

# The co-variation of phonology with morphology and syntax: A hopeful history

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## *Abstract*

*Throughout its history, the hope has always been cherished that typology is holistic, and holism entails that there is systematic co-variation not only within levels or modules of grammar but also between them. Accordingly, numerous claims have been made that phonology does not vary across languages independently of morphology and syntax, and vice versa. The variables that are allegedly interrelated pertain to segment inventories, the shapes of syllables, morphemes, and words, phonological or morphonological rules, tones and accents, and rhythmic or prosodic patterns on the one hand and to analytic or (poly-)synthetic grammar, separatist or cumulative morphological exponence, the complexity of grammatical units, and their linear order on the other. These claims are catalogued in this paper. To substantiate them and to accommodate those that are found valid in theories of the interface between phonology, morphology, and syntax remain as tasks for the future.*

*Keywords:* accent, agglutination, flexion, foot, holistic typology, metre, phoneme systems, prosody, rhythm, syllable structure, tone, vowel harmony, word order

## 1. TOUT se tient?

In recent times, typologists have often confined themselves to seeking dependencies among variable language-parts WITHIN syntax, WITHIN morphology, or WITHIN phonology. As to dependencies BETWEEN levels or modules, syntax and morphology were considered essentially the only candidates showing some real typological promise. Dependencies between sound structure on the one hand and word, phrase, clause, sentence, and discourse structure, or also lexical structure, on the other were something

respectable mainstream typology has steered clear of. None seem to have made it into the Stanford *Working Papers of Language Universals* (1969–76, partly inventoried in Burquest et al. 1982) and their four-volume digest, *Universals of Human Language* (edited by Joseph H. Greenberg et al. 1978), collectively probably the richest treasury of implications conforming to contemporary canons.<sup>1</sup>

Nonetheless, the temptation to link phonological parameters of cross-linguistic variation on the one hand and morphological and syntactic ones on the other has now and again proved irresistible to the more adventurous, perhaps encouraged by the ever popular all-encompassing master maxim that languages are *systemes où TOUT se tient* (emphasis added).<sup>2</sup> All in all an impressive number of claims have been advanced over the last 250 or so years, often repeatedly but independently, about inventories of sounds or phonemes, about the sound shapes of syllables, morphemes, and words, about particular kinds or effects of phonological or morphonological rules, about tones and accents, and about rhythmic or prosodic patterns as systematically interrelated with morphological and syntactic variables such as analytic vs. synthetic vs. polysynthetic grammar, separatist vs. cumulative exponence (or agglutination vs. flexion), complexity of grammatical units, and morpheme, word, and phrase order.

It is too scattered a record, however, to have made any lasting impression—although recently key fragments of it did gain recognition in a textbook, Moreno Cabrera's awesomely comprehensive *Curso Universitario* (1994: Chapter 23). On present evidence, it is not a record about to be closed; my aim, therefore, is to provide a backdrop for its continuation by cataloguing what has so far been claimed about such inter-level dependencies, showing typology at its most daring. As with any catalogue, there are bound to be inadvertent omissions; but eventual addenda should not be of a kind to open up entirely new vistas.

Few of the items catalogued have ever been methodically checked against cross-linguistic samples wide and diverse enough to inspire much confidence in their falsity or truth, as laws of language or tendencies. Often they owe their existence to theories more than to facts, and the assumptions they have been deduced from are not always beyond question either. However, the chief aim here is recollection rather than factual or theoretical evaluation. Empirically (re-)examining the allegations on record and embedding any truths eventually distilled from fancy in theories of the interface between phonology, morphology, and syntax are left as challenges—which intending contributors to this journal are invited to respond to, whether they are convinced that holistic hopes need nursing or dashing, as long as they can tell stories that carry conviction.

## 2. Great expectations

In view of the celebrity of the passage where it occurs, it is appropriate to commence with a mere hunch to the effect that there really is something to be catalogued in the first place:

- (1) Each language is a system all parts of which organically cohere and cooperate. One has the feeling that the whole would be changed if one of these parts were absent or different. . . . I am thinking of characteristics of word and sentence structure, of the preference for or the neglect of particular grammatical categories. But one may, and indeed should, also reckon with a mutual relationship between all this and sound matters.

This is translated from Georg von der Gabelentz's *Die Sprachwissenschaft: Ihre Aufgaben, Methoden und bisherigen Ergebnisse* (second, posthumous edition of 1901: 481). However, what exactly von der Gabelentz expected to be mutually related is only obliquely alluded to (1901: 401–402, 404, 412, 479). As to sound matters, it seemed to him that languages generally favour one direction for sounds to influence each other: when the tendency is towards anticipation, in language as elsewhere in the life of a people, there would be umlaut (Germanic-style), regressive vowel harmony (à la Dravidian and Japanese), and consonantal assimilations and other sandhi rules would also be regressive (as predominantly in Indo-European and Semitic); when it is towards perseveration there would be progressive sandhi and, most conspicuously, progressive vowel harmony (as widespread in the long agglutinative words of Ural-Altai). And it seemed to him that, apart from articulation, the inclination to anticipate also shows syntactically, in letting attributive adjectives agree with nouns which only come after them. There would seem to be two options for persevering peoples with progressive phonologies: to have prenominal adjectives and no agreement or postnominal ones which agree—but this was not an issue on von der Gabelentz's agenda. No “conjunctures” (as he called correlations) were really induced by him with the methodical rigour that he himself demanded in his programmatic statement about the typological enterprise (1897). But then, it had long become habitual in comparative linguistics to profess holism as a matter of mere principle, often taking one's inspiration from disciplines such as comparative anatomy where it had proven fruitful in actual practice.<sup>3</sup>

## 3. The length and order of words

Long before von der Gabelentz's musings, a fairly specific theme occupied among other contemporaries the anonymous Scotsman who covered

linguistic matters for the first edition of the *Encyclopædia Britannica* of 1771 (possibly the editor, William Smellie, himself), viz., how word length, typically measured in syllables, might correlate with word order:

- (2) Words tend to be longer than one syllable in transpositive languages and to be monosyllabic in analogous languages.

“Transpositive” and “analogous” were the established technical terms for free and rigid word order respectively, and rigid order was supposed to be rigidly SVO (and noun – adjective, etc.), mirroring the natural order of thought (actor – action – effect, substance – attribute, etc.).

Anonymous’s particular link between sound and syntax, however, was not a direct one: transpositive languages were generally supposed to indulge in inflections, of nominal and also verbal words, and these morphological appendages accounted for the greater length of such words. What Anonymous (1771) took for granted as being invariable was that inflections are (minimally) syllabic and that uninflected words are one syllable long.

#### 4. Double articulation, in tandem

As the notion of “articulation” was early on found to be applicable both to sound (or “matter”) and to meaningful form, representing the key articulatory and cognitive operation of imposing structure upon the unstructured, there was extensive speculation about correspondences between articulation at these two levels. In the early days of typology, when this subject enjoyed great popularity especially in enlightened France and Scotland before it caught on in romantic Germany, the theorist (or “conjectural historian”) most eager for reliable knowledge about such co-variation, and the one most ambitious concerning its truly systemic nature, was James Burnett, better known as Lord Monboddo.<sup>4</sup> A seven-line digest can hardly do justice to his two roughly concurrent series of six anonymous volumes each, *Of the Origin and Progress of Language* (1773–92) and *Antient Metaphysics* (1779–99); it can only list the chief parameters of Burnett’s scenario of progress in articulation, where typological co-variation was founded on co-evolution.

