

Some Unnatural Consequences of Natural Generative
Phonology: A Review of *An Introduction to Natural
Generative Phonology* by J. Hooper*

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An Introduction to Natural Generative Phonology (henceforth *INGP*) by Joan Hooper [9] is the most recent and comprehensive version of Natural Generative Phonology (NGP) to be published. The book is essentially self-contained and is the most explicit statement of NGP to appear. *INGP* is divided into two sections, the first outlining the theoretical structure of NGP and the second investigating the role of the syllable within this theory. The book contains chapters on abstractness, the cycle, rule ordering, historical change, underlying representations, constraints on phonological structure, insertion and deletion rules, and strength relations in syllable structure, as well as chapters devoted to the study of Spanish verbal morphophonemics and the role of the syllable and strength scale in Spanish phonology.

In what follows, I will consider the consequences of Hooper's claims concerning the cycle, rule ordering, and abstractness. Since Hooper attempts to discredit these theoretical constructs by arguing against some of the weakest examples found in the literature of generative phonology, it will be interesting to consider examples from the literature that are developed in some detail and motivated with some care. I will argue that well-supported examples of these constructs show their indispensability. The conclusion to be drawn from this study is that the theory underlying *INGP* fails in certain crucial respects.

Hooper's central concern is constraining the abstractness of phonological representations. Hooper has rejected a number of published analyses on the basis of empirical considerations. She proposes the True Generalization Condition as a theoretical device to rule out such analyses: "the rules speakers formulate are based directly on surface forms and that these rules relate one surface form to another, rather than relating underlying to surface form" [9: 13].

This is central to Hooper's approach and is implemented through

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- (4) kórobu he groaned tálah he asked
 kórobu they groaned tálahu they asked
 kórobet she groaned tálabet she asked
 koróbua we groaned talábua we asked
 koróbt I groaned talábt I asked

Stress can therefore be assigned to the underlying representations by (5).

- (5) V → [+stress] / — C_i((VC)(VC))_i

The same stress and elision patterns are seen at work in the derivation of the following imperfective forms:

- (6) nkith I write nkthbu we write
 tkith you write tkthbu you (pl) write
 nínzel I descend nínzlu we descend
 yínzel he descends yínzlu they descend
 tífənd you bleed tífəndu you (pl) bleed
 ndáhhak I amuse ndáhhaku we amuse
 nsiefer I emigrate nsieferu we emigrate
 ndúr I turn ndú:ru we turn

Forms such as *ndúr*, *ndáhhak* and *nsiefer* show that if a prefix vowel is unstressed and in an open syllable, it is elided.

Brame illustrates a complication in the pattern of imperfective verbs, shown below.

- (7) nítlob I ask nítóbu we ask
 tíšrob you drink tíšórbu you (pl) drink
 yéhməz he pins yéhməzənu they pin
 nóhno? I choke nóhón?u we choke

If these stems were to follow the pattern established in (6), we would expect incorrect **nítlobu*, **tíšrbu*, **yéhməzənu* and **nóhón?u*. The stems in (7) can be distinguished from those in (6) by the fact that the second radical consonant is a sonorant in the former. Accordingly, Brame proposes the following Metathesis rule.

- (8) CRVCV → CVRCV

This rule provides the change of *nítlobu* to *nítóbu*. Brame notes that Metathesis must apply before Apocope, since otherwise the stem vowel of *nítlobu* will be elided. However, if Metathesis applies before Apocope, *nítóbu* should become **nítóbu*. Brame averts this paradox by applying Stress cyclically, so that stress is assigned to the prefix vowel on the first cycle. Metathesis applies after Stress Assignment, and reapplication of Stress Assignment on the second cycle places stress on the stem vowel. The presence of reduced stress on the prefix vowel is sufficient to prevent its elision. The following derivation clarifies this point.

- (9) [[nítlobu]]
 Stress [[nítlobu]]
 Metathesis [nítóbu]
 Stress [nítóbu]
 Apocope NA

The bracketing of [[*nítlobu*]] is consistent with the requirement that material within brackets must consist of an independent word and that the meaning of the whole word must be a direct function of the meaning of the parts (cf. Brame [3]).

A second argument for the cycle (discussed by Brame in the context of Palestinian, but applicable to Maltese¹ is the fact that addition of consonant-initial object suffixes or the negative marker -*š* causes a reassignment of stress. When these suffixes are added to *hátaf* 'he snatched', stress falls on the second stem vowel, as predicted by Stress Assignment (5). The initial vowel is not elided.

