This paper challenges the arguments for abstract phonology based on the treatment of the Nupe vowels in Hyman 1970. Both formal and substantive deficiencies of Hyman's analysis are noted, and a non-abstract solution is proposed.

In recent years the basic principles of generative phonology have been subjected to increasingly critical scrutiny. Many questions have been raised; but answers have been few and, for the most part, have lacked firm empirical support. One important unresolved issue concerns the abstract relationship between the phonological shape of morphemes in the lexicon and their phonetic manifestations. In an attempt to restrict the abstractness of phonological lexical representation, Kiparsky 1968 proposed that grammars not permit 'absolute neutralization'—i.e. the positing of 'underlying distinctions for the sole purpose of classifying segments into those that do and those that do not meet the structural analysis of a rule', distinctions which 'are never realized on the phonetic surface' and which are lost 'regardless of environment' (pp. 10-11).

Hyman 1970 proposes an analysis of Nupe which, he feels, requires three underlying low vowels /e o a/, all of which unconditionally become phonetic [a], a case of absolute neutralization. Hyman's Nupe solution, if valid, would constitute strong counter-evidence to Kiparsky's constraint, and thus more firmly establish the status of abstract phonological representation.

I shall show, first, that a Nupe solution is possible which employs only the most general form of those rules assumed by Hyman, but which avoids the need for a rule of absolute neutralization. Second, I will show Hyman's rules to be inadequate to account for the data of Nupe (as reported in Hyman and in Smith 1967). Third, a plausible analysis of Nupe will be given which not only fails to support the case for abstract phonology, but is also consistent with one of the most concrete of phonological approaches, that of Sapir—one in which the lexical representation of a morpheme contains all those surface phonological features which remain constant in all its variants (cf. McCawley 1967:110).

1. Hyman presents the following rules (numbered as in his article):

(14) Strident Palatalization:

\[ [+\text{strident}] \rightarrow [+\text{high}] / \text{V} \backslash +\text{back} \]

I.e., \( zc > zi \) before \( ie \) as well as \( e \).

(22) Reduplication. I can't figure out Hyman's notation, but in effect he has:

\[
\begin{array}{c}
\text{SD: C} \\
+\text{syllabic} \\
\text{around} \\
+\text{REDUP} \\
\end{array}
\]

\[
\begin{array}{c}
1 \\
2 \\
\Rightarrow 1 \uparrow \\
\end{array}
\]

\[
\begin{array}{c}
2 \\
+\text{high} \\
\text{aback} \\
2\text{tone} \\
\end{array}
\]

\[439\]
E.g. lé > tité ‘mildness’, lā > tild ‘telling’, tš > tälś ‘trimming’, where the vowel of reduplication is either i or u.

(55) Palatalization/Labialization:
\[
\begin{array}{c}
[+\text{consonantal}] \rightarrow \\
\text{back} \\
\text{around}
\end{array}
\rightarrow
\begin{array}{c}
[+\text{high}] \\
\text{back} \\
\text{around}
\end{array}
\]

I.e., except before [a], a consonant is palatalized before a front vowel, rounded before a rounded vowel; e.g. tité > vîtê ‘mildness’, tild > vîld ‘telling’, tälś > tâlś ‘trimming’.

(VD) Vowel Deletion (p. 61):
\[
V_1 \rightarrow \emptyset / \quad \#V_2
\]
I.e., vowel clusters are simplified across morpheme boundary; e.g. à+dà+à > à+dà+à > âdà ‘he cooked them’.

(12) Absolute Neutralization:
\[
\begin{array}{c}
V \\
[+\text{low}]
\end{array}
\rightarrow
\begin{array}{c}
[+\text{back}] \\
\text{round}
\end{array}
\]

I.e., [ε] and [ɔ] merge with [a]; thus, vîtê > vîld ‘mildness’, tâlś > tâlś ‘trimming’.

