun or adjective has a singular form in the stop grade, and would also display a stop grade form in one of the other grades (i.e., has either a continuant or a prenasal grade form which is homophonous with its stop grade form), morphological factors can give rise to an unusual substitution. Suppose the stop grade is homophonous with the prenasal grade, and the singular form belongs to a class requiring the stop grade. Then if the plural form of the word belongs to a class which requires the prenasal grade, we would expect to find a homophony between the stem forms in the singular and plural. For example, an adjective meaning 'large' appears as *fārāmè* in continuant-grade environments, but as *pārāmè* in stop and prenasal grade environments. Corresponding to the singular *é-gàf é-pārāmè* 'large meal without sauce', appearing in class 7 (which normally calls for the stop grade, as shown by the form *gàf* of the head noun), we would expect a plural **mā-ngàf mā-pārāmè*, since the plural of this phrase appears in class 6, which takes the prenasal grade (as the noun stem shows). The adjective would thus have the same (stem) form in both singular and plural. This form does not occur, however: the homophony of singular and plural is avoided by shifting the adjective stem into the continuant grade, otherwise completely anomalous for a class 6 noun or adjective, giving *mā-ngàf mā-fārāmè*.

In other cases, the stop and continuant grades of a stem might be homophonous: if the stem begins with the implosive *ɓ*, for example, these two grades are not distinguished. In Bedik (unlike Fula), *ɓ* does have a distinct nasal form: *m*. A shift similar to that just noted

makes use of this fact. The singular form $\acute{e}\text{-c}\bar{e}r \acute{e}\text{-b}\bar{a}l\grave{a}$ 'black chicken' is in class 7, which calls for the stop grade. The corresponding plural is from class 11, which normally takes the continuant grade. We would thus expect $*\acute{ó}\text{-š}\bar{e}r \acute{ó}\text{-b}\bar{a}l\grave{a}$ 'black chickens', since the continuant form of $\bar{b}\bar{a}l\grave{a}$ 'black' is homophonous with the stop form. We do not get this, however: rather, we find $\acute{ó}\text{-š}\bar{e}r \acute{ó}\text{-m}\bar{a}l\grave{a}$ with the nasal form of the stem, which would otherwise be completely anomalous for class 11.

In Bedik, then, we find a morphologically conditioned process similar to that in Fula: each noun class has a corresponding grade for the stem. This factor is overruled by another morphological feature however: wherever a plural form would be homophonous with a corresponding stop grade singular, nasal and continuant grades are substituted for one another in order to prevent such homophony. We have illustrated this only from Ferry's examples with adjectives, since in these cases the grade of the noun stem itself makes clear what grade we would expect in the associated adjective. In other cases, however, we find exactly the same phenomenon in the noun alone: if the class of the plural corresponding to a stop-grade singular would normally require a homophonous continuant or nasal grade, nasal and continuant grades are interchanged. This is a striking example of morphological conditioning, and makes it clear that an alternation which was originally phonological in character is now employed for non-phonological purposes. In yet other cases (discussed by Sapir [1971]) the morphological conditioning has been lost as well, and it is only through lexical relations between forms that can be traced back to the same stem, or through comparative considerations, that the original existence of a gradation system can be demonstrated for a language like Pajade.

The gradation systems in West Atlantic, then, are similar in some ways to the systems found in the Celtic languages. Here we have reason to believe that an original system of rules of intervocalic spirantization and lenition, and of strengthening after certain consonants, has developed into a morphologically based system where initial consonants appear in one of several forms, depending on the morpho-

logical (not phonological) character of preceding particles, prepositions, etc., or of gender and/or number, and similar factors involving the identity of particular morphemes. We can then ask ourselves what the original phonological conditioning was. In Celtic, historical and comparative evidence allows us to reconstruct the original phonological factors with some precision.

In Fula, the variation with which we are concerned appears in the root-initial consonant, but there is no element preceding the stem which (even in its ancestral form) could have provided the phonological conditioning for the choice of stop, nasal, or continuant grades. We note, however, that the stem is followed by a marker for class membership. When we compare this system with those of other West Atlantic languages, we see that this is something of an anomaly: the majority of the languages of the family which display an active noun-class system have preposed class markers, as in the Bedik examples cited above. Furthermore, many of the particular class markers which are found postposed in Fula can be shown to correspond phonologically to preposed class markers in other languages of the family.

In fact, in other classifying language families of Africa we find parallels to this situation. Thus, while most Bantu languages have preposed class markers, some have postposed markers; and in a very few cases we find what is probably the intermediate step: class markers which are duplicated as prefix and suffix to the same noun. Thus, it appears to be a possible development for a language with preposed class markers to copy these as suffixes, after which the original prefixed forms may be lost. If we imagine such a development in Fula, we can then suggest that the (now suffixed) class markers originally appeared before the stem. From there, we need only assume that the markers for those classes which now require the continuant grade of a stem originally ended in some phonological material which could condition the presence of a continuant (most plausibly, a vowel); those which now require the nasal grade ended in a nasal element (at least before consonants); and those now requiring the stop grade ended in something which would condition neither of these processes (or which would, on

the contrary, condition the conversion of continuants to stops). Subsequently, the preposed copies of the class markers were lost, but their effects on stems were retained; the conditioning at this point changed from phonological to morphological.

3. The Gradation System in Fula

We now have, as a result, a system of consonantal correspondences which are correlated with noun classes. The correspondences involved are shown (for the Gombe and Adamawa dialects) in (4):

(4) 'Continuant' ⁷	r	w	w	y	y	f	s	h	b	d	j	g
'Stop'	d	b	g	g	j	p	c(sh)	k	b	d	j	g
'Nasal'	nd	mb	ŋg	ŋg	nj	p	c(sh)	k	mb	nd	nj	ŋg

It is our task below to examine these alternations, and to determine the correct form for their description. We have already noted that they occur in nouns, depending on class, and also in adjectives according to the same system. Thus, an adjective modifying a noun in class n will itself be marked as a member of class n, and will take the form of the stem appropriate to a member of class n. Further, these alternations appear in verbs, which show a stem grade determined by the number of the subject, and the position of a subject pronoun. The system thus pervades the morphology of the language.

3.1. Suffix gradation. In addition to the stem alternations which we have sketched above, the class suffixes themselves show a similar pattern of alternation, conditioned by distinct factors. Thus, all of the stems lepp- 'strip of cloth', lilli(i)- 'feather', taador- 'belt' and ðor- 'leather armlet' are members of class 17, with plurals in class 25. They also form diminutives of both class 3 and class 5, a diminutive plural in class 6, an augmentative in class 7, and an augmentative plural in class 8. Their paradigms (from Arnott

⁷The designations "continuant", "stop", and "nasal" are somewhat arbitrary, and should not be taken as literal phonetic descriptions of the segments referred to. They are used here as mnemonics to refer to the relevant classes of segments.

[1970:90]) are given in (5) below (recall that the initial consonants l, t and ɓ do not alternate in Gombe, so no stem-initial alternation is associated with this variation in class):

(5)	class 17	(sg.)	lepp-ol	liili-wol	taador-gol	ɓoor-ɲgol
	class 25	(pl.)	lepp-i	liili-ji	taador-ɗi	ɓoor-ɗi
	class 3	(dim.)	lepp-el	liili-yel	taador-gel	ɓoor-ɲgel
	class 5	(dim.')	lepp-um	liili-yum	taador-gum	ɓoor-ɲgum
	class 6	(dim.pl.)	lepp-on	liili-hon	taador-kon	ɓoor-kon
	class 7	(aug.)	lepp-a	liili-wa	taador-ga	ɓoor-ɲga
	class 8	(aug.pl.)	lepp-o	liili-ho	taador-ko	ɓoor-ko

From these paradigms, we can see the initial consonant of the noun-class suffix alternates according to the stem with which it appears. Since all of these nouns belong to the same class(es), it cannot be the noun class itself which determines the variation: it is rather the stem with which they appear. When we consider the variation -ol/-wol/-gol/ɲgol, for example, we see that it is actually rather like the pattern w-/g-/ɲg- which we have already seen in root initials. The patterns -el/-yel/-gel/-ɲgel, -on/-hon/-kon/-kon, etc., also look rather similar to those already encountered. We can thus see the outline of a system of continuant, stop, and nasal grades for suffixes, as well as for stems. We note further that if a given stem takes a particular grade of one suffix, it takes the same grade for other suffixes as well. We could thus divide stems into four groups (which we will call A, B, C, and D), depending on what grade of suffix they take. We then have a cross classification of stems, according to a) the noun-class to which they belong (in the basic singular form); and b) the grade of suffix-initial consonants which they condition. The stem lepp-, for example, can be described as class 17a; liili(i)- as 17b; taador- as 17c; and ɓoor- as 17d. Similar subdivisions exist for the other basic noun classes.