- (10) *hátafna* he snatched us
hátafkom he snatched you (pl)
ma hátafš he didn't snatch

Since the meaning of *hátafna* is a function of the meaning *hátaf* 'he snatched' plus *-na* 'us', this form must be bracketed [[*hátafna*]]. Applying Stress to the innermost brackets yields [[*hátafna*]]. Reapplying Stress Assignment to the outermost brackets yields *hátafna*. Apocope cannot apply since the initial vowel bears reduced stress. If this form

¹ Brame argues that if stress is not assigned cyclically to [[*hátaf*+*ti*kom]] 'she snatched you' (pl), Apocope will yield **hátafkom*. However, correct *hátafkom* will result if Apocope applies from right to left, bleeding itself.

were not bracketed, the initial vowel would not receive stress and incorrect **háiŋna* would result. By applying the stress rule cyclically, two seemingly unrelated irregularities become entirely regular. It appears that no solution that avoids the cycle is likely, owing to the fact that *háiŋna* 'we grabbed' and *háiŋna* 'he grabbed us' have the same underlying representation, *háiŋna*, save for syntactic bracketing.

Hooper has asserted that it is possible to formulate a noncyclic analysis of such data with equal or greater generality. However, by failing to provide a reanalysis of Brame [2.3], she has concealed the fact that there may well be no adequate noncyclic analysis.

Under a noncyclic approach to Stress, Apocope, and Metathesis, Apocope must be complicated in some fashion so that the unstressed vowels of *háiŋna* and *níŋbu* are not elided. It might be thought that the former case is dealt with by stating that a vowel in a third-person masculine-perfect form is never elided. However, this is incorrect, since the stem final vowel elides in the proper context, such as *háiŋfek* 'he snatched you.' Within Hooper's framework, Apocope would have to be bifurcated into two rules, so that the initial vowel of the 3rd singular masculine perfect is not elided.

$$(11) \quad \bar{V} \rightarrow \phi / \left\{ \begin{array}{l} \#C_0 \text{---} CV \text{ [-3rd sing. masc. perf.]} \\ VC_0 \text{---} CV \\ VC_0 \text{---} CV \end{array} \right\} \quad \begin{array}{l} \text{(a)} \\ \text{(b)} \end{array}$$

This revision turns out to be insufficient. There is a rule in Maltese which lengthens a vowel before object pronouns and the negative suffix *š*, accounting for the following length alternations in final vowels.

(12)	háiŋu	you (pl) snatched	háiŋu:na	you (pl) snatched us
	háiŋna	we snatched	háiŋnekom	we snatched you (pl)
	háiŋu	they snatched	ma háiŋu:š	they didn't snatch

Adding the object suffix *-na* to the vowel final verb *ʔara* 'read' yields *ʔára:na* 'he read us.' Vowel Lengthening precedes Stress Assignment, so under the cyclic approach, these rules apply in the order Vowel Lengthening > Stress to underlying *ʔarana*, yielding *ʔára:na*. Apocope follows these rules, yielding *ʔára:na*. The initial vowel is not stressed at any stage of the derivation since the final stem vowel is long. Application of Apocope is therefore to be expected under these circumstances.

Rule (11) restricts Apocope so that it does not apply to the initial vowel of third sing. masc. perfective *háiŋna*, yet Apocope has applied to that vowel in *ʔára:na*. Apocope would therefore be provided with additional complications under the noncyclic approach, by including a third subrule.

$$(13) \quad \bar{V} \rightarrow \phi / \left\{ \begin{array}{l} \#C_0 \text{---} CV \text{ [-3rd sing. masc. perf.]} \\ VC_0 \text{---} CV \\ \#C \text{---} CV: + \end{array} \right\} \quad \begin{array}{l} \text{(a)} \\ \text{(b)} \\ \text{(c)} \end{array}$$

Attempts to restrict Apocope so as not to delete the prefix vowel of *níŋbu* meet with similar difficulties. Although Apocope does not apply to *V+CVRC+V* strings resulting from application of Metathesis, this fact must be acknowledged within Hooper's framework by specifying the environments where Apocope applies. Still another revision would be required to restrict elision of the imperfect prefix vowel to stems which do not have the shape CVRCV.

$$(14) \quad \bar{V} \rightarrow \phi / \left\{ \begin{array}{l} \#C_0 \text{---} CV \quad \text{[-3rd sing. masc. perf.]} \\ VC_0 \text{---} CV \\ \#C \text{---} CV: + \\ \#C \text{---} + CV \text{ [-sonorant]} \end{array} \right\} \quad \begin{array}{l} \text{(a)} \\ \text{(b)} \\ \text{(c)} \\ \text{(d)} \end{array}$$