These rules must be linearly ordered as follows: 14—22—55—VD—12. The following hypothetical derivation types result:

<table>
<thead>
<tr>
<th>Underlying:</th>
<th>ce</th>
<th>ce</th>
<th>ca</th>
<th>cu+a</th>
<th>ca</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14)</td>
<td>ĉe</td>
<td>ĉe</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>(22)</td>
<td>ĉiĉe</td>
<td>ĉiĉe</td>
<td>cica</td>
<td>___</td>
<td>cucu</td>
</tr>
<tr>
<td>(55)</td>
<td>ĉiĉe</td>
<td>ĉiĉe</td>
<td>cica</td>
<td>cu+a</td>
<td>cu+cucu</td>
</tr>
<tr>
<td>(VD)</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>(12)</td>
<td>___</td>
<td>ĉiĉa</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

Hyman’s vowel deletion rule contains an unwarranted morpheme boundary. Since his analysis allows no intramorphemic vowel clusters, the rule should not be complicated to indicate its non-applicability within morphemes. Thus the rule must be restated as:

(VD') \quad V \rightarrow \emptyset / \quad \#V

In view of this modification, one clear alternative to the /e o/ segments is to posit underlying vowel-cluster representations, /ia/ and /ua/ respectively. Hyman’s data can now be handled with only the most general form of his own rules, and we can dispense entirely with the rule of absolute neutralization (12). Typical derivations would then be:

<table>
<thead>
<tr>
<th>Underlying:</th>
<th>ce</th>
<th>cia</th>
<th>ca</th>
<th>cu+a</th>
<th>cua</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14)</td>
<td>ĉe</td>
<td>ĉia</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>(22)</td>
<td>ĉiĉe</td>
<td>ĉiĉa</td>
<td>cica</td>
<td>___</td>
<td>cucu</td>
</tr>
<tr>
<td>(55)</td>
<td>ĉiĉa</td>
<td>ĉiĉa</td>
<td>cica</td>
<td>cu+a</td>
<td>cu+ua</td>
</tr>
<tr>
<td>(VD')</td>
<td>___</td>
<td>ĉiĉa</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

Although Hyman actually considers a vowel-cluster alternative, he rejects this

1 Hyman apparently has his evaluation measure turned around when he objects (61) to ‘the added machinery (intramorphemic vowel deletion), or rather the extending of old machinery’ which would permit the simplification of this rule.
HOW ABSTRACT IS NUPE?

approach on several grounds. First, he notes that in careful speech Nupe speakers can isolate the underlying formatives of \[ud\*\(\hat{a}\)\] 'he cooked them' from polymorphemic \(/\hat{\theta}+\hat{d}u+\hat{a}/\), thus giving \[\hat{\theta}-d\hat{u}-\hat{a}\], but they cannot do this with monomorphemic \[\hat{e}\*\(\hat{a}\)\] 'hand'. That speakers can 'upgrade' the level of morpheme boundaries to block certain phonological rules is well known, but there is no reasonable way to request speakers to pronounce underlying forms in their language. To syllabify \[\hat{e}-g\*\(\hat{a}\)\] is presumably no problem, but what could motivate a further breakdown of \[-g\*\(\hat{a}\)\] beyond an attempt to reconstruct underlying segmental phonology? Nupe speakers are also incapable of pronouncing \[e a\], but Hyman would not consider this as possible counter-evidence to his analysis.

Second, Hyman finds underlying postconsonantal \(/ya/\) or \(/ia/\) clusters objectionable because they would occur within morphemes only when the first component is \(/y w/\) or \(/i u/\) and the second component is \(/a/-i.e.,\) morpheme-structure generality would be lost. For those who reject the notion of morpheme structure (my own position), this argument is not relevant. If instead we recognize the necessity of surface-structure constraints, exactly the same skewness must be stated: in effect, consonant palatalization and labialization are restricted before vowels which show agreement in backness and rounding, but not before \[a\]. The domain of this surface constraint is obviously broader than the corresponding morpheme-structure condition, since it also encompasses \[C\*a\] from polymorphemic \[/Cu+a/\]. For those who still embrace some notion of morpheme structure, however, the problem is more complex. How is the putative gain in morpheme-structure generality to be balanced against the otherwise superfluous phonological rule of absolute neutralization? There is no non-arbitrary basis for making a decision here. Perhaps the more standard practice is to follow Halle's edict: 'economy in the phonological rules is to take precedence over economy in the morpheme structure rules and dictionary' (cf. Harms 1966:610).