The patterns observed in suffix-initial consonant variation are those shown in (6), for Gombe (with a few exceptional variants disregarded):

(6)	A	∅	ɓ	∅	∅	∅	r
	B	j	ɓ	y	h	w	r
	C	ɗ	ɓ	g	k	g	d
	D	ɗ	ɓ	ŋg	k	ŋg	nd

There are two major ways in which this system differs from that established for initial consonant gradation. First, we have a system of four grades, rather than three. In addition to what we can call the continuant, stop, and nasal grades (B,C, and D, respectively) we have an additional form which we can call the zero grade (A). This is generally treated as a distinct suffix class, but Skousen [1972] has argued plausibly that it ought to be considered simply a variant of the continuant grade. In general, the distinction between stems that take the zero grade and stems that take the continuant grade is phonological in character: consonant-final stems, like *lepp-* take the zero grade, while vowel-final stems, like *liili(i)-* take the continuant grade. If we assigned both to the continuant grade, we could then have a rule which deletes the glides *y*, *w*, and *h* (as well as *j*, for which Skousen proposes an abstract analysis as a further type of glide) after a consonant-final stem.

The second difference between the stem alternation pattern and the suffix alternation is the existence in the latter series of an alternation $(\emptyset-/)j-/ɗ-/ɗ-$. This is unlike anything in the stem-alternation series in two respects: when a stop such as *j* occurs in continuant-grade environments in stem-alternation, the stop grade form of the root should be the same; and when a glottalized consonant (such as *ɗ*) appears in any grade in stem alternation, it appears in all grades and the root is invariant. This is paralleled in the suffix system by the series *ɓ/ɓ/ɓ/ɓ*. Thus, the suffix alternation $(\emptyset-/)j-/ɗ-/ɗ-$ is completely isolated, and must be provided for specially

in the rules of gradation. Skousen [1972] suggests that this alternation be represented in terms of an abstract segment (a glide of some sort which alternates with d but which becomes j in the continuant grade if not deleted). We prefer simply to differentiate morphologically between the behavior of j/d in suffixes, and that of j or d in stems. With this exception, however, and taking into account the phonological analysis of the difference between A-stems and B-stems, we can reduce the suffix alternation to a special case of the continuant /stop/nasal alternation in stems, conditioned again by morphological factors (this time, the classification of stems as A/B,C, or D).

3.2. Gradation in verbs. There is one other area in which consonant gradation can be found in Fula: the initial consonant of the verb root shows a similar alternation. Thus, corresponding to Gombe *mi-warii* 'I came (have come)', we have the plural form *min-ngarii* 'we came (have come)'. Many stems show only these two forms, but others show a stop-grade form of the root in the singular, against a nasal grade form in the plural: thus, ?o-dilli 'he went away', but *min-ndilli* 'we went away'. Still other roots show only one form under all circumstances. Most of these are stems with an initial consonant which does not alternate in any event, such as *tedda* 'be heavy'. Others are forms in which the stop and nasal grades would be identical, such as *kaas-* 'fall short'; these can be assimilated to the type in which stop grade appears in environments where the continuant grade (in this case, **haas-*) would be expected. A few stems show a prenasal initial in all environments: thus, *ngat-* 'bite' has the nasal grade in all environments, rather than showing the expected continuant (**wat-*) in the continuant grade forms.

Skousen [1972] has suggested that the gradation in verbs can in fact be reduced to the operation of a phonological rule. He argues that the nasal grade of the stem appears just after those subject pronominal markers that end in a nasal, such as *min* 'we'; elsewhere, the continuant grade (insofar as this is distinct from the nasal grade) appears. The nasalization of the stem initial itself follows from an

independently motivated rule: after a homorganic nasal, stops are prenasalized across morpheme boundaries. In Adamawa, the final nasal of *min* does indeed assimilate in position to the stem initial; and since Skousen takes the underlying forms of the stem to contain the stop grade (as will be discussed below), this rule would thus produce the correct forms, and eliminate the need for morphological conditioning of the nasal grade in verb stems.

Unfortunately, however, this reduction will not work. The nasal grade of verbal stems appears not only after those plural subject markers which end in a nasal in Gombe, *min* 1pl., *?en* 2pl.incl., *?on* 2pl.excl. *kon* class 6 (dimin. pl.), but also after other plural elements such as *be* class 2 (pl.), *ko* "class 6 (aug. pl.)" *de* class 24 (inan. pl.), and *di* class 25 (inan. pl.). Furthermore, the stem appears in the nasal grade even when no pronominal subject element at all is present, if the subject is plural, as in *na?i Bello fuu mbaatii* (cow-pl Bello all died) 'all of Bello's cattle died'. In fact, (as noted by Klingenheben [1963:23]) it is probable that the nasalization in plural verb forms is originally due to the phonological effect of the first and second person plural nasal-final pronouns; but it has spread into all plural forms. This can be seen particularly clearly in the Bagirmi dialect (described by Gaden [1908]), a form of Adamawa spoken by a group that migrated from the Eastern into the Western dialect region. In this dialect we find not only nasalization of those consonants for which a nasal grade form exists, but also intrusive nasal elements after those non-nasal-final pronouns that are plural and followed by a non-nasalizable initial: *be-n-?uwat* 'they will sow', with a root-initial *?* which of course does not have a nasal form. It appears, therefore, that the nasalization originally induced by the first and second person plural pronouns was extended into other plural forms, first through the pronouns only (as in Bagirmi) and finally into all plural verb forms regardless of the presence or absence of a (possibly nasal-final) pronoun.

There are other arguments which also show that the purely phonological account of nasal grades in verb forms is not adequate. First of all, in the Gombe dialect the final nasal of *min*, etc., does not assimilate to the initial of a following verb stem. The nasalization rule which operates over boundaries under purely phonological conditions, on which Skousen bases his analysis, only applies to stops following a homorganic nasal. Thus, there is no way to produce the nasal grade in stems beginning with *b*, *j*, or *g* in Gombe by phonological rule.

A more important argument arises from the fact that the plural is not the only circumstance in which verbs appear in the nasal grade. In some of the combinations of tense, aspect, and person in the complex Fula verbal system, the subject prefix appears postposed, as a suffix. The nasal grade always appears for stems which are followed by such suffixed pronouns, regardless of whether they are singular or plural (data from Arnott [1970:204-5]).

(7)	<u>person/number</u>	<u>past</u>	<u>rel. past active</u>	<u>subjunctive act.</u>
	1sg.	mi-warii	ngar-mi	mi-war-a
	2sg.	?a-warii	ngar-ɗaa	ngar-aa
	3sg.	?o-warii	?o-war-i	?o-war-a
	1pl.	min-ngarii	min-ngar-i	min-ngar-a
	2pl. incl.	?en-ngarii	ngar-ɗen	ngar-en
	2pl. excl.	?on-ngarii	ngar-ɗon	ngar-on
	3pl.	ɓe-ngarii	ɓe-ngar-i	ɓe-ngar-a

Forms of war-/ngar- 'come'

It is thus the case that the distribution of grades in the verb is as follows: if the subject is plural, or if a pronoun is suffixed to the verb, the stem appears in the nasal grade. Otherwise it appears in the continuant grade (insofar as this exists for the stem in question). Clearly, then, the gradation process is conditioned by morphological factors in the verb just as much as in the noun, adjective, and suffix gradation systems, though the phonological basis of the rule (in at least some cases) is not quite as hard to reconstruct on a synchronic basis.

4. Lexical Representation of Gradation

We have now outlined the operation of the gradation system in Fula, based on a set of morphologically conditioned alternations among continuant, stop, and nasal grades of morpheme-initial consonants. The question which must now be dealt with is the following: what is the correct lexical or underlying representation for elements which are subject to gradation? In the absence of specific evidence for some other solution, we would like to limit the possible representations of a given alternating element to just the class of surface elements by which it can be manifested. We pose the problem of an underlying representation for consonants which undergo gradation in Fula, then, in terms of a choice among the continuant, stop, and nasal grades of the element. We will make some further methodological remarks about this question below; for the present, we simply assume that these are the only choices open to us.