Subrule (d) correctly allows elision in *ŋfákel* 'you obstruct' from *ŋfákel*, and prevents Apocope in *níŋbu*. This formulation, however, incorrectly prevents application of Apocope to the prefix vowel of quadrilateral roots having a second radical sonorant such as *ténten* 'stutter.' Consequently, incorrect **títénten* results under this analysis, rather than *ténten*. Thus, Apocope would have to be formulated to distinguish the environment CVRC in quadrilateral roots from the same environment derived via Metathesis, as specified below by condition (e).

$$(15) \quad \bar{V} \rightarrow \phi / \left\{ \begin{array}{l} \#C_0 \text{---} CV \quad \text{[-3rd sing. masc. perf.]} \\ VC_0 \text{---} CV \\ \#C \text{---} CV: + \\ \#C \text{---} + CV \text{ [-sonorant]} \\ \#C \text{---} + CVCCVC + \end{array} \right\} \quad \begin{array}{l} \text{(a)} \\ \text{(b)} \\ \text{(c)} \\ \text{(d)} \\ \text{(e)} \end{array}$$

It is abundantly clear that these simple data cannot be handled

simply without the cycle, contrary to Hooper's assertion. By contrast, the cyclic solution is elegant and insightful. It is not merely a question of simplicity, but rather that the cyclic approach makes the correct predictions in a wide range of data, while the solution imposed by the True Generalization Condition either makes no predictions or else the wrong ones. The above analysis of Maltese is instructive in showing one consequence of Hooper's failure to provide a reanalysis. The noncyclic analysis of Apocope and Stress requires five Apocope rules, and therefore cannot be preferred to the cyclic analysis.

As Brame [3] points out, a constrained cycle does not necessarily provide additional power to the theory, if necessary and sufficient conditions for the cycle can be determined. Under such conditions, as are proposed by Brame, the number of hypotheses a child must evaluate for a given set of data is greatly reduced. In addition to being empirically questionable, based on the evidence for the cycle in Maltese Arabic, the theoretical rejection of the cycle is also questionable when it is based on the mistaken belief that any theory allowing cyclic application of rules is of necessity more powerful than a non-cyclic theory.

2. RULE ORDERING AND SUPPLETION

Rule-ordering statements provide a major source of violations of the True Generalization Condition. By disallowing extrinsic ordering, Hooper provides a theoretically based argument prohibiting certain abstract analyses. She presents a detailed criticism of an analysis of Spanish velars proposed in Harris [6], drawing the conclusion that counterfeeding orders are not possible in language. This position therefore requires a reanalysis of counterfeeding orders so that a rule which is counterfed on the surface cannot overapply.

In showing that the prohibition of counterfeeding order is untenable, I shall investigate two sets of sandhi rules in Sanskrit and Shona which stand in a counterfeeding order, and conjecture how they might be reanalyzed to be made consistent with the True Generalization Condition. Since an analysis with NGP may make quite extensive use of morphological restrictions and of suppletion, I have selected external sandhi rules, where the question of suppletion or morphologization is irrelevant.

Sanskrit has a highly pervasive Vowel Contraction process which changes the sequences *ai* and *au* to *e*; and *o*; respectively. A Glide Formation rule changes the high vowels *i* and *u* to the glides *y* and *v* before vowels.

- (16) $V \rightarrow [-\text{syll}] / \text{---} [+ \text{syll}]$
(+hi)

The following alternations demonstrate the viability of Contraction.

- (17)

agnay+as	fire (nom. pl.)	agne:+s	fire (gen. sing.)
prabhav+as	lord (nom. pl.)	prabho:+s	lord (gen. sing.)
nay+ati	he leads	ne:+syati	he will lead
gav+as	cow (acc. pl.)	go:+bhis	cow (inst. pl.)
ajuhav+am	I burnt	ajuh:+s	you burnt
ita	gone	pre:ta	gone forth?
isyati	he sends	pre:syati	he sends forth
uksate	he sprinkles	pro:ksate	he sprinkles forth
i:ksate	he looks	upe:ksate	he looks at
u:hati	he pushes	upo:hati	he pushes toward

This rule also applies across word boundaries, as the following data reveal.²

- (18)

abharata iva	→	abharate:va	as if he carried
nama uttamam	→	namo:tamam	highest name
de:vasya iti	→	de:vasye:ti	of the god, thus
de:va iha	→	de:ve:ha	O god, here
bharatha udakam	→	bharatho:dakam	you (pl) carry water
tasya i:ša	→	tasye:ša	lord of him

These data can be accounted for by the following rule of Contraction.

