

What (else) Depends on Phonology?

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“To construct phonology so that it mimics syntax is to miss a major result of the work of the last twenty years, namely, that syntax and phonology are essentially different.” (Bromberger & Halle 1989: 69).

In my presentation I addressed three interrelated issues, which are taken up in the following three sections: (i) Is phonology different? (ii) Dependencies require analysis. (iii) Non-arbitrary ≠ predictive.

1. Is phonology different?

In Hyman (2007) I asked, “Where’s phonology in typology?” While phonology turned out to be well represented at this workshop, it is typically underrepresented, even ignored by some typologists. I considered three reasons: (i) Phonology is different (cf. the opening quote above). (ii) Phonological is uninteresting. Why should a typologist be interested in phonological typology defined as follows?

“[. . .] it is possible to classify languages according to the phonemes they contain.... Typology is the study of structural features across languages. Phonological typology involves comparing languages according to the number or type of sounds they contain.” (Vajda 2001)

(iii) Phonology is disconnected from the rest (e.g. from morphosyntactic typology).

As evidence that phonology is underrepresented, I noted that there is no coverage in Whaley’s (1997) textbook, *Introduction to typology*. The more recent *Oxford Handbook of Linguistic Typology* (Song 2011) provides confirmation of the above assessment:

(i) Phonology is *underrepresented*: there is only one chapter on phonology out of thirty (= 1/30) constituting 13 out of 665 pages (= 2%).

(ii) Phonological is seen as *different*: Why isn’t Chapter 24 entitled “Phonological Typology”, parallel with the other chapters?

Chapter 21:	Syntactic typology (Lindsay Whaley)
Chapter 22:	Morphological typology (Dunstan Brown)
Chapter 23:	Semantic typology (Nicholas Evans)
BUT: Chapter 24:	<i>Typology of phonological systems</i> (Ian Maddieson)

(iii) Phonology is *ignored*: There is no mention of phonology in Chapter 10 “Implicational Hierarchies” (Greville Corbett), which has sections on syntactic (§3.1), morphosyntactic (§3.2) and lexical (§3.3) hierarchies. As a phonological example the chapter could easily have cited and illustrated the sonority hierarchy (Clements 1990) and the claim that if a lower sonority segment can function as the nucleus of a syllable, then a higher sonority segment in a column to its right also can.

Obstruent	< Nasal	< Liquid	< Glide	< Vowel	
-	-	-	-	+	syllabic
-	-	-	+	+	vocoid
-	-	+	+	+	approximant
-	+	+	+	+	sonorant
0	1	2	3	4	rank (degree of sonority)

There are of course exceptions to the above: *WALS On-Line* (Dryer & Haspelmath 2013) includes 19 chapters on phonology out of 144 (or 13.2%). There also are several phonological databases and occasional typological projects which are concerned with how phonology interfaces with the rest of grammar, e.g. Bickel et al (2009). Still, phonology is at best incidental or an afterthought in much of typological work. This stands in marked contrast with the work of Joseph Greenberg, the father of modern linguistic typology, whose foundational work on typology and universals touched on virtually all aspects of phonology, e.g. syllable structure (Greenberg 1962, 1978a), distinctive features (Greenberg, Jenkins & Foss 1967), vowel harmony (Greenberg 1963), nasalized vowels (Greenberg 1966, 1978b), glottalized consonants (Greenberg 1970), word prosody (Greenberg & Kaschube 1976) etc. Note also that one out of the four volumes of Greenberg, Ferguson & Moravcsik (1978) was dedicated to phonology!

There are at least two reasons why phonological typology, properly conducted, can be relevant to scholars outside of phonology: (i) There are lessons to be learned that are clearest in phonology, e.g. concerning phonological dependencies, the topic of this workshop. (ii) There have been claims that grammatical typology can be dependent on phonology. I take these both up in the following two sections.