We would like any proposed underlying representation of an alternating root or suffix to meet the following basic condition: it should be possible to predict from this representation, by means of the system of rules, as much as possible of the range of variation the element shows. This condition is indeed inherent in the very concept of an underlying (or lexical) representation for an alternating element. It is, furthermore, sufficient to force a particular choice in this case, for there is only one form of alternating elements from which their range of variation is uniquely determined (as we will show below).

Consider first the possibility that the nasal grade of alternating elements is underlying. With the exception of those consonants which do not alternate at all (pure nasals, glottalized consonants, l, and t), and those for which the nasal and stop grades are identical (the voiceless consonants), consonants in roots which show a nasal grade alternate with stop and/or continuant grade forms. There are a few forms, however, of which this is not true. In Adamawa (cf. Klingenberg [1963]).

the verbs mbar-⁸ 'kill', ŋgaaw- 'go fishing', mbod- 'treat as a bad omen', and others show the nasal grade form of the root not only with plural and suffixed subjects, but also with singular non-suffixed subjects, where the continuant grade would be expected. Further, nouns like njaatiraawo 'great-grandchild', ŋgorgi or ŋgorgiraawo 'comrade', and ndottiiŋjo 'older, important personality' appear with the nasal grade not only in those noun classes where this would be expected, but also in those where the stop or continuant grade would be normal. If we take the nasal grade of stems as basic, how are we to describe these elements? In that case, we will need rules which operate on consonants in the nasal grade to convert them to stops or to continuants. We would then mark the forms which always show nasal-grade consonants as exceptions to these rules: they would never undergo them, and would always appear in the nasal grade.

Suppose, on the other hand, that we had taken either the continuant or the stop grade as basic. We would then have rules to produce the nasal grade where required. How would we represent the exceptional stems in that case? We would then not need to employ an exception feature at all: simply by representing these (and only these) items with underlying nasal-grade consonants, their behavior would be completely determined. Since the rules of the grammar would be rules converting continuants or stops to other grades, a form with an underlying nasal grade consonant would not meet their structural descriptions. They would thus show invariant nasal-grade consonants. This seems an entirely appropriate way to represent their invariance: their variation is limited in that they show nasal grade forms in all environments. Provided we do not choose the nasal grade as basic for those consonants which do alternate, we can capture this fact precisely by giving them as their underlying representation the only shape they ever show phonetically: a representation with a nasal grade consonant. No arbitrary exception feature is necessary.

⁸In Gombe, this stem is alternating war-/(bar-)/mbar-.

The correctness of this solution is confirmed by other considerations. From the (Adamawa) verbal root *wiir-* 'to raise, bring up, educate; to perform (such service as a king's retainer', there can be formed two deverbal nouns: *biiruki* 'good breeding, culture', and *mbiiru* 'court service'. From this last, in turn, a new verb can be formed: *mbiir-* 'to serve at court!'. This verb is one of those that are invariant, showing the nasal grade in all positions. If we take the nasal grade as basic, this fact is arbitrary and unmotivated, for we would expect the verb created from such a noun as *mbiiru* to be perfectly able to undergo rules changing underlying nasal grade to continuant. The exceptionality would then be an isolated and unexplained fact. If we take one of the other grades as basic, however, this is not the case: it is exactly when a verb is created from a noun with a nasal-grade representation that we would expect the underlying representation of the verb also to show a nasal grade. As we noted above, if we choose either stop or continuant grade as basic, such an underlying nasal-grade form will automatically be invariant, as in fact it is. We conclude, therefore, that the nasal grade should not be taken to be basic to the consonant gradation process, and that we are left with a choice between the continuant and stop grades.

In fact, this choice is determined by much the same considerations as those which excluded the nasal grade as a possibility: the representation of forms which show less than the full range of variation under gradation. Excluding again those items with consonants not subject to gradation (a class now seen to include the prenasal stops of the nasal grade), the majority of stems and suffixes in Fula show distinct continuant and stop grade forms (as well as a nasal grade, where this is distinguishable from the stop). A substantial number of forms, however, do not distinguish between the continuant grade and the stop grade. As noted above, there are nouns in the Gombe dialect like *bukkaa(-ru)* 'shelter', *dept(e-re)* 'book', *janggir(-de)* 'school', and *gooroo(-re)* 'kola-nut' which (while they occur in classes that normally require the continuant grade) do not distinguish between the continuant and stop grade forms. Similarly, there are verbal roots like *baarr-*

'be impotent', dany- 'give birth to', and juul- 'say prayers', which show stops rather than continuants with singular non-suffixed subjects.

In these cases, again, we can ask how the difference between items with distinct continuant and stop grade forms and those with stops in both categories is to be represented. If we take the stop grade as basic, we will need a rule to turn stops into continuants in certain environments, to which the forms above will be exceptions. On the other hand, if we take the continuant grade forms as basic, and posit a rule to turn these into stops in certain environments, the difference can be represented without the use of an exception feature: a root with distinct continuant and stop grade forms is simply one with an underlying continuant, while a root which always shows the stop grade has this underlyingly. Since there is (on this analysis) no rule in the grammar which converts stops into continuants, the failure of such roots to show distinct forms follows automatically. Again, the correctness of such a solution is indicated by other considerations. In verbs, for example, only the continuant and nasal grades are found. If we took the stop grade of alternating roots as basic, we would have to say that verbal radicals never occur in their underlying form (unless they are members of an exceptional class), except when a deverbal noun is made from them which happens to fall in a class that takes stop-grade initial consonants. Indeed, this cannot be the case. We noted above that from the root wiir-/biir-/mbiir- 'raise, bring up, etc.' two deverbal nouns can be formed (in Adamawa). We have already considered mbiiru 'court service', from which another (unchanging stem) verb can be derived. It is also possible to derive another verb from the noun biiruki 'good breeding, culture', viz. biir- 'raise well.' This verb is derived from a (deverbal) noun with stop-category initial consonant, and so it is natural that it should have a stop-grade in underlying representation. If we assume that continuants underlie those verbs which show continuants in the non-suffixed singular, rather than stops, and stops those with stops, these facts follow

naturally. If we assume that all have underlying stops, however, it will be necessary to assume (without motivation) that when a denominal verb is formed from a noun whose initial consonant is of the stop class (ex hypothesi, in its underlying form) it acquires an exception feature which prevents it from being made a continuant in the non-suffixed singular (but which does not, for example, prevent it from becoming a nasal-grade in the plural and the suffixed singular). The evidence points quite clearly, it seems, to an underlying representation for all items in the language in which alternation is possible (nouns, adjectives, verbs, and suffixes) which has the initial consonant that appears in environments calling for the continuant grade.

On the basis of the observation that, given the continuant-grade form of the noun, adjective, verb, or suffix it is in general possible to predict the others by rule, while no other form serves this purpose as well, nearly all writers on Fula who have expressed an opinion (including Arnott, Klingenheben, Stennes, and with some reservation Sapir [1971]) have claimed that it is this form that should be taken as the basic or lexical representation of items in alternating categories. The only exception of which we are aware is Skousen, whose objections we will consider below. For the present, we will take the arguments just given as sufficient, and will assume that the continuant-grade form (which may be, in items whose variation is restricted, a member of the stop or even of the nasal class) is the lexical representation. We will provide further evidence for this below, in the form both of synchronic arguments and of historical changes and dialectal differences which this assumption renders coherent and plausible.

5. The History of the Gradation System

We would like now to take up the history of the gradation system, and its development in the various Fula dialect areas. While we have suggested above that there was a stage at which the alternations reflected in the gradation system were conditioned by purely phonological factors, it does not seem possible at present to recover the details of such a stage of the language. It must in any case have been a property

of the proto-language which was ancestral to the entire northern group of West Atlantic, and perhaps to common West Atlantic itself. The time depth involved is thus quite considerable. Furthermore, since the alternation has become morphological in nearly all of the languages, a large proportion of the vocabulary of any one language involves the consequences of extensive analogical change and restructuring. Until more comparative work is done in West Atlantic, therefore, the phonological details of the original system must remain obscure. They are certainly not accessible to internal reconstruction from within Fula alone.