- (19) $a (\#) \left[\begin{array}{c} +\text{syll} \\ +\text{hi} \end{array} \right] \rightarrow \phi \left[\begin{array}{c} -\text{hi} \\ +\text{long} \end{array} \right]$

Glide Formation must precede Contraction as demonstrated by *agnayas*, from *agnaitas*. In Hooper's theory, which does not employ rule ordering, Contraction must be complicated to specify that the high vowel in the right-hand context cannot be followed by a vowel. Although Contraction incorporates an optional word boundary in its formulation, this is to be interpreted to mean that presence of word boundaries has no effect on application of the Contraction process. An adequate theory should be capable of stating this rule in purely phonological terms.

² The prefixes *pre-* 'forth', *upo-* 'towards' show their final vowel before consonant initial verbs such as *krin-* 'walk' (*krinam* 'he walks') in *praharantam* 'he sets forth', *upakramati* 'he walks to'.

³ Initial and final vowel are retained in isolation, thus *abharata* 'he carried', *iva* 'like'.

Lowering must precede Raising, as indicated in (26).

(26) a.	akaténgá tsámba	Lowering
	NA	
	akaténgá tsámba	Raising
b.	akaténgá tsámba	Raising
	*akaténgá tsámba	Lowering

Raising and Lowering must apply in a counterfeeding order, since the HH#H structure in *akaténgá tsámba* created by application of Raising (24) satisfies the structural requirement of Lowering (24), yet Lowering does not apply here. Under the standard theory of phonology, the failure of Lowering to apply to *akaténgá tsámba* is expressed by a rule ordering statement. Under an NGP analysis, Lowering can not be a purely phonological rule, since there are surface exceptions to it. Given pairs such as *ákáóna mbádzí* 'he saw the goat' and *ákáóní mbádzí* 'he saw the root,' it is clear that application versus nonapplication of Lowering is determined by some lexical characteristic of the following word. Within the NGP framework, all words having H tone derived by Raising must be marked in some ad hoc manner to prevent their conditioning Lowering. The facts regarding the interaction of Lowering and Raising simply do not lend themselves to description, much less explanation, if counterfeeding order is disallowed. We are led to conclude from the above discussion that counterfeeding order is indeed a characteristic of natural language, and that any theory which precludes the existence of counterfeeding is too restricted.

Hooper also discusses and finds favor with certain bleeding relations. Two rules which she believes to stand in a bleeding relation are the phonological rules involved in the distribution of the surface allomorphs of the English plural suffix -2 . Her initial analysis incorporates the suffix -2 , which entails a devoicing rule, as well as epenthesis.

$$(27) \phi \rightarrow i / [+sib] \text{ — } z \ \$$$

$$z \rightarrow s / [-\text{voice}] \text{ — } \$$$

According to Hooper, the "rule of devoicing is clearly a (Phonetic) rule, and furthermore a very general rule in English" [9: 73]. However, in order to obtain the correct results, it is necessary that Vowel Insertion apply before Devoicing, since otherwise incorrect **kísts* results from application of Devoicing to underlying *kísts*+2. Under Hooper's analysis, both devoicing and epenthesis should apply simultaneously to the underlying representation, yielding the incorrect form. Hooper

then claims to have resolved this problem by adopting a version of lexical representation proposed in Hudson [10].

According to this theory, "Hudson proposes that all nonproductive alternations be represented in the lexicon as suppletive" [9: 128].⁴ In place of diacritic features which identify morphemes that undergo phonetically unpredictable alternations, lexical items which participate in these processes are identified by the existence of disjunctions of alternating segments or features in their lexical representation. As an example, Hooper claims that Standard Spanish *contár* 'count' should be entered in the lexicon with both *we* and *o* as the vocalic nucleus.

$$(28) /k \left\{ \begin{array}{l} o \\ we \end{array} \right\} nt /$$

The distribution of *kont-* vs *kwent-* is accounted for by the following rule.

$$(29) \left\{ \begin{array}{l} o \rightarrow o \\ we \rightarrow we \end{array} \right\} \left\{ \begin{array}{l} / \text{ — } \text{ — } / \\ | \text{ — stress} | \\ \text{elsewhere} \end{array} \right\}$$

This analysis allows us to differentiate between vowels that do not alternate with diphthongs, as in *montár* 'mount,' and diphthongs that do not alternate with simple vowels, as in *amueblár*, 'furnish.' The rules selecting the correct allomorphs of *contár* do not apply to these stems, since they do not contain a disjunctive element as *contár* does. The rules selecting vocalic variants of *contár* do not change one phonetically interpretable form into another; rather, they directly select the correct forms.