- (3) The extent of “material” articulation, pertaining in particular to (a) the elaboration of sound systems, (b) the complexity of syllable structures, (c) word length, (d) accentual differentiation (as opposed to not-so-articulated tonal modulation), correlates with the extent of “formal” articulation, pertaining in particular to (a) the differentiation of parts of speech, (b) the elaboration of inflectional and derivational systems, (c) analytic syntax (as opposed to polysynthesis, where sentences are not articulated into words).

Many of James Burnett's interrelated themes were to recur in one or another variation in the centuries to come, including our own; and the standards of induction did not necessarily rise as factual knowledge widened and deepened. The notion of articulation as such retained its significance also with later systemic thinkers, including Wilhelm von Humboldt and Ferdinand de Saussure (see Trabant 1993); but for them double articulation seemed less obvious a bonanza for phonological–morphosyntactic correlations than for Burnett.

## 5. Consonants, vowels, ways of life and thought

Surely James Burnett would have found the Reverend James Byrne, an Irishman, the most congenial of those following in his footsteps in the nineteenth century, when other comparatists gained academic respectability by limiting themselves to comparing sounds or affixes or words across the Aryan universe or within one or the other family of Aryan descent. It was both by deduction and by induction from a vast range of languages, cultures, and national or racial temperaments that Byrne sought to establish concomitant variations, and his findings included co-variations of a host of structural features among each other as well as with ways of life and thought. Among the structural features were ones pertaining to “phonesis” (culled from Byrne 1885):

- (4) (a) The utterance of the consonants with strong pressure of breath from the chest (as in aspirates, affricates, or in guttural consonants) corresponds to strength of purpose in the language community.
- (b) The tense and full utterance of consonants corresponds to laborious and active habits respectively, with easy life and indolence producing softly and imperfectly uttered consonants instead.
- (c) The unrestricted occurrence of consonants in consonant clusters corresponds to versatility, restrictions in their co-occurrence to tenacity.
- (d) The predominance of consonants (more adapted for the representation of ideas in the consciousness of the speaker) over vowels (more adapted for the transmission of that representation to the sense of the hearer) corresponds to thoughtfulness, while the predominance of vowels over consonants corresponds to thoughtlessness and talkativeness.

In general it is the quickness or slowness of mental excitability which, according to Byrne,<sup>5</sup> exerts the greatest influence on all conceivable aspects of the structure of languages—word and affix order, agreement, incorporation, grammatical relations such as subject, morphological exponence, word-class distinctions, categories such as person, number,

gender, voice, tense, or mood. How the ethnopsychological parameters that primarily govern phothesis—strength of purpose, laboriousness, versatility, talkativeness, and the modes of life favouring them—in turn interrelate with mental excitability, is not hard to imagine. For instance, the more habitually impulsive and excitable a race, the readier it will be to deviate from the natural order of words where subjects precede verbs (Byrne 1885: I, 27–28; II, 281–285); and since impulsiveness vs. deliberation aligns with versatility vs. tenacity, the phonological variable in (4c) finds a syntactic correlate:

- (4') (c) Unlimited consonant clustering correlates with VS order, limitations on consonant clustering correlate with SV order.

### 6. The more (the sounds), the shorter (the morphemes)

Following the zeitgeist, James Burnett had been given to arguing economically. He would reason, for instance, that when a sound system is not well articulated, with the individual articulations of the continuous stream of speech not (yet) very numerous, the smallest units of meaning need to be longish—unless the language community is content with a modest basic vocabulary. The wider the choice of distinctive sounds, the more you can rely on selection rather than combination in distinguishing the meaningful units consisting of them. For James Byrne this would perhaps have been too prosaic a correlation to be deduced from mental excitability;<sup>6</sup> but it was to enjoy considerable popularity later, being repeated for example by Hockett (1958: 93), Saporta (1963: 69–70), Milewski (1969/1973: 154–155), Hagège & Haudricourt (1978: 67), Décsy (1987: 70, 87), and Dressler (1979: 268), whose formulation is reproduced in (5).

- (5) There is an inverse relationship between the number of phonemes in a language and the average length of its morphemes.

Milewski calculated that with smallish systems of little more than about a dozen phonemes, as in Aranda (Arrernte) or Hawaiian, the mean length of morphemes is as long as four phonemes,<sup>7</sup> while with unusually large systems of 45–75 phonemes, as in certain North American or North Caucasian languages, morphemes are shorter than 1.5 phonemes on average.

As suggested by Roman Jakobson (Saporta 1963: 72), alternative ways of compensating for small phoneme inventories, without extending the length of morphemes, would be to be more liberal about phonotactics and utilize more diverse phoneme combinations than are permissible in languages with larger phoneme systems, or to be more tolerant of

homonymy. Neglecting phonotactics, Décsy (1970: 11; 1987: 70) likewise proposed what he considered “basically, a mathematical banality”:

- (5') The probability of homophony is inversely related to the number of principal phonemes and to the length of words.

## 7. Morphological glue and the cement of harmony

When vowel harmony was recognized as being widespread in Uralic and Altaic languages, it was first accounted for diachronically, as common heritage or common innovation, reflecting common phonetic or mental predispositions. But soon an alternative explanation was suggested, relating vowel harmony not to the mouths or the minds of Uralic and Altaic peoples but to the morphology of their languages, which tended to be agglutinative. In the agglutinative style of morphology, the cohesion between stems and suffixes was supposed to be loose, looser at any rate than in the flective style of morphology preferred in Indo-European.<sup>8</sup> With the agglutinative suffixes themselves deriving from what had not so long ago been independent words, there had not been sufficient time for the creation of well-integrated complex words; but, on their way to suffixhood, such appendages were deprived of their autonomy by having their vowels subjected to the influence of stem vowels.

In Jan Baudouin de Courtenay's (1876, 1877) version of this theory a relationship was suggested between the two styles of morphology and two alternative ways of cementing word-internal cohesion:

- (6) When stem-suffix combinations are morphologically less cohesive (i.e., agglutinative), words are given unity by vowel harmony; when stems and endings are morphologically more cohesive (i.e. flective), words are given unity by (a single main) stress accent.

There are no principled reasons why stress should not cement wordhood in agglutinative languages too, or why syllabic endings should not be required to harmonize with stem vowels in flective languages as well, assuming that the morphological unit of the word has got to be given phonological recognition one way or another. Indeed, Baudouin de Courtenay (1879) himself was convinced that the same phonetic laws, changes, and correspondences could be shared by languages of totally different morphological and syntactic types, and of the different world-views self-evidently encouraged by such structural differences as those between confusing flexion and sober agglutination with their cumulative and separatist exponents respectively (1910: 57; 1929: 24–25). Also from this general perspective, then, the implication between morphological cohesion or looseness on the one hand and vowel harmony or stress on the other

would not be expected to hold in the opposite direction too. At any rate, the directionality of vowel harmony follows from the position of the affixes to be integrated with stems: they come after stems, hence vowel harmony, whose *raison d'être* is to subordinate affixes to stems, perforce works progressively. With prefixes one would therefore expect it to work regressively.