The earliest stage in the history of the system in which we can have any confidence is the alternation pattern described by Klingenberg [1927] for "Urful." By this point, the class system in the noun was fairly well established in essentially the form we find it in the modern dialects, and the consonant gradation system was conditioned by such morphological factors. Phonologically, however, the system was somewhat simpler:

(8)	f	s	x	w	r	y	y	(continuant grade)
	p	t'	k	b	d	d'	g	(stop grade)
	*mp	*nt'	*nk	mb	nd	n'd'	ng	(nasal grade)

As in the modern language, pure nasals, glottalized consonants, *l* and *t* did not alternate. The hypothetical prenasalized voiceless stops are posited largely on the basis of symmetry, though there is a small amount of direct evidence for them from early records of the (Western) Masina dialect. In any event, if nasality was originally possible for the voiceless stops it was lost at an early point, with *mp, *nt', and *nk being replaced by the corresponding simple stops.

The fact that *s* alternates with (alveo-)palatal *t'* has led some to conclude that modern *s* reflects an original alveopalatal *š*, not a dental. It is interesting, in fact, to compare this situation with that which obtains in several of the languages of the Austro-nesian family. Most of the languages of the Phillipine group, as

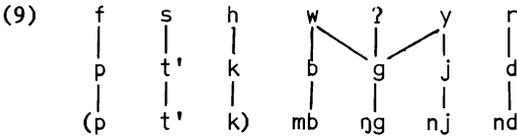
well as Malay and related Indonesian languages, have a rule by which a nasal-final prefix coalesces with an obstruent-initial root to produce a nasal homorganic with the original obstruent. Underlying /paN+putul/, for example, gives pamutul in modern Tagalog, with parallel forms for roots beginning with other consonants. The interesting point is that for the purposes of this rule, s behaves as a palatal, not a dental, in nearly all of the languages. Thus, /paN+sulat/ gives panyulat. It is for this reason, primarily, that Dempwolff's pioneering reconstruction of proto-Austronesian phonology involved positing an alveopalatal stop *t' as the ancestor of modern s. When we see the same sort of correspondence in Fula (and some of the other West Atlantic languages), we may suspect that it is the laminal (as opposed to apical) character of s that causes it to be associated with (laminal) alveopalatals rather than with (apical) dentals. In that case, no change of position would need to be involved.

Two other features of the system in (8) require comment: the velar spirants x and γ. The positing of x, alternating with k and later becoming h is perfectly plausible, and such a development is attested in many languages. The voiced counterpart, γ, is attested in the earliest documentary evidence on Fula, and is also plausible. It is the subsequent history of this segment which will be of greatest interest to us below. Notice that its presence is responsible for a major difference between the system in (4) (Modern Gombe) and that in (8) ("Urful"): in (4), w alternates with either b or g, while γ alternates with either j or g; on the other hand, g alternates with either w or γ. In (8), on the other hand, there is a one-to-one correspondence between the members of the continuant grade and the members of the stop grade. This change is what gives the whole example of gradation in Fula its theoretical interest.

The system in (8) underwent different development in different regions. The stop t' is only retained as such in some Western dialect areas, and becomes affricated to c in other dialects. In Gombe, the affricate c is replaced (except when geminated, and in a few ideophones) with the spirant sh, so that this functions as the

"stop" corresponding to s . In a few areas, in fact, this change is followed by a shift of ʃ to s , with the result that s effectively ceases to alternate.

In considering the subsequent development of γ , we must distinguish the Western dialect area from the Eastern. In Western Fula, γ was replaced by w before back rounded vowels (o,u); by γ before front unrounded vowels (i,e), and by $?$ before a . This change had a very important consequence: after it took place, it was only the stop grade of the root from which its alternation pattern could be deduced. Notice that the "Urful" system in (8) has the property that either stop or continuant is sufficient to predict the other. A result of the shift of γ in "Westful", however, is the following system:



In this system, knowing the continuant grade of a root is not sufficient to predict its other forms. If the continuant grade has w followed by an unround vowel (i,e,a), the corresponding stop grade may have only b . If w is followed by a round vowel, however, the stop grade form may be either b or g . On the other hand, while y before a back vowel (a,o,u) always alternates with j , before a front vowel (i,e) it may alternate either with j or with g . Even $?$ is not unambiguous: before a it may either alternate with g (if it represents original γ), or remain invariant (if it represents original $?$).

These complications have the consequence that the continuant grade is not sufficient to determine which stop a given continuant in a root will alternate with. On the other hand, the arguments given above for taking the continuant grade as basic were valid for the system already at that point since the gradation series $b-b-mb$, $d-d-nd$, etc. existed as well. This creates a conflict: if the stop grade is taken as basic in the system of (9), it is always clear which continuant a given stop will alternate with. What is not clear, however, is whether it

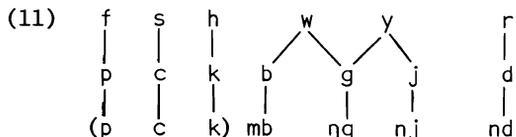
6. Continuants vs. Stops in Underlying Forms

As we noted, the only writer known to us who has challenged the assumption that the continuant-grade form of roots is basic is Skousen [1972], who proposes that the stop-grade form is basic. Having noted that the traditional argument in favor of taking the continuant-grade forms as basic is the existence of a number of stems which show stops in both continuant and stop-grade environments, and that these can be differentiated by representing them with underlying stops as opposed to continuants, Skousen suggests that an analogous argument could be constructed in the opposite direction, and that in fact neither argument gives evidence for the correct underlying representation. He notes, that is, that there are a number of forms which show a continuant in both the continuant and the stop grade environment, such as *suley-* 'shilling', *sooje-* 'soldier', *hakiika-* 'truth', *foto-* 'photograph', and others. According to Skousen, these forms (like the forms with initial *b, d, j, g* in both continuant and stop grade environments) are simply [-STEM ALTERNATION]: they are outside the gradation schema altogether. Skousen proposes that the gradation system is in fact dying out, and that this sort of stem is actually the unmarked or most natural case.

Having (apparently) disposed of the argument for taking continuant-grade forms as basic, Skousen goes on to note that if we did so, we would have as yet no way to deal with the behavior of *w*. Before front vowels, that is, *w* alternates only with *b*; but before back vowels, it is an idiosyncratic property of particular roots whether *w*⁹ alter-

⁹Actually, Skousen also suggests that a similar indeterminacy arises in relation to the gradation of *ɣ*. This is based on a single form, *yeh-i*, which Skousen gives as *yeh-* 'go'. As we have seen, *y* before front vowels normally alternates with *g*, but in this form it alternates with *j*. This claim is based on an incomplete analysis however. In fact, the stem for 'go' is /*yah-*/, and *y* before a back vowel (*a*) alternates normally with *j*. The stem appears with *a* in most environments, except that (dialectically, esp. in Adamawa) it undergoes a minor rule of fronting before the aorist ending /+*i(i)*/ and the plural imperative endings /+*e*/, /+*en*/. In all other instances the vowel *a* appears in this root, and it is clear that it does not really constitute an exception to the generalization that *ɣ* alternates with *j* before (underlying) *a, o, u* and with *g* before (underlying) *e, i*.

system at all. Instead, γ is replaced by w before all back vowels (a,o,u), and by y before front vowels (i,e). It is also clear that t' was replaced by c at an early point in this area. The result is the system in (11):



This system also presents difficulties for the analysis on which the continuant grade is taken as basic. Again, given a b , g , or j it is possible to determine which continuant it alternates with (assuming we can determine whether it alternates at all), but given a w followed by a back vowel we cannot tell whether it alternates with b or with g , and given a y followed by a front vowel, we cannot tell whether it alternates with g or with j . Again, assuming the stop grade to be basic, this would entail no added complexity, but assuming the continuant grade as basic (as we have argued) it is necessary to introduce some diacritic to resolve these indeterminacies, which results in a more complex system.

In fact, a general change takes place in the Eastern dialect region which eliminates one of the two problems posed by (11). Note first that before a back vowel, y alternates only with j : it is only before a front vowel that y (from original γ) can alternate with g . The indeterminacy of underlying γ thus appears only before a following front vowel; and it is in just this environment that original j/ng alternating with y are systematically replaced by g/ngg . The result is that, given a y , we can now tell unambiguously what stop it alternates with: if it is followed by a back vowel, it alternates with j/nj , while if it is followed by a front vowel, it alternates with g/ngg . Again, this change makes perfect sense from the point of view of a system in which the form of the root appearing in continuant grade environments is basic, but is unmotivated from the point of view of a system where the stop-grade form is basic. The ambiguous status of w will be dealt with below.

certain preposed pronouns were generalized to other morphologically related forms.