Even if this analysis could eliminate the requirement of diacritics in Spanish, there are serious objections that must be advanced against suppletion in general and against Hooper's use of suppletion for English plurals in particular. Hooper assumes that this model of the lexicon avoids the previously mentioned rule ordering (pseudo-) paradox found in English plural formation. She assigns the following suppletive representation to the regular plural suffix.⁵

$$(30) \left\{ \begin{array}{l} tz \\ s \end{array} \right\}$$

⁴ In fact, Hudson [10] actually suggests that all nonallophonic alternations must be represented as lexical suppletion.

⁵ S stands for an archiphoneme unspecified for voice.

Hooper never formulates a plural formation rule. However, on the analogy with other examples of rules operating on suppletive representations, we may approximate a rule which determines the surface form of this suffix.

$$(31) \left\{ \begin{array}{l} /z \rightarrow /z \quad / [+sib] \text{ --- } \$ \\ S \rightarrow S \quad \text{elsewhere} \end{array} \right\}$$

This rule functions like *t*-epenthesis, but avoids the ordering implications that a phonological analysis entails.

In the earlier portions of *INGP*, Hooper proposes that suppletive representations are designed to account for all nonproductive alternations. When she later represents Epenthesis as a suppletive process, the domain of suppletion is greatly expanded without imposing corresponding constraints. Because of the implications that Devoicing and Epenthesis carry for rule ordering, Hooper must allow suppletion to underlie phonetically regular⁷ and productive as well as nonproductive and irregular processes. Her model of the lexicon does not guarantee that phonological problems can be provided with unique solutions if a phonetically based alternation can be expressed by means of a phonetic rule or as suppletion. Instead, suppletion merely appears to be a notational variant of extrinsic rule ordering.

To refute her analysis of English phonology, and consequently her assumptions *vis-a-vis* bleeding orders, I shall show that it misses some very important generalizations about English phonology. The processes exhibited in plural formation of nouns are found to affect two other suffixal morphemes with the shape *-z*, the possessive of nouns and the 3rd singular of verbs. In addition, these rules apply to the output of an optional rule reducing unstressed monosyllabic clitics of the shape $([-\text{cons}])V C$, as shown below.

$$(32) \begin{array}{lll} \text{bart } /z & \rightarrow & \text{barts} \quad \text{'Bart is'} \\ \text{jim } /z & \rightarrow & \text{jimz} \quad \text{'jim is'} \\ \text{bU} \acute{e} /z & \rightarrow & \text{bU} \acute{e}z \quad \text{'Butch is'}$$

Words which can reduce include the following.

⁷ The principles governing the distribution of the three allomorphs of *z* are regular. In addition, there are irregular processes governing plurals like *men*, *sheep*, *oxen*, etc.

(33)	is	z	are	t
	was	z	were	t
	has	z	had	d
	his	z	have	v
	her	r	would	d
	will	l	him	m

The following rule accounts for the optional reduction of these words.

$$(34) \# ([-\text{cons}]) \left[\begin{array}{l} +\text{syll} \\ -\text{stress} \end{array} \right] C \# \rightarrow \# C \# (\text{Optional})$$

The final phonetic shape of each reduced sequence of words is governed by epenthesis and devoicing. This fact is expressed with rule ordering in the standard theory, by allowing any $[+sib]z \ \$$ sequence to undergo Epenthesis, whether derived by reduction or occurring in underlying representation. Under Hooper's analysis, it becomes necessary to supply each of the words in (33) with a suppletive variant; accordingly, *was* has the following underlying representation.

$$(35) / \left\{ \begin{array}{l} waz \\ /z \\ S \end{array} \right\} /$$

In place of Reduction (34), Hooper's analysis requires one of the forms *S* or */z* to be optionally selected. The approximate formulation of this rule is not clear, and its formulation is critical since the rule must be sufficiently complex so that the option *S* is not chosen if the preceding word ends in a sibilant and so that the option */z* is selected only after a word ending in a sibilant. The entire process must, however, remain optional. Furthermore, the rule must allow for reduction of words such as *have* and *will*, which do not contain sibilants, where epenthesis is irrelevant. Whatever the reformulation of these rules might be, the NGP analysis reduces the fact that epenthesis has no exceptions to the status of an accident. The generalization that all underlying or derived sibilant-sibilant sequences undergo Epenthesis is expressed in the framework of NGP by representing all words having sibilants that might appear in the relevant environment in some form with a suppletive matrix. The NGP version of suppletion proposed by Hooper provides no apparatus indicating that the lack of a suppletive

matrix in such an environment would constitute irregularity in English. That none of the words in (33) (*has*, for example) is an exception to epenthesis or devoicing does not follow from the NGP analysis.