2. Dependencies require analysis (which requires theory)

It is interesting Greenberg typically cited phonological examples to make the didactic point that any property found in a language can be stated as a implicans on an absolute universal implicatum:

“We have the unrestricted universal that all languages have oral vowels and the implicational universal that the presence of nasal vowels in a language implies the presence of oral vowels, but not vice-versa.” (Greenberg 1966: 509)

“Of course, where an unrestricted universal holds, any statement may figure as implicans. For example, if a language has a case system, it has oral vowels.” (Greenberg 1966: 509n)

However, phonology teaches us two additional “lessons”: (i) Dependencies are themselves highly dependent on the level of analysis. (ii) The analysis however varies according to the theory adopted. To illustrate the first point, let us stay with the example of nasality which, in different languages, may be underlyingly contrastive:

- | | | | |
|-------|---------------------------|---------------------|---------------|
| (i) | on consonants only: | /m, n, ŋ/ | e.g. Iban |
| (ii) | on vowels and consonants: | /ĩ, ã, ã̃, m, n, ŋ/ | e.g. Bambara |
| (iii) | on vowels only: | /ĩ, ã, ã̃ / | e.g. Ebrié |
| (iv) | on whole morphemes: | /CVC/ ^N | e.g. Barasana |
| (v) | absent entirely: | ----- | e.g. Doutai |

(cf. Cohn 1993, Clements & Osu 2005)

A problem arises when we attempt to typologize on the basis of languages which have vs. do not have underlying nasal consonants. The class of languages lacking underlying nasal consonants is not coherent, as this includes three different situations: languages like Ebrié (iii) which contrast nasality only on vowels; languages like Barasana (iv) which have nasal prosodies, e.g. /bada/^N → mǎnǎ; languages like Doutai (v) which nasality altogether.

While (v) represents an observable (“measurable”) fact, assuming that there is also no nasality on the surface, (iii) and (iv) represent linguistic analyses designed to factor out the distributions surface nasality by assigning the contrast either to vowels or to whole morphemes—ignoring the fact that these language have output nasal consonants. To appreciate the fact that languages with contrastive nasality on vowels only (iii) always have surface phonetic nasal consonants, let us consider Ebrié a little more in detail:

“... nous considérons que l'ébrié ne possède aucune consonne nasale phonologique et que [m], [n] et [ɲ] sont les allophones respectifs de /b/, /d/ et /y/ [before nasalized vowels]” (Dumestre 1970: 25)

In this language from Ivory Coast, /ba, da, ya/ are realized [ba, da, ya], while /bǎ, dǎ, yǎ/ are realized [mǎ, nǎ, ɲǎ]. This analysis is possible because there are no sequences of *[bǎ, dǎ, yǎ] or *[ma, na, ɲa]. Since contrasts such as /ta/ vs. /tǎ/ independently require a [+nasal] specification on vowels, the structure-sensitive phonologist cannot resist generalizing: only vowels carry an underlying [+nasal] specification to which a preceding /b, d, y/ assimilate.

The Ebrié example neatly illustrates the fact that there is no language which has SURFACE nasality only on vowels. This raises the question what level of representation is appropriate for typological purposes: underlying (phonemic) or surface (allophonic)? While Hockett (1963: 24) once noted that “phonemes are not fruitful universals,” since they are subject to the individual linguist’s interpretation of “the facts”, the question is whether the same applies to typological generalizations. As I like to put it, we aim to typologize the linguistic properties, not the linguists. At the workshop Martin Haspelmath argued forcefully that observable “surface” properties are the facts and that they should serve as input to typology. If so, we must then address the question of what to do about vowel nasalization in English. As often pointed out, a word like *can't* is often pronounced [kǎnt] or even [kǎt], in contrast with *cat* [kæt]. Although many attribute such variations to phonetic implementation, hence a third level, should English be considered a language with a nasalization contrast on vowels?

A related question is how we should state the dependency. In an earlier paper I tried to capture the dependency by referring to both levels:

“Vocalic Universal #6: A vowel system can be contrastive for nasality only if there are output nasal consonants [i.e. surface phonetic nasal consonants]” (Hyman 2008: 99)

To rephrase this: If a vowel system is contrastive for nasality, there will always be output nasal consonants, as in Ebrié. However, it appears that this is not general enough: the underlying nasality on vowels may be irrelevant. An alternative is:

Consonantal Universal: If a language contrasts nasality, there will always be output nasal consonants (i.e. independent of whether the consonant nasality is underlying or derived)

This is true of all four of the systems (i)-(iv) which have contrastive nasality. Thus, the implicans can be either the underlying vowel system or the whole phonological system. Are the dependencies about observable “facts” or about our (interesting) analyses of them? The same point can be made concerning vertical vowel systems: Systems such as Kabardian or Marhsallese are often analyzed as /ɨ, ə, a/, /ɨ, a/ etc., but always have output [i] and [u] (cf. Vocalic Universal #5 in Hyman 2008: 98).