The verbs thus show that it is not true that whenever a stem alternates at all, at least one of its forms must be a stop-grade. This would be a rather minimal claim in any event, since in order for it to be falsified the stem would have to show a continuant and a nasal grade, but not a stop grade. The full paradigm of any noun or adjective will include diminutive and augmentative forms; the diminutive singular classes all take stop-grade forms and the diminutive plural and all augmentatives take nasal grade forms. Thus we need only assume that there is an absolute distinction between alternating and non-alternating nouns (and adjectives): either a stem is invariant, or it undergoes any applicable gradation rule. If it shows a continuant initial, then, and also a nasal grade form, it must be alternating; in which case it will also show a stop-grade, at least in diminutive singulars. It is clear therefore that the fact that any alternating noun or adjective stem shows a stop grade form is irrelevant to the choice of one grade or another as underlying. If anything, the evidence from gradation in verbs (where only continuant and nasal grades are found) suggests that the continuant grade is more appropriate than the stop grade for the representation of alternating forms.

6.1. The distribution of "exceptional" forms. We turn now to the exceptional forms cited by Skousen. It will be recalled that the major argument in favor of underlying continuants as opposed to stops was the existence of many forms in which a stop (b,d,j,g) appears in both continuant and stop grade environments. It was proposed to represent these items with underlying stops, as opposed to those items which show a full range of alternation, represented with underlying continuants. Skousen, however, cites a number of forms with continuants in both continuant and stop grade environments. He claims that both of these classes are actually just exceptions to the gradation process: that is, forms with underlying stops and continuants, respectively, which simply do not undergo the gradation process at all and thus give no evidence for the appropriate underlying forms for elements that do undergo gradation.

nates with *g* or with *b*. Roots which are homophonous in the continuant grade can thus have distinct stop (and nasal) grade forms: in Gombe, *war-/(bar-)/mbar-* 'kill' contrasts with *war-/(gar-)/ŋgar-* 'come' in this way, and there are several others. If we take the stop grade as basic, however, we can always tell what continuant corresponds to the stop in a given element: *j* always corresponds to *y*, *b* always corresponds to *w*, and *g* corresponds to *y* before front vowels, to *w* before back vowels. We can thus eliminate an indeterminacy (or rather the need for a diacritic) by taking the stop grade as basic. As further evidence for this position, Skousen claims that wherever a stem shows an alternation, it shows the stop grade as one of its forms. Thus, every alternating stem shows a stop grade, though some fail to show one or the other of the two remaining possibilities.

We will discuss the distribution of exceptions and their treatment in what follows, where it will be seen that the forms Skousen cites do not impugn the traditional argument for taking the continuant-grade forms as basic. The treatment of *w/g/ŋg* vs. *w/b/mb* alternations will also be dealt with below. Before proceeding, however, it is necessary to eliminate the last point made by Skousen. In fact, there are alternating stems that do not show a stop grade: verb stems from which there does not happen to be a deverbal noun of appropriate class. In the verb system itself, the basic alternation is between continuant grade and nasal grade, with the stop grade appearing only in related nouns. In those Western dialects in which there is no gradation in the verb (such as Fula Jalo; cf. Gaden [1929]), verbs always appear with a continuant-grade initial (which may, of course, be identical with a consonant from one of the other classes, just as in the other cases from all dialects which we have discussed above where stops and occasionally prenasal stops appear in environments where normally the continuants would be found). We could, of course, claim that gradation always applies in verbs, but this would be a completely gratuitous assumption. The history of gradation in verbs in those dialects that have it shows that verbs did not originally alternate under morphologically defined conditions (which is still the case in other dialects), and that the phonological consequences of a final nasal in

(stop-grade) as *beebeejo*, in class 2 (continuant-grade) as *beebeʔen*, and in class 6 (nasal grade) as *beebehon*.

If we assume that exceptionality with respect to gradation is an all-or-nothing proposition, we would expect to find just the types of stem which are in fact attested: 1) regularly alternating stem (underlying continuant, not exception: type *wor-/gor-/ŋgor-* 'man'); 2) same stem for continuant and stop grades, distinct nasal grade (underlying stop; not exceptional: type *daag-/daag-/ndaag-* 'sleeping mat'); 3) invariant, with continuant grade throughout (underlying continuant; exceptional with respect to gradation: types *hawsa-/hawsa-/hawsa-* 'Hausa', *wannyo-/wannyo-/wannyo-* 'game'); 4) invariant, with stop grade throughout (underlying stop; exceptional with respect to gradation: type *beebe-/beebe-/beebe-* 'deaf mute'); and 5) invariant, with nasal grade throughout (underlying nasal, not subject to gradation: type *njaat-/njaat-/njaat-* 'great-grandchild'). Notice that there are certain stem types which, while hypothetically possible, could not be described in these terms: stems with distinct continuant and stop grade forms, but for which the nasal grade is the same as one or the other of these (assuming, of course, that the stop and continuant grade forms have voiced consonants so a distinct nasal grade would be phonetically possible). Such a stem would have to undergo gradation between the continuant and stop categories, but be exceptional with respect to the gradation rule that forms nasal grades. There is no way to describe such a situation if we allow only one (global) type of exceptionality with respect to gradation, and it is striking that it is just this type of stem which is completely unattested.

There is thus no evidence that nasal-grade formation and continuant/stop alternation correspond to distinct types of exception. We have argued that if a stem is exceptional with respect to any part of gradation, it is an exception with respect to the entire alternation, and does not change. But if this is true, the fact that stems like *daag-/daag-/ndaag-* ('sleeping mat'; type 2 above) are not exceptions to nasal-grade formation shows that they are not exceptions to gradation at all; and if this is the case, they must contain underlying stops. Furthermore, since they contain underlying stops, do not convert these to continuants, but are not exceptions to gradation, gradation must not

We note immediately one significant difference between those forms with stops in both stop and continuant grade environments, and those forms with continuants in both. The latter class is composed largely of comparatively recent or unassimilated borrowings from other languages (e.g., *sooje-* 'soldier', *hawsa-* 'Hausa', etc.). The class of forms with stops in both categories, however, consists mostly of words with impeccably native status. This fact alone indicates that the continuant forms are much more likely than the stop forms to be exceptions to the gradation process.

There is a much more important reason not to call the forms with *b*, *d*, *j*, *g* in continuant-grade environments exceptions to the gradation process however: they are not exceptions to nasal-grade formation. Thus, a word like *janan-* 'foreign' shows a form *jananbe* in class two (where a continuant form like **yananbe* might be expected), but alternates with *njananon* in class 6 (diminutive plural). A word like *hawsa-* 'Hausa', however, is invariant: not only does it appear as *hawsaajo* (rather than **kawsaajo*) in class 1, where stops are normal, and *hawsa?en* in class 2 where continuants are normal, but also as *hawsahon* (rather than **kawsahon*) in class 6, where nasal grades are normally found. In this case, we might attribute the lack of variation to the formal identity between stop and nasal grades in the case of voiceless consonants. This is not the case, however: those items with voiced continuant in both continuant and stop grade environments also do not form a distinct nasal grade. Thus, Adamawa *wannyo* 'game' forms a diminutive plural *wannyohon*, in which the expected nasal grade does not appear. It is thus the case that any stem for which the stop-grade form begins with a continuant shows no variation whatsoever, while the forms cited already in which the continuant-grade form begins with a stop form a distinct nasal grade.