With W. Radloff (1882: 50–69), a member of Baudouin de Courtenay's circle at Kazan', directionality gets more attention in its own right, although in terms of phonology rather than morphology. For Radloff vowel harmony is assimilation, and assimilation can work forwards and backwards, with the net result being the same: word-parts are bound together by virtue of the vowel of one part depending on that of the other, and it is immaterial whether affix vowels depend on stem vowels or vice versa. Surveying Northern Turkic, Radloff also noted regressive assimilations, with the vowels of stems harmonizing with those of suffixes, and these turned out to be most productive where progressive vowel harmony was least well developed (viz. in Taranchi Tatar, or Ili Turki, deported to the Ili Valley of Xinjiang Province, China). "Rückwirkung der Vocale" à la Taranchi reminded Radloff of umlaut in Germanic, in directionality and in its every prosodic detail. In his conspectus of Altaic and Uralic Radloff did find evidence to correlate the relative extents of (progressive) vowel harmony and of agglutination. Nonetheless, since Germanic, adduced by Radloff as favouring (regressive) umlaut, is not conspicuously agglutinative, vowel assimilation as such, irrespective of its direction, should not really have been seen as an implicatum of agglutination. His combined Altaic-Uralic-Germanic evidence would thus only have licensed these two one-way implications (had Radloff been so meticulous in his generalizations):

- (7) (a) If vowel assimilation is progressive (= vowel harmony), then the morphology will be agglutinative (and indeed suffixing), but not vice versa (see Taranchi);  
 (b) if the morphology is flective, then if there are vowel assimilations they will be regressive (= umlaut), but not vice versa (see again Taranchi).

Among specialists in Ural-Altaic it continued to be a popular contention that vowel harmony is phonology's firm helping hand for loose agglutinative morphology (see, e.g., Krámský 1931). And it was arguably on the strength of the Ural-Altaic evidence that more comprehensive typological schemes used to come to similar conclusions.

An early example (and for later ones see Sections 8, 9, and 10.4 below) is the "natural system" of Raoul de la Grasserie (1890: 297–298, 336–337),



where the dominant trait of vowel harmony is accompanied by the subordinate traits of agglutinative morphology and the “enveloping” word order of *déterminant* before *déterminé* (object before verb, etc.). (And de la Grasserie was not entirely sure this did not point to a hidden genetic affiliation after all, for how could such mysterious correlations be explained otherwise?) When classifying languages morphologically rather than integrally, de la Grasserie indeed had agglutinative and flective languages in the same class, differing essentially only in that agglutinative affixes derived historically from nouns and flective affixes from pronouns. But in the process of grammaticalization (or, more specifically, univerbation), de-nominal affixes then had their vowels adapted to those of stems, while de-pronominal affixes managed to have their own vowels influence those of stems—with the vocalic assimilations being progressive and regressive respectively when both kinds of affixes were suffixes. This account based on the relative weakness and strength of vowels in de-nominal and de-pronominal affixes thus also pairs umlaut with flective morphology.

Later, vowels were also found to harmonize elsewhere, especially in Africa, America, and Australia. While these continents may be overwhelmingly agglutinative, and also seem to share in the worldwide preference for suffixing over prefixing, vowel harmony was sometimes heard to spread in more than one direction.<sup>9</sup>

## 8. Five fairly comprehensive constructs

8.1. One of the most prominent later attempts at truly holistic typology was that of Vladimír Skalička, whose background was in the Prague Linguistic Circle.<sup>10</sup> Skalička posited the ideal types of polysynthesis (or composition—a type defined rather idiosyncratically, with Chinese as one of its representatives), agglutination, flexion, introflexion (à la Semitic), and isolation (or analysis), and these five “typological constructs” were claimed to be characterized by a web of peculiarities of sound as well as of morphology and syntax. The inter-level interdependencies that Skalička envisaged were assumed to be “mutually supportive”; thus, in that not particularly strict sense, they are correlations rather than one-way implications.

Real languages, incidentally, were not really expected to attain these ideals; usually they would be combining ingredients of different types, although with one type often predominating.

The summary portrayal of the five ideal types in Tables 1a and 1b, as indeed Skalička’s own, is most detailed for agglutination and flexion, although not necessarily complete even here. The emphasis in Skalička’s

Table 1a. *Skalička's typological constructs*

POLYSYNTHESIS	AGGLUTINATION	FLECTION
<ul style="list-style-type: none"> <li>• little or no affixation</li> </ul>	<ul style="list-style-type: none"> <li>• more than one inflectional affix per word</li> <li>• separatist exponents</li> <li>• exponents of the same category combinable</li> <li>• no inflectional synonymy (i.e. inflection uniform)</li> <li>• no or little inflectional homonymy</li> <li>• basic paradigmatic category always zero-marked</li> <li>• rich inflection</li> </ul>	<ul style="list-style-type: none"> <li>• typically one inflectional affix per word</li> <li>• cumulative exponents</li> <li>• exponents of the same category not combinable</li> <li>• inflectional synonymy (i.e. inflection classes)</li> <li>• much inflectional homonymy</li> <li>• basic paradigmatic category with overt marking</li> <li>• not-so-rich inflection</li> </ul>
<ul style="list-style-type: none"> <li>• function and content words not well delimited</li> </ul>	<ul style="list-style-type: none"> <li>• function words rare (in relation to affixes)</li> </ul>	<ul style="list-style-type: none"> <li>• function words numerous (in relation to affixes)</li> </ul>
<ul style="list-style-type: none"> <li>• no derivation</li> </ul>	<ul style="list-style-type: none"> <li>• rich derivation</li> <li>• derivation not-so-well delimited from inflection</li> <li>• no noun classes/genders</li> </ul>	<ul style="list-style-type: none"> <li>• not-so-rich derivation</li> <li>• derivation well delimited from inflection</li> <li>• noun classes/genders</li> </ul>
<ul style="list-style-type: none"> <li>• compounding instead of subordinate clauses</li> </ul>	<ul style="list-style-type: none"> <li>• predominantly non-finite subordinate constructions (nominalizations)</li> </ul>	<ul style="list-style-type: none"> <li>• predominantly finite subordinate clauses</li> </ul>
<ul style="list-style-type: none"> <li>• word-classes not well delimited, if at all</li> </ul>	<ul style="list-style-type: none"> <li>• word-classes not-so-well delimited</li> <li>• basic clause constructions diverse</li> <li>• ergative construction (at least at a previous stage)</li> </ul>	<ul style="list-style-type: none"> <li>• word-classes well delimited</li> <li>• basic clause construction uniform</li> <li>• accusative construction</li> </ul>
<ul style="list-style-type: none"> <li>• word order rigid</li> </ul>	<ul style="list-style-type: none"> <li>• word order relatively rigid</li> </ul>	<ul style="list-style-type: none"> <li>• word order relatively free</li> </ul>
<ul style="list-style-type: none"> <li>• little grammatical marking, if any</li> </ul>	<ul style="list-style-type: none"> <li>• phrase-marking (hence no phrase-internal agreement)</li> <li>• affixes loosely attached</li> <li>• morpheme boundaries clear</li> </ul>	<ul style="list-style-type: none"> <li>• word-marking (hence phrase-internal agreement)</li> <li>• affixes fused with stems</li> <li>• morpheme boundaries unclear</li> </ul>
<ul style="list-style-type: none"> <li>• lexemes and grammemes barely distinguished</li> </ul>	<ul style="list-style-type: none"> <li>• lexemes and grammemes not-so-distinct in form</li> </ul>	<ul style="list-style-type: none"> <li>• lexemes and grammemes distinct in form</li> </ul>
<ul style="list-style-type: none"> <li>• formatives syllabic</li> </ul>	<ul style="list-style-type: none"> <li>• affixes syllabic</li> </ul>	<ul style="list-style-type: none"> <li>• exponents often non-syllabic</li> </ul>

Table 1a. (Continued)

POLYSYNTHESIS	AGGLUTINATION	FLECTION
<ul style="list-style-type: none"> <li>• no or few morphonological alternations</li> <li>• no suppletion</li> <li>• rich vowel systems</li> <li>• vowel-consonant ratio high in texts</li> <li>• no complex consonant clusters</li> <li>• roots short, even monosyllabic</li> <li>• tones</li> </ul>	<ul style="list-style-type: none"> <li>• no or few morphonological alternations, other than</li> <li>• vowel harmony</li> <li>• no suppletion</li> <li>• rich consonant systems</li> <li>• vowel-consonant ratio high or not-so-high in texts</li> <li>• complex consonant clusters and</li> <li>• roots short OR</li> <li>• no complex consonant clusters and</li> <li>• roots longer</li> <li>• tones possible</li> </ul>	<ul style="list-style-type: none"> <li>• rich morphonological alternations, including</li> <li>• umlaut</li> <li>• suppletion</li> <li>• rich vowel systems</li> <li>• vowel-consonant ratio high in texts</li> <li>• few complex consonant clusters</li> </ul>

Reconstructed from Skalička 1958, 1964, 1975 etc., collected in Skalička 1979; also Skalička 1950.

