ABSTRACT

Title of Thesis: HARMONIC PHONOLOGY WITHIN ONE LANGUAGE: AN ANALYSIS OF YIDINʸ

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Degree and Year: Master of Arts, 1992

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This thesis attempts to implement and flesh out Prince and Smolensky's (1991) proposal for a declarative, multi-stratal model of phonology based on the quasi-connectionist notion of maximization of phonological "harmony" or well-formedness (henceforth "Harmonic Phonology"), applying this approach to a detailed analysis of the phonology of Yidinʸ, a language of North-Eastern Australia. In Harmonic Phonology, the phonological component of the grammar consists of a set of universal markedness principles (e.g. "prefer non-low back vowel to be rounded," or "prefer syllable to have onset"). Cross-linguistic variation is accounted for solely in terms of the ranking of such markedness statements: <u>there are no language-specific rules or constraints</u>. The thesis uses this framework to account for the structure of Yidinʸ's phoneme inventory, syllable template, and stress system, as well as a variety of alternations, including odd-syllable apocope and penultimate vowel lengthening, and demonstrates the superiority of such an analysis as compared to a rule-based account of the same phenomena.

HARMONIC PHONOLOGY WITHIN ONE LANGUAGE:

AN ANALYSIS OF YIDIN^y

by

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Thesis submitted to the Faculty of the Graduate School
of the University of Maryland in partial fulfillment
of the requirements for the degree of
Master of Arts
1992

Gil MD.
Dept. of Linguistics

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ACKNOWLEDGEMENTS

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0.   Introduction

This thesis attempts to implement and flesh out Prince and Smolensky's (1991) proposal for a declarative, multi-stratal model of phonology based on the quasi-connectionist notion of maximization of phonological "harmony" or well-formedness (henceforth "Harmonic Phonology"), applying this approach to a detailed analysis of the phonology of Yidinʸ, a language of North-Eastern Australia described in Dixon (1977). In Harmonic Phonology, the phonological component of the grammar consists of a set of universal markedness principles (e.g. "prefer non-low back vowel to be rounded," or "prefer syllable to have onset"). Cross-linguistic variation is accounted for solely in terms of the ranking of such markedness statements: there are no language-specific rules or constraints. Yidinʸ phonology contains a variety of non-trivial prosodic phenomena, including odd-syllable apocope and penultimate vowel lengthening, and thus provides a reasonably challenging language for demonstrating the feasibility of this highly constrained theoretical framework.

1.   Theoretical Framework

1.1.   Prolegomenon.   Since Kisseberth's famous article (1970) on phonological conspiracies, it has been increasingly observed that phonological rules seem to be more concerned with creating a certain output representation rather than acting upon a particular input.[1] This observation poses a fundamental challenge to the approach of SPE and the standard generative theory, which conceived of rules as structural changes which are conditioned by a particular input (the rule's context), but are blind to the output. For example, constraints on representation such as Prosodic Licensing and syllable templates (Itô 1987, 1989) provide a far more explanatory account of epenthesis and deletion phenomena than language-specific rules which act upon arbitrary

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[1] See Goldsmith (forthcoming).

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sequences of consonants and vowels. Moreover, such constraints on representation allow us to capture underlying phonotactic generalizations as well as account for the triggering and blocking of phonological processes, all using a single theoretical device, thus eliminating a major redundancy in phonological theory.

While most phonologists currently employ a hybrid model, using both constraints on representation (Prosodic Licensing, OCP, Line-Crossing Constraint, Structure Preservation, etc.) and language-specific rules, a "vanguard party"[2] of phonologists has proposed a constraint-based model which abandons context-sensitive language-specific rules altogether, thus sharply reducing the available theoretical machinery.[3] In the framework of Paradis (1988), to cite the best-known example, phonological rules are replaced by universal, context-free "repair strategies" (insert α, delete α, change α) which seek to preserve language-specific as well as universal phonological constraints on representation.[4] Constraint violations, which trigger the repair strategies, may arise from (a) ill-formed underlying representations, (b) morphological operations which yield ill-formed representations, and (c) a conflict between two constraints.

Conflicts between constraints are resolved according to a constraint precedence hierarchy, such that foot-level constraints are preserved at the expense of syllable-level constraints, syllable-level constraints are preserved at the expense of skeletal constraints, etc. Paradis (1988), however, is not explicit as to how the "level" of a particular constraint is determined. For example, is a constraint which

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[2]To continue the metaphor of the title.

[3]Note that other phonologists (e.g. Kiparsky 1982, Myers 1991) have resolved the redundancy problem in the opposite direction, by abandoning constraints in favor of rules.

[4]In addition, Paradis views automatic spreading processes as the result of a positive setting for the parameter "spread F." Paradis admits the existence of language-specific context-sensitive rules, but claims that such rules are morphologized.

rules out unstressed heavy syllables a foot-level constraint (because it refers to the metrical grid), a syllable-level constraint (because it refers to a syllable node), or a mora-level constraint (because it refers to the number of moras)?[5] Furthermore, how are conflicts to be resolved between two constraints of the same level? Without an adequate theory of constraint interaction, it is impossible to predict how a given constraint violation will be repaired, and constraints are effectively reduced to mere meta-statements about the outputs of phonological rules.

A second criticism of constraint-based theories such as Paradis' concerns constraint proliferation. Because the theory allows constraints to be "turned off" in particular languages (in effect, allowing language-specific constraints), it is always possible in the face of some language-specific fact to posit a new constraint which happens to be turned "off" in all natural languages except the one under examination.[6] Constraint proliferation obviously threatens to vitiate the principal advantages which proponents of constraint-based frameworks would wish to claim over the rule-based frameworks, in terms of explanatory power as well as learnability.

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[5]Paradis (p.c.) explains that the level of a constraint is determined by its "focus," which is the most "specific" part of the constraint; but this merely shifts the problem into a determination of the constraint's most specific part, which seems no more straightforward than the original problem. Furthermore, even if we were to decide that a constraint's focus is, say, the highest level of structure that it refers to, the theory of constraint precedence would still be largely vacuous, since it is almost always possible to add a gratuitous reference to higher structure in the formal statement of a constraint.

[6]This kind of analysis has led Myers (1991) to accuse the constraint-based theorists of inventing a new constraint every time they encounter a phonological alternation. Of course, rule-based approaches fare no better on this score: constraint-based accounts are no more stipulative than accounts which invent a new rule for every alternation. Moreover, the constraint-based framework (assuming a satisfactory solution to the constraint interaction problem) at least achieves the desirable result of eliminating the redundancy and excessive power of a theory that has recourse to both constraints and rules.

1.2. <u>Harmonic Phonology</u>. The term "Harmonic Phonology" appears
to have been coined by Goldsmith (forthcoming), taking up Smolensky's
(1986) characterization of connectionist systems as "harmony-maximiz-
ing."[7] However, the particular version of Harmonic Phonology pursued
herein is that of Prince and Smolensky (1991) (henceforth "P&S").[8]
With regard to issues of universality, Harmonic Phonology can be viewed
as the inverse of Paradis' model: constraint ranking is stipulated on a
language-specific (even stratum-specific) basis,[9] but all constraints
on representation are assumed to be universal and unparametrizable.
This move avoids the two pitfalls noted above: the difficulty of
deriving constraint precedence from some single overarching principle,
and the proliferation of language-specific constraints. By allowing
rankings to be language-specific, the constraints themselves can be
simplified and their number reduced, thus achieving greater explanatory
power, and a more plausible learnability story.[10] Consider the OCP and
the array of effects attributed to it in McCarthy 1986, Yip 1988, and
Selkirk 1988, as well as the counterexamples in Odden 1988. Rather than
outfitting this "principle" with dozens of parameters (applies on tonal
tier (on/off), applies on the place tier (on/off), triggers fusion

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[7]Paul Smolensky (p.c.) describes the links between connectionism and
Harmonic Phonology as "tenuous." Harmonic Phonology emulates certain
connectionist models in that it is harmony-maximizing, and is therefore
more amenable to connectionist implementation than phonological theories
which lack this characteristic. But direct "low-level" connectionist
implementation of this "high-level" phonological theory appears to be a
non-trivial task; and in any case it is beyond the scope of this paper.

[8]My pursuit of P&S's version of Harmonic Phonology herein does not
indicate a rejection of Goldsmith's theory. I find, however, that the
formal mechanisms are not as well worked out in Goldsmith's version.
Moreover, Goldsmith seems to believe that the availability of particular
repair strategies must still be stipulated on a language-specific basis,
which I regard as an insufficiently radical departure from rule-based
frameworks.

[9]But see footnote 13 below.

[10]This move recalls the arguments of classical generative phonology
regarding rule-ordering: some cross-linguistic (particularly dialectal)
variation can be accounted for in terms of alternative ordering of a
common set of rules. See e.g. Halle (1962).

(on/off), triggers dissimilation (on/off), blocks syncope (on/off), applies across morpheme boundaries (on/off), etc.), we can posit a single, simple OCP: its failure to apply in particular cases, and the various effects of its application, can be attributed to its interaction with other constraints.

A corollary difference between P&S and Paradis' theory concerns absolute versus relative conceptions of well-formedness. In Paradis' model, if a representation is ill-formed, the constraint violation must be repaired at all costs. P&S, in contrast, view well-formedness as relative. The grammar assigns to a given representation the structure which maximally satisfies the universal constraints, according to the stipulated ranking. (By "assignment of structure" I mean the manipulation of association lines and assignment of prosodic structure.) But if a constraint violation cannot be repaired without violating a higher-ranked constraint, or changing the representation other than by an alternative assignment of structure, the constraint violation simply persists, at least until the end of the phonology. Ultimately, however, segments and features which are not incorporated into prosodic structure are deleted, and features are inserted to fill empty segmental positions, "en route to the phonetics."[11] Thus, within each phonological stratum, Harmonic Phonology is declarative rather than derivational: there are no "repair strategies," except perhaps as a descriptive metaphor.

The constraints themselves are stated as mere preferences for particular structure, i.e. markedness principles; thus, the theory appeals directly to notions of markedness, allowing the formal capture

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[11]P&S are unclear as to whether this means that stray erasure and epenthesis are phonological or phonetic in character. If these two "rules" were viewed as results of phonetic implementation, it would allow for a principled distinction between the types of the operations which can occur in the phonology (i.e. optimal assignment of structure) versus those which can occur in the phonetics (stray erasure and epenthesis, interpolation effects, and compression-of-timing effects à la Browman and Goldstein 1990).

of many markedness generalizations which have mere meta-theoretical status in other frameworks. Furthermore, the identification of constraints with notions of markedness sharply constrains the class of possible phonological constraints: in order to posit a constraint for a particular language, the constraint should have independent motivation as a markedness generalization.

The workings of Harmonic Phonology can be illustrated through P&S's discussion of syllable structure. P&S posit the following markedness principles (henceforth "MP's"):

(1)   **ONS**: Prefer syllables with onsets.

(2)   **-COD**: Prefer syllables with no coda.

(3)   **PARSE**: Prefer parsed segments [i.e. prefer segments to be incorporated into syllables].

(4)   **FILL**: Prefer filled syllable positions.

(It is assumed that a nucleus is required by the definition of a syllable.) P&S account for gross cross-linguistic variation in syllable structure in terms of alternative ranking of these MP's.

<u>Case 1</u>.

Assume the ranking PARSE >> {ONS, -COD} >> FILL, where "X >> Y" means that X is ranked higher than Y, and "{X, Y}" means that X and Y are unranked with respect to each other. Further assume the input is /CVC/. Since PARSE is ranked above the other constraints, any assignment of structure is preferable to leaving a segment unparsed. Moreover, since -COD is ranked above FILL, it is better to have an empty syllable position than to have a coda. Thus the optimal assignment of structure (ignoring moras for the time being) is as follows:

(5)   σ   σ
      / | / |
     C V C Δ

"Δ" indicates an unfilled syllable position, in this case a nucleus, which is ultimately filled in with a default vowel by the beginning of the phonetics. Now assume that the input is simply /V/. By the same reasoning, the optimal assignment of structure would be (6).

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(6)
$$\sigma$$
$$\Delta \quad V$$

The result is "epenthesis" of a default onset consonant.

Case 2.

Assume the ranking FILL >> {ONS, -COD} >> PARSE. Now an unfilled position becomes the worst option. Since ONS and -COD are ranked above PARSE, it is better to have an unparsed segment than to have a syllable with a coda or without an onset. Thus, the optimal assignment of structure for the /CVC/ and /V/ inputs discussed above is as shown in (7).

(7)
$$\sigma$$
$$C \ V \ C \qquad V$$

The unparsed segments are ultimately deleted by stray erasure by the beginning of the phonetics.

Case 3.

Assume the ranking {FILL, PARSE} >> {ONS, -COD}. Now it is preferable to have a syllable with a coda or without an onset than to have an unfilled syllable position or an unparsed segment:

(8)
$$\sigma \qquad \sigma$$
$$C \ V \ C \qquad V$$

This gives the appearance that ONS and -COD are "turned off" in this language, when they are merely outranked. This insight allows us to capture, for example, the fact that languages universally prefer syllables with onsets (syllables take onsets whenever they can), though languages vary as to whether onsets are absolutely obligatory.

The remaining ranking possibilities either involve distinctions in the relative ranking of ONS and -COD (i.e. onsetless syllables might be tolerated, whereas codas would be stray erased or trigger epenthesis, or

vice-versa); or they are equivalent in effect to Cases 1-3.[12] For

example, {FILL, PARSE} >> {ONS, -COD} is equivalent to FILL >> PARSE >>

ONS >> -COD, or PARSE >> FILL >> -COD >> ONS, etc. The latter fact

suggests that more than one ranking can describe the same data. Such

weak overgeneration can be ruled out by assuming that {A, B} is the

"default" ranking: unless there is evidence requiring A to be ranked

above B or vice-versa, or ranking is required by some other ranking

principle, the constraints will simply be unranked with respect to each

other.[13]

2.   Yidin^y Segment Inventory

In this section I derive the segment inventory of Yidin^y from a

ranking of MP's which indicate preferences for the cooccurrence or non-

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[12]Additional possibilities would be {ONS, -COD} >> {PARSE, FILL}
(epenthesis and deletion would be equally preferable, and therefore would
occur in free variation); and {ONS, -COD, PARSE, FILL} (any of the above
assignments of structure would occur in free variation. I assume these
possibilities are ruled out by a requirement that PARSE and FILL be ranked
with respect to all other prosodic constraints, and that they must be
ranked with respect to one another unless both are ranked above all other
prosodic constraints.