This suggests that we should differentiate (as already suggested) between forms that do undergo gradation and forms that are exceptions to it. In that case, we would also expect to find some forms which show stops in all three classes of environment, and in fact we do: the Gombe stem *beebe*, 'deaf-mute', for example, appears in class 1

pattern in the language which suggests an alternative analysis. The class 25 plural marker $-i/-ji/-di/-di$ can be added not only to simple stems to make the plurals corresponding to certain classes, but also to some entire singular forms, with a special sense: *nyaam-du* 'food' is a singular of class 11, with a stem *nyaam-* which appears before other suffixes in its paradigm; but a class 25 plural marker can be added to the whole form *nyaamdu* to produce *nyaamduji* 'kinds of food'. This process of double suffixation is fairly productive, for nouns for which it is semantically appropriate. Double suffixation of the class 25 marker also appears to create what is referred to as the 'plural of abundance', i.e., an emphatic plural, as in *pucc-u* 'horse', *pucc-i* 'horses', *pucciiji* 'a great many horses.' Now the important thing to note about this formation is that while it creates a noun in class 25, and class 25 is normally associated with stop-class initials, in these formations the initial consonant is the one we would expect on the basis of the first suffix, not on the basis of the class 25 form. Thus, we have an alternation between *gim-dō* (class 1) 'person' and *yim-be* (class 2) 'persons'; to this latter we can add another plural suffix from class 25, forming *yimbeeji* 'a great many people.' Note that the initial continuant, γ , is appropriate for class 2 (corresponding to the first suffix, $-be$), but inappropriate for class 25. This situation appears to be quite general, and suggests the following generalization: when a form has more than one suffix, the grade of the stem is that appropriate to the innermost of these, while the agreement properties are those appropriate to the outermost layer of suffixation.

Once we have proposed this, however, the large class of apparently exceptional forms typified by *faada* 'palace', *faadaaji* 'palaces' etc. disappears. These can be regarded as involving two layers of suffixation: first the singular suffix \emptyset just discussed, which we suggested takes continuant forms of the root, and then any further suffixes (such as $-ji$, class 25 plural). Since all other suffixes are added to the singular form of the noun, and this can always be taken to include the continuant-grade suffix \emptyset , it will follow automatically that the noun-stem will appear as (apparently) invariant. This follows from the

involve a process converting stops to continuants at all, but rather a process converting continuants to stops. We have thus arrived once more at the conclusion that for regular alternating stems showing three distinct forms, it is the continuant form which must be underlying.

As we have seen, then, the evidence from exceptions goes in favor of , not against the assumption that continuants underlie the gradation alternations. When we look more closely at the exceptional forms cited by Skousen, however, we find that there are probably fewer forms which must be treated as idiosyncratic lexical exceptions than appears at first glance. The largest class of forms showing continuants in both continuant and stop grade environments is that containing forms like faada 'palace' faadaaji 'palaces'; wannyo 'game' wannyooji 'games'; ragare 'end' ragareeji 'ends'; saaʔa 'hour', saaʔaaji 'hours'; yəla 'hope', yelaaji 'hopes', and others. This class is peculiar in that the nouns in it apparently have no suffix at all in the singular: the other suffixes, such as the plural -ji and appropriate diminutive and augmentative forms, are thus added on to the entire singular. Other singular nouns in Fula, however, take overt class-marking suffixes in the singular as well as in the plural, diminutive, etc. On this basis, Arnott [1970] suggests that there is an additional class suffix \emptyset , added primarily to borrowings, which takes the same adjective agreement as class 23 nouns. It would appear that this suffix, unlike the usual class 23 suffix which is associated with the stop grade, is associated with the continuant grade of the stem. Recall that, on our analysis, the continuant grade is exactly the form to which no gradation rule has applied and the stem is in its underlying form; this is perfectly appropriate for a class of unassimilated loan words. This class also contains, as we would expect, some items with initial stops: barka 'luck', barkaaji 'lucks'; dabare 'trick', dabareeji 'tricks', pensur 'pencil', pensurji 'pencils', etc.

We have thus far treated this class in Gombe, with suffix \emptyset in the singular, class 23 agreement, and a continuant category initial, as if they were simply exceptions to gradation. There is, however, another

Hausa *gabaa* 'front'. The development which makes it look as if gradation is sometimes being lost is really of another type: in some cases, an original singular suffix is re-analyzed as if it were part of the stem, with the singular belonging to the \emptyset -suffix class. A new plural, etc., form is then created on the basis of this new stem. An example cited by Skousen is *sabbo* 'nest', originally formed from the stem /*saḅ-*/ with the singular suffix /-*ḅo*/. This singular was re-analyzed as the stem, however, and the original plural *caḅḅe* replaced by *sabḅooji*. As we have seen, this does not consist in the loss of stem alternation in this noun, but rather in the re-analysis of the root for 'nest' as /*sabḅo-*/ and its transfer to the \emptyset -suffix class. The lack of alternation in the plural, diminutive, augmentative, etc. forms of this re-analyzed stem is not due to the addition of a feature like [-STEM ALTERNATION], but rather to the fact that these forms are treated as instances of multiple suffixation with an innermost suffix \emptyset , which takes the continuant grade form of the root. Skousen's claim that gradation is on the wane, which is contrary to the demonstrated stability of the system in all dialects, is thus seen not to be correct.

We have considered the history and dialectal development of the gradation system, the gradation pattern of verbs, and the distribution and consequences of lexical exceptions to gradation. In every case, the evidence seems to point toward the continuant grade form as the one which should be taken to underlie alternating noun, adjective, and verb stems. We turn now to the pattern of gradation in suffixes, for which the same seems to be true.

6.2. The underlying forms of suffixes. It will be recalled that suffixes, like stems, show a continuant grade, a stop grade, and a nasal grade: in addition, they show a zero grade, for which we tentatively accept Skousen's proposal that it be regarded as derived from the continuant grade. The choice of grade for suffixes is determined as an idiosyncratic property of particular nouns, cross-cutting the independent division into noun classes. It is in general impossible to determine the grade of suffixes which a given noun stem will take by inspection (except insofar as the zero and continuant grade are in complementary

generalization about multiple suffixation, however, and need not be ascribed to idiosyncratic lexical exceptionality for the individual nouns involved. Indeed, we can see that in some cases the stem involved is not exceptional. In the case of wannyo 'game', wannyooji 'games', for example, we could treat the noun as exceptional with regard to gradation. This would not be appropriate, however, since it is in fact a deverbal derivative of a verb stem wannyo- which does alternate, showing a stem nganny- in the plural and suffixed singular. The non-alternating character of the noun wannyo/wannyooji, then, is due not to the stem's being exceptional, but rather to the noun's having been re-analyzed as if its stem were wannyo- and it took a (continuant grade) suffix \emptyset , to which other suffixes could be added to derive those parts of its paradigm other than the simple singular. The same re-analysis has taken place in a number of other nouns, where an original singular suffix has been re-analyzed as part of the stem. Several nouns in -ri (such as njaayri 'open space', njaayriiji 'open spaces', and wajiiri 'vizier, minister', wajiiri?en 'ministers'), as well as sporadic members of other classes follow this pattern. There are, therefore, many fewer lexical exceptions to the gradation process than would appear from an inspection of the lists given by Skousen: in the majority of cases, and probably in all cases that are not loan words, apparent inability to undergo gradation is actually to be regarded as a consequence of multiple suffixation involving an innermost suffix \emptyset which takes the continuant form of the stem.

Having disposed of the large group of forms in the \emptyset -singular class, we are left with a very small residue of truly exceptional forms. This, in turn, undercuts Skousen's claim that the gradation system is being lost, and that it is becoming more and more common for stems to become [-STEM ALTERNATION]. Indeed, as Arnott [1970:106,109] makes clear, the tendency is just the opposite: alternating stems continue to alternate, and borrowed stems (initially non-alternating) come to alternate as they are assimilated into the language. Examples include gooroo-re 'kola nut', dim. pl. ngooro-hon, from Hausa; and (with a sort of back-formation), wabaare 'chest', gabaaje 'chests', from

-um/-yum/-gum/-ngum. In Adamawa this corresponds to the unproblematic -um/-wum/-gum/-ngum. How are we to describe the Gombe form, however? If we take /gum/ to be the underlying form of the suffix, we will have no non-ad hoc way of differentiating this g(u) which alternates with y(u) from the g(u) which alternates with w(u) in the class 15 suffix -u/-wu/-gu/-ngu. If we represent the class 5 suffix as underlying /yum/ on the other hand, we can state the facts about the alternation of y as follows: underlying /y/ becomes [j] in the stop grade and [ŋj] in the nasal grade before back vowels in roots; otherwise, /y/ becomes [g] in the stop grade and [ŋg] in the nasal grade. "Otherwise" in this statement covers the case of /y/ before front vowels in roots, and before all vowels in non-roots (i.e., in suffixes). This statement is thus uncomplicated if we take continuant forms as basic, but impossible if we take stop-grade forms as basic. Of course, since the set of suffixes is a closed, unproductive class, it is not clear that this choice is forced, but it is certainly indicated, at least for the Gombe dialect.