Table 1b. *Skalička's typological constructs (continued)*

INTROFLECTION	ISOLATION
<ul style="list-style-type: none"> <li>• root-internal marking</li> <li>• derivation not well delimited from inflection</li> <li>• word-classes well delimited</li> <li>• word-marking</li> </ul>	<ul style="list-style-type: none"> <li>• little or no inflection (by affixation or internal marking)</li> <li>• words short, because monomorphemic</li> <li>• little derivation, if any</li> <li>• function words numerous</li> <li>• word-classes not-so-well delimited</li> <li>• finite subordinate clauses</li> <li>• word order rigid</li> <li>• phrase-marking</li> </ul>
<ul style="list-style-type: none"> <li>• lexemes and grammemes distinct in form</li> <li>• rich consonant systems</li> <li>• complex consonant clusters</li> </ul>	<ul style="list-style-type: none"> <li>• lexemes and grammemes not-so-distinct in form</li> <li>• formatives syllabic</li> <li>• rich vowel systems</li> <li>• vowel-consonant ratio not-so-high in texts</li> <li>• few complex consonant clusters</li> <li>• roots short, often monosyllabic</li> </ul>

scheme is clearly on morphology, with separation vs. cumulation of the exponents of inflectional categories, inflectional classes (synonymy of exponents) vs. uniformity of inflection, and homonymy (or syncretism) vs. non-homonymy of inflections as the central, though not the only typological parameters. Syntactically his constructs comprise such diverse parameters as the rigidity of word order, the finiteness of subordinate clauses, the distinctness of word-classes, the uniformity of clause construction, the location of grammatical marking on words or phrases, and the presence (with word-marking) or absence (with phrase-marking) of agreement.<sup>11</sup> For phonological correlates Skalička—as well as those of his followers who shared his inter-level holistic optimism (such as Popela 1985 or Sgall 1993)—would preferably look at the sound shapes of different kinds of formatives, at kinds of morphonological alternations (including umlaut and vowel harmony), and at vowel–consonant ratios. At the core of phonological typology as such, as Skalička saw it, were phoneme systems, but their differing structures could not even ideally be claimed to correlate with anything in morphology, syntax, or lexicon (Skalička 1967: 78; similarly Dressler 1979: 264).

8.2. In two papers centring on Japanese and slighting induction, Neustupný (1959, 1966; revised in 1978) claimed a few further phonological correlates especially for the agglutinative and flective constructs of Skalička's. They are to do (a) with the domains and perhaps kinds of

Table 2. *Addenda to Skalička's typological constructs: Neustupný (1978)*

AGGLUTINATION	FLECTION
<ul style="list-style-type: none"> <li>• word order OV</li> <li>• morphemes as highly independent units</li> </ul>	<ul style="list-style-type: none"> <li>• word order other than OV</li> <li>• words (rather than morphemes) as smallest independent units</li> </ul>
<ul style="list-style-type: none"> <li>• domain of accent rules: morpheme</li> <li>• accent primarily pitch</li> <li>• full, regular series of contrasting segments, with vowels and consonants of ideally all places and manners of articulation showing a relevant contrast, such as length</li> <li>• phonemic segmentation often indeterminate, especially with geminates, affricates, palatalized consonants</li> <li>• poetry non-rhyming</li> </ul>	<ul style="list-style-type: none"> <li>• domain of accent rules: word</li> <li>• accent primarily stress</li> <li>• contrasts in phoneme systems more sporadic rather than in entire series</li> <li>• phonemic segmentation usually determinate</li> <li>• poetry rhyming</li> </ul>

accent (morphemes or words, pitch or stress), supposedly depending on what are the basic independent units of grammar (morphemes with agglutinative and words with flective morphology); (b) with the pervasiveness of contrasts in phoneme systems (regular series for parameters of contrast or not-so-systematic series), supposedly mirroring the regularity (agglutination) or otherwise (flection) of grammar; and (c) with phonemic segmentability (sometimes indeterminate or always determinate), supposedly determined by the pervasiveness of relevant contrasts. Also, the poetic technique of rhyme did not seem to sound right with an agglutinative morphology and its preferably OV syntax (1978: 106).

8.3. Directly or indirectly, bits and pieces of Skalička's own edifice of mutually supportive traits were re-used elsewhere. Natural Morphology thus helped itself to a typological component, featuring implications like these (adapted from Dressler 1979, 1985a, 1985b: 337–348), based on evidence that appears to have been impressionistic:

- (8) In flective and introflective languages word forms tend to be between two and three syllables long (which is considered the optimal length from the point of view of processing such units), while agglutinative and incorporating languages tend to have longer word forms, and isolating languages shorter ones.
- (9) Inflectional affixes tend to be longer in agglutinative than in flective languages.
- (10) Derivational affixes tend to have a more complex syllable structure in agglutinative languages than in flective languages.
- (11) Whereas the phonological structure of affixes is very similar to the structure of stems in the agglutinative type, affixes tend to differ significantly from stems in the flective type: they are much shorter, structurally simpler, and more uniform than their agglutinative counterparts.
- (12) Typically, agglutinative languages, where stems and affixes are bound together more loosely than in flective and introflective languages, use vowel harmony for signalling which morphs are part of the same word forms. (Thus: If vowel harmony, then agglutinative morphology, but not necessarily vice versa.)
- (13) Typically, in agglutinative languages there are few allomorphic or morphonological rules (other than vowel harmony) disturbing morphotactic transparency (which remains unaffected by vowel harmony).
- (14) The consonant–vowel ratio is comparatively high in polysynthetic languages (in the customary sense of this term rather than Skalička's), where morphemes are comparatively short.

Rarely, the inter-level typology of Natural Morphology would also venture beyond Skalička, positing innovative links between styles of morphology and of speech (Dressler 1985a, 1985b: 339):

- (15) In agglutinative languages casual or fast speech shows less phonological deletion, fusion, and weakening than in flective ones, owing to the lack of syntactic redundancy that follows from the absence of (phrase-internal) agreement.

Whether or not this correlation holds, its purported rationale takes too much for granted—viz., that agglutination does shun agreement.