[13]It seems likely that additional principles of ranking will emerge
which further restrict ranking possibilities. For example, some MP's
(presumably those which are tied most closely to the physiology of the
vocal tract) may be inviolable in all languages.
     Furthermore, it has been observed that constraints on representation
(e.g. syllable structure constraints and feature cooccurrence restric-
tions) generally become looser on successive strata of the phonology (the
Strong Domain Hypothesis, Kiparsky 1985). The Strong Domain Hypothesis
might be recast as a stipulation that PARSE and/or FILL can only rise in
the ranking (or stay in the same position) on a subsequent stratum.
     Moreover, John McCarthy (p.c.) observes that MP's tend to occur in
"bundles." For example, the MP's which define the syllable template of a
particular language (ONS, -COD, etc.) can be thought of as collectively
forming an MP bundle which may be called GOODSYLLABLE. Similarly, the
MP's which define the possible feet of a language may be lumped together
as GOODFOOT. It appears that while GOODSYLLABLE >> GOODFOOT, GOODFOOT >>
GOODSYLLABLE, and {GOODFOOT, GOODSYLLABLE} are all possible rankings, and
while the individual MP's may be freely ranked within each bundle (subject
to other ranking principles), the MP's of one bundle can not to be freely
interspersed among those of another bundle. (It is difficult at this
stage to determine how this observation may be formalized).
     See also the discussion of the Elsewhere Condition in section 2.2
below.

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cooccurrence of certain features in relations of sisterhood or dependen-
cy. The Yidin^y segment inventory is given as follows by Dixon:

(9)   a.   <u>Consonants</u>   b.   <u>Vowels</u>
          b   d   d^y g   i   u
          m   n   n^y ŋ
                 l   a
                 r, *R*
          w   y

The [r] is described as a "trilled apical rhotic," and [*R*] as an
"apical-postalveolar (retroflex) rhotic continuant."

        2.1. <u>Feature Theory</u>. I adopt the feature theory of Selkirk
(1991, 1988) in which all contrasts in place of articulation are stated
in terms of privative major articulator features, or combinations
thereof in dependency or sisterhood relationship with each other. That
is, subsidiary place features such as [anterior] and [lateral] are
eliminated. An alveopalatal (-anterior) coronal (10a) might instead be
represented as a coronal with secondary coronal articulation (10b).

(10)   a.   cor   b.   cor
              | |
             -ant   cor

Selkirk's theory also eliminates separate vowel features, equating them
with the major articulator features:

(11)   +high = dors   -back = cor   +round = lab   +low = phar

Mid vowels are formed by combining [dorsal] and [pharyngeal]. In
Selkirk's theory [sonorant] and [consonantal] are clustered on the root
node; [continuant] is dependent on the root node; and the place features
are dependent on [continuant] if the segment is specified for continuan-
cy, otherwise the place features are dependent on the root node.

(12)   ⎡ son ⎤
            ⎣ cons ⎦   L = Laryngeal features
          / | \   P = Place features
         L (cont) nas
       / | |
      L L   P
              | \
              P P

Following Lombardi (1991), I assume that the laryngeal features are
privative as well, leaving only the stricture features as bivalent. In

sum, the following features are available as elements of segmental representations:

(13) <u>Place</u>   <u>Laryngeal</u>   <u>Stricture</u>   <u>Other</u>
      labial (lab)   voiced (voi)   continuant (cont)   nasal (nas)
      coronal (cor)   glottalized (gl)   sonorant (son)
      dorsal (dors)   aspirated (asp)   consonantal (cons)
      pharyngeal (phar)

In the following discussion, reference to a bivalent feature without mentioning its value indicates specification for either value of the feature.

In accordance with this feature theory, I posit the following representations for the Yidin^y segment inventory.

(14) $\text{p} = \begin{bmatrix} -\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{t} = \begin{bmatrix} -\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{t}^y = \begin{bmatrix} -\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{k} = \begin{bmatrix} -\text{son} \\ +\text{cons} \end{bmatrix}$

$\qquad \quad$ −cont $\qquad\qquad$ −cont $\qquad\qquad$ −cont $\qquad\qquad$ −cont

$\qquad \quad$ lab $\qquad\qquad\quad$ cor $\qquad\qquad\quad$ cor $\qquad\qquad\quad$ dors

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ cor

$\text{m} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{n} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{n}^y = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{ŋ} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$

$\qquad$ −cont nas $\qquad$ −cont nas $\qquad$ −cont nas $\qquad$ −cont nas

$\qquad$ lab $\qquad\qquad\quad$ cor $\qquad\qquad\quad$ cor $\qquad\qquad\quad$ dors

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ cor

$\text{l} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$

$\qquad$ −cont

$\qquad$ cor

$\text{r} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$ $\quad \text{R} = \begin{bmatrix} +\text{son} \\ +\text{cons} \end{bmatrix}$

$\qquad$ +cont $\qquad\qquad$ +cont

$\qquad$ cor $\qquad\qquad\quad$ cor

$\qquad\qquad\qquad\qquad\quad$ cor

$\text{y, i} = \begin{bmatrix} +\text{son} \\ -\text{cons} \end{bmatrix}$ $\quad \text{w, u} = \begin{bmatrix} +\text{son} \\ -\text{cons} \end{bmatrix}$ $\quad \text{a} = \begin{bmatrix} +\text{son} \\ -\text{cons} \end{bmatrix}$

$\qquad$ cor $\qquad\qquad\qquad$ lab $\qquad\qquad\quad$ phar

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I view the Yidiny stops as being phonologically voiceless (see Nash

1979), although I leave Dixon's transcriptions unamended.[14]

 2.2. <u>Consonant Inventory</u>. To derive this inventory from a set of

universal MP's, I will first posit the following definition:

(15)   A **segment** is a root node and all features which are clustered on
        it or which it mediately or immediately dominates, such that the
        relations among the features constitute a subset of the feature
        relations in (12).

We further require various feature cooccurrence MP's, such as the

following, all of which seem plausible as markedness generalizations.

(16)   **NOPHARCONS**: Prefer consonants with no instance of [phar].

(17)   **NOLARYNGEAL**: Prefer segments with no laryngeal features.

(18)   **NOFRICATIVE**: Prefer obstruents to be specified [−cont].[15]

 I extend P&S's notion PARSE to the licensing of features, as

follows:

(19)   **PARSE(FEATURE)**: Prefer parsed features (i.e. prefer features to be
        incorporated into segments).

If a given set of feature cooccurrence MP's is ranked higher than

PARSE(FEATURE), then feature combinations violating those constraints

are left as a mere collection of floating features (ultimately eliminat−

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[14]It is clear from the inventory that voicing is not contrastive in
Yidiny phonology. Although Dixon (1977:32) describes a rule of word-
initial partial devoicing of stops, the gradient character of the rule,
and Dixon's statement that "it is normal for the glottis to be vibrating
throughout the articulation of a Yidiny word," suggest that voicing is a
result of phonetic implementation rather than the phonological representa-
tion in Yidiny.

[15]A weaker alternative to (18) would be, "Prefer [−son] not to cooccur
with [+cont]," allowing obstruents to be unspecified for [−cont].
However, I prefer not to resort to a redundancy rule that inserts [−cont]
<u>between</u> the root node and the place features (see Padgett 1991 for
criticism of this aspect of Selkirk's theory.) To ensure specification of
some value for [cont] in sonorants as well as obstruents, a further MP is
required:
 CONTSPEC: Prefer [+cons] to cooccur with [cont].
Note that CONTSPEC has the further effect of ruling out specification of
[cont] for vowels. I further assume that nasals are specified as [+son]
noncontinuants:
 NASCONT: Prefer nasal segments to be specified [+son, −cont].
Finally, we must rule out monstrosities such as obstruent vowels:
 NOOBSTRUENTV: Prefer obstruents to be specified [+cons].

ed by stray erasure), effectively excluding them from the segment inventory of the language:

(20)   {NOPHARCONS, NOLARYNGEAL, NOFRICATIVE, CONTSPEC, NASCONT, NOOBSTRUENTV} >> PARSE(FEATURE)

On the other hand, if a set of cooccurrence MP's is ranked lower than PARSE(FEATURE), then the feature combination must be incorporated into a segment notwithstanding the violation of such cooccurrence MP's, and the segment is admitted to the inventory of the language.[16]

Of the Yidin* consonants with complex place of articulation, all involve primary and secondary coronal place. This appears to involve a combination of markedness scales, in this case a feature complexity scale and coronal unmarkedness.

(21)   **COMPLEXITY**: Prefer segments to have a minimal number of place features; i.e. prefer S over S' if S has fewer place features than S'.

(22)   **CORUNMARK**: For any place feature P, prefer P = [cor].

To make this notion explicit, however, some technical innovations are required. To begin with, inherently relative, scalar MP's such as (21), pose a theoretical problem. On the one hand, many markedness phenomena are most elegantly captured in terms of a preference for "more" or "less" of some property of a representation: languages prefer onsets and codas of minimal length; syllables of minimal mora count; nuclei of maximal sonority; minimal sonority drop from nucleus to syllable margin; etc. However, it is impossible to rank such preferences with respect to other (non-scalar) MP's, because a representation can never be said to satisfy (or fail to satisfy) an inherently relative MP; therefore it is impossible to impose cutoffs at some particular point along the scales. To get around this problem, I adopt the following convention:

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[16]Furthermore, if the feature cooccurrence MP in question is a positive feature cooccurrence requirement, rather than a restriction, and if the MP is ranked below PARSE(FEATURE), then the offending segment will be included, but default values for the absent features may be filled in as a matter of phonetic implementation (or supplied by feature spreading if possible). Thus, a featural equivalent of FILL is not required, since its effect is subsumed by particular feature cooccurrence requirements.

(23) <u>Binarization Convention</u>
If an MP expresses a preference for the maximum (or minimum) of some property π of a representation, then for ranking purposes, it is interpreted as a set of MP's of the form: Prefer $|\pi| \geq (\leq)$ 0; Prefer $|\pi| \geq (\leq)$ 1; Prefer $|\pi| \geq (\leq)$ 2; ... ; Prefer $|\pi| \geq (\leq)$ n (where n is the maximum permissible amount of π).

Thus, in Yidin^y, COMPLEXITY may be "binarized" for ranking purposes into the following MP's:

(24) **COMPLEXITY$_{\leq 0}$**: Prefer the number of place features in a segment to be less than or equal to 0.

COMPLEXITY$_{\leq 1}$: Prefer the number of place features in a segment to be less than or equal to 1.

COMPLEXITY$_{\leq 2}$: Prefer the number of place features in a segment to be less than or equal to 2.

COMPLEXITY$_{\leq 3}$: Prefer the number of place features in a segment to be less than or equal to 3.[17]

I further assume that the ranking of these (derivative) MP's with respect to one another is determined by the Elsewhere Condition (Kiparsky 1973): that is, a specific MP outranks a more general (i.e. more restrictive) MP applying to the same representation.[18]

(25) COMPLEXITY$_{\leq 3}$ >> COMPLEXITY$_{\leq 2}$ >> COMPLEXITY$_{\leq 1}$ >> COMPLEXITY$_{\leq 0}$

The actual cutoff point in a particular language is determined by the position of PARSE(FEATURE) in the ranking.[19] In Yidin^y, segments with 3 place features are clearly excluded, and segments with one place feature are clearly permitted; but the ranking of COMPLEXITY$_{\leq 1}$ is more problematic. The question is how to rank COMPLEXITY$_{\leq 1}$ and CORUNMARK so as to admit coronal and non-coronal simplex consonants and double-

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[17]For expository purposes, I will assume that the universal maximum of place features in a segment is 3, although nothing critical hinges on this assumption.

[18]I am indebted to John McCarthy for this insight.

[19]This kind of analysis could be extended to laryngeal features: in lieu of NOLARYNGEAL, there is a relative MP preferring minimal laryngeal features, which is, by the Binarization Convention, decomposed into discrete, non-scalar MP's. In Yidiny, the most restrictive of these, "Prefer number of laryngeal features $\leq$ 0," is ranked above PARSE(FEATURE), thereby excluding laryngeal features from participation in the segment inventory.

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coronal complex consonants, but no others. It appears that none of the
rankings gives the correct result:

(26) CORUNMARK >> PARSE(FEATURE) >> COMPLEXITY$_{\leq 1}$ (admit coronal C's)
      COMPLEXITY$_{\leq 1}$ >> PARSE(FEATURE) >> CORUNMARK (simplex C's)
      PARSE(FEATURE) >> {CORUNMARK, COMPLEXITY$_{\leq 1}$} (all C's)
      {CORUNMARK, COMPLEXITY$_{\leq 1}$} >> PARSE(FEATURE) (cor simplex C's)

Alan Prince (p.c.), however, suggests an addition to the ranking
relations ">>" and "," considered thus far: MP's may be conjoined by a
boolean "or" ($\vee$), such that together they form a "compound MP", which is
violated only if both its component MP's are violated. Thus, the
correct ranking for the Yidin^y facts is:

(27) COMPLEXITY$_{\leq 3}$ >> COMPLEXITY$_{\leq 2}$ >> {CORUNMARK $\vee$ COMPLEXITY$_{\leq 1}$} >>
      PARSE(FEATURE) >> COMPLEXITY$_{\leq 0}$

That is, a segment is excluded from the inventory only if it is complex
and contains a non-coronal place feature.

      A remaining issue is the exclusion of non-coronal place of
articulation in liquids. Generally, it seems that the number of places
of articulation and the complexity allowed for a class of consonants
decreases as the sonority of that class increases: nasals tend to have
more restricted place of articulation than obstruents, and liquids are
more restricted than nasals (see Maddieson 1984: 64-65, 77, 81). To
account for the complexity aspect of this generalization, I posit the
following additional complexity markedness scales:[20]

(28) **SONCOMPLEXITY**: Prefer sonorant consonants to have a minimal number
      of place features.

(29) **LIQCOMPLEXITY**: Prefer non-nasal sonorant consonants to have a
      minimal number of place features.

The Elsewhere Condition imposes the following ranking on the complexity
scales, from most specific to most general:

(30) LIQCOMPLEXITY >> SONCOMPLEXITY >> COMPLEXITY

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[20]It is tempting to view the three complexity MP's as being derived
from some more general principles. These markedness scales could be said
to derive from the combination of two phonetic scales (complexity and
sonority); but unless it could be argued that segments of higher sonority
are more marked than segments of lower sonority, these complexity scales
as markedness scales must be taken as primitives of the theory.