Of further relevance here is Hyman's claim to have evidence for the psychological reality of his \(/e a/\) based on 'the observed productivity of the absolute neutralization rule' (66). He assumes that 'a rule is productive if new forms coming into a language are subject to its application.' Since Yoruba loans into Nupe show Yoruba \[Cc Co\] replaced by Nupe \[Cya Cwa\], he concludes that 'it is the existence of LR, PR, and AN [i.e., rules 55 and 12] that causes borrowed words

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1 A second curious problem for morpheme-structure enthusiasts (one not considered by Hyman) is that, since no Nupe morpheme ends in a consonant, and no vowel alternations (vowel deletion or other rules—see below) precede strident palatalization, it is possible to eliminate rule 14 and to list lexically all occurrences of \(/s e c e/\) etc. This lexical solution cannot be rejected offhand. Given a system of lexical markedness (with \(v\) and \(m\) feature values), and allowing context-sensitive marking conventions, perhaps the unmarked stridents before front vowels would be \(/\hat{\theta} e/\) etc.; the unmarked stridents before other vowels, \(/s e/\) etc. Nupe evidence in support of underlying palatalization can also be found, although no compelling arguments are available. The fact that reduplication leads to minimal surface contrasts such as \[\hat{a}\*\(\hat{a}\)\] 'cutting' (from \(/\hat{a}\hat{s}/\) vs. \[\hat{a}\hat{\hat{a}}\] 'chair' points up the non-productivity of strident palatalization (handled here, of course, by ordering it before the reduplication rule). The Nupe pronoun 'who' has a range of variants \[sI \hat{s} z \hat{a}\]\, lexical \(/s i/\) in borrowings does not undergo rule 14 (\[\hat{\theta}\hat{\hat{a}}\] 'sixpence', \[\hat{\theta}\hat{\hat{a}}\] 'Saturday'); and lexical \(/\hat{a}/\) is necessary in \(/\hat{a}w\hat{r}a/\) 'fever', a loanword from Hausa. (Data are from Smith, who does not mark the palatalization of strident consonants before front vowels.)
to be nativized in this fashion' (67). Apparently Hyman considers the act of lexical acquisition of non-native morphemes to proceed by feeding the perceived phonetic output of the source language into those independently motivated phonological rules which are productive, i.e. through a diachronic function of the synchronic derivational process.

No one can seriously question that the adaptation of loans is rule-governed, and that such rules are language specific. But the process of nativization is poorly understood. Beyond the fact that foreign loans must be adapted to certain surface constraints of the borrowing language, little is known about this process. Neither the phonological rules nor the morpheme-structure conditions of current theories provide meaningful explanation of the available data. For example, Finnish has only the labial consonants [p m v] (also underlying). Foreign [b] is regularly replaced by [p], an obvious choice—but why? Are we to conclude that Finnish has a phonological rule devoicing voiced stops, a rule which has no synchronic application? Morpheme-structure conditions might state that Finnish has no /b/, but they do not specify the replacement for the excluded segment. Note that Nootka also has [p m] and no [b], but in Nootka the regular replacement for foreign [b] is [m]. Moreover, Finnish generally matches non-initial foreign [p] not with its [p], but rather with a geminate [pp] (e.g. [appelsi:n] ‘orange’, cf. Swedish apelsin). Finnish also regularly replaces [f] in loans with native [hv] clusters (e.g. [rohvessori] ‘professor’). Here again, neither the morpheme-structure nor the phonological component explains the phenomena.