### 9. Sound and sense working backwards or forwards

In the Ural-Altaic and the Skalička traditions certain (morpho-)phonological rules, in particular vowel harmony, were seen as related to, and motivated by, the tightness or looseness of morphological bonding. In Winfred Lehmann's scheme, sharing some dependencies with Skalička's as is evident from Table 3, the emphasis was on the phonological directionality of such rules, as if echoing Georg von der Gabelentz. To Lehmann, as to Radloff (1882), Turkish-style vowel harmony and Germanic-style umlaut appeared to be essentially the same kind of process, only with the linear order of the harmony-determining or umlauting and harmonizing or umlauted vowels reversed. Now, the relative linear order of determining and determined elements in sound structure was supposed to mirror that in morphology and syntax, where the principal determining-determined or

Table 3. *The direction of determination: W. Lehmann (1973, 1974, 1978a–d)*

• (S)OV and allied orders	• (S)V(S)O and allied orders
• suffixes	• prefixes
• agglutination (i.e., separatist exponents, not-so-tightly fused with stems)	• flexion (i.e., cumulative exponents, tightly fused with stems)
• no agreement	• agreement
.....	.....
• vowel harmony (being progressive)	• umlaut (being regressive harmony)
• few other morphonological rules (effect predominantly progressive)	• numerous other morphonological rules (effect predominantly regressive)
• syllable structure simple	• syllable structure complex
• pitch accent	• stress accent accompanied by reduction of unstressed vowels
• mora-counting	• syllable-counting

modifying-modified pair was object and verb. De la Grasserie (1890) could have thought of this too, since he had also been correlating vowel harmony, agglutination, and determining-determined (“enveloping”) order; but then he had a different explanation for the direction of vocalic assimilations.

As to the relationships between the (morpho-)phonological rules operating in opposite directions and modifying-modified serialization in syntax, they are now intended as one-way implications rather than correlations, in line with the assumption of an all-determining influence of the ordering of the object before or after the verb—“VO languages foster umlaut, OV languages foster vowel harmony” (Lehmann 1978a: 113):

- (16) If a language has vowel harmony and perhaps other progressive phonological modifications, then basic word order is OV (or, equivalently, if no OV, then no vowel harmony), but not vice versa; if a language has umlaut and perhaps other regressive phonological modifications, then basic word order is VO (or, equivalently, if no VO, then no umlaut), but not vice versa.

On this reasoning, languages with both progressive and regressive vowel harmony would be expected to have free word order, where neither OV nor VO can be singled out as basic; this in fact is what is found in Australian Warlpiri (Evans 1995: 741, and personal communication). But one hesitates to reason along such lines, too ethereal is the link between phonological and syntactic directions.

## 10. Rhythm and prose

10.1. Next to Turkish, Japanese was Lehmann’s favourite OV specimen; it lacked full-fledged vowel harmony, but reassuringly most slips of Japanese TV announcers’ tongues were progressive rather than regressive (as those of their English-speaking colleagues tended to be). The analysis of Japanese as mora-counting probably alerted him to the potential, though in his directional system marginal, typological significance of prosodic differences between languages, including that between pitch accent and stress accent (accompanied by the reduction of unstressed vowels), already touched upon by Neustupný (1978) in the Skalička tradition, and adumbrated much earlier by James Burnett. Lehmann’s speculations about the correlation of stress types with vowel harmony or umlaut, though not necessarily its morphological and syntactic correlates, have since been endorsed by van Coetsem and his collaborators (see van Coetsem 1996: 7, 25).

Numerous other schemes—to some extent elaborated independently of each other but incorporating subsets of the elements that we have already

encountered, sometimes adding a few more—played up such prosodic and especially rhythmic themes. The general idea here is that rhythmic organization is not something peculiar to poetic language but fundamentally structures ordinary language too, and at several or indeed all levels.

10.2. The atmosphere of the first of these schemes is Saussurean. Although it was the express purpose of Charles Bally's *Linguistique générale et linguistique française* (first published in 1932, revised in 1944) to confirm his master's axiom that "dans un système, tout se tient" (1944: §8), he felt that a certain lack of superficial harmony in actual linguistic systems was not to be ruled out completely. As the opposing forces that shape linguistic structures are rarely kept in perfect equilibrium, languages are constantly changing, and they are liable to be influenced by others of different character. Nonetheless, Bally was confident that underlyingly there was a strong urge towards harmony, and in particular towards the parallel operation of grammar and phonology with respect to the linear arrangement of weak and strong elements. Table 4 summarizes the relevant morphosyntactic and, below the dotted line, phonological parameters of strength.

For Bally it was of such fundamental importance whether a language opted for the "progressive" order or the "anticipatory" (or "regressive") order because progression and anticipation, as he defined these opposites, were such general structuring principles, governing the sequential arrangement of units at all linguistic levels. (As Bally saw it, progression caters for the needs of the hearer, facilitating processing and interpretation on the basis of the overt sequence of elements, with *déterminé* naturally preceding *déterminant*, while anticipation caters more for the needs of the speaker, giving free rein to momentary impulse at the expense of easy interpretation, with elements that are necessary for the understanding of other elements coming before rather than after them.) Central to his cross-level typology was the assumption of a parallelism between the rhythm of thinking and the rhythm of sound (1944: §315): semantically strong or communicatively weighty elements (such as lexemes vis-à-vis grammemes or other *déterminants* vis-à-vis *déterminés*) tended to attract the main accent in their morphological or syntactic constructions.

While Bally's characterization of the progression and anticipation profiles owed much to his comparison of Modern French and German, Walter von Wartburg's (1943: 164–180) specimens for essentially the same types were Modern French on the one hand and its Romance relatives (notably Italian and Spanish) as well as earlier stages of French on the other. This occasioned the addition of a few further phonological and morphosyntactic



Table 4. Bally's séquences (1944: especially Part 2)

	<i>SÉQUENCE PROGRESSIVE</i>	<i>SÉQUENCE ANTICIPATRICE</i>
• order of meaningful elements:	<i>déterminé – déterminant:</i> N Adj N Genitive VO etc. grammeme–lexeme (i.e., prefixes) Topic Comment (or Subject Predicate) shorter before longer	<i>déterminant – déterminé:</i> Adj N Genitive N OV etc. lexeme–grammeme (i.e., suffixes) Comment Topic (or Predicate Subject) longer before shorter
• constituent structure:	continuous constituents	possibly discontinuous constituents (bracketing or enveloping constructions)
• syntactic marking:	government	agreement
• morphosyntax:	more analytic, with little inflection and many function words	more synthetic, with much inflection and few function words
.....		
• word accent:	final	initial
• compound accent:	final	initial
• phrase accent:	final ( <i>'rhythme oxyton'</i> : Weaker–Stronger)	initial ( <i>'rhythme baryton'</i> : Stronger–Weaker)
• syllable canon:	preferably CŸ (i.e., peak preferably final)  few consonant clusters	preferably CVC, CVV (i.e., peak non-final, no short open syllables)  complex consonant clusters
• syllable length:	length more or less uniform	marked contrast short–long
• vocalism:	monophthongal (or also rising diphthongs)	diphthongal (falling)

traits to Bally's scheme, including the diachronic one of vowel stability, as being allegedly likewise type-specific, listed in Table 5.

In an attempted marriage of Bally's progressive vs. anticipatory orders to neo-classical German typology (see Plank 1995: Section 2) and especially his own version of it that emphasized the notion of "supposition", Johannes Lohmann (1949a/b) enriched the morphosyntactic half of Bally's scheme by a few traits. Agreement, favoured by the anticipatory

Table 5. *After Bally: Wartburg (1943)*

• order:	<i>déterminé – déterminant</i> grammeme – lexeme (in particular, prefixes)	<i>déterminant – déterminé</i> lexeme – grammeme (in particular, suffixes)
• accent (word phrase, clause):	oxytonic rhythm	non-oxytonic rhythm
• timing:	stress-timed	syllable-timed (?)
• vowel inventory:	large diachronically unstable	relatively small diachronically stable

Table 6. *After Bally: Lohmann (1949alb)*

• word order:	VO prepositions	OV postpositions
• order of inflectional affixes:	mostly prefixes, also infixes	exclusively suffixes
• categories:	gender, noun classes	no genders or noun classes
• syntactic marking:	agreement	rigid order
• function words:	articles	no articles
• rhythm:	oxytonic	barytonic

order according to Bally, ended up on the progressive side, as shown in Table 6.