Moreover, LIQCOMPLEXITY and SONCOMPLEXITY, by the Binarization Convention, may be further decomposed as in (24), and ranked pursuant to the Elsewhere Condition, as follows:

(31) $SONCOMPLEXITY_{\leq 3}$ >> $SONCOMPLEXITY_{\leq 2}$ >> $SONCOMPLEXITY_{\leq 1}$ >> $SONCOMPLEXITY_{\leq 0}$

(32) $LIQCOMPLEXITY_{\leq 3}$ >> $LIQCOMPLEXITY_{\leq 2}$ >> $LIQCOMPLEXITY_{\leq 1}$ >> $LIQCOMPLEXITY_{\leq 0}$

For Yidin^y, LIQCOMPLEXITY and SONCOMPLEXITY may be ranked with respect to the other relevant MP's as follows:[21]

(33) $LIQCOMPLEXITY_{\leq 3}$ >> $SONCOMPLEXITY_{\leq 3}$ >> $COMPLEXITY_{\leq 3}$ >> $LIQCOMPLEXITY_{\leq 2}$ >> $SONCOMPLEXITY_{\leq 2}$ >> $COMPLEXITY_{\leq 2}$ >> {{$LIQCOMPLEXITY_{\leq 1}$ >> $SONCOMPLEXITY_{\leq 1}$ >> $COMPLEXITY_{\leq 1}$ >> $LIQCOMPLEXITY_{\leq 0}$} ∨ CORUNMARK} >> PARSE(FEATURE) >> $SONCOMPLEXITY_{\leq 0}$ >> $COMPLEXITY_{\leq 0}$

Presumably, the effect of having several MP's ranked with respect to one another within one half of a compound MP ({A >> B >> C} ∨ D}) is that A, B, and C must be satisfied, or D must be satisfied. In this case, $COMPLEXITY_{\leq 1}$ and $LIQCOMPLEXITY_{\leq 0}$ must be satisfied, or CORUNMARK must be satisfied.[22] That is, a segment is excluded from the inventory only if it is complex or liquid and it contains a non-coronal place feature.[23]

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[21]I assume that binarization may occur before or after Elsewhere Condition ranking of the three (scalar) MP's. That is, these derivative MP's may be ranked first by sonority, then by complexity as in (a), or vice-versa, as in (b).

a. $LIQCOMPLEXITY_{\leq 3}$ >> $LIQCOMPLEXITY_{\leq 2}$ >> $LIQCOMPLEXITY_{\leq 1}$ >> $LIQCOMPLEXITY_{\leq 0}$ >> $SONCOMPLEXITY_{\leq 3}$ >> $SONCOMPLEXITY_{\leq 2}$ >> $SONCOMPLEXITY_{\leq 1}$ >> $SONCOMPLEXITY_{\leq 0}$ >> $COMPLEXITY_{\leq 3}$ >> $COMPLEXITY_{\leq 2}$ >> $COMPLEXITY_{\leq 1}$ >> $COMPLEXITY_{\leq 1}$

b. $LIQCOMPLEXITY_{\leq 3}$ >> $SONCOMPLEXITY_{\leq 3}$ >> $COMPLEXITY_{\leq 3}$ >> $LIQCOMPLEXITY_{\leq 2}$ >> $SONCOMPLEXITY_{\leq 2}$ >> $COMPLEXITY_{\leq 2}$ >> $LIQCOMPLEXITY_{\leq 1}$ >> $SONCOMPLEXITY_{\leq 1}$ >> $COMPLEXITY_{\leq 1}$ >> $LIQCOMPLEXITY_{\leq 0}$ >> $SONCOMPLEXITY_{\leq 0}$ >> $COMPLEXITY_{\leq 0}$

[22]The other MP's ranked above $COMPLEXITY_{\leq 1}$ within the conjunct are less restrictive than $COMPLEXITY_{\leq 1}$, and therefore have no practical effect.

[23]Note that the foregoing account fails to explain why Yidin^y lacks a post-alveolar lateral. It is common among eastern Australian languages to have two rhotics (alveolar and post-alveolar), but only one lateral, in the inventory (Dixon 1980: 141-145). One the other hand, precisely the opposite state of affairs obtains in languages such as Italian (alveolar and alveo-palatal laterals but only one rhotic), making it difficult to posit a markedness principle which could account for this gap in the Yidin^y inventory. Perhaps this is not a very serious problem, however. Segment inventories may evidence not only markedness principles, i.e. satisfaction of phonological well-formedness, but also idiosyncratic gaps as a result of diachronic phonetic mergers and the like. Since Yidin^y phonology

2.3. <u>Vowel (and Glide) Inventory</u>. In Selkirk's (1991) feature theory, high vowels are standardly represented as [dors] in dependency relation with one of the "color" place features, [cor] and [lab]. The usual cooccurrence requirements and restrictions of the "height" place features, [dors] and [phar], and the color features can be summed up in terms of the following MP's:

(34) **COLORHEIGHT**: Prefer a [-cons] segment which contains a color feature to be specified for a height feature which is dependent on some color feature.[24]

(35) **DORSMARK**: Prefer a [-cons, dors] segment to specified for a color feature.

(36) **ONECOLOR**: Prefer no more than one instance of a color feature in a [-cons] segment.[25]

However, in a three vowel system such as Yidin^y's, in which there is no evidence of [i] and [u] patterning together as a class of high vowels, there is no reason to suppose that [dors] is part of the phonological representation of these vowels.[26] Thus the vowel system can be represented as in (14) using only the features [cor], [lab] and [phar]. Such a system can be obtained by positing the following ranking:

(37) {DORSMARK, ONECOLOR}, {COMPLEXITY$_{s1}$ ∨ CORUNMARK} >> PARSE(FEATURE) >> COLORHEIGHT

Because COMPLEXITY$_{s1}$ is ranked above PARSE(FEATURE), and COLORHEIGHT is ranked below it, only vowels with single place features are admitted to

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contains no processes of feature spreading which might rely on some notion of Structure Preservation to block the creation of post-alveolar laterals, Yidin^y's lack of a post-alveolar lateral could be viewed as an accidental gap, so to speak, which the synchronic phonology need not account for. Alternatively, we could slightly weaken the Harmonic Phonology framework by allowing language-specific feature cooccurrence constraints.

[24]If, as Selkirk (1991) claims, color features may be dependent on height features in some languages, this could be handled by restating this MP such that it requires a color feature to be dependent on <u>or to dominate</u> a height feature, with perhaps some independent principle requiring uniformity within the language as to the dependency relations between height and color features.

[25]Perhaps this MP may ultimately be related to the complexity markedness scales discussed in the previous section.

[26]Of course, tongue height is ultimately specified as a matter of phonetic implementation.

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the inventory; and because DORSMARK is ranked above PARSE(FEATURE), [dors] is prevented from participating in the vowel system. Double coronals, permitted in the consonantal inventory, are ruled out for vowels by the fact that ONECOLOR is ranked above PARSE(FEATURE).

To summarize, I posit the following ranking of MP's to derive the Yidin^y segment inventory:[27]

(38) {NOPHARCONS, NOLARYNGEAL, NOFRICATIVE, CONTSPEC, NASCONT, NO-OBSTRUENTV, DORSMARK, ONECOLOR, {COMPLEXITY$_{\leq2}$ >> {{LIQCOMPLEXITY$_{\leq1}$ >> SONCOMPLEXITY$_{\leq1}$ >> COMPLEXITY$_{\leq1}$ >> LIQCOMPLEXITY$_{\leq0}$} ∨ COR-UNMARK}}} >> PARSE(FEATURE)

(or: GOODSEG >> PARSE(FEATURE))

3. Yidin^y Syllable Structure

3.1. Preliminaries. P&S's ONS (1) and −COD (2), while sufficient to account for "0th-order syllable structure," do not allow sufficient gradations in markedness to account for subtler syllable structure distinctions, as needed for Yidin^y. In this section, I outline a theory of harmonic syllabification building on Clements (1990), taking the notion of optimal syllable shapes as a theoretical primitive, but imposing language-specific cutoffs on unacceptable syllables by decomposing relative MP's into sets of binary MP's. Let us begin with the following definitions and MP:

(39) a. A σ is a prosodic constituent which immediately dominates any number of segments and at least one μ.
      b. A μ is a prosodic constituent which immediately dominates a single segment.[28]
      c. The **nucleus** of σ is the first segment in σ dominated by a μ. An **onset** is all the segmental material dominated by σ which precedes the nucleus of σ. A **coda** is all the segmental material dominated by σ which follows the nucleus of σ.

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[27]I omit MP's which do not play a decisive role in Yidin^y, such as LIQCOMPLEXITY$_{\leq3}$, or which are ranked below PARSE(FEATURE).

[28]Note that this does not imply that a single segment may not be dominated by more than one mora.

d. An **initial demi-σ** is all the segmental material dominated by σ which precedes and includes the nucleus of σ. A **final demi-σ** is all the segmental material dominated by σ which follows and includes the nucleus of σ.[29]

(40) **SONORITYCURVE**: Prefer no sonority decrease within an initial demi-σ, and no sonority increase within a final demi-σ.

Clements further posits the following sonority scale:

(41) Obstruent < Nasal < Liquid < Glide[30] < Vowel
     0   1   2   3   4

Using this numeric sonority ranking, Clements calculates the dispersion, or the inverse of steepness and steadiness of sonority transition, within a demisyllable, as follows.[31]

(42) (a) $$D = \sum_{i=1}^{m} 1/d_i^2$$

where d = distance in sonority rank between each *i*th pair of segments within an initial demi-σ or within a final demi-σ (including nonadjacent pairs), and where m = is the number of pairs in the demi-σ.

(b) If D is undefined then let $D = \infty$.

Modifying Clements' proposal slightly, I posit the following dispersion ranking metric:

(43) The dispersion ranking, R, of a demisyllable increases as its ranking in terms of D increases.

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[29]Recognizing that demisyllables play a role in intrasyllabic sonority transitions does not, pace Clements, require us to admit demisyllables into the pantheon of prosodic constituents. Demisyllables can be defined entirely in terms of the prosodic constituents σ and μ; and their role derives from the Janus-like character of the syllable peak in determining the segments which can come before and after it. Beyond this, the demisyllable seems to play no role in grammar. Much the same argument could be made with regard to onsets, nuclei and codas.

[30]Of course, from a derivational point of view, prior to initial moraification, there is no sonority distinction between glides and vowels. This distinction is useful from a declarative perspective, however, in order to avoid treating GV sequences as sonority plateaux, which would then be an exception to DISPERSION.

[31]Clements (1990:311) observes, "We need not attribute such computation to the explicit knowledge of native speakers in any sense. Rather, the relationships we have sought to bring out are properties of the representations as such, and can presumably be apprehended by speakers without carrying out conscious mathematical calculations -- just as we can detect whether billiard balls are evenly dispersed on a billiard table without doing computations on a pocket calculator." Part (b) is my addition, to cover single segment demisyllables, for which D is undefined in Clements' equation.

The resulting values for D and R for various demisyllable types are as follows:[32]

(44)

Initial		Final		D	R
OV		VO		0.06	0
NV		VN		0.11	1
LV		VL		0.25	2
OLV		VLO		0.56	3
GV		VG		1.00	4
ONV,	OGV	VGO,	VNO	1.17	5
NLV,	NGV	VGN,	VLN	1.36	6
LGV		VGL		2.25	7
V		V		∞	8

We can now posit the following scalar MP's:

(45) **INITLDISP**: Prefer initial demi-σ's with minimal R.

(46) **FINALDISP**: Prefer final demi-σ's with maximal R.

These MP's capture Clements' observation that the universally preferred syllable shape consists of maximal sonority rise from the left edge of a syllable to the nucleus, and minimal sonority decline from nucleus to right edge, subsuming P&S's ONS and –COD. INITLDISP and FINALDISP may be decomposed into the following sets of binary MP's, respectively:

(47) **INITLDISP$_{\leq 0}$**: Prefer initial demi-σ with R $\leq$ 0.

    INITLDISP$_{\leq 1}$: Prefer initial demi-σ with R $\leq$ 1, etc.

    INITLDISP$_{\leq n}$ >> ... >> INITLDISP$_{\leq 1}$ >> INITLDISP$_{\leq 0}$

(48) **FINALDISP$_{\geq 0}$**: Prefer initial demi-σ with R $\geq$ 0.

    FINALDISP$_{\geq 1}$: Prefer initial demi-σ with R $\geq$ 1, etc.

    FINALDISP$_{\geq 1}$ >> FINALDISP$_{\geq 2}$ >> ... >> FINALDISP$_{\geq n}$

The cutoff of acceptable demisyllable sonority contours in a particular language is determined by the ranking of PARSE and FILL with respect to these MP's.

In addition to sonority contour restrictions, languages typically impose length restrictions on onsets and codas:

(49) **ONSETLENGTH**: Prefer minimal onsets.

(50) **CODALENGTH**: Prefer minimal codas.

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[32]As I assume that long vowels are identical to short vowels on the segmental plane, the value for D is not affected by vowel length.

as well as mora count restrictions:

(51) **MORACOUNT**: Prefer syllables with minimal μ count.[33]

Moreover, languages may impose sonority requirements on nuclei and non-nuclear moras independent of sonority contour with respect to neighboring segments (e.g. requiring all nuclei, and even non-nuclear moras, to dominate vowels) (see Zec 1988):

(52) **NUCSON**: Prefer nuclei with maximal sonority.

(53) **MORASON**: Prefer moraic segments with maximal sonority.[34]

MP's (49–53) may each be decomposed into non-scalar MP's along the same lines as INITLDISP and FINALDISP above in order to impose language-particular cutoffs.

Furthermore, many languages prohibit diphthongs even though they permit long vowels and heavy closed syllables, motivating the following MP:

(54) **NODIPHTHONG**: Prefer no diphthongs.

Finally, to account for the moraicity of coda consonants, I posit the following MP:

(55) **WEIGHTBYPOSN**: Prefer post-nuclear coda segments to be dominated by a μ.

Assuming heavy (bimoraic) syllables are permitted, if WEIGHTBYPOSN is ranked higher than MORASON$_{24}$ (requiring moras to be dominated by vowels), the language permits moraic codas and long vowels; if MORASON$_{24}$ is ranked higher, syllables with long vowels will be the only heavy syllables in the language.

    3.2. <u>The Yidin^y Syllable Template</u>. Yidin^y syllable types are exemplified as follows:

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[33]Thus, in some languages, only monomoraic syllables are permitted; in others, bimoraic syllables are permitted as well; and on rare occasions, superheavy syllables are tolerated; but there are no languages where, e.g., syllables must be either monomoraic or trimoraic. Also note that, a syllable must have at least one mora, by the definition in (39).

[34]The subset relation between the sonority of non-nuclear vs. nuclear moras noted by Zec (1988) follows from SONORITYCURVE.