In addition to the fact that suppletion allows certain regularities to be expressed only derivatively, the inclusion of matrices containing disjunctions of features and segments adds a significant element of abstractness to the theory of phonology, since this construct renders the level of representation containing disjunctive matrices inherently unpronounceable.

Harris [8] points out that the suppletive analysis of Spanish vocalic alternations could also allow *o*→*yo* and *e*→*we* alternations with no extra effort. Disjunctive matrices allow suppletive alternants to be either closely or distantly related at the phonetic level without attaching any extra weight to distant relations.

Hooper has incorporated suppletion into NGP to avert an ordering paradox. Because of the No Ordering Condition, the English data cannot be handled in any other way within her framework. Rather than see this as evidence for burdening the theory with suppletion where none is truly required, I see this as an indication that the ordering relations observed between Devoicing and /-Epenthesis in English can only be redescribed, not explained, by NGP.

3. ABSOLUTE NEUTRALIZATION

A major goal of NGP has been to disallow absolute neutralization. If such a objective were to limit the number of hypotheses consistent with the primary data that the language-learning child must advance, it would be a desirable constraint. A constraint against absolute neutralization is acceptable only if it does not entail significant loss of generality nor require added descriptive power in other areas. We shall see here that absolute neutralization cannot be rejected without burdening the theory with numerous ad hoc and unenlightening devices.

Hooper has discussed arguments advanced for absolute neutralization in Latin American Spanish and Nupe, and has given arguments for rejecting these analyses. Since these are among the weakest examples of absolute neutralization in the literature, a more impressive demonstration of the correctness of her claim would have been a reanalysis of the well-supported examples, for example Brame [1], Kisseberth [11]. Hooper omits any discussion of these analyses, and

if she had attempted to account for one of these languages, it would be clear that NGP makes false claims, since the arguments for absolute neutralization in these languages are very strong.

Hooper [9: 128] asserts that suppletion obviates the need for diacritic features, but this can only be true if an irregular alternation is manifest entirely within the supposedly idiosyncratic morpheme. If a morpheme, idiosyncratically conditions an alternation in an adjacent morpheme, the alternation cannot be represented by suppletion. Since I shall show that suppletion fails to provide an alternative to absolute neutralization, an important claim of NGP will be refuted. Diacritic features are clearly inconsistent with the goals of limiting the abstractness of underlying representations, since diacritics are even more abstract than phonetically based abstract segments. Diacritics have no syntactic or phonetic correlates and are virtually unconstrainable (cf. Odden [12]).

In what follows, I will briefly review the role of the abstract consonant ζ in the stress system of Maltese, as discussed in Brame [1], and then attempt to sketch a reanalysis without underlying ζ within the framework of NGP. It will follow that the so-called concrete analysis is quite abstract in requiring two diacritics and entirely non-general in requiring four ad hoc stress rules.

The consonant ζ plays a role in stress assignment (as well as in numerous other rules) in various ways. Stems with medial ζ exhibit aberrant behavior with respect to Stress Assignment (5) (as well as Apocope) in the imperfect, as seen in (36).

(36)	<i>nib̄a:t</i>	I send	<i>nib̄a:tu</i>	we send
	<i>nôbo:d</i>	I hate	<i>nôbô:du</i>	we hate
	<i>tima:d</i>	you chew	<i>timâ:du</i>	you (pl) chew
	<i>tôʔo:d</i>	you stay	<i>tôʔô:du</i>	you (pl) stay
	<i>yîlâ:b</i>	he plays	<i>yîlâ:bu</i>	they play
	<i>yîlâ:ʔ</i>	he licks	<i>yîlâ:ʔu</i>	they lick

The prefix vowel in *nib̄a:t* and other singular imperfectives in (36) are stressed, although the long stem would be incorrectly stressed if Stress Assignment (5) were applied to *nib̄a:t*. By assuming the underlying representation *nib̄ʔat*, Brame succeeds in explaining this stress pattern, since the final syllable does not contain a long vowel at the stage when stress is assigned.