10.3. While Bally had argued that stems are *déterminants* and inflectional affixes (especially those for verbal person and number and for nominal case) *déterminés*, whence inflections or their equivalents were supposed to precede stems in the progressive order and to follow stems in the anticipatory order, Hintze (1947) saw it the other way round. Again differing from Bally et al., Hintze believed that accent was preferably assigned to the *déterminé*, this being the semantic core of a construction, rather than to the *déterminant*. His association of traits was accordingly somewhat different from Bally's, and he also switched the original labels, as is seen in Table 7.

Serious testing against wider cross-linguistic samples was not considered a priority by Bally or any of his adaptors.

10.4. While Natural Morphology had acquired a typology tying up morphology with sound structure virtually wholesale from Vladimír

Table 7. After Bally in reverse order: Hintze (1947)

	REGRESSIVE ORDER	PROGRESSIVE ORDER
• order of meaningful elements:	<i>déterminé – déterminant:</i> N Adj N Gen N Dem N Poss etc. lexeme – grammeme	<i>déterminant – déterminé:</i> Adj N Gen N Dem N Poss N etc. grammeme – lexeme
• morphosyntax:	more synthetic, with much inflection and few function words	more analytic, with little inflection and many function words (especially articles and auxiliaries)
.....		
• word accent:	initial	final
• compound accent:	initial	final
• phrase accent:	initial	final
• i.e., rhythm:	Strong–Weak (trochaic/barytonic)	Weak–Strong (iambic/oxytonic)

Skalička, Natural Phonology's holistic typology was home-made, and it was founded on rhythm.

That rhythm ruled almost everything else was a lesson to be learnt from intra- and inter-family diachrony. Assuming, no longer controversially, that Mon-Khmer and Munda are sprung from a common Austroasiatic source, Donegan & Stampe (1983) survey individual divergent developments of these two families and conclude that they all hang together, united by the rhythmic themes of rising and falling accent, of iambic and trochaic rhythm respectively. Comparing other families, iambic like Mon-Khmer are, on the whole, Khamti-Tai, Chamic, and Sinitic; trochaic like Munda are, on the whole, Dravidian, Indo-Aryan, Thai, Indonesian, Tibeto-Burman, Australian, Austronesian, Uralic, Altaic, Japanese, and Basque. Germanic, Romance, and Celtic used to be trochaic, but had drifted towards the iambic type (see also Stampe 1985).

The central notion in the Donegan–Stampe scheme, summarized in Table 8, is phrase accent: “What but accent could be behind such holism? Accent is the only factor pervading all the levels of language” (1983: 350, 340). Its rationale is this: normally, the operand/head is given and the operator/modifier is asserted; owing to its foregrounding function within

Table 8. *Rhythmic holism: Donegan & Stampe (1983) and Stampe (1985)*

• phrase accent ('X):	rising (final)	falling (initial)
• word canon:	iambic (last syllable accented) or monosyllabic	trochaic or dactylic (first syllable accented)
• timing:	isoaccentual (stress-timed)	isosyllabic or isomoric (syllable- or mora-timed)
• syllable canon:	(C)ǃ or (C)(C)ǃ(Glide)(C)	(C)V(C)
• consonantism:	diachronically shifting tonogenetic non-geminate clusters	stable geminate clusters
• vocalism:	diachronically shifting diphthongal reductive	stable monophthongal harmonic
• tone/register:	contour tones/register	level tone
• verse:	rhyme (identities final)	alliteration (identities initial)
• music:	polyphony tempered scales multiplicative rhythms	monophony modal scales additive rhythms
.....		
• word order:	rigid operator last: V 'O V 'Adv Aux 'V N 'Adj A 'Adv N 'Gen Adp 'NP (i.e., prepositions)	variable, but basically operator first: 'O V 'Adv V 'V Aux 'Adj N 'Adv A 'Gen N 'NP Adp (i.e., postpositions)
• clitic order:	proclitic	enclitic
• affix order:	prefixing	suffixing
• morphosyntax:	more analytic	more synthetic, especially case, verb agreement
• morphology:	flective or isolating	agglutinative or polysynthetic

temporally integrated domains, accent (') naturally falls on the asserted part, regardless of its order relative to the given part. Of the two variables—rising vs. falling phrase accent, operand-before-operator vs. operator-before-operand order—accent is the primary one, synchronically and diachronically, determining order and much else, including word accent (coinciding with phrase accent when single words make up phrases), affix and clitic order (with prefixation and proclisis encouraged by rising accent, and suffixation and enclisis by falling accent), rhythm (with words or

syllables as the units of isochronous speech, depending on rising or falling accent and concomitant word boundary processes and moraic word structure), syllable canons (showing the effect of rhythm), phonological segments and processes (also shaped by rhythmic requirements), tone and register (reflecting distinctions lost in consonant shifts), and even the structure of verse and music (with poets and singers drawing on what they know and do as speakers).

On the crucial point of the operator rather than the operand being accented, Donegan and Stampe agree with Bally and disagree with Hintze. And there are encouragingly numerous further agreements between their iambic and trochaic types and the progressive-oxytonic and anticipatory-barytonic orders respectively of Bally, Wartburg, and Lohmann. One disagreement is about the affiliation of diphthongal and monophthongal vocalism, which for Donegan–Stampe are iambic and trochaic, respectively, but the other way round for Bally. Another one is possibly about the variability of syllable length and the principle of timing: stress-timing and concomitantly the reduction of unstressed vowels are iambic features and syllable- or mora-timing are a trochaic feature for Donegan–Stampe (and probably Wartburg), while Bally again has it the other way round.

10.5. Rhythm was also at the basis of the typology developed by David Gil in a series of articles culminating in Gil (1986). To begin with, in an approach reminiscent of Bally's, Gil defines iambic and trochaic rhythms as composite notions, with several phonetic, morphosyntactic, and semantic measures for gauging the relative weakness or strength of co-constituents (stress, length, sonority, complexity, import). The relative linear ordering of co-constituents is assumed to be fundamentally determined by their relative strength—although grammaticalization can impose rigid regulations which, though ultimately inspired by strength, may not be reflecting it in every single instance. The more the weakness and strength distributions on the various parameters are harmonious, the clearer is the result of the struggle for initial and final position, with weak coming before strong in the iambic and strong before weak in the trochaic rhythm, of ordinary language no less than of metered verse.

Based on a fairly large sample of no less than 170 languages, drawn from the 197 in the Stanford Phonology Archive, a number of variables are claimed to harmonize—not categorially but statistically<sup>12</sup>—with the preferred iambic or trochaic ordering of co-constituents in ordinary language, as shown in Table 9.