(56) a. <u>CV</u>   b. <u>CV:</u>   c. <u>CVC</u>$_{[+son]}$
      bala 'shin'   ŋa<u>Ra</u>:   'south'   ma<u>lan</u> 'flat rock'
      d^{y}abu 'earth   gu<u>da</u>:ga 'dog'   gu<u>rbi</u> 'perhaps'

      d. <u>CV:C</u>$_{[+son]}$
      dur<u>gu</u>:ŋ   'mopoke owl-ergative'
      bin^{y}d^{y}i:nmu 'hornet-ablative'

Stress data reveal that the coda consonant does not contribute to syllable weight (see section 4.1 below), and should therefore be viewed as non-moraic.

These syllables can generally be described in terms of the following template:

(57)   CV(:)(C$_{+son}$)

Branching onsets and codas can be ruled out by ranking ONSETLENGTH$_{\leq 1}$ and CODALENGTH$_{\leq 1}$ above PARSE. Heavy syllables are permitted, but superheavy syllables prohibited, by ranking MORACOUNT$_{\leq 2}$ above PARSE, and MORACOUNT$_{\leq 1}$ below it. The requirement of vocalic nuclei and non-nuclear moras is imposed by ranking NUCSON$_{\geq 4}$ and MORASON$_{\geq 4}$ above PARSE, and PARSE above WEIGHTBYPOSN; and diphthongs may be ruled out by ranking NODIPHTHONG above PARSE.

For the remaining demisyllable types, the following dispersion ranking obtains:

(58) | Initial | Final | D | R |
      | ------- | ----- | ---- | - |
      | OV | VO | 0.06 | 0 |
      | NV | VN | 0.11 | 1 |
      | LV | VL | 0.25 | 2 |
      | GV | VG | 1.00 | 4 |
      | V | V | ∞ | 5 |

For initial demisyllables, any R value below 5 is permitted (INITL-DISP$_{\leq 4}$) (excluding onsetless syllables); whereas for final demisyllables, any R value above 0 is permitted (FINALDISP$_{\geq 1}$) (excluding coda obstruents). In sum, the Yidin^y template is derived from the following ranking of (relevant) MP's:

(59)   FILL >> {SONORITYCURVE, INITLDISP$_{\leq 4}$, FINALDISP$_{21}$, ONSETLENGTH$_{\leq 1}$, CODALENGTH$_{\leq 1}$, NUCSON$_{24}$, MORASON$_{24}$, MORACOUNT$_{\leq 2}$, NODIPHTHONG} >> PARSE

(or: FILL >> <u>SYLTEMPLATE</u> >> PARSE)

That is, the syllable structure MP's which are ranked higher than PARSE are satisfied, while those ranked lower may be violated; and since FILL is ranked higher than all relevant MP's, no empty syllable positions are created to obviate their violation.

   3.3.   <u>Further Coda Restrictions</u>.   There are several further wrinkles on Yidin^y syllable structure.   First, there is a prohibition on non-coronal coda consonants (where "coronal" includes palato-alveolars), except when followed by a homorganic consonant, or word-finally.   Thus, while (60a-c) are attested, (60d) are impossible words in Yidin^y:

(60)   a. <u>Coronal</u>
       gilga   'soft'
       banbi   'river bank'
       gaRba   'behind'
       yaRun^{y}gu   'silly person-ergative'

       b. <u>Homorganic</u>
       baŋguR   'multi-prong fish spear'
       bin^{y}d^{y}i:nmu   'hornet-ablative'
       bimbi   'father'
       d^{y}unda-n   'hang down'

       c. <u>Word-final</u>
       d^{y}adam   'wild banana'
       bun^{y}a:ŋ   'woman-ergative'

       d.
       *daŋba
       *damn^{y}a

This is a familiar case of a coda condition (Itô 1986),

(61)   * C]$_\sigma$
          |
          place

combined with the Linking Constraint (Hayes 1986), plus final extra-metricality.   More recently, Goldsmith (1990) has recast the coda condition and Linking Constraint in terms of positional licensing, i.e. "contrastive" (marked) place of articulation in consonants is licensed only in onset position: in the case of a full or partial geminate, the place feature is parasitically licensed by virtue of its membership in

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the onset. This notion can be captured in terms of the following

definition and MP:

(62)   A feature is **licensed** if it is contained in onset or nucleus
        position.

(63)   **NOCODAPLACE**: Prefer place features to be licensed.

Furthermore, extrametrical licensing of place can be stated as follows.

(64)   **EXTRAMETRICALITY**: If a segment contains place features, prefer the
        segment to be word-final.[35]

If the ranking is

(65)   {NOCODAPLACE ∨ CORUNMARK ∨ EXTRAMETRICALITY} >> PARSE

then the compound constraint is not violated unless all its component

MP's are violated, with the result that a segment must either have

coronal place, or the place feature must be licensed by membership in

the onset or by extrametricality.[36]

   A further wrinkle is the Yidin^y prohibition on [w] glides in coda

position. Thus, (66a) is attested, but (66b) is impossible.

(66)   a. bayga-R 'feel sore'
        b. *bawga-R

Nash (1979) and Kirchner (1990) account for this by assuming that the

Yidin^y [w] is actually an obstruent, presumably a labial fricative. But

aside from the problem of why a fricative would be phonetically realized

as a glide, this analysis poses a serious markedness problem: if a

language has a single fricative, markedness theory predicts it to be

coronal rather than labial. Moreover, in a theory in which glides are

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[35]This is surely a special case of some more general notion of
edgemost licensing. The ultimate formulation of this notion in Harmonic
Phonology terms I leave to future research.

[36]Note that this analysis accounts for the occurrence of palato-
alveolars as well as plain alveolars in coda position: a result which the
competing approach to coronal unmarkedness, underspecification theory,
cannot obtain. A coronal underspecification analysis would posit that
these coda consonants lack place features underlyingly (thereby satisfying
the coda condition), and that the coronal place features are filled in at
some subsequent point in the derivation, after the coda condition has been
turned off. But a default fill-in rule cannot idiosyncratically insert
plain coronals in some cases and double (i.e. -anterior) coronals in other
cases.

simply non-moraic vowels, a further constraint is required to prevent

[u] from syllabifying as a coda glide, in which case the obstruent [w]

analysis becomes superfluous. In fact, the [w] coda prohibition falls

out from the foregoing assumptions about coda place. The feature [lab]

is unlicensed in coda position; whereas the [y] glide is acceptable in

coda position by virtue of coronal unmarkedness.[37] Furthermore, para-

sitic licensing via double linking is prohibited in this case by Sel-

kirk's (1990) principle of Homogeneous Stricture Linking (HSL):[38]

(67) If G   H   and G, H ε {STR},   {STR} = {cons, son, cont}
         \ /   then (i)   G = H = STR$_i$
          F   (ii) No instance of STR$_i$ intervenes between G
                                  and H

HSL can be viewed as a MP (i.e. "prefer (67) to be the case"), which in

Yidin^y is ranked above PARSE. For a glide to share place features with

a following onset consonant requires heterogeneous stricture linking

(68a), unlike nasal/stop clusters, as in (68b).[39]

(68) a.   σ   b.   σ   σ
                           /   \   /
           σ   ⎡ son ⎤   ⎡ +son ⎤   ⎡ −son ⎤
            \   ⎢ +cons⎥   ⎢ +cons⎥   ⎢ +cons⎥
      ⎡ +son ⎤   ⎣   ⎦   ⎣   ⎦   ⎣   ⎦
      ⎢ −cons⎥   │   / │   │
      ⎣   ⎦   cont   nas −cont   −cont
            \   /   \ /
             *   lab   lab

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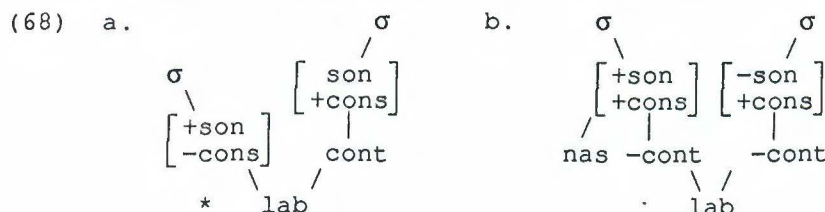
[37]Note that this account leaves unexplained the absence of word-final
[w], since the labial place feature ought to be licensed by extra-
metricality; however, this gap need not be attributed to the synchronic
grammar, as there are no alternations which clearly evidence the
unsyllabifiability of word-final [w]. Alternatively, EXTRAMETRICALITY
might be reformulated so as to apply only to [+cons] segments.

[38]HSL is supposed to be a special case of Selkirk's more general (and
vaguer) Multiple Linking Constraint (MLC). Perhaps HSL could viewed in
Harmonic Phonology as the product formed by combining the MLC and other
constraints dealing with stricture. In this way, the variability in
content of the MLC could be explained in terms of its interaction with
other constraints, rather than by parametrizing the MLC itself.

[39]Note that total geminate consonants do not occur on the surface in
Yidin^y. However, I view this as the result of phonetic degemination
(recall that Yidin^y codas are non-moraic) rather than a phonological
prohibition on geminates. See the discussion of nasal geminates in
sections 6 and 7 below.

3.4. <u>Prenasalized Stops</u>. A further puzzle is posed by Dixon's report of word-medial tri-consonantal clusters, consisting of a liquid or glide followed by a homorganic nasal/stop cluster.

(69) balmbinʸ   'grasshopper'   dʸaymbi   'in turn'
      bilnʸdʸin   'jump down'   dʸayŋgaR   'rapids in river'
      birmbi:dʸa   'salt-water'   wadi:rnda   'cicatrices-dative'
      biRmbir   'jealousy'   ɳala:lnda   'big-dative'
      dʸalŋgan   'small black bird'

We could account for these clusters by revising the Yidinʸ syllable template to allow an additional coda consonant. However, several considerations suggest that this would be an incorrect move. First, coda clusters never occur word-finally. Second, Yidinʸ reduplication facts suggest that the nasal consonant in at least some homorganic nasal/stop clusters is not part of the coda.

(70) mula:ri   'initiated man'   mulamula:ri   'initiated men'
      ginda:lba   'lizard sp.'   gindalginda:lba 'lizards'
      galambaRa: 'march fly'   galagalambaRa: 'march flies'

If a consonant is in the coda in the base, it reduplicates, as with the [l] in <u>ginda:lba</u> (compare with the [r] in <u>mula:ri</u>). Note, however, that the [m] of <u>galambaRa:</u> does not reduplicate, indicating that it is not in the coda.[40] Finally, certain conditions on Yidinʸ apocope (see footnote 47) indicate that some homorganic nasal/stop clusters are not clusters at all, but single segments. For these reasons, Nash (1979) analyzes these clusters as prenasalized stops. Lombardi (1991) has argued that affricates must be represented as segments which are simultaneously [+cont] and [-cont]; the timing of the release gesture is a result of phonetic implementation rather than ordering within the phonological representation. In other words, continuancy could be thought of as consisting of two privative features, [cont] and [stop], which usually do not cooccur, but are not necessarily mutually exclusive. I extend this analysis to the feature [sonorant], proposing that prenasalized
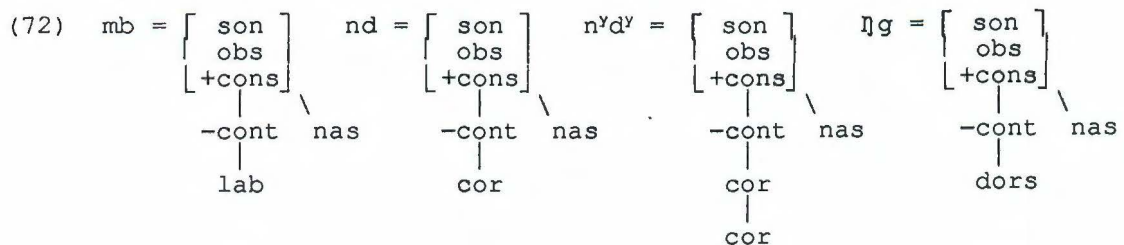
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[40]Dixon claims that the reduplicative prefix (like other disyllabic affixes in Yidinʸ) forms a separate prosodic word from the base, hence the non-coronal place of the nasal is extrametrically licensed. Thus, place licensing cannot account for the failure of the nasal to reduplicate.

stops are simultaneously [+son] and [-son], or alternatively, [son] and

[obs]. Prenasalized stops are usually ruled out by the following MP:

(71) **NOPRENASALSTOP**: Prefer [+son] and [-son] not to cooccur within a
      segment.

However, if NOPRENASALSTOP is ranked lower than PARSE(FEATURE) in

Yidinʸ, then prenasalized stops are admitted to the segment inventory of

the language.

(72)   mb = ⎡ son ⎤   nd = ⎡ son ⎤   nʸdʸ = ⎡ son ⎤   ŋg = ⎡ son ⎤
            ⎢ obs ⎥   ⎢ obs ⎥   ⎢ obs ⎥   ⎢ obs ⎥
            ⎣+cons⎦   ⎣+cons⎦   ⎣+cons⎦   ⎣+cons⎦
             | \\ | \\ | \\ | \\
           -cont nas   -cont nas   -cont nas   -cont nas
             | | | |
            lab   cor   cor   dors
                                                 |
                                                cor

If the liquid-nasal-stop clusters in (70) are in fact liquid-pre-

nasalized stop clusters, then there are no word-medial triconsonantal

clusters, and we can maintain the generalization that Yidinʸ codas

contain at most one segment.[41]

    3.5. Remaining Issues. Other phonotactic generalizations

mentioned by Dixon, such as the absence of word-initial liquids, or of

root-internal [lnd] and [ynʸdʸ] clusters, appear to have no synchronic

significance. Assimilated loan-words, such as /landima-l/ 'teach' (>

"learnt him") violate this word-initial generalization. And [lnd] and

[ynʸdʸ] clusters do occur at root + affix junctures within prosodic

words. Similarly, the absence of prenasalized stops in word-initial

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[41]Dixon (1979:36) also reports triconsonantal clusters consisting of
[ln] followed by [dʸ] or [b]. These clusters are not amenable to a
prenasalized stop analysis, because the nasal and stop are not homorganic.
However, the only examples of such clusters which appear in Dixon's
vocabulary list are walndʸal ('select best of everything') and dulnbi:lay
('white cedar tree'). Were it not for the fact the Yidinʸ data are now a
closed corpus (the last speakers died in the 1970's), one would want to
confirm these examples with instrumental analysis. Regarding the first
example, since palatalization is primarily audible on the release of the
consonant, it would be difficult to determine, based solely on accoustic
analysis, whether the nasal is alveolar or alveo-palatal. Similarly, for
dulnbi:lay, perhaps the alveolar articulation of the nasal is the result
of transition from the alveolar articulation of the [l] in casual speech.
As it is, I hesitate to consider these questionable forms as valid
counterexamples to otherwise robust generalizations about Yidinʸ's syllable
structure.