Above I cited Greenberg’s absolute universal “all languages have oral vowels” as a universally available implicatum (“if a language has a case system, it has oral vowels”). What about an implicans that is extreme rare? The velar implosive [ɠ] if very rare in languages:

“The velar implosive is a very infrequent sound and... always seems to imply the presence of bilabial, apical, and palatal members of the series.” (Greenberg 1970: 128)

What then can be predicted from its presence? Note first that implosives occur in 53 out of the 451 languages in the UPSID database (Maddieson & Precoda 1991). A bilabial implosive occurs in 50 of these 53 languages, while an apical (dental or alveolar) implosive occurs in 42 languages. In stark contrast, a velar implosive occurs in only five of the 53 languages. In the table below I attempt to establish dependencies “if ɠ, then X” to see what holds true:

		<i>Chadic</i>	<i>Omotic</i>	<i>East Sudanic</i>	
		Tera	Hamer	Ik	Maasai Nyangi
other implosive consonants:	if /ɠ/, then /ɓ, ɗ/	✓	✓	✓	✓ ✓
basic voiceless consonants:	if /ɠ/, then /p, t, k/	✓	✓	✓	✓ ✓
voiced non-implosives:	if /ɠ/, then /b, d, g/	✓	✓	✓	* *

As seen, if a language has /ɠ/ we can predict that the other two implosives will be present, as well as voiceless stops. While Maasai and Nyangi appear to falsify the implication “if ɓ, ɗ, ɠ, then b, d, g”, it can be saved if we re-analyze [ɓ, ɗ, ɠ] as /b, d, g/, which are lacking in the two systems. I am not saying this is a valid move, but it again underscores the problem of level of analysis, which provides us with two different kinds of claims:

- (i) a descriptive claim: if a language has [ɓ, ɗ, ɠ], it will have contrastive /b, d, g/
- (ii) an analytic claim: if a language has [ɓ, ɗ, ɠ] it will have /b, d, g/ (either contrastively or not)

The above summarizes a bit of what we face in phonology. What about grammar depending on phonology?

3. Non-arbitrary ≠ predictive

In this section I begin by considering the empirical bases in establishing a dependency. Specific implicans-implicatum of dependencies are arrived at in a number of ways,

combining degrees of inductive observation and deductive reasoning. Ultimately false claims may at first appear to be common sensical or intuitive (at least to the proposer):

“Since sequences containing only pure consonants, such as [kptčsm] or [rftlks], cannot be pronounced, all words must include at least one vowel or vowel-like (vocalic, syllabic) sound segment”, hence: “In all languages, all words must include at least one vocalic segment.” (Moravcsik 2013: 153)

This statement contains the dependency, “If X is a word, then it contains at least one vocalic segment,” which however is false, as seen in the following Bella Coola voiceless obstruent utterance (Nater 1984:5, cited by Shaw 2002:1):

xɬp'χ^wɬɬpɬs k^wc' 'then he had had in his possession a bunchberry plant'

In this case there was a functional basis to the claim—languages shouldn't have words that are hard to pronounce. On the other hand, there are arbitrary and misguided “universal stabs in the dark” such as: “No language uses tone to mark case” (Presidential Address, 2004 Annual Linguistic Society of America Meeting, Boston), or, stated as a dependency:

- (i) If a language has tone, it will not be used to mark case.
- (ii) If a language has case, it won't be marked by tone.

But consider the following from Maasai (Tucker & Ole Mpaayei 1955: 177-184), where the acute (´) marks H(igh) tone, while the grave (`) accent marks L(ow) tone:

	<i>nominative</i>	<i>accusative</i>		<i>nom. vs. acc. tone patterns</i>
class I:	èlòkònyá	èlókónyá	‘head’	L ⁿ -H vs. L-H ⁿ
	èncòmátá	èncómátá	‘horse’	
class II:	èndèròni	èndèróni	‘rat’	H on σ ₁ vs. σ ₂
	ènkòlòpà	ènkòlópà	‘centipede’	
class III:	òlmérégèsh	òlmérégèsh	‘ram’	H on σ ₂ & σ ₃ vs. on σ ₂ only
class IV:	òlósówùàn	òlósòwùàn	‘buffalo’	identical tones
	òmótònyî	òmótònyî	‘bird’	
	òsínkírî	òsínkírî	‘fish’	

In reality, if tone can be a morpheme (which is uncontroversial), it can do anything that a morpheme can do! What functional or other principle would block tone from marking case?