Stems with final ζ show stress and other irregularities, as demonstrated by the following imperfective alternations.

(37) nisimaw	we hear	nisma	I hear
nizraw	we sow	nizra	I sow
niblaw	we swallow	nibla	I swallow
naʔlaw	we earn	naʔla	I earn

The penultimate vowel of the plural form *nisimaw* is stressed, although the antepenultimate vowel would be stressed if Stress Assignment (5) were applied to *nisimaw*. Brane shows that the underlying representation *ni+smiʔ+u* with a stem final ʔ explains these and other irregularities in the stem solely on the basis of regular Stress Assignment and Metathesis, motivated earlier. The derivation of *nismiʔu* demonstrates how ʔ explains these irregularities.

(38)		[nismiʔu]
Stress		[nismiʔu]
Metathesis		[nismiʔu]
Stress		nismiʔu
Absolute Neutralization		nisimau
other rules		nisimaw

The assumption that ʔ is the final consonant of these stems also explains why Stress Assignment (5) does not place stress on the final long vowel of the third sing. feminine perfect *samer*: 'she heard,' since (5) stresses the initial vowel of the abstract representation *samʔet*.

Thus, three irregular stress patterns can be easily explained if the abstract consonant ʔ is allowed in the underlying representations of Maltese. The discussion has been limited to evidence for ʔ based on stress assignment so that the abstract analysis can be more easily compared with a reanalysis within the NGP framework. The reader is referred to Brane [1] for more detailed arguments showing the need for ʔ and for arguments determining its precise phonetic nature.

The NGP analysis of Stress Assignment, which takes into consideration stems with ʔ, requires special stress rules and complications of the existing stress rule. The fact that a long vowel is ignored in the imperfect *nɔbo:d* as explained in (36) cannot be explained by any modification of Stress Assignment (5). A second rule must be included which ignores certain long vowels, and Stress Assignment (5) must be complicated so that it does not incorrectly place a stress on the final long vowel. The special case is formulated as (39).

$$(39) V \rightarrow [+stress] / \text{---} X \left[\begin{array}{l} +\text{segment} \\ +\text{stem} \\ +D \end{array} \right] \#$$

This rule must distinguish phonetic long vowel stems which contain ʔ such as *bo:d* (from *bʔod*) from inherently long vowel stems such as *dur*: for the purpose of stress assignment. Specifically, stems such as *bo:d* must condition application of (39), whereas true long vowel stems such as *dur*: must not; cf. *nɔdur*: 'I turn.' The phonetically irregular stress appears entirely outside of the stem *bo:d* so, as previously stipulated, suppletion cannot be employed to account for this irregularity. It was for this reason that (39) had to be formulated with an arbitrary diacritic feature, since there is no other basis on which to distinguish *bo:d* from *dur*:. This diacritic feature must also be built into the Stress Assignment rule (5) so that forms which undergo (39) cannot undergo (5), as the revision of Stress Assignment below specifies. It is not as if the stem *bo:d* is never stressed by (5); rather, it is specifically in the imperfective singular that stress is unpredictable. Thus, (40) exempts *bo:d* from regular stress only in the imperfective singular.

$$(40) V \rightarrow [+stress] / \text{---} C_n((VC)VC_0) \left\{ \begin{array}{l} -\text{imperfect} \\ +\text{plural} \\ -D \end{array} \right.$$

The plural form *nisimaw* 'we hear' is an apparent exception to the stress assignment rule, since **nisimaw* is to be predicted on the basis of the phonetic form. Forms such as *nisimaw* are unique in that they have a stem vowel standing before final *Vw* on the surface. Perhaps this fact is to be incorporated into an additional stress assignment rule.

$$(41) V \rightarrow [+stress] / \text{---} C_0 V w \#$$

It remains to reformulate the major Stress Assignment rule (40) so that it will not also apply to *nisimaw*, yielding **nisimaw*. Stems such as *smiʔ* are not across the board exceptions to Stress Assignment, cf. *nisma*. Some feature must identify this stem as failing to undergo the principal Stress Assignment rule, but as failing to do so only in the imperfect plural. A distinct diacritic feature is needed to distinguish the irregular stems like *bo:d* which are stressed regularly in the plural imperfect from the stems like *smiʔ* which are stressed regularly in the singular imperfect. Employing a second diacritic S, Stress Assignment must be revised along the following lines.