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position can be explained diachronically, since prenasalized stops presumably derive historically from nasal-stop clusters.

To recapitulate, I posit the following ranking of (relevant) syllable structure MP's for Yidinʸ:

(73)   FILL >> {SYLTEMPLATE, HSL, {CORUNMARK ∨ NOCODAPLACE ∨ EXTRA-METRICALITY} >> PARSE

(or: FILL >> GOODSYL >> PARSE)

4.   Yidinʸ Metrical Structure

4.1.   Data. The Yidinʸ stress facts are exemplified in (74) below.[42]

(74)   a. No long vowels
    málan   'flat rock'
    gídʸa   'quick'
    gúdagáni   'dog-genitive'
    dʸámbuláŋalnʸúnda   'two-comitative-dative subordinate'

b. Long vowel(s) in odd syllable
    gáliŋá:dʸiŋ   'go-comitative-antipassive-present'
    wúŋabá:dʸinʸúnda   'hunt-antipassive-dative subordinate'

c. Long vowel(s) in even syllable
    wayí:l   'red bream'
    gulúgulú:y   'black bream-comitative'
    yadʸí:riŋál   'walk about-going aspect-comitative-present'
    waṟá:bugá   'white apple tree'
    magí:riŋá:ldanʸú:n   'climb up-going aspect-comitative-coming aspect-dative subordinate'

d. Odd-syllabled forms
    gudá:ga   'dog-absolutive'
    mudá:mgu   'mother-purposive'
    burwá:liŋá:lna   'jump-coming aspect-comitative-purposive'

Words which contain no long vowel (74a) are uniformly trochaic, as are words which contain a long vowel in an odd-numbered syllable (74b). Words which contain a long vowel in an even-numbered syllable (74c) are uniformly iambic. The odd-syllabled forms (74d) all contain long vowels

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[42]Dixon describes only a single degree of stress in Yidinʸ. Hayes (1980:131), however, reports a personal communication from David Nash to the effect that the first stressed syllable in a word seems to bear primary stress, at least according to Nash's acoustic impressions. There appears to be no phonological motivation in Yidinʸ for positing an additional degree of stress. If, however, Nash is correct, primary stress could be accounted for trivially by bracketing the feet into a metrical word and applying end rule: left.

in the penultimate syllable, and all have iambic stress. Note that words may contain more than one long vowel, e.g. maɡí:riɲá:ldanᵞú:n, but that long vowels occur either all in odd- or all in even-numbered syllables within a word.

4.2. <u>Deriving Foot Types</u>. To derive the foregoing stress patterns, I begin by positing the following definitions and MP's:

(75) A Φ is a prosodic constituent which immediately dominates one or more σ's. A Φ is either **iambic** (right-headed) or **trochaic** (left-headed) (monosyllabic feet are acceptable in either system).

(76) **PARSE(SYLLABLE)**: Prefer parsed syllables

(77) **WEIGHT-TO-STRESS PRINCIPLE (WSP)**: Prefer a heavy syllable to be stressed. (Prince 1990)

(78) **FOOTMAX**: Prefer a Φ to contain no more than 2 σ's.

In a grammar where WSP and FOOTMAX are ranked above PARSE(SYLLABLE), this set of MP's gives rise to the set of foot types in (79):[43]

(79) Iambic: $[\sigma_\mu \; \acute{\sigma}_{\mu\mu}]$, $[\sigma_\mu \; \acute{\sigma}_\mu]$, $[\acute{\sigma}_{\mu\mu}]$, $[\acute{\sigma}_\mu]$

Trochaic: $[\acute{\sigma}_{\mu\mu} \; \sigma_\mu]$, $[\acute{\sigma}_\mu \; \sigma_\mu]$, $[\acute{\sigma}_{\mu\mu}]$, $[\acute{\sigma}_\mu]$

However, certain languages, Yidinᵞ among them, require feet to be disyllabic, eliminating the $[\sigma_{\mu\mu}]$ and $[\sigma_\mu]$ feet from the inventory.[44] This can be achieved by positing the following MP:

(80) **FOOTMIN**: Prefer a Φ to contain no less than 2 σ's.

4.3. <u>Optimal Feet</u>. Prince (1990), building on observations of Hayes (1985) concerning the tendency of iambic systems to enhance (and

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[43] $[\sigma_{\mu\mu} \; \sigma_{\mu\mu}]$ feet are ruled out by the interaction of CLASHAVOID and WSP. If a heavy syllable must be stressed, and stressed syllables cannot be adjacent, then heavy syllables cannot be adjacent, within a foot or otherwise.

[44] Two considerations support the assumption that Yidinᵞ has a strictly disyllabic foot template. First, there are no monosyllabic words in Yidinᵞ: all words have at least two syllables. Second, Yidinᵞ has a class of affixes which, for all phonological purposes, constitute a separate prosodic word from the stem: these affixes are uniformly disyllabic. If, as McCarthy and Prince (1986) have claimed, the minimal prosodic word of a language must be a foot, and if the Yidinᵞ foot is strictly disyllabic, the disyllabicity of these affixes follows (cf. Lardil, Kirchner 1991, in which a bimoraic foot is the minimal word).

trochaic systems to avoid) syllable weight contrasts, posits the
following metric of "grouping harmony":

(81) Grouping Harmony
      Let G be a rhythmic unit, at most binary on syllables or moras.
      Let X be the first element of G.
      Let Y = G − X
      $\text{Harmony}(G) = |Y|_\mu / |X|_\mu$

giving the following harmony values for the various foot types:

(82)
Foot type	X	Y	Harmony
light heavy	[μ	μμ]	2
light light	[μ	μ]	1
heavy	[μ	μ]	1
heavy light	[μμ	μ]	.5
light	[μ	__]	0

This Grouping Harmony metric allows us to posit the following MP:

(83) **GROUPING**: Prefer feet with maximal harmony value.[45]

The choice between iambic and trochaic feet in a given instance will
depend on WSP, with default trochaic assignment in the case of a
balanced ($|X| = |Y|$) foot.[46]

Note that languages with exhaustive foot parsing typically can be
classified as uniformly iambic or trochaic.

(84) **UNIFORMITY**: Prefer feet to be either all iambic or all trochaic
      within the language.

Yidin^y is unusual in that it permits both iambic and trochaic feet,
although the two types may not cooccur in the same prosodic word. I
assume that in Yidin^y, UNIFORMITY is not in force, due to its ranking
below PARSE(SYLLABLE), and that the word-internal uniformity is the
result of the following MP's:

(85) **CLASHAVOID**: Prefer no adjacent stressed syllables.

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[45]As with other scalar MP's, GROUPING may be decomposed according to
the Binarization Convention; however, as we need not rely on GROUPING to
impose any cutoffs on foot types in Yidin^y, the binarization of this MP,
and indeed its ranking with respect to other MP's, is not of immediate
relevance.

[46]Prince derives this trochaic default rule from the observation that
a balanced foot is the best possible trochaic foot (assuming WSP is
obeyed), whereas it is only the second-best iambic foot; consequently, the
language will tend to choose the rhythmic category (trochaic or iambic) in
which balanced feet are optimal.

(86) **WEAKCLASH**: Prefer no adjacent unstressed syllables.

Ignoring for the moment the odd-syllabled words (74d), the foregoing ranking of MP's account for the surface stress patterns observed in (74).

(87) {FOOTMAX, FOOTMIN, WSP, CLASHAVOID, WEAKCLASH} >> PARSE(SYLLABLE)

In words without heavy syllables (74a), trochaic default applies. Elsewhere, WSP results in trochaic (74b) or iambic (74c) feet, depending on the location of the heavy syllable; and CLASHAVOID prevents long vowels from occurring in odd- and even-numbered syllables within the same word.

5.   Odd-Syllable Apocope and Penultimate Lengthening

Thus far, we have sketched the principles defining licit segments, syllables, and feet in Yidin^y. In the remaining sections, these structural notions are put to work to account for phonological alternations.

5.1. <u>Data</u>. The bulk of alternations in Yidin^y involve odd-syllabled words. As can be seen in (88), words containing an odd number of syllables, whether underlyingly, as in the roots in (88a), or by suffixation, as in (88b), undergo apocope or final vowel deletion, with compensatory lengthening of the previous vowel.

(88) a.   gindanu   → gindá:n   'moon'
            d^{y}ambula   → d^{y}ambú:l   'two'
            waŋaRi   → waŋá:R   'youth'
      b.   bun^{y}a-ni   → bun^{y}á:n   'woman-genitive'
            bimbi-n^{y}a   → bimbí:n^y 'father-accusative'

The forms in (89) suffice to show both that the forms in (88a) must be underlyingly trisyllabic, and that apocope does not occur with even-syllabled words.

(89) gíndanúni   'moon-genitive'   gíndanún^{y}a 'moon-accusative'
      d^{y}ámbuláni   'two-genitive'   d^{y}ámbulán^{y}a 'two-accusative'
      wáŋaRíni   'youth-genitive'   wáŋaRín^{y}a   'youth-accusative'

The additional vowel cannot be epenthetic since its quality is unpredictable.

There are certain conditions on Yidinʸ apocope in addition to an odd number of syllables. For both roots and affixed forms, apocope is blocked if it would render any consonant unsyllabifiable.

(90) a. gudaga   → gudá:ga   'dog'
      b. bagiram   → bagí:ram   'tea tree'
      c. guygal-ni   → guygá:lni 'bandicoot-genitive'

In (90a), apocope would result in *guda:g, which is syllabically ill-formed due to the final coda obstruent. In (90b) and (c) it would result in *bagi:rm and *guyga:ln, both of which are ill-formed due to coda consonant clusters.[47]

This brings us to the second kind of alternation found in odd-syllabled words. As may be surmised from (90), when apocope is blocked in odd-syllabled words, they undergo penultimate lengthening, i.e. the vowel in the penult becomes long. The vowel length alternations in the partial paradigms in (91) suffice to show that this penultimate length cannot be underlying.

(91) absolutive   genitive   'fear' case
      gudá:ga   gúdagáni   gudágayí:da
      gúygal   guygá:lni   gúygalyída

The phenomenon of penultimate lengthening accounts for the observation that, on the surface, odd-syllabled words are all iambic, since they all have a long vowel in an even-numbered syllable (74d).

5.2. Apocope. Of the vocabulary items listed by Dixon, roughly seventy-five percent are underlyingly even-syllabled. Furthermore, the apocope rule can be viewed as Yidinʸ's attempt to get rid of odd-syllab-

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[47]This latter point provides additional evidence in favor of the existence of prenasalized stops in Yidinʸ, discussed in section 3. There are two suffixes, transcribed as -ŋgu ('ergative case') and -nʸunda ('dative subordinate'), which undergo apocope, surfacing as -ŋ and -nʸu:n respectively, when the word resulting from suffixation is odd-syllabled, despite the fact that the [ŋg] and [nd] clusters ought to block apocope. The anomaly of these forms disappears if we assume that these clusters are in fact prenasalized stops, and that prenasalized stops in coda position are phonetically implemented as ordinary nasals.

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led words.[48] These facts give rise to the question, Why are odd-syllabled words disfavored in Yidin^y? The answer is Yidin^y's disyllabic foot template: odd-syllabled words cannot be exhaustively parsed into disyllabic feet. (I will ignore for the time being the chirality, or left- vs. right-headedness, of the feet.) To make this explicit, we first need a notion of directionality, translated into declarative terms, to account for the occurrence of these foot-based alternations at the right edge of words. The effect of left-to-right construction can be obtained by the following MP:[49]

(92) **DIRECTIONALITY:** Prefer a Φ to be at least as well-formed as the following Φ.

If the foot-size MP's (FOOTMAX and FOOTMIN) are ranked above DIRECTIONA-LITY, then it will only have an effect <u>ceteris paribus</u>. In Yidin^y, the result is an unfooted final syllable in odd-syllabled words.

Thus, Yidin^y apocope is simply stray erasure of the unfooted syllable. But why do unfooted syllables undergo stray erasure in Yidin^y, whereas they persist in languages such as English?[50] This variation can be accounted for in terms of the ranking of PARSE and

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[48]We must reject the hypothesis that apocope or penultimate length-ening are the result of some kind of pure mora-counting condition on foot construction. Even-syllabled words with a long vowel in an odd-numbered syllable (a) exhibit the same stress pattern as even-syllabled words with no long vowel (b).
    a. wúŋabá:d^{y}in^{y}ú^{n}da 'hunt-antipassive-dative subordinate'
    b. d^{y}ámbuláŋaln^{y}ú^{n}da 'two-transitive verbalizer-dative subordinate'
Furthermore, penultimate lengthening occurs even where there is already a long vowel in a previous syllable:
    burwa-:li-ŋal-na → burwá:liŋá:lna 'jump-going-comitative-purposive'
If penultimate lengthening is related to foot structure (as seems reasonable), and if foot construction counts moras, we would incorrectly predict such forms to pattern differently from odd-syllabled words without any underlyingly long vowels.

[49]To account for right-to-left languages as well, this MP could be restated in a weaker form, along the same lines as the discussion of COLORHEIGHT in footnote 24.

[50]The notion of stray adjunction (i.e. adjunction of stray syllables to the nearest foot) is not particularly helpful here: the question simply becomes, Why do unfooted syllables become stray-adjoined in English but not in Yidin^y? Furthermore, allowing stray adjunction as a theoretical device would require a complication of PARSE(SYLLABLE).

PARSE(SYLLABLE). If PARSE is ranked above PARSE(SYLLABLE), then it is better to have an unfooted syllable than an unsyllabified segment, and so the syllable will persist. If PARSE(SYLLABLE) is ranked above PARSE, then the syllable deletes.

Similarly, we can account for the compensatory lengthening which accompanies apocope in terms of the following MP:

(93) **PARSE(MORA)**: Prefer parsed moras.

Assume that moraic structure is present in the underlying representation. In the phonology, however, FOOTSIZE is ranked above PARSE(MORA) and PARSE(SYLLABLE), triggering apocope.

(94) FILL >> GOODSYL >> FOOTSIZE >> PARSE(MORA) >> PARSE(SYLLABLE) >> PARSE >> CHIRALITY

Since PARSE(MORA) is ranked above PARSE(SYLLABLE) and PARSE(VOWEL), the mora persists when the nodes above and below it are deleted; but since it is ranked below GOODSYL, and since no segments may be epenthesized, it must resyllabify by associating to the previous vowel, hence compensatory lengthening.