Note the significant differences between the Donegan–Stampe scheme (plus Bally's, where relevant) and that of Gil. While everybody concerned (including Lehmann) agrees on the OV/agglutination and VO/flection

Table 9. *Rhythmic holism: Gil (1986)*

IAMBIC RHYTHM (WEAKER – STRONGER)	TROCHAIC RHYTHM (STRONGER – WEAKER)
unstressed before stressed	stressed before unstressed
less- before more-syllable units	more- before less-syllable units
less before more sonorous units	more before less sonorous units
less before more complex syntactically	more before less complex syntactically
less before more important semantically	more before less important semantically
-----	
• (S)OV etc. (i.e., modifier-head order throughout)	• (S)VO etc. (i.e., head-modifier order throughout)
• agglutinative morphology	• flective morphology
.....	
• stress-timed	• syllable-timed
• faster tempo (measured in syllables per unit time or per unit content)	• slower tempo
• simple syllable structure	• complex syllable structure
• high consonant–vowel ratio	• low consonant–vowel ratio
• more obstruent segments (textually and in phonemic inventory)	• more sonorant segments
• more level intonation contours (less pitch variation)	• more variable intonation contours (more melodic)
• non-tonal	• tonal

associations, iambic rhythm goes with VO and allied orders and flective (or no) morphology according to Donegan–Stampe (and, as to VO, also Bally et al.), but with OV and agglutination according to Gil (and, as to OV, presumably Hintze). Also, it is iambic rather than trochaic that potentially has more complex syllable structures according to Donegan–Stampe, while Gil (this time in agreement with Bally) has it the other way round. Now, while Donegan–Stampe and Gil agree on the iambic/stress-timing and trochaic/syllable-timing (or also mora-timing) associations,<sup>13</sup> syllable-timed languages have elsewhere been claimed to have simpler syllable structures than stress-timed languages (Bertinetto 1977, 1989; Dauer 1983; Brakel 1985)—which ought to be better news for Donegan–Stampe than for Gil. Further, to return to another familiar phonological variable, if umlaut implies stress-timing, as is suggested by McCormick (1981), and umlaut also implies flexion, then Donegan–Stampe score another point because they pair stress-timing and flexion (and, unlike Lehmann, they do have vowel harmony on the side of syllable-timing; Bertinetto (1989: 124) concurs), whereas for Gil stress-timing comes with agglutination.

Unlike Donegan–Stampe and Bally, Gil is not banking on stress: in ordinary language, stress at phrase and clause levels seems to him to show a clear iambic bias everywhere, and therefore would not be sufficiently variable to support a typology. Similarly, semantic import in general appears to favour an ordering of weak before strong—e.g., given before new information, topic before comment. In more recent work by Gil the trochaic part of his earlier typology has accordingly been played down considerably (Gil 1987), with the iambic principle of “Small/Weak Precedes Large/Strong” promoted from a genuine variable to a universal or a universal preference—in recognition of Aristotle’s Law: “The iambic, we know, is the most speakable of metres, as is shown by the fact that we very often fall into it in conversation, whereas we rarely talk [trochaic] hexameters, and only when we depart from the speaking tone of voice” (*Poetics*, 1449<sup>a</sup>).

10.6. Other recent approaches to prosodic typology were less ambitious concerning its interdependencies with morphology and syntax. Table 10 summarizes that of Auer & Uhmann (1988) and Auer (1993), where the rhythmic difference between stress-timing and syllable-timing is not seen

Table 10. *Moderate rhythmic holism: Auer & Uhmann (1988) and Auer (1993)*

STRESS-TIMING	SYLLABLE-TIMING
<ul style="list-style-type: none"> <li>• relative diversity of syllable structure, with a tendency towards (syllable-final) consonant clusters</li> <li>• stressed syllables heavy, unstressed syllables light</li> <li>• syllable boundaries ill-defined and variable</li> <li>• reduced vowel system in unstressed syllables</li> <li>• vowel-harmony impossible</li> <li>• preference for word-initial stress</li> <li>• ...</li> </ul>	<ul style="list-style-type: none"> <li>• relative uniformity of syllable structure, with a tendency towards CV</li> <li>• no structural differences between stressed and unstressed syllables</li> <li>• syllable boundaries well-defined and constant</li> <li>• stable vowel system</li> <li>• vowel harmony possible</li> <li>• preference for word-final stress (or no word stress)</li> <li>• ...</li> </ul>
<ul style="list-style-type: none"> <li>• stress-variation grammatically distinctive (e.g., word-class distinction as in English <i>pérvert</i> N – <i>pervért</i> V; focusing and contrastive emphasis encoded by stress alone rather than by special syntactic constructions)</li> </ul>	<ul style="list-style-type: none"> <li>• no grammatically distinctive stress-variation</li> </ul>

as a phonetic one but as the combined effect of various phonological structures and processes,<sup>14</sup> selecting either the phonological word or the syllable as the central prosodic category.

In Kleinhenz's (1996) reinterpretation of this particular typology the basic distinction is whether phonologies are geared to phonological words or phonological phrases, with the syllable as relevant to both types, and the only remaining link to morphosyntax is which phonological and morphosyntactic units coincide: in the word-oriented type syntactic phrases are supposed to coincide with phonological phrases while morphosyntactic words are not to be equated with phonological words, and in the phrase-oriented type it is supposedly the other way round.

10.7. When stress patterns—unstressed before stressed or vice versa—and word order have been correlated, usually in less comprehensive schemes than those of Bally et al., Donegan–Stampe, or Gil, it has usually been in a spirit similar to that of Bally's and Donegan–Stampe's phrase-accent rationale (see above):

- (17) In a VP, main stress should be to the right of V in VO languages and to its left in OV languages [because a phrase's main stress is located on its most deeply embedded constituent, which is ordinarily the innermost complement of the phrase head].

This is from Cinque (1993: 271–272); see further on this topic Bing (1980), Deszó (1982), Harlig & Bardovi-Harlig (1988), or Kim (1988).

While accepting this kind of correlation, and indeed generalizing it to all head and complement constructions, Nespor, Guasti, & Christophe (1996) argue for the primacy of stress, and their reasoning is to do with the relative chronology of early language acquisition, following the lead of Mazuka (1996). On the basis of prosodic cues (stress, falls in pitch, lengthening) available before the continuous sound stream can be segmented into words, language acquirers will recognize the main prominence inside phonological phrases to be initial or final. Once the phrasal rhythm has been determined as being either weak-strong (iambic) or strong-weak (trochaic), the evolving syntax will be fitted into these prosodic moulds, with recursive, hence potentially more expansive complements ordered after or before their heads. While the right or left branching nature of syntax will thus be dependent on phrasal rhythm, rhythm within words (word stress) is assumed to be an independent variable by Nespor, Guasti, & Christophe (1996: Footnote 13).

10.8. Donegan & Stampe (1983) claimed the poetic techniques of rhyme and alliteration, where salient identities are final or initial, as



correlates of the iambic (VO, flection or isolation, etc.) and trochaic (OV, agglutination, etc.) types, respectively. Neustupný (1978) too had rhyming poetry on the flective, VO side, although for different reasons (Section 8.2 above).

There is yet another claim on record linking the sound structure of verse with inflectional and derivational morphology. It is due to Kuryłowicz (1970: 12–16; 1975: 152–158), and is based on the assumption that the rules of metered verse are adaptations of patterns of ordinary speech:

- (18) If verse is alliterative, then there is productive reduplication, but not vice versa.

As Kuryłowicz argues, the initial identities that are required for purposes of alliteration in Old Germanic and elsewhere in Indo-European faithfully reflect the partial copying of roots in reduplication. Noting that alliteration was not favoured in some Indo-European verse traditions although the languages made good use of reduplication, Meid (1971: 105–106) suggests that a phonological variable be added to the *implicatum*:

- (18') If verse is alliterative, then there is productive reduplication and word stress is initial.

The testing ground for these correlations, however, did not extend beyond ancient Europe and India.