That Nupe should match foreign [Ce] with its own [Cya] seems perfectly natural, and Hyman is justified in positing such a rule. But there is absolutely no evidence to support the identification of this rule of nativization with the abstract phonological rule of absolute neutralization. To argue that some nativization, but not all, proceeds by way of the rules of abstract phonology would only effectively shield the claim from empirical test, and could hardly provide a coherent basis for explaining nativization, or serve as a justification for a questionable rule of abstract phonology.

2. But the Nupe rules as stated above don’t quite work. First, as Hyman observes (65), [+high] in the strident palatalization rule produces PALATALS (čš etc., which are ‘+high, -back’) and his consonant palatalization rule produces PALATALIZED consonants (čv čv etc., which are also ‘+high, -back’). Since even the palatals get palatalized (čv čv etc.), there is no feature available for distinguishing pairs such as [Č] vs. [Čv]: all are ‘-anterior, +coronal, +high, -back’.

One obvious solution to this difficulty is to consider [Čv] and [Čv] as clusters.

8 Other ways of resolving this difficulty are conceivable. We might attempt to handle this distinction at the level of numerical values for [+high], say [+1high], [+2high], since no lexical contrast is involved. This is more easily said than done, however, since [Čv], as opposed to [č] and [čv], is the product of two different rules; i.e. č > č > čv. The main problem here is the difficulty in formulating a general convention for adding together highness values in this derivation which would be consistent with the conventions assumed for other numerical-value rules, such as the stress rules. Of course, if č š etc. are listed lexically rather than
Hyman's early discussion (cf. 59–61) indicates that the two types are essentially transcriptional variants. Given general rules governing the cohesion of segments within Nupe syllables (timing, intensity etc.), the palatalization and labialization (plus velarization) of Nupe consonants are very likely the automatic—i.e. universal phonetic—consequence of the following glides, not the result of any language-specific rule. Thus rule 55 can be replaced by an epenthesis rule (not significantly different in terms of generality or economy):

**(GE) GLIDE EPENTHESIS:**

\[
\emptyset \rightarrow \begin{bmatrix} -\text{consonantal} \\ \text{syllabic} \\ \text{aback} \end{bmatrix} / [+\text{cons}] \quad \begin{bmatrix} V \\ \text{around} \end{bmatrix}
\]

Derivations would then look like this:

<table>
<thead>
<tr>
<th>UNDERLYING:</th>
<th>ca</th>
<th>cia</th>
<th>eua</th>
<th>ce</th>
<th>co</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14)</td>
<td></td>
<td>čia</td>
<td></td>
<td>če</td>
<td></td>
</tr>
<tr>
<td>(22)</td>
<td>cica</td>
<td>čičia</td>
<td>eucua</td>
<td>čiče</td>
<td>cuco</td>
</tr>
<tr>
<td>(GE)</td>
<td>cyica</td>
<td>čyičia</td>
<td>cwucwua</td>
<td>čyičye</td>
<td>cwucwo</td>
</tr>
<tr>
<td>(VD')</td>
<td></td>
<td>čyičya</td>
<td>cwucwua</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Vowel deletion will still account for *yia > ya* and *wua > wa*, but the derivations *Cua > Cuwa > Cwa* appear somewhat forced. A more natural derivation would be simply *Cua > Cwa*, but this necessitates a new rule, to apply before glide epenthesis:

**(DV) DEVOCALIZATION:**

\[
\begin{bmatrix} V \\ [+\text{high}] \end{bmatrix} \rightarrow [-\text{syllabic}] / \quad \begin{bmatrix} V \end{bmatrix}
\]

derived by rule from *c* etc. (cf. fn. 2), the difficulty of adding numerical values could be avoided.