(95) UR   Phonology   Phonetics

g i n d a n u   g i n d a n u   gindá:n
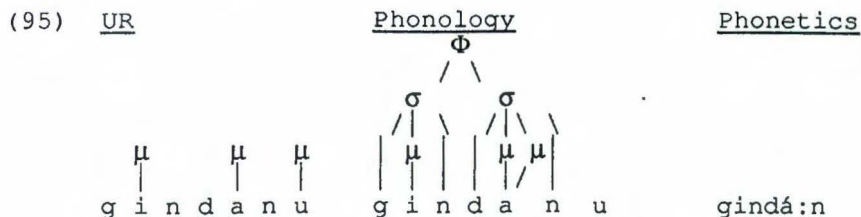
5.3. Penultimate Lengthening. Recall, however, that not all odd-syllabled words undergo apocope: apocope fails to occur if it would render any consonant unsyllabifiable (90). P&S observe that, for ranking purposes, PARSE must be split into two MP's: PARSE(CONSONANT) and PARSE(VOWEL), and FILL must be split into FILL(ONSET) and FILL(NUCLEUS), otherwise we incorrectly predict that in any CV syllable language, either onsets and nuclei are both epenthesized or both deleted.[51]

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[51]For Yidin^y, it does not appear necessary to distinguish between the ranking of FILL(ONSET) and FILL(NUCLEUS), therefore I will continue to refer to them as a single MP, FILL.

(96)   **PARSE(CONSONANT)**: Prefer parsed consonants.

(97)   **PARSE(VOWEL)**: Prefer parsed vowels.

Now, let us assume that on the Post-Lexical Stratum, PARSE(CONSONANT) splits off from PARSE(VOWEL), moving above <u>FOOTSIZE</u> in the ranking:

(98)   FILL >> <u>GOODSYL</u> >> PARSE(CONSONANT) >> <u>FOOTSIZE</u> >> PARSE(MORA) >> PARSE(SYLLABLE) >> PARSE(VOWEL) >> <u>CHIRALITY</u>

Because PARSE(CONSONANT) is ranked higher than FOOTMAX and FOOTMIN, it is no longer permissible to leave consonants unparsed in order to satisfy the foot structure MP's. In cases such as (88), PARSE(CONSONANT) can be satisfied merely by resyllabifying the sonorant as the coda of the previous syllable, and apocope persists (see (94)). However, in those cases where apocope would result in unsyllabified consonants, such as (90), these consonants are assigned syllable nodes; and since syllable structure MP's require syllables to include a nucleus and mora, a new mora is inserted,[52] and the stray vowel is reincorporated into the prosodic structure as well (recall that stray erasure does not apply until the end of the phonology). In other words, apocope is not, strictly speaking, "blocked"; rather, the shift in position of PARSE(CONSONANT) "undoes" odd-syllable apocope in cases such as (90), in order to save consonants from stray erasure.[53] However, the compensatory lengthening which resulted from apocope in the lexical phonology persists: hence, penultimate lengthening.

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[52]It may be asked why the mora requirement must be satisfied by inserting a new mora, rather than reappropriating the second mora of the previous syllable — particularly since MORACOUNT$_{S1}$ states that a representation without heavy syllables is preferred. I assume that MORACOUNT$_{S1}$ is outranked in Yidiɲ by the following MP:
    DONOTHING: Prefer minimal reassignment of structure.

[53]Note that the vowel is <u>not</u> reincorporated into prosodic structure to satisfy the low-ranked PARSE(VOWEL), but because reincorporation of the vowel happens to dovetail with the need to satisfy PARSE(CONSONANT) and the syllable structure MP's.

(99)   <u>UR</u>   <u>Lexical</u>   <u>Post-Lexical</u>   <u>Phonetics</u>

```
                        Φ                  Φ
                      / \                / \
                     σ   σ              σ   σ    σ
                    /|  /|\            /|  /|\  /|
         μ  μ  μ   | μ | μ μ          | μ | μ μ | μ
         |  |  |   | | | |/           | | | |/  | |
         g u d a g a   g u d a  g a       g u d a   g a          gudá:ga
```

We have hitherto ignored the chirality of feet in the discussion
of apocope and penultimate lengthening. I have assumed that, within the
lexical phonology, <u>CHIRALITY</u> (WSP, CLASHAVOID, and WEAKCLASH) is ranked
below PARSE(SYLLABLE). This ranking is necessary to prevent <u>CHIRALITY</u>
from blocking apocope and the compensatory lengthening which accompanies
it. Post-lexically, however, <u>CHIRALITY</u> comes to be ranked equally with
<u>FOOTSIZE</u>, resulting in the stress patterns exemplified in (74).

(100) FILL >> <u>GOODSYL</u> >> PARSE(CONSONANT) >> {<u>FOOTSIZE</u>, <u>CHIRALITY</u>} >>
       PARSE(MORA) >> PARSE(SYLLABLE) >> PARSE(VOWEL)

       5.4. <u>Exceptional Non-Apocopating Roots and Affixes</u>. There remain
a handful of trisyllabic roots and one affix which fail to undergo
apocope, instead undergoing penultimate lengthening, even though they
appear to meet the syllable shape requirements which characterize the
apocopating forms.

(101) a.   mulari   → mulá:ri   'initiated man'
             gudʸara   → gudʸá:ra   'broom'
             galgali   → galgá:li   'curlew'

       b.   -na 'purposive'
             gali-n-na → galí:na   'go-purposive'

I propose that these exceptional non-apocopating roots and affix end in
a [+sonorant] root node which lacks place features:[54]

(102) a.   m u l a r i $\begin{bmatrix} +son \\ +cons \end{bmatrix}$ b.   n a $\begin{bmatrix} +son \\ +cons \end{bmatrix}$

Ordinarily, such placeless segments are ruled out by the following MP:

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[54]Diachronically speaking, I assume that this placeless root node is
the remains of a decayed consonant. The general absence of /ŋ/ from
underlying root-final position suggests that this may be the origin of
these placeless consonants.

(103) **MINSPEC**: Prefer a segment to contain at least one place feature or laryngeal feature.[55]

But in Yidin^y, I posit that MINSPEC is ranked lower than PARSE(FEATURE).

Crucially, as with other word-final consonants, these placeless root nodes block apocope (i.e. trigger post-lexical reincorporation of the final syllable), because apocope would result in an unsyllabifiable consonant cluster, in violation of CODALENGTH$_{\leq 1}$. I further assume that these abstract root nodes, lacking oral or laryngeal articulation, are unable to be phonetically realized. Thus, in effect, they are eliminated in the phonetic component.

5.5. <u>Apocope without Compensatory Lengthening</u>. Apocope without compensatory lengthening occurs in the dozen nominal roots with a final (underlyingly) long vowel, e.g. /margu:-ni/ → <u>marqú:n</u> 'gray possum-genitive'. This result falls out from ranking <u>GOODSYL</u> (specifically, MORACOUNT$_{\leq 2}$) above PARSE(MORA). Since the mora of the final (apocopated) syllable cannot resyllabify without creating a superheavy syllable, the mora undergoes stray erasure.

In addition, there is one affix, -<u>mu</u> 'ablative/causal case', which appears to undergo apocope without triggering compensatory lengthening:

(104) bun^{y}a-mu → <u>bún^{y}am</u> 'woman-ablative'.

This fact requires some additional morphological device such as prosodic circumscription.[56] Let us suppose that -<u>mu</u> selects a stem which has been subjected to circumscription and deletion of the final mora.[57]

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[55]Hence placeless segments are licit if they are specified for laryngeal features, i.e. [h] and [ʔ].

[56]See McCarthy and Prince (1990), McCarthy and Lombardi (1990), Kirchner (1992). Note that prosodic circumscription is an operation of the morphological, not the phonological, component.

[57]Note that when apocope is "blocked" by the presence of a root-final consonant, penultimate lengthening nevertheless occurs, e.g. bin^{y}d^{y}in + mu → bin^{y}d^{y}i:nmu ('hornet-ablative'). It appears that the morphological operation, "Circumscribe a final mora" requires the mora to be word-final; that is, circumscription is blocked if the mora is followed by any non-moraic phonological material within the word, namely a coda consonant. This result is consistent with the behavior of final-mora circumscription in Lardil (Wilkinson, 1988).

Compensatory lengthening in connection with apocope will thus result in a single mora being assigned to the last vowel of the stem.

(105)   Root   Circum'n   Affix'n   Apocope + CL
        μ μ   μ   μ   μ   μ μ
        | | | | | | |
        bun^ya   bun^ya   bun^ya + mu   bun^ya m u

In contrast, when —mu attaches to an odd-syllabled stem, since there is no apocope, hence no compensatory lengthening, prosodic circumscription of the stem-final mora simply triggers assignment of a new mora:

(106)   Root   Circum'n   Affix'n   μ Assignment
        μ μ μ   μ μ   μ μ   μ   μ μ μ μ
        | | | | | | | | | | | |
        gudaga   gudaga   gudaga + mu   gudagamu

6.   Verbal Conjugation Class Markers

6.1.   Data.   The previous discussion has been primarily limited to nominal forms. These generalizations concerning apocope and penultimate lengthening are equally true for the verbal forms; however, the conjugation class markers, —n, —l, —R, which occur at the end of all verbal roots and derivational verbal suffixes, seem to be disregarded for purposes of the coda cluster condition on apocope.

(107)   wawa-l-n^yu   → wawá:l   'see-past'
        gali-n-n^yu   → galí:n^y 'go-past'
        bad^ya-R-n^yu → bad^yá:R 'leave-past'

Rather, it seems that these forms undergo apocope, and then the resulting coda cluster is simplified through some sort of segmental fusion. The results of combining the various verbal markers and inflectional suffixes, both in apocopated and non-apocopated cases, are shown in (108):

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(108)   <u>Apocopated</u>   <u>Non-Apocopated</u>

	Apocopated	Non-Apocopated
Past	$R + n^yu = {:}R$ $l + n^yu = {:}l$ $n + n^yu = {:}n^y$	$R + n^yu = Rn^yu$ $l + n^yu = ln^yu$ $n + n^yu = n^yu$
Present	$R + \eta = R$ $l + \eta = l$ $n + \eta = \eta$	$R + \eta = R$ $l + \eta = l$ $n + \eta = \eta$
Imperative	$R + \emptyset = r$ $l + \emptyset = \emptyset$ $n + \emptyset = n$	$R + \emptyset = r$ $l + \emptyset = \emptyset$ $n + \emptyset = n$
Purposive[58]		$R + na = Rna$ $l + na = lna$ $n + na = na$
Dative subordinate	$R + n^yu^nda = Rn^yu{:}n$ $l + n^yu^nda = ln^yu{:}n$ $n + n^yu^nda = n^yu{:}n$	$R + n^yu^nda = Rn^yu^nda$ $l + n^yu^nda = ln^yu^nda$ $n + n^yu^nda = n^yu^nda$
Causal subordinate		$R + n^yum = Rn^yum$ $l + n^yum = ln^yum$ $n + n^yum = n^yum$
"Lest" form		$R + d^yi = Rd^yi$ $l + d^yi = ld^yi$ $n + d^yi = nd^yi$

For both apocopated and non-apocopated forms, the −n conjugation class marker deletes prior to a nasal-initial suffix. The imperative suffix appears to require suppletive allomorphy for the −l and −R conjugations. For the other inflectional suffixes, in non-apocopated forms, the verbal markers −l and −R surface without fusion, as in (109).

(109) galiŋa-l-n^yu   → gáliŋáln^yu   'take-past'
       bad^ya-R-d^yi   → bad^yá:Rd^yi   'leave-"lest" form'

Whereas in apocopated forms, an −l or −R + nasal cluster results in deletion of the nasal, as in (107). These generalizations are also consistent with the derivational suffixes, modulo suppletion, discussed in section 8 below.

6.2. <u>The −n Class</u>. It is tempting to view the deletion of the −n conjugation class marker before nasal-initial suffixes as some sort of nasal cluster simplification. On broader analysis, however, the only

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[58]Exceptional non-apocopating suffix, see section 5.4 above.

generalization which can be made is that a sequence of identical nasals degeminates.[59]

(110) muRudum + mu → múRudúmu 'stingaree-ablative'
      binʸdʸin + ni → binʸdʸí:ni 'hornet-genitive'

There is no general prohibition on nasal clusters, root-internally or across morpheme boundaries:

(111) a.   mánŋa-n   'be frightened'
            nʸúnmul   'one'
      b.   dʸudʸú:m-nʸa[60]   'aunt-accusative'
            yáramán-mu   'horse-ablative'

Furthermore, even in other cases that appear to involve simplification of underlying nasal clusters, the outcome of such simplification varies depending on the morpheme, sometimes with more than one possibility for the same morpheme:

(112) nʸ + n = n (ŋidʸubanʸ + ni → ŋídʸubáni 'mussel-genitive')
      nʸ + m = nʸ ~ ym (ŋidʸubanʸ + mu → ŋídʸubánʸu ~ ŋídʸubáymu 'mussel-ablative')
      m + n = m ~ mn (mudʸam + ni → mudʸá:mi ~ mudʸá:mni 'mother-genitive')

These facts indicate that (aside from degemination) there is no regular, synchronic process of nasal cluster simplification in Yidinʸ; therefore, alternations which appear to involve such simplification are most straightforwardly analyzed as morphological suppletion. Returning to the problem at hand, we can posit a zero allomorph for the -n conjugation class marker, which allomorph is selected by nasal-initial suffixes. Now, the behavior of the -n marker with respect to apocope ceases to be exceptional. Since the verbal inflectional suffixes which undergo

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[59]See footnote 39. Such degemination must be viewed as phonetic, otherwise it would feed apocope.

[60]Note that the presence of a coda [m] in this word, as in the variant form mudʸá:mnʸi in (112), appear to be counterexamples to the claims of section 3.3 above concerning coda place licensing. Perhaps these examples can be accounted for by assuming that the relevant domain of extrametricality is the root rather than the word. That is, the coda [m] is licensed because it is in root-final position, notwithstanding the affixation which makes it non-peripheral to the word.

apocope all happen to be nasal-initial,[61] and since the -n class marker is in these cases replaced by a zero allomorph, the -n marker cannot block apocope.