6.3. Further arguments for underlying continuant-grade forms. In addition to the considerations which have been adduced above in favor of underlying continuant grade forms for all alternating elements, we can provide three further arguments for this analysis based on the distribution of segmental units and alternation patterns. First, on this analysis, a stem can begin with any of the consonants in the language: continuants, stops, nasal-grade consonants, and the non-alternating consonants (pure nasals, glottalized stops, l, and t). On the analysis proposed by Skousen, however, where stop grade forms are taken to be underlying, there are no (non-exceptional) stems that begin with continuants: initial continuants are always derived. This asymmetry has no parallel elsewhere in the language, since members of non-alternating word classes such as adverbs, conjunctions, prepositions, etc. show no such prohibition against underlying initial continuants. Since there is no reason to expect such a restriction, we would expect some stems to begin with continuants, a position which is only consistent with the analysis argued for here.

distribution), but there is a partial generalization about the relation between stems and suffix grades which is suggestive. The following noun stems take suffixes in the continuant grade: all stems which display no alternation though they begin with one of the consonants which can alternate (as we have seen, this includes both the class of absolute exceptions to gradation and the class of multiply suffixed stems); most nouns derived from adjectives, proper nouns, adverbs, or other noun stems; and all unassimilated loans. Thus, exactly the class of nouns that are derived, foreign, or otherwise opaque consistently take suffixes in the continuant grade. Similarly, virtually all adjectives take suffixes in the continuant grade, if the zero grade is identified as a variant of this: only *wor-* 'male' takes the stop grade, and only *wod-/woɕ*¹⁰ 'a certain other' and *maw-/maɕ-* 'big, important' take the nasal grade in Gombe. All others take one or the other of the continuant forms.

These facts are suggestive of an analysis on which the continuant forms of the suffix are underlying, and rules produce the stop and nasal grades: it would be most plausible for derived and opaque forms not to have any mark causing them to condition a particular rule (gradation from continuant to stop or nasal), but it would be less plausible for them all to acquire a certain mark (causing them to condition a derived continuant grade). Similarly adjectives, like verbs in those dialects which lack gradation, seem to display elements (here, their suffixes) in a nearly invariant form, which is plausibly taken to be underlying.

Besides this plausibility argument, however, there is at least one positive piece of evidence for taking continuant rather than stop grade forms of the suffixes to be underlying. In stems, it will be recalled, *ɣ* alternates with either *j* (before underlying back vowels) or *g* (before underlying front vowels). In suffixes, however, *ɣ* always alternates with *g*, regardless of the following vowel. This is true only of Gombe, and involves the class 5 diminutive singular suffix

¹⁰"ɕ" here indicates an element which assimilates to a following consonant.

to d; f to p; h to k; y and w to j, g, and b. There is simply no possible source from which the gradation rules, operating on the continuant segments of the language, could be expected to produce a t. The failure of t to alternate thus falls out as a natural consequence of taking the continuants as basic forms of alternating consonants.

7. The Problem of /w/

We have argued above at considerable length, from a number of different sorts of considerations, that the underlying representations of items subject to consonant gradation in Fula should be taken to be identical (in the relevant respect) with the form the items show in environments requiring the continuant grade. We have also demonstrated that Skousen's attempt to attack this analysis, and to substitute one on which the stop grade forms are taken as basic, is incorrect. We conclude that the continuant grade forms are indeed basic, but we are left with one residual problem raised by Skousen which we have not yet addressed: given an underlying form in this system, we can in general predict the stop and nasal grade forms from it, with one exception. When the item begins with /w/ followed by a back vowel, we cannot tell whether the stop and nasal grades will have labials or velars. Some device must be posited in this system to differentiate, e.g., /war-/ 'kill' which alternates with labials and /war-/ 'come' which alternates with velars. If the device required is a sufficiently unattractive or unmotivated one, it could seriously undermine the attractiveness of the analysis we have presented.

In fact, however, there is a perfectly well-motivated device available to us which allows us to describe the difference in question. In traditional phonetic descriptive frameworks, a distinction is made between primary and secondary articulatory strictures, coexistent in the same segment. The distinction is generally based on the degree of constriction: of two simultaneous occlusions, the more radical is taken as primary, with the other(s) regarded as superimposed, secondary articulations. Thus both rounded and palatalized dentals (e.g., [t^o]

Secondly, on the analysis where stops are taken as basic, we must express the fact that all stems beginning with *j* plus a front vowel are exceptions to gradation: any stem like *jeyaado* 'slave', *jeyaabe* 'slaves', or *jiha* 'region', *jihaaji* 'regions' will display a continuant grade form which is identical with its stop grade form. This correlation of exceptionality with phonological structure has no motivation, since the (putative) continuant-grade rule simply says "/j/ becomes [y] in the continuant grade'. No such redundant exception feature is needed if the continuants are taken as basic, however: the stems just cited are of course among the class of stems whose underlying form contains a stop, and the absence of alternating *j* before front vowels is due to the fact that the alternation rule for /y/ says "/y/ becomes [j̥] before back vowels in roots, [g] elsewhere in stop grades". There is thus no possible way to produce alternating *j* before front vowels, and no additional restriction is needed.

A final point concerns the class of consonants that alternate. Recall that among the phonetic stops, the only one that does not alternate is *t*: *p, c, k, b, d, j, g* all alternate, with *f, s, h, w, r, y*. If stops are taken as basic for the alternating categories, this is a purely adventitious fact. Indeed, it may well be that historically *t* did alternate, with some segment like [θ] which has since merged again with [t] creating a non-alternating pattern. There is no direct evidence for this or any similar alternation with Fula, however. We are presented with a system in which *t* is the only (non-glottalized) stop that does not alternate, a system which has remained stable in this regard over a considerable period of time. If stop-grade forms are indeed underlying, we would expect that in at least some dialects a continuant corresponding to *t* would have arisen by simplification of the continuant-grade rule through elimination of this restriction. Yet no such continuant correspondent of *t* is attested anywhere in the Fula area, to our knowledge. On the other hand, if continuant grade forms are underlying, this stable system has a natural basis: there is simply no continuant left in the system to correspond to *t*. *s* corresponds to *c* (to *t'*, *sh* depending on the dialect); *r* corresponds

sion of the other. In general, such ambiguity is resolved in a uniform way within a language (that is, all labial-velars in a given language are generally basic labials, or else all are basic velars), but there is no reason in principle to require this to be the case. What we find in Fula is that the two possible phonological interpretations of a phonetic segment are in contrast, a contrast that does not happen to have any direct phonetic effect, but which is only revealed in the language's phonology.

Within the feature system of Chomsky and Halle [1968], we can differentiate the two kinds of /w/ by means of the feature [\pm anterior]: "labial" /w/'s are [+anterior], while "velar" /w/'s are [-anterior]. There is nothing essential in the choice or definition of this particular feature, however. The major point is that, given a feature system in which primary and secondary articulations are described by the same features (i.e., velars are described by the same features as velarization, etc.), some device is necessary to distinguish primary from secondary point of articulation. Given such a device, however, which is inherent in the feature system itself and its conceptual basis, we predict that even where there is no phonetic basis for determining which of two strictures is primary, it is nonetheless possible (and probably necessary) that one of them is. The evidence from the Fula gradation system is quite dramatic support for this contrast, and by extension for the feature system which predicts its existence.

As we can note immediately, however, this distinction is a maximally opaque one, since there can never be any direct phonetic evidence for it. It is only possible to determine whether a given instance of /w/ is [+anterior] or [-anterior] (or whatever else corresponds to the distinction) by examining related forms of the same stem. It is perfectly natural, therefore, that the distinction should be difficult to acquire and easy to lose. In fact, some contemporary Fula dialects are apparently in the process of resolving this problem. In the Yola subdialect of Adamawa, for example, those /w/'s that are [+anterior] (i.e., that are basic labials) are being replaced phonetically by [v], while "velar" /w/ remains [w]. Other sub-dialects of Adamawa have

and [ʃ]) can be treated as dentals, rather than as labials, palatals, or some completely distinct articulatory position.