A second alternative is to abandon Hyman's feature framework (apparently based on Chomsky & Halle 1968) in favor of an acoustically based feature system in which 'sharp' and 'flat' reflect palatalization and labialization respectively. Rule 55 could then be given as:

\[
\begin{bmatrix} V \end{bmatrix} [+\text{cons}] \rightarrow \begin{bmatrix} \text{aflat} \\ \text{asharp} \end{bmatrix} / \quad \begin{bmatrix} V \end{bmatrix}
\]

4 One argument against this cluster approach given by Hyman is based on a tone rule ‘by which high tone becomes rising when the (prevocalic) consonant of the syllable is [+voiced] and when the preceding syllable has low tone’ (60); thus, *édé* > *édé* ‘cloth’, *éwá* > *éwá* ‘puckering’, but *yékó* ‘road’ is unaffected. The fact that a putative *é+gbény* ‘is stripping off’ becomes *égbény*, while *é+týá* ‘is mild’ is unaffected, apparently is interpreted as evidence for a rule requiring a single intervocalic voiced consonant (where *gb* is a unit labiovelar stop), and the above suggested cluster representation is rejected in favor of *é+gbény* and *é+týá* (or perhaps even *é+gbé*, *é+té*). But the data, rather than suggesting that the number of voiced consonants is relevant to the operation of this rule, support the view that the crucial factor is the uninterruptedness of phonation over the two syllables—the first of which is low and the second of which is inherently high. Given continuous voicing over this span, the observed rise in the second syllable would seem to reflect a lag in the tonal transition between the two syllables. A rule which reflects this generalization can easily be stated:

\[
\begin{bmatrix} V \\ [+\text{hi}] \end{bmatrix} \rightarrow [+\text{RISE}] / \quad \begin{bmatrix} V \\ [+\text{lo}] \end{bmatrix} [C] [+\text{vce}]
\]
Typical derivations now become:

<table>
<thead>
<tr>
<th>Underlying:</th>
<th>ca</th>
<th>cia</th>
<th>cua</th>
<th>ce</th>
<th>co</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14)</td>
<td></td>
<td>čia</td>
<td></td>
<td>če</td>
<td></td>
</tr>
<tr>
<td>(22)</td>
<td></td>
<td>cica</td>
<td></td>
<td>cicã</td>
<td></td>
</tr>
<tr>
<td>(DV)</td>
<td></td>
<td>ċića</td>
<td></td>
<td>cuća</td>
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</tr>
<tr>
<td>(GE)</td>
<td></td>
<td>cyica</td>
<td></td>
<td>cyicya</td>
<td>cwucwa</td>
</tr>
<tr>
<td>(VD')</td>
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<td></td>
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</tbody>
</table>

At first glance, the increase in naturalness of these derivations seems to have been achieved at the cost of a new rule, otherwise unmotivated. But the vowel deletion rule now has no function, at least in those cases across morpheme boundary which are relevant to the problems at hand (and in all examples given by Hyman); cf. /u+dů+gi/ > [ǔdůwǎ] 'he cooked them' by devocalization. Further examination of the Nupe data provided by Smith 1967 reveals that vowel deletion is by no means a single general process. Nasal vowels (which I shall not consider here) and oral vowels appear to follow quite different rules. For oral vowels, the following rule applies first:

\[
(A) \left[ \begin{array}{c}
V \\
\{+\text{low} \} \\
\{\text{aback} \}
\end{array} \right] \left[ \begin{array}{c}
V \\
\text{aback}
\end{array} \right] \Rightarrow \emptyset \left[ \begin{array}{c}
2 \\
\text{+long}
\end{array} \right]
\]

I.e., if the first vowel of a cluster is [a] or if it agrees in backness with the second vowel, then the first vowel is lost and the second is lengthened; e.g. a+a > a:, a+u > u:, i+e > e:, o+u > u:, o+o > o:. Far from being a loss, this process is better characterized as fusion or assimilation. The resultant long vowel preserves the length of the underlying cluster.

The second rule, which must be ordered to apply after A, is:

\[
(B) V \rightarrow [-\text{syllabic}] / \quad ___ V
\]

I.e., other cluster-initial vowels lose their syllabicity: i+a > ya, e+o > yo, u+a > wa, u+e > we etc. In effect, rule B is essentially identical with the devocalization rule posited above—the restriction to high vowels proving unnecessary; and once this rule is adopted, the vowel deletion rule is no longer needed.