6.3. _The -l and -R Classes_. As for the remaining conjugation class markers, I propose that they underlyingly lack root nodes, consisting solely of the following features.[62]

(113) /-l/ = -cont   /-R/ = +cont
                 | |
               cor   cor
                                             |
                                           cor

Such "quasi-segments" are disfavored as a result of the following MP:

(114) **ROOTFEATURES**: Prefer segments to be specified for [cons] and [son].

but ROOTFEATURES happens to be ranked below PARSE(FEATURE) in Yidin^y, with the result that the quasi-segments must be incorporated into a segment, i.e. receive root nodes, e.g. by insertion of a featurally empty root node:

(115)   [   ]$_{Root Node}$
                                  |
      -cont →   -cont
         | |
       cor   cor

The featural content of this empty root node is filled in as a matter of phonetic implementation.[63] This scenario accounts for examples such as (109), where the conjugation class markers surface as segments. But where insertion of a root node would violate syllable structure condi-

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[61]Recall that the obstruent-initial affixes don't undergo apocope because this would result in an (unsyllabifiable) coda obstruent.

[62]The phenomenon of floating, unsyllabified segments should be familiar from cases such as French elision and liaison, and Slavic yers. Facts such as these have been taken as motivation for a skeletal tier in addition to the moraic and root node tiers (see e.g. Tranel 1990) -- an enrichment of the representation which seems otherwise unwarranted. Alternatively, Archangeli (1989) has posited the diacritic feature [unsyllabifiable] to deal with similar segment behavior in Yawelmani. I suggest that such cases might be handled in a more constrained manner by positing segments without root node features.

[63]See footnote 16 and surrounding text.

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tions, such as the prohibition on coda clusters, the features of the verbal marker dock on to the nearest available root node, giving rise to consonant fusion, as in (107). Let us further assume that quasi-segments are classed with vowels for purposes of the distinction between PARSE(CONSONANT) and PARSE(VOWEL).[64] It now follows that the presence of one of these quasi-segments in the coda of the penult of an odd-syllabled word will not block apocope: given the ranking in (98) it is better to have an unparsed quasi-segment than to violate FOOTSIZE and PARSE(SYLLABLE).

Actually, the quasi-segment does not remain unparsed, since an alternative assignment of structure is possible:

(116)

$$\sigma \qquad\qquad\qquad \sigma$$

But why are the features of the conjugation class marker able to usurp the root node of the following consonant, supplanting its original features? Recall that this consonant fusion accompanies apocope in verbs, and apocope only occurs in verbs when the inflectional suffix is nasal-initial. The choice is therefore between saving the features of the conjugation class marker (a liquid) from stray erasure, versus saving the features of the following nasal. In fact, there appears to be a general asymmetry in nasal-liquid assimilations: liquids rarely assimilate to nasals, but nasals commonly assimilate to liquids, as in English:

(117) in + logical → illogical
      in + relevant → irrelevant

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[64]Note that PARSE(VOWEL) must not apply to glides, since coda glides can block apocope. Hence a segment is a "vowel" for purposes of the PARSE(CONSONANT)/PARSE(VOWEL) distinction if it is not specified [+cons] and is non-moraic, admittedly a rather unnatural conjunction of conditions.

These asymmetries suggest that nasals are more marked than liquids:

(118) **NONASAL**: Prefer sonorant consonants to be liquids.[65]

Finally, the place features of the (supplanted) nasal must be coronal, because of the Yidinʸ restriction of liquids to coronal place of articulation.

7.   Nominal Inflection

Having presented an analysis of the verbal inflectional suffixes, we will now "bat clean-up" with the nominal inflectional system.[66]

(119) Absolutive (= uninflected)

Ergative
-ᵑgu   (with vowel-final stem)
-Cu   (with consonant-final stem, C = an obstruent homorganic with the previous consonant)
-:l   (for one root: /bama/ 'person' → bamá:l)

Locative
-la   (with odd-syllabled vowel-final stem)
-:   (with even-syllabled vowel-final stem)
-Ca   (with consonant-final stem)
-nʸdʸa   (with stem ending in [y])
-:l   (for four roots: /dʸugi/ 'tree, wood', /dʸadu/ 'shade', /biwi/ 'stick knife', /muyubara/ 'new')

Dative
-nda

Purposive
-gu

Ablative
-mu

Genitive
-ni   (word-finally)
-nu   (elsewhere)

Genitive-Ablative
-nim

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[65]This MP must be ranked below PARSE(FEATURE) in Yidinʸ, otherwise nasals would be excluded from the inventory; nevertheless, NONASAL is capable of having a tie-breaker effect between two competing assignments of structure.

[66]I ignore the pronoun system, which contains little of synchronic phonological interest. Yidinʸ reduplication facts are discussed in section 3.4 above.

'Fear' Case
<u>'Fear' Case</u>
-yida   (with vowel-final stem)
-d^{y}ida   (with consonant-final stem)

<u>Comitative</u>
-yi   (with vowel-final stem)
-d^{y}i   (with consonant-final stem)

<u>Accusative</u>
n^{y}a

I have omitted listing of alternations which follow straightforwardly
from the previous discussions of apocope and nasal degemination. The
colon (:) indicates that the suffix induces lengthening of the preceding
vowel.[67]

The ergative, locative, 'fear' case, and comitative suffixes,
display alternations depending on whether the stem ends in a vowel or
consonant (including a glide). The generalization is that these
suffixes become sonorant if the preceding consonant is non-syllabic;
however, there are several obstacles to phonological characterization of
this phenomenon. This is not a straightforward assimilation or dissimi-
lation which could be captured by the usual autosegmental manipulation
of association lines: rather, it would require an arbitrary feature-
changing rule of the kind prohibited by modern autosegmental theory:
(120) C $\rightarrow$ [α son] / [$-\alpha$ syl] + ___
Second, this kind of alternation is restricted to the four suffixes
listed above: thus, even if these alternations are characterized as a
phonological rule, the rule is heavily morphologized. In light of these
obstacles, it seems more straightforward simply to posit suppletive
allomorphy for these four suffixes.

Furthermore, the obstruent allomorphs of the ergative and locative
suffixes display alternations in place of articulation. These alterna-
tions, however, follow from MINSPEC (103), if we assume that the initial
consonant of these suffixes lacks place features. To satisfy MINSPEC,
place features of the preceding consonant spread to the placeless root

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[67]Length-inducing suffixes are discussed more fully in section 7.3
below.

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node. However, as we have already posited word-final placeless root nodes in section 5.4, it may be wondered why place-feature spreading does not occur in those cases. Since the segments preceding the placeless root nodes in section 5.4 are all vowels, HSL (67) would prohibit such non-homogeneous double linking of place features; and since the placeless segments are word-final, there is no following consonant with which the placeless consonant could share place features.[68]

The remaining alternations appear to be a hodge-podge of morpheme-specific allomorphy best handled by morphological suppletion.[69]

8.   Derivational Suffixes

8.1.   Non-cohering suffixes. There is a class of disyllabic derivational suffixes which behave as though they were a separate word from the stem for purposes of apocope, penultimate lengthening, and the other processes discussed in this paper.[70] Dixon refers to them as "non-cohering" suffixes. For example, consider -dagan 'inchoative verbalizer':

(121) gad^{y}ula-dagan-n^{y}u --> gad^{y}ú:ldagá:n^y 'became dirty'

The stem, /gad^{y}ula/ undergoes apocope, even though it is followed by the suffix -dagan, and -n^{y}u undergoes apocope even though the stem that it attaches to is (underlyingly) odd-syllabled. Following Dixon, I assume that these suffixes form separate phonological words from their stem.

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[68]This analysis raises the question, why then can a placeless consonant share place features with a preceding [y] glide, given our previous assumptions concerning Homogeneous Stricture Linking (67)? To get around this problem, we are forced to view the alternations conditioned by [y]-final forms as suppletive: there is no actual sharing of features between [y] and the following obstruent.

[69]There is some additional allomorphy, not shown in the table, involving stem-final nasals and nasal-initial suffixes. See section 6.2 above.

[70]Note, however, that some disyllabic affixes are cohering: e.g. -yida ~ d^{y}ida ('fear case') and -n^{y}u^{n}da ('dative subordinate').

In other words, these suffixes morphologically subcategorize, but do not prosodically subcategorize, for a stem. Cf. Inkelas (1989).[71]

8.2. <u>Verbal Derivational Suffixes</u>. Verbal derivational suffixes are listed in (122):

(122) <u>Comitative</u>
    R + maŋa-l = Rmaŋa-l   (non-cohering)
    l + maŋa-l = lmaŋa-l   (non-cohering)
    n + maŋa-l = ŋa-l

    <u>Antipassive</u>
    R + :d^{y}i-n = :Rd^{y}i-n
    l + :d^{y}i-n = :d^{y}i-n
    n + :d^{y}i-n = :d^{y}i-n

    <u>Going aspect</u>
    R + ŋali-n = :Ri-n
    l + ŋali-n = :li-n
    n + ŋali-n = ŋali-n   (non-cohering)

    <u>Going aspect</u> + <u>Comitative</u>
    R + ŋali-n + ŋa-l = :riŋa-l
    l + ŋali-n + ŋa-l = :riŋa-l
    n + ŋali-n + ŋa-l = :riŋa-l

    <u>Coming aspect</u>
    R + ŋada-n = :da-n
    l + ŋada-n = :lda-n
    n + ŋada-n = ŋada-n   (non-cohering)

Alternations such as /-n-ŋali-n/ → -ŋali-n follow straightforwardly from the previous discussion of -n class allomorphy. The remainder of the alternations clearly require suppletive allomorphy as well.

I have not showed apocopated forms of these suffixes, since they generally do not apocopate. This is not because they end in a consonant (recall that the conjugation class markers are disregarded for prosodic purposes), but because they are always followed by some inflectional suffix. Consider /n^{y}ina-n-ŋa-l-ŋ/ ('sit-comitative-present'). If apocope were to occur, the result would be a ŋ(-l)ŋ cluster (even though the final -ŋ will ultimately fuse with the verbal marker -l): thus apocope is blocked by the prohibition on consonant clusters. Note however that with the imperative (zero) suffix, ŋa-l does reduce:

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[71]Inkelas' theory provides no mechanism for assigning prosodic constituency to a suffix if it has no prosodic subcategorization frame. This problem can be obviated, however, by assuming that the prosodic constituency of these suffixes is present underlyingly.

(123) gali-n-ŋa-l-∅ → galí:ŋ 'go-comitative-imperative'

The results of apocope in such cases are in accordance with the previous discussion of conjugation class markers in section 6 above.

    8.3. <u>Length-Inducing Suffixes</u>. The length-inducing properties of the antipassive and aspectual suffixes (as well as certain allomorphs of the locative suffix) can be accounted for by assuming that they under-lyingly have a floating mora. The effect of a length-inducing suffix is illustrated in (124).

(124) barganda-n-dyi-n-ŋ → bárgandá:dⁱiŋ 'pass by-antipassive-present'

As discussed in section 5.2 with regard to compensatory lengthening, the position of PARSE(MORA) (93) in the ranking of MP's results in the extra mora resyllabifying, resulting in lengthening of the previous vowel.

9.   Illicit Length Elimination

    In the event that two adjacent syllables both become heavy during the course of a derivation, the first of the two must become light. Dixon (1977) refers to this process as "illicit length elimination." This situation arises when a length-inducing suffix is followed by a suffix which undergoes penultimate lengthening or compensatory lengthen-ing as a result of apocope. The process of illicit length elimination is illustrated in (125).

(125) a. barganda-n-dʸi-n-nʸu → barganda:dyi:ny → bargándadʸí:nʸ
     b. barganda-n-dʸi-n-na → barganda:dʸi:na → bargándadʸí:na

That is, despite the length-inducing properties of -dʸin, the previous vowel does not surface as long when the following syllable contains a long vowel, by compensatory lengthening in (125a) and penultimate lengthening in (125b). The "derivation" is as follows:

(126)   UR   Lexical   Post-Lexical   Phonetics
         Φ   Φ   Φ   Φ
        / \ | / \   / \
       σ   σ   σ   σ   σ   σ   σ
       |\   /| /| |\   /|\\ |\   /|\\
       μ μ | μ | μ μ μ | μ μ| μ μ | μ μ|
       |/ | |/| | |/ | |/ | |/ | |/ |
(bargand)a   dʸ i   nʸu   a   dʸ i nʸu   a   dʸ i nʸ u   bargándadʸí:nʸ

We have already observed in section 4.3 that the absence of adjacent
heavy syllables on the surface can be accounted for with CLASHAVOID (85)
and WSP (77), since heavy syllables must be stressed, and stressed
syllables cannot be adjacent. As noted in section 5, however, <u>CHIRALI-
TY</u>, the bundle which contains these MP's, is ranked below
PARSE(SYLLABLE) and PARSE(MORA) until the post-lexical stratum (see
(98)); hence, compensatory lengthening is not blocked by the preceding
heavy syllable. The only remaining question is why, once <u>CHIRALITY</u>
assumes its post-lexical ranking above PARSE(MORA) (100), the clash is
resolved by shortening (i.e. un-parsing one mora of) the first rather
than the second syllable within the final foot. The answer is provided
by GROUPING (83): because of the circumstances under which these clashes
arise, the clashing syllables always happen to be within the same foot,
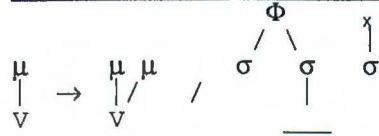and $[\sigma_\mu \; \sigma_{\mu\mu}]$ is a better foot than $[\sigma_{\mu\mu} \; \sigma_\mu]$.

10. Comparison: a Rule-Based Account

In the following section, I will compare the features of the
foregoing harmonic account with what I consider to be the best possible
rule-based account of the Yidinʸ alternations.[72] Let us begin by posit-
ing a stress rule which constructs strictly disyllabic feet from left to
right (ignoring chirality for the moment). Since the final syllable of
an odd-syllabled word remains unparsed, as in the harmonic account,
penultimate lengthening can be stated as follows:

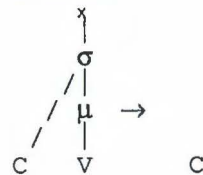[72]See also the analysis of Yidinʸ in Hayes (1980, 1982).
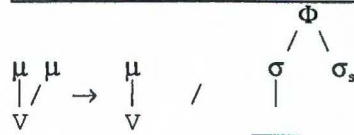
(127) <u>Penultimate Lengthening</u>

$$\begin{matrix} & & & & & \Phi & & x \\ & & & & & /\ \backslash & & | \\ \mu & & \mu\,\mu & & \sigma & \sigma & \sigma \\ | & \rightarrow & |\,/ & / & & | \\ V & & V & & & \underline{} \end{matrix}$$

Similarly, apocope can be viewed as the deletion of an unparsed sylla-
ble, or more precisely, the nucleus thereof.