There is one articulatory type where this definition fails us, however. In some cases, two closures may be of the same degree: an example is the well-known multiple stop of the labial-velar type ($[\widehat{k}p, \widehat{g}b]$). The definition above gives us no way to tell whether one or the other (or neither) of the labial and velar occlusions is primary in this case. We have argued elsewhere, however (cf. Anderson [1975]) that even in this case it makes sense to speak of one of the occlusions as primary and the other as secondary. Thus, a single phonetic segment (a labial-velar stop) has two distinct characterizations: as a labialized velar, and as a velarized labial. The two are phonologically distinct, as revealed by the role the segments may play in the sound systems of particular languages, but may well be phonetically indistinguishable.

Labial velar stops, however, are not the only segment types for which such an ambiguity is possible. In fact potentially ambiguous multiple articulations exist at all degrees of articulatory occlusion. The most widely distributed segment of this type is indeed not the stop ($[\widehat{k}p, \widehat{g}b]$), but rather the labial-velar glide [w]. As we have argued elsewhere, this segment shows exactly the same range of ambiguity as the stops: some [w]'s are (velarized) labials, while others are (labialized) velars, without there being any consistent phonetic correlate of the difference.

This of course gives us just what we require to deal with the problem we have raised in Fula. Here we wish to say that some w's are basic labials (as in war-/mbar- 'kill'), while others are basic velars (as in war-/ŋgar- 'come'), despite the fact that all are (essentially homophonous) labial-velar approximants. The device required to differentiate them, then, is not a peculiarity of the Fula lexicon: it is a device required by universal phonetic theory. In a feature system similar to that of Chomsky and Halle [1968] or Anderson [1974], the same features are used to describe both primary and secondary occlusions. It is thus necessary, where two articulations are present in the same segment, to designate one of them as primary to the exclu-

8. Conclusion

We have seen the way in which a perfectly plausible historical phonetic change (the assimilation of γ to a neighboring vowel) has had far reaching consequences for the gradation system of Fula, and has resulted in a situation in which a particularly subtle distinction must be reflected in phonological representations. This fact thus makes an important prediction which is made by the feature system stand out in unusually strong relief. The fact that such a system provides a natural (and indeed necessary) way of encoding the required distinction is a particularly satisfying result, for which we might never have looked in the absence of the theory's specific prediction.

We can see only one way of avoiding the conclusion reached here with respect to the consequences of the Fula material, and this is a rather radical one. One might choose to deny that the alternation should be described in the way assumed above: instead of positing a single underlying form for such an alternation, and deriving the related forms from this by rule, one might choose to treat such an alternation in terms of complete suppletion. One might choose, that is, to represent a lexical item like $\text{war-}/\text{bar-}/\text{mbar-}$ not as $/\text{war-}/$ with a [+anterior] $/w/$, but rather as $/(\text{w},\text{b},\text{mb})\text{ar-}/$, whose first element is a completely abstract morphophoneme whose realizations are specified by suppletion rules depending on various environmental factors. Such an approach to alternations, involving morphophonemic elements whose content is completely arbitrary, is essentially like that of Trubetskoy; this position has recently been revived by Hudson [1975], who proposes that all morphologically determined alternations should be regarded as lexicalized in the form of such suppletive rules. In that case, of course, it would hardly follow that the need to distinguish an element $(\text{w},\text{b},\text{mb})$ from an element $(\text{w},\text{g},\text{ŋg})$ provides evidence for the existence of a distinction between labial and velar $/w/$; these morphophonemes are distinct, even though they share one portion of their content, and there would be no need to distinguish $/w/$ as a member of one of them from $/w/$ as a member of the other.

borrowed some of these forms, and they are apparently spreading. Outside of Yola, however, while there may be some "labial" /w/'s that have been replaced by /v/, there are others that have not. In most of Adamawa, then, and in all of the Gombe region, labial and velar /w/ are in contrast phonologically but not phonetically. Nonetheless, if the Yola change becomes general in the Eastern dialect area, it will have rendered the distinction between labial and velar labial-velar glides transparent again.

Besides the change of labial /w/ to /v/ in some areas, there are other pieces of evidence that the distinction is being treated in a fashion familiar for opaque aspects of phonological systems. In the suffix system, for instance, there is no trace of a distinction between labial and velar /w/: all /w/'s in suffixes alternate with velars. In non-initial position in roots, it is difficult to get any evidence for the phonological character of /w/, since it is primarily the gradation system which allows us to determine the identity of a given /w/. The distinction is maximally opaque here, and as a result we seem to see the extension of one form to all lexical items. We can see this in a single root-final alternation, by which single consonants alternate with geminates before certain following suffixes. Thus, from a root /ful(l)-/ we have the forms ful-*be* 'Fulani (pl)', pul-*eI* (a small Fulani', but pull-*o* 'a Fulani', with gemination. When continuants are geminated by this process, they usually become stops: thus, nof-*ru* 'ear', nof-*eI* 'little ear', but nopp-*i* 'ears.' In Gombe, all instances of /w/ which are geminated in this way alternate with [bb], showing that labials are generalized in this position: fow-*ru* 'hyena', pow-*eI* 'little hyena', but pobb-*i* 'hyenas'. Since alternations in this position are rare, it is not remarkable that the distinction between labial and velar /w/ is leveled out. That it originally existed, however, is shown by verb forms with a similar alternation: in Adamawa we find not only verbs like heew- 'be full,' causative hebbin- 'fill', but also pairs like yiw- 'wash (intrans.)', yig- "rub, scrub off" which are at least etymologically related.

not feel that Hudson's suggestion that all morphologically conditioned alternations should be treated suppletively can be correct. As far as can be determined, the gradation system in Fula has been morphologically conditioned for most of its history. It should therefore have been lexicalized at a very early point in Hudson's view. That this is not the case is implicitly shown throughout the above discussion: the subsequent changes in the system, the replacements and analogical restructurings that have occurred, are all rendered coherent by the assumption that continuant grade forms are basic, and the others are derived from them. The changes that have taken place can be seen as rendering such a system more transparent and less idiosyncratic after opacities were introduced by the operation of natural phonetic change. If we assume that the gradation system has always been represented in the form of abstract morphophonemes (or at least has been so represented since becoming morphologically conditioned), these changes cease to be at all motivated. As long as the individual abstract morphophonemes remain distinct from one another, there should be no need whatever to change the system; any changes that take place should be sporadic and random. On the contrary, we find that the changes that have taken place have quite a specific character, and tend to support the other evidence which exists for taking one form (the continuant grade) as basic and deriving the others from it. We conclude, then, that the Fula material we have discussed furnishes evidence (albeit of an indirect and inferential character) against at least the strongest form of a theory which would represent all morphologically determined alternations as suppletions. Since the account of these facts in terms of phonological rules with a definite directionality seems to be strongly supported, we conclude that they also furnish support for the point addressed above concerning the character of the feature system, and for the abstract character of phonological oppositions.

It is not, of course, possible to resolve such a far-reaching issue on the basis of a single example like this. One objection that could be raised against the position of arbitrary morphophonemes, while not particularly cogent, is the following: if the content of morphophonemes is arbitrary such an analysis would miss the fact that the alternations we find are phonologically coherent: each stop alternates with its "corresponding" continuants in ways that are phonetically natural. Arbitrary morphophonemes would make it equally possible to describe "incoherent" alternations, such as (f,j,ŋg) or the like. Deriving alternations from unique underlying forms, on the other hand, constrains the description to some extent, in that incoherent alternations such as that just suggested require much more complex rules than coherent ones.

It would be a mistake to take this line of reasoning too seriously as an argument against the suppletive/abstract morphophoneme, however. First of all, we have a perfectly satisfactory account of why the alternation should be coherent: the historical one, since the alternation arises as the modern consequence of what was once (presumably) a phonetically natural set of rules. In fact, there are many relations between forms in natural languages which must be treated as suppletive, despite their phonetic coherence: forms in English which could be related by a form of Grimm's Law for instance. Despite the phonetic coherence of the alternation, footstool and pedestal should presumably not be related by rule and derived from a single underlying form. Accordingly, mere coherence is no argument for common derivation of the terms of an alternation from a basic form. Quasi-systematic relations may exist in the lexicon between items that are at best historically related; but these can presumably be encoded in the form of explicit statements about lexical structure, such as the ones that are necessary in any event to capture various aspects of morphological, syntactic, and semantic structure between items that are not productively derived from one another.

Although there seems no clear basis a priori for choosing between the suppletive and the productive account of a given alternation, we do

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