Within Hyman's framework, rule A (vowel lengthening merger) must be ordered before the palatalization/labialization rule, since /Ca+u/ becomes [Cu:], which should then be labialized to [C'ui:]; similarly /Ca+e/ becomes [Ce:] followed by palatalization. The vowel deletion rule, however, would have to follow palatalization/labialization, since /Ca Cia Cua/ all would become [Ca], and there would be no way to know which [Ca]'s to palatalize or labialize. Cluster reduction is undoubtedly a single process in Nupe, as Hyman suggests (61), but his analysis is unable to capture this generalization either directly (by formally collapsing rule A and vowel deletion) or indirectly (by claiming some...
kind of functional ‘conspiracy’). Rules A and B are indeed functionally similar. Both rules operate to combine sequences of vowels into single syllables, either by assimilation into long monophthongs \((a+o > o:)\) or by devocalization of the initial components \((o+a > wa)\). In no meaningful sense can we speak of vowel deletion or cluster shortening here.

Rule 55 does not work for yet another reason. Palatalization and labialization before surface front vowels and rounded vowels, respectively, are optional; but before those \([a]\)’s which Hyman derives from \(/e\ a/\), and in the cases resulting from cluster devocalization, they are obligatory.7 There is no easy way to incorporate this distinction into rule 55, since it is not possible to refer to the non-low vowels apart from \(/e\ a/\). One might add ‘\(-\text{low}\)’ to the structural description of 55, and tie it to a condition of some kind. But this alone would not suffice, since that rule must operate before vowel deletion. Thus the consonants in \(/Ci/\) \(/Ci+a/\), and \(/Ce/\) all palatalize, but this is optional only in the first instance. Within the present solution, these data can be handled quite easily. The glide epenthesis rule corresponds to just those instances where palatalization/labialization is optional; devocalization corresponds to those cases where the presence of glides is obligatory.

3. One further modification of the alternative solution under consideration appears justified. Lexical \(/ia/\) and \(/ua/\) are always realized as phonetic sequences of glide plus vowel ([ya], [wa], or glide plus some other vowel in case [a] is replaced by vowel merger). The positing of abstract underlying \(/i u/\) solely in order to feed them through an extra derivational stage (devocalization) is clearly unmotivated. There is no apparent lexical advantage of \(/Cia/\) over \(/Cya/\), and it is not difficult to envisage marking conventions for the syllabic features which would consider \(/Cya/\) a less highly marked sequence than \(/Cia/\). Obviously lexical \(/Cya/\), \(/Cwa/\) representations bring our phonological forms close to their phonetic realizations. Once we eliminate the strident palatalization rule (14)—since no paradigmatic alternations \(s \sim š\), \(c \sim č\) etc. are possible in Nupe8—our revision is both plausible and entirely consistent with Sapir’s most concrete practice of phonological transcription. We are thus led to predict the following derivation types—although not all possibilities are illustrated by Hyman and Smith:

| Underlying: | če čya či+a ca ca+u cwa cu+a |
| Reduplication | čiše čišya čiši+a cica cica+u cuwa cuca+u |
| Devocalization | ——— čišya ——— ——— ——— cuwa |
| Vowel Merger | Epenthesis (optional) |
| | čyicye čyišya čyiši+cica cyicw: cuwca cuwcwa |
| | čiše čišya cica cieu: cuwca cuwcwa |

7 Cf. Smith (153): ‘In addition to and in free variation with these allophones [i.e. \(p\ b\ t\ d\)], \(/p\ b\ t\ d/\) each present an allophone with a palatal onglide to a following front vowel (viz. \(/i\ e\ i/\)) and an allophone with a labiovelar onglide to a following back vowel (viz. \(/o\ u\ a/\)), e.g. \(/bɛ/\ ‘to come’ has \([bɛ]\) and \([bʲɛ]\) in free variation; \(/pɔ/\ ‘to roast’ has \([pɔ]\) and \([pwo]\) in free variation…” For some reason Hyman has overlooked this fact, which is repeated numerous times by Smith.

8 Cf. fn. 2 above.
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HYMAN, LARRY M. 1970. How concrete is phonology? Lg. 46.58–76.


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