(128) <u>Apocope</u>

$$\begin{matrix} & x \\ & | \\ & \sigma \\ & /\,| \\ & /\;\mu & \rightarrow \\ & /\;\;| \\ C & V & C \end{matrix}$$

Moreover, if Penultimate Lengthening is somehow ordered before Apocope,
no compensatory lengthening story is necessary. Finally, if illicit
length elimination is stated as follows, then the choice between iambic
and trochaic labelling can rest on standard assumptions concerning
quantity sensitivity (see, e.g. Hayes 1980, 1992).

(129) <u>Illicit Length Elimination</u>

$$\begin{matrix} & & & & & \Phi \\ & & & & & /\ \backslash \\ \mu\,\mu & & \mu & & \sigma & \sigma_s \\ |\,/ & \rightarrow & | & / & | \\ V & & V & & \underline{} \end{matrix}$$

In evaluating this account, let us begin with the Apocope rule.
Thus far we have not accounted for the blocking of apocope in cases
where it would result in an unsyllabifiable consonant. In fact, it is
difficult to imagine how a consistently ruled-based account (i.e. a
rule-based approach to syllabification as well as the alternations
discussed above) could handle this kind of blocking. Syllabification
rules can account for the resyllabification of the onset consonant which
is stranded by operation of the Apocope rule. But whether syllabifica-
tion rules apply cyclically (Steriade 1982) or even "persistently"
(Myers 1991), they do not have the power to block Apocope where resyl-

labification cannot occur (as when the consonant is an obstruent, or when resyllabification would create a coda cluster).[73]

The only alternative is to build Yidinʸ's syllable structure constraints into the structural description of the Apocope rule itself.[74] However, this move introduces a serious redundancy into the account, since the particularities of Yidinʸ syllable structure must be stated twice: in the structural description of the Apocope rule, and in the body of syllabification rules themselves. In contrast, the harmonic approach accounts for this blocking effect by ranking the MP's which result in apocope lower (ultimately) than the MP's which require consonants to be properly syllabified.

A further, perhaps deeper, problem with the rule-based account of Yidinʸ apocope is that, although the statement of the rule's context refers to the fact that the apocopated syllable is unparsed, it fails to _derive_ apocope from this fact. One might as easily posit a rule which apocopates a syllable just in case it _is_ parsed. For the rule-based approach essentially denies that apocope occurs _because_ the syllable is unparsed. In contrast, the harmonic approach relies on one device, the

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[73]Sharon Inkelas (p.c.) suggests that a rule-based account might capture this blocking effect by viewing apocope as the delinking of metrical structure from a unary foot (rather than deletion of the vowel itself), followed by application of a syllabification algorithm which first tries to adjoin floating material (i.e. the consonant) leftward and, failing that, assigns a syllable node to the consonant, which in turn can rescue the vowel. I see two problems with this account. First, why (other than language-specific stipulation) does the unsyllabifiability of the stray consonant (but not the stray vowel) trigger insertion of an additional syllable node? Second, if Myers (1991) is (within the terms of a rule-based framework) correct in arguing that syllabification and foot construction should be viewed as a set of "persistent" rules, and if Yidinʸ apocope is viewed as part of Yidinʸ's foot construction rules, it is impossible to order "persistent" syllabification after "persistent" apocope.

[74]One could imagine a hybrid account, in which apocope is viewed as a rule, but a constraint on the rule is stipulated to the effect that the rule is blocked if application would result in an unsyllabifiable consonant. We must recognize however, that such a constraint is ad hoc for this particular rule: it is not a universal condition on phonological rules. Moreover, even this hybrid account does not overcome the objection in the following paragraph.

preference for parsed syllables (76), both to account for apocope and to drive assignment of metrical structure in the first place.

Turning now to penultimate lengthening, the opacity of the rule-based approach becomes fully apparent. The rule-based approach offers no explanation as to why Yidin[y] happens to have two independent rules whose structural descriptions refer to unparsed final syllables. The Penultimate Lengthening rule itself is opaque and ad hoc; it cannot be related to any commonly observed process of syllable weight adjustment (e.g. closed syllable shortening, or phrase-final lengthening). Furthermore, as noted above, with the Penultimate Lengthening rule (127), a compensatory lengthening analysis of apocopated forms is superfluous. But this apparent advantage of the rule-based account actually presents a problem: for compensatory lengthening offers a far more insightful analysis of the lengthening that accompanies apocope than does the Penultimate Lengthening rule (see Hayes 1989). The harmonic account, on the other hand, allows all regular vowel lengthening in Yidin[y] to be viewed as compensatory lengthening, both for apoco-pated and unapocopated forms (with subsequent "undoing" of apocope in certain cases); and compensatory lengthening is in turn derived from the preference for parsed moras (93), the same device that drives incorpora-tion of moras into syllable structure in the first place.

Finally, the rule of Illicit Length Elimination (129) stipulates the result that, given two adjacent heavy syllables, vowel shortening will apply so as to create a $[\sigma_\mu\ \sigma_{\mu\mu}]$ rather than a $[\sigma_{\mu\mu}\ \sigma_\mu]$ foot, rather than deriving this fact from the independently observed cross-linguistic preference for $[\sigma_\mu\ \sigma_{\mu\mu}]$ feet over $[\sigma_{\mu\mu}\ \sigma_\mu]$ feet (see Prince 1991). Moreover, whereas the harmonic account relies on a single device, the Weight-to-Stress Principle (77), to derive both quantity-sensitive stress assignment and illicit length elimination in Yidin[y], the rule-based account requires two independent rules.

10. Conclusion

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In this paper I have presented a fairly exhaustive analysis of the phonology of Yidin[y], from the segment inventory to metrically conditioned phonological "rules."[75] My goal has been to demonstrate the possibility of accounting for the phonology of a particular language in detail using the Harmonic Phonology framework, without being forced to posit ad hoc constraints or inconsistent rankings. I have also argued that, in certain respects, this framework allows for a more elegant analysis of Yidin[y] phonology than does a competing rule-based account. Harmonic Phonology, however, is primarily a theory of cross-linguistic variation, founded on the hypothesis that the possibilities of such variation are delimited by alternative rankings of a universal set of well-formedness constraints; and that theories relying on "on/off" parametric variation fail to predict these possibilities. The notion of Harmonic Phonology within a single language must therefore be read tongue-in-cheek: ultimate confirmation or falsification of this hypothesis must await research of a more typological character.

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[75]In addition, Dixon posits rules of Yotic Deletion, Stress Fronting, Stress Retraction, Vowel Nasalization, and Phonetic Reduction. All of these "rules" appear to be phonetic in character, in terms of their gradience, optionality, and/or transparent phonetic motivation; therefore they are beyond the scope of this paper. Dixon also mentions rules of Dissimilation and Double Dissimilation, and Nasal Insertion, but these are clearly allomorphic conditions rather than phonological rules.

In this Appendix, I list the Markedness Principles (MP's) proposed in the foregoing thesis, in alphabetical order, together with the MP rankings required for Yidin^y:

CLASHAVOID	Prefer no adjacent stressed syllables.
CODALENGTH	Prefer minimal codas.
COLORHEIGHT	Prefer a [-cons] segment which contains a color feature to be specified for a height feature which is dependent on some color feature.
COMPLEXITY	Prefer segments to have a minimal number of place features.
CONTSPEC	Prefer [+cons] to cooccur with [cont].
CORUNMARK	For any place feature P, prefer P = [cor].
DIRECTIONALITY	Prefer a Φ to be at least as well-formed as the following Φ.
DONOTHING	Prefer minimal reassignment of structure.
DORSMARK	Prefer a [-cons, dors] segment to specified for a color feature.
EXTRAMETRICALITY	If a segment contains place features, prefer the segment to be word-final.
FILL	Prefer filled syllable positions.
FINALDISP	Prefer final demi-σ's with maximal R.
FOOTMAX	Prefer a Φ to contain no more than 2 σ's.
FOOTMIN	Prefer a Φ to contain no less than 2 σ's.
GROUPING	Prefer feet with maximal harmony value.
HSL	Prefer (67) to be the case.
INITLDISP	Prefer initial demi-σ's with minimal R.
LIQCOMPLEXITY	Prefer non-nasal sonorant consonants to have a minimal number of place features.
MINSPEC	Prefer a segment to contain at least one place feature or laryngeal feature.
MORACOUNT	Prefer syllables with minimal μ count.
MORASON	Prefer moraic segments with maximal sonority.
NASCONT	Prefer nasal segments to be specified [+son, -cont].

NOCODAPLACE	Prefer place features to be licensed.
NODIPHTHONG	Prefer no diphthongs.
NOFRICATIVE	Prefer obstruents to be specified [-cont].
NOLARYNGEAL	Prefer segments with no laryngeal features.
NONASAL	Prefer sonorant consonants to be liquids.
NOOBSTRUENTV	Prefer obstruents to be specified [+cons].
NOPHARCONS	Prefer consonants with no instance of [phar].
NOPRENASALSTOP	Prefer [+son] and [-son] not to cooccur within a segment.
NUCSON	Prefer nuclei with maximal sonority.
ONECOLOR	Prefer no more than one instance of a color feature in a [-cons] segment.
ONSETLENGTH	Prefer minimal onsets.
PARSE(CONSONANT)	Prefer parsed consonants.
PARSE(FEATURE)	Prefer parsed features.
PARSE(MORA)	Prefer parsed moras.
PARSE(SYLLABLE)	Prefer parsed syllables
PARSE(VOWEL)	Prefer parsed vowels.
ROOTFEATURES	Prefer segments to be specified for [cons] and [son].
SONCOMPLEXITY	Prefer sonorant consonants to have a minimal number of place features.
SONORITYCURVE	Prefer no sonority decrease within an initial demi-σ, and no sonority increase within a final demi-σ.
UNIFORMITY	Prefer feet to be either all iambic or all trochaic within the language.
WEAKCLASH	Prefer no adjacent unstressed syllables.
WEIGHTBYPOSN	Prefer post-nuclear coda segments to be dominated by a μ.
WSP	Prefer a heavy syllable to be stressed.

{NOPHARCONS, NOLARYNGEAL, NOFRICATIVE, CONTSPEC, NASCONT, NOOBSTRUENTV, DORSMARK, ONECOLOR, {COMPLEXITY$_{\leq 2}$ >> {{LIQCOMPLEXITY$_{\leq 1}$ >> SONCOMPLEXITY$_{\leq 1}$ >> COMPLEXITY$_{\leq 1}$ >> LIQCOMPLEXITY$_{\leq 0}$} ∨ CORUNMARK}}} >> PARSE(FEATURE) >> {ROOTFEATURES, MINSPEC, COLORHEIGHT, NONASAL, {SONCOMPLEXITY$_{\leq 0}$ >> COMPLEXITY$_{\leq 0}$}}

Lexical Phonology:

FILL >> {{SONORITYCURVE, {INITLDISP$_{\leq 0}$ >> INITLDISP$_{\leq 1}$ >> INITLDISP$_{\leq 2}$ >> INITLDISP$_{\leq 3}$ >> INITLDISP$_{\leq 4}$}, {FINALDISP$_{\geq 5}$ >> FINALDISP$_{\geq 4}$ >> FINALDISP$_{\geq 3}$ >> FINALDISP$_{\geq 2}$ >> FINALDISP$_{\geq 1}$}, {ONSETLENGTH$_{\leq 3}$ >> ONSETLENGTH$_{\leq 2}$ >> ONSETLENGTH$_{\leq 1}$}, {CODALENGTH$_{\leq 3}$ >> CODALENGTH$_{\leq 2}$ >> CODALENGTH$_{\leq 1}$}, {NUCSON$_{\geq 0}$ >> NUCSON$_{\geq 1}$ >> NUCSON$_{\geq 2}$ >> NUCSON$_{\geq 3}$ >> NUCSON$_{\geq 4}$}, {MORASON$_{\geq 0}$ >> MORASON$_{\geq 1}$ >> MORASON$_{\geq 2}$ >> MORASON$_{\geq 3}$ >> MORASON$_{\geq 4}$}, MORACOUNT$_{\leq 2}$, NODIPHTHONG}, HSL, {CORUNMARK $\vee$ NOCODAPLACE $\vee$ EXTRAMETRICALITY} >> {{FOOTMAX, FOOTMIN} >> DIRECTIONALITY} >> PARSE(MORA) >> PARSE(SYLLABLE) >> {PARSE(CONSONANT), PARSE(VOWEL)} >> {WSP, CLASHAVOID, WEAKCLASH, INITLDISP$_{\leq 5}$, FINALDISP$_{\geq 0}$, {DONOTHING >> MORACOUNT$_{\leq 1}$}}

Post–Lexical Phonology:

FILL >> {{SONORITYCURVE, {INITLDISP$_{\leq 0}$ >> INITLDISP$_{\leq 1}$ >> INITLDISP$_{\leq 2}$ >> INITLDISP$_{\leq 3}$ >> INITLDISP$_{\leq 4}$}, {FINALDISP$_{\geq 5}$ >> FINALDISP$_{\geq 4}$ >> FINALDISP$_{\geq 3}$ >> FINALDISP$_{\geq 2}$ >> FINALDISP$_{\geq 1}$}, {ONSETLENGTH$_{\leq 3}$ >> ONSETLENGTH$_{\leq 2}$ >> ONSETLENGTH$_{\leq 1}$}, {CODALENGTH$_{\leq 3}$ >> CODALENGTH$_{\leq 2}$ >> CODALENGTH$_{\leq 1}$}, {NUCSON$_{\geq 0}$ >> NUCSON$_{\geq 1}$ >> NUCSON$_{\geq 2}$ >> NUCSON$_{\geq 3}$ >> NUCSON$_{\geq 4}$}, {MORASON$_{\geq 0}$ >> MORASON$_{\geq 1}$ >> MORASON$_{\geq 2}$ >> MORASON$_{\geq 3}$ >> MORASON$_{\geq 4}$}, MORACOUNT$_{\leq 2}$, NODIPHTHONG}, HSL, {CORUNMARK $\vee$ NOCODAPLACE $\vee$ EXTRAMETRICALITY} >> PARSE(CONSONANT) >> {WSP, CLASHAVOID, WEAKCLASH, {{FOOTMAX, FOOTMIN} >> DIRECTIONALITY}} >> PARSE(MORA) >> PARSE(SYLLABLE) >> PARSE(VOWEL) >> {INITLDISP$_{\leq 5}$, FINALDISP$_{\geq 0}$, {DONOTHING >> MORACOUNT$_{\leq 1}$}}

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