$$(42) V \rightarrow [+stress] / \text{---} C_0((VC)VC_0) \left\{ \begin{array}{l} \text{[-imperfect]} \\ \text{[+plural]} \\ \text{[+D]} \\ \text{[-Plural]} \\ \text{[+S]} \\ \text{[-D]} \\ \text{[-S]} \end{array} \right.$$

Finally, the anomalous phonetic stress of perfective *sámet* 'she heard' requires an ad hoc rule to avoid **sámét*. Stem stress is guaranteed by the following rule:

$$(43) V \rightarrow [+stress] / [C \text{---} C] + 3rd \text{ fem. perf.}$$

In order to avoid incorrect **sámét*: by conjunctive application of (43) and Stress Assignment (42), (42) is revised again.

$$(44) V \rightarrow [+stress] / \text{---} C_0((VC)VC_0) \left\{ \begin{array}{l} \text{[-imperfect]} \\ \left\{ \begin{array}{l} \text{[-S]} \\ \text{[-3fem]} \end{array} \right\} \\ \text{[+plural]} \\ \text{[+D]} \\ \text{[-imperfect]} \\ \text{[-plural]} \\ \text{[+S]} \\ \text{[-S]} \\ \text{[-D]} \end{array} \right.$$

It is clear that the stress assignment principles cannot be organized in any revealing manner under the NGP analysis which disallows underlying ζ . While the abstract analysis unifies the seemingly unrelated sets of anomalies in stems containing ζ on the basis of independently motivated rules, the nonabstract analysis fails in this respect. Each set of clearly related facts must be stated separately, unrelated to one another and to all other facts in the grammar. Corresponding to each ad hoc stress rule is an ad hoc restriction in the principle stress assignment rule. The phonetically viewed irregularities of stems containing ζ are highly correlated, so that one cannot find a stem which

is "exceptional" with respect to Stress Assignment like *nábo'd*, but which is not anomalous in terms of Apcope, as might be found in a nonexistent form like **náó'dá*. The NGP analysis which is based on superficial phonetic patterns cannot provide an explanation for these correlations and cannot be maintained in light of the high explanatory value of the abstract analysis.

By failing to provide an account for the Maltese data discussed in Brame [1] and rediscussed here, Hooper has again disguised the fact that Brame's strong arguments for absolute neutralization in Maltese are counterexamples to the claims of NGP, since they cannot be accommodated into that theory in any coherent or insightful manner. We have seen that no analysis of Maltese within the framework of NGP is possible without diacritics; even so, the diacritic analysis is significantly more complex than the phonetically abstract segment ζ in that the diacritic analysis requires phonological rules to be stated three and four times, fails to unify a range of otherwise irregular forms, and fails to explain these irregularities on the basis of the regular patterns of the language.

4. CONCLUSION

The major weakness of *NGP* is that Hooper has failed to pursue the claims inherent in NGP to the extent that they should have been pursued. She attempts to discredit devices such as rule ordering, the cycle, and abstract underlying representations by criticizing a few of the weakest examples of each. After rejecting specific analyses, she concludes that ordering, the cycle, and abstractness are illegitimate. Based on the analyses presented here, it is clear that the notions themselves need not be illegitimate, merely that some specific application of them may well be. Well-motivated examples of these theoretical constructs should be considered if one wishes to argue against them.

Any radically new theory would hopefully be tested extensively against one or more languages with reasonably involved phonological alternations. Although Hooper has presented isolated analyses from various Spanish dialects, she has not attempted to account for a wide range of related data. Her analysis of Spanish vocalic alternations is not as comprehensive as related discussions in Harris [6,7] and Brame and Bordoieis [4,5] (nor is it essentially correct: cf. Harris [8].) She has not presented an in-depth NGP analysis of any language having a number of productive alternations, nor has her work shed light on the

structure of a specific language. We have not gained insight into the structure of language in general from the theory of *INGP*.

Evaluating the empirical claims of NGP is rendered difficult since it is not clear from the tone of *INGP* what constitutes a generalization or an explanation within the framework of NGP, or what Hooper considers the goals of linguistic description and theory to be. While she imposes some constraints on certain areas of phonological theory, she also widens the descriptive power of the theory by recourse to suppletion and to the unconstrained use of morphologically conditioned rules. NGP does not provide us with a new and powerful tool which can yield insight into the nature of language, nor does it appear to resolve any significant issues that arise within the standard theory of generative phonology. The theory advanced in *INGP* fails to explain the data discussed in this review and does not contribute significantly to our understanding of language.

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