Quite unrelated to this example, there has been recent renewed interest in pursuing a centuries-old “intuition” that certain aspects of syntax and morphology are not only interdependent, but also dependent on phonology. The standard reference is Plank (1998), who attributes the following positions to:

Encyclopaedia Britannica (1771): “Words tend to be longer than one syllable in transpositive [free word order] languages and to be monosyllabic in analogous [rigid word order] languages.” (Plank, p.198)

W. Radloff (1882): “(a) If vowel assimilation is progressive (= vowel harmony), then the morphology will be agglutinative (and indeed suffixing), but not vice versa.... (b) if the morphology is flecive, then if there are vowel assimilations they will be regressive (= umlaut), but not vice-versa....” (Plank, p.202)

Rev. James Byrne (1885): “Unlimited consonant clustering correlates with VS order, limitations on consonant clustering correlate with SV order.” (Plank, p.200)

Georg von der Gabelentz (1901): Languages with anticipatory phonological assimilation should have anticipatory grammatical agreement (e.g. from N to A in an A-N order), while languages with perseverative phonological assimilation should have perseverative grammatical agreement (e.g. from N to A in an N-A order). (my paraphrasing of Plank, p.197); also Bally (1944): Séquence Progressive vs. Séquence Anticipatrice (Plank, p.211)

Interestingly, Greenberg did not buy into this. Grammar does appear in examples involving the universality of oral vowels, which was didactically exploited as an implicatum to show that any arbitrary implicans follows—grammatical ones are typically cited (Greenberg 1966, 1978):

- (i) If a language has case, it also has oral vowels (repeated from above)
- (ii) If a language has sex-based gender, it also has oral vowels
- (iii) If a language doesn't have oral vowels, the language doesn't have sex-based gender (or maybe it does)

“Although these implications all happen to be true, their typological value is nil.” (Plank 1998: 223)

The last century has seen a proliferation of proposals to distinguish language “types” which identify various phonological properties with grammatical ones, either as non-directional correlations ($P \leftrightarrow G$) or with one dependent on the other ($P \rightarrow G$, $G \rightarrow P$), e.g.

- anticipatory vs. progressive languages
- iambic vs. trochaic languages
- stress-timed vs. syllable-timed vs. mora-timed languages
- syllable vs. word languages
- word vs. phrase languages

(see especially proposals of Bally, Skalička, Lehmann, Dressler, Donegan & Stampe, Dauer, Gil, Auer)

As an example, consider the following two languages types from Lehmann (1973 et seq), as summarized by Plank (1998: 208):

<i>“think Turkish or Japanese”</i>	<i>“think Germanic”</i>
• dependent-head (OV, AN etc.)	• head-dependent (VO, NA etc.)
• suffixes	• prefixes
• agglutination (exponents = loosely bound affixes)	• flexion (exponents = tightly fused with stem)
• no agreement	• agreement
• vowel harmony (progressive, root triggers)	• umlaut (= regressive, suffix triggers)
• few morphophonological rules (mostly progressive)	• many morphophonological rules (mostly regressive)
• syllable structure simple	• syllable structure complex
• pitch accent	• stress accent + unstressed vowel reduction
• mora-counting	• syllable-counting

While such grammar-phonology dependencies have not generally caught on in typological or in phonological circles, there is renewed interest in statistical correlations between

phonological properties and OV vs. VO syntax (Nespor et al 2011, Tokizaki 2010, Tokizaki & Kuwana 2012; cf. Cinque 1993) as well as word class, e.g. noun vs. verb, transitive vs. intransitive verbs (Smith 2011, Fullwood 2014). Concerning the latter, Fullwood demonstrates a statistical correlation between verb transitivity and stress on English bisyllabic verbs:

	<i>trochaic</i>	<i>iambic</i>
obligatorily transitive	506 (39%)	804 (61%)
ambitransitive	357 (55%)	293 (45%)
obligatorily intransitive	227 (64%)	130 (36%)

“Words that frequently occur phrase-finally are more likely to retract stress from their final syllable, while other words that rarely occur in phrase-final position are quite happy to accommodate a final stress.” (Fullmer, ms. p.6)

Foley & Olson (1985: 50-51) offer “an interesting list of shared properties” among languages with valence-increasing serial verbs, particularly in West Africa and Southeast Asia:

- | | |
|------------------------------|------------------------------------|
| (i) phonemic tone | (iii) isolating morphological type |
| (ii) many monosyllabic words | (iv) verb medial word order (SVO) |

They go on to explain:

“This cluster of properties is not accidental: they are all interrelated. Phonological attrition causes syncope of segments or syllables, with the result that phonemic tone or complex vowel systems develop to compensate for phonemic distinctions being lost. On the grammatical side, phonological attrition causes gradual loss of the bound morphemes.... At this verbal morphological is lost, a new device for valence adjustment must be found. Verb serialization begins to be used in this function, *provided serial constructions already exist in the language.*” (Foley & Olson 1985: 51) [my emphasis]

Foley & Olson suggest that the development of serial verbs proceeds in the following order:

motion/directional verbs > postural verbs > stative/process verbs > valence

Crucially, it is only the last (valence) stage that correlates with the above properties (vs. Crowley 2002 re Oceanic serial verbs which do not meet these criteria). It is the loss of head-marking on verbs (benefactive, instrumental applicatives etc), which was due to the introduction of prosodic size conditions on verb stems in NW Bantu (Hyman 2004), that feeds into verb serialization. Thus there is a NON-ARBITRARY relation between the phonological development, the loss of head-marking morphology, and the extended development of an analytical structure with serial verbs.

However, the cause-and-effect is not PREDICTIVE: Neither the synchronic nor diachronic interpretation of these dependencies holds true for all cases:

- synchronic dependency: if valence-marking serial verbs, then tone, tendency towards monosyllabicity, isolating morphology, SVO (but Ijo = SOV)
- diachronic dependency: if serial verbs + phonological attrition, then valence-marking serial verbs, tone etc.

The diachronic alternative for marking benefactives, instruments etc. is with adpositions. Nzadi is a Narrow Bantu language spoken in the Democratic Republic of Congo which has broken down the Bantu agglutinative structure to become analytic and largely monosyllabic. Serial verbs have not been introduced to replace lost verbal suffixes (Crane et al 2011):

- (i) b̀̀ ó túŋ ndź́ sám ̀́é báàr ‘they built a house for the people’
 they PAST build house reason of people
- (ii) ndé ó wéé mb̀̀m tí ntáp òté ‘he picked fruit with a stick’
 he past pick fruit with branch tree

The serial structures *they built house give people and *he take stick pick fruit are not used in Nzadi, which is spoken outside the West African serial verb zone.

“Holistic” typologies such as the one from Lehmann presented above are still only “hopeful” (Plank 1998), based to a large extent on the feeling that clustering of properties across phonology, morphology and syntax is non-arbitrary (e.g. Indo-European and Semitic vs. Uralic and Altaic; West Africa and Southeast Asia vs. Athabaskan, Bantu). But whatever links one can find between the cited properties, these effects are non-predictive. Still, linguists hold strong feelings on such interdependencies, and I’m guilty too. Thus, as my own observation (hope) I offer the following:

The highly agglutinative Bantu languages contrast only two tone heights, H and L (often analyzed as privative /H/ vs. Ø). A third M(id) tone height is only present in languages which have broken down the morphology (thereby creating more tonal contrasts on the remaining tone-bearing units). Thus compare the H vs. L agglutinative structure in the following Luganda utterance in (i) with the H vs. M vs. L isolating structure in (ii) of Fe’fe’-Bamileke, a Grassfields Bantu language of Cameroon:

- (i) à-bá-tá-lí-kí-gúl-ír-àgàn-à ‘they who will not buy it for each other’
 AUG-they-NEG-FUT-it-buy-APPL-RECIP-FV (aug=augment; fv = inflectional final vowel)
- (ii) à kà lách pìē náh ncwēe mb̀̀d̀̀d̀̀ hā mūū ‘he cut the meat with a knife for the child’
 he PAST take knife take cut eat give child (̀̀ = Mid tone)

The morphological structure of words in polyagglutinative languages like Luganda is highly syntagmatic. This is most compatible with a tone system with privative /H/ vs. Ø, where the Hs are assigned to specific positions. (Although they don’t have a M tone, some Bantu languages allow ¹H, as tonal downstep is also syntagmatic.) A full contrast of /H, M, L/ on every tone-bearing unit would produce a huge number of tone patterns (3 x 3 x 3 etc.), so one should expect the /H, M, L/ contrast at best only to contrast on prominent positions (e.g. the root syllable). /H, M, L/ is thus more compatible with languages like Fe’fe’, where words are short, with little morphology. Languages with shorter words often have more paradigmatic contrasts in general (more consonants, vowels—and tones). This may again be non-arbitrary, as the greater paradigmatic contrasts make up for the lost syllables of longer words. But it is not predictive.

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