10.9. In metrical phonology, as developed over the last twenty years, the lowest constituents that determine the rhythmic organization of (prosodic) words are assumed to be feet; feet result from the grouping of syllables, the units of melodic organization, and, in languages that respect quantity, also of moras, the units of syllabic weight. Feet can vary along various parameters, including that of initial or final prominence (or headedness), yielding trochees and iambs respectively. The inventory of feet utilized across languages has been assumed to be quite limited, with moraic trochees (canonically consisting of two light syllables, i.e., of one mora each), syllabic trochees (consisting of two syllables regardless of weight), and iambs (canonically consisting of a light syllable followed by a heavy syllable) as apparently the most common types (Hayes 1995), and with variations on the trochaic or iambic themes found in particular languages or families (such as the resolved moraic trochee of older Germanic, with a head of at least two moras, not necessarily obtained from a single syllable, and a weak branch of at most one mora; see Dresher & Lahiri 1991).

The most conspicuous manifestation of rhythmic organization in ordinary speech is stress, accruing to heads of feet. But feet are also crucially

involved in patterns other than stress, prosodic as well as segmental ones, not to mention verse. Since the choice of foot type is cross-linguistically variable (within limits), this raises the question of whether particular languages may alternate between several feet or always confine themselves to a single foot for all relevant patterns, thus attaining “metrical coherence” (Dresher & Lahiri 1991). A variety of segmental rules altering syllable and mora structures, especially vowel and consonant lengthenings, vowel reductions and deletions, and vowel-glide alternations, have been shown to co-occur or “conspire” owing to the requirement of metrical coherence or in order to enhance the particular foot structure a language has opted for (Dresher & Lahiri 1991; Hayes 1995: 82–85, 269). Metrical coherence subsumes what has been called “moraic consistency” (Broselow 1995: 198), requiring syllable weight to be defined uniformly for all phonological purposes of a language, although between languages there is variation (for example, with respect to coda consonants being moraic).

Now, looking beyond phonology, at least the lower units of prosodic structure—mora, syllable, foot, prosodic word—have been argued to be precisely those that are also relevant for particular kinds of morphological phenomena, including reduplication, infixation, (Semitic-style, non-concatenative) introflexion, truncation as in nicknames, appellatives, or hypocoristics, reversals and replacements in language games, affix allomorphy, and minimality conditions for (prosodic) words. In itself this basic tenet of Prosodic Morphology (see McCarthy & Prince 1995 for a recent overview) represents a constraint on morphology of this sort, providing it only with a limited range of units to manipulate, viz. prosodic ones.

A farther-reaching constraint would be in the spirit of Dresher and Lahiri’s metrical coherence, prohibiting independent variation of foot types in phonology and morphology:

- (19) Phonology and morphology are metrically coherent; that is, whatever foot structure governs the prosodic and relevant segmental phonology of a language, this same foot structure will also govern its prosodic morphology.

McCarthy and Prince themselves take a more liberal stand, invoking for example trochaic feet for stress, certain broken plural patterns, and minimal word shapes, but iambic feet for versification, the major broken plural pattern, the plural of plurals, and diminutives in Modern Literary Arabic (1990: 262). Broselow (1995: 198–202) likewise has examples of languages that are moraically not quite consistent. While not denying the

possibility of diversity, Hayes (1995: 47, 55, 78), however, regards it as the exception rather than the rule:

- (19') Typically (though not universally), the kind of foot required by a language's morphological system is the same as that required by its stress system.

Surveying the theoretical literature, Loewe (1996) concludes that in the overwhelming majority of the languages covered from this angle phonologies (especially stress) and morphologies (especially reduplication) have indeed been analysed as metrically coherent, and she suggests that the few incoherent languages on record—such as Axininca Campa, allegedly mixed iambic and trochaic—might have been misanalysed, feet being easy to mistake for one another.

### **11. The longer (the whole), the shorter (the parts)**

In quantitative linguistics, especially in the tradition of Paul Menzerath ("the bigger the whole, the smaller the parts"), observations and postulates about interrelationships of the degrees of internal complexity of units at various linguistic levels have inspired conclusions about how sound and meaningful form may co-vary.

Thus, from the two phonological and mixed phonological-morphological observations (a) that there are the fewer phonemes (sound segments) per syllable the more syllables there are per word, and (b) that words have more syllables if the morphology is agglutinative than if it is flective or non-existent (as Skalička and others hold, if on somewhat limited cross-linguistic evidence), (20) would follow, as suggested by Fenk & Fenk-Oczlon (1993) and Fenk-Oczlon & Fenk (1994, 1995):

- (20) There is a positive correlation between agglutinative morphology and simple syllable structure (or at any rate short syllables) on the one hand and flective (and possibly also no<sup>15</sup>) morphology and more complex syllable structure (or at any rate longer syllables) on the other.

Polysynthetic languages, or at least their verbal complexes, ought to side with agglutinative ones on this count, but Dressler's prediction, repeated from (14) above and expanded, is that their syllable structures will be complex (1979: 268):

- (21) The consonant–vowel ratio is comparatively high in polysynthetic languages, where morphemes are comparatively short, as there are many morphemes within a word.

Now, from (20) and the phonological observation that there are the fewer phonemes per syllable the more syllables there are per sentence, (22) follows (same sources):

- (22) There is a positive correlation between higher syllable-per-sentence and syllable-per-word ratios, simpler (or shorter) syllables, agglutinative morphology, and (S)OV basic word order on the one hand and between lower syllable-per-sentence and syllable-per-word ratios, more complex (or longer) syllables, flective (or no) morphology, and (S)V(S)O basic word order on the other.

Actually, the correlation with word order does not follow but was induced by Fenk-Oczlon and Fenk from their modest, but reasonably diverse sample of 29 languages. Their eight SOV languages had an average number of 7.2 syllables per core sentence (and relatively simple syllable structure), while their 19 SVO and two VSO languages only recorded an average of 6.2 and 5.7 syllables per sentence respectively.

Fenk-Oczlon and Fenk subscribe to the view that the difference between syllable- and stress-timed language is essentially due to the stronger or weaker resistance of vowels to reduction, and with vowels elided, the complexity of syllable structures is increasing. Hence the alleged association of syllable-timing, simple syllable structure, and agglutination on the one hand and stress-timing, more complex syllable structure, and flexion on the other.<sup>16</sup>

## 12. The pitfalls of haste, paradox, family resemblance, and singularity

The co-variation of sound and meaningful form has been a favourite source for those teaching by example how not to do typology.

One lesson that the typologist needs to learn is not to derive cross-linguistic generalizations from inadequate samples, or else the results are likely to be shortlived. To teach this lesson, the textbook writer is well-advised to exaggerate. Thus, as a most obviously implausible example to stand the test of proper sampling, Croft (1990: 18–19) hypothetically correlates the “articulation” of the sound inventory and of a grammatical category. Suppose a pathetically inept sample is limited to just Spanish and Ponapean; since both languages have a three-way deictic contrast with demonstratives and lack the uvular stop [q], universal (23) can be induced—only to be abandoned after virtually any arbitrary extension of the sample.

- (23) Languages have a three-way deictic distinction for demonstratives if and only if they lack [q].

The following three cross-level implications are found in Howard (1971) and Greenberg (1978: 51):

- (24) If a language has subject-verb inversion, it also has oral vowels.
- (25) If a language has twenty-seven genders, it also has oral vowels.
- (26) If in any language oral vowels are not found, the language has sex gender (or just as easily, the language does not have sex gender).

Their point is again didactic. Although these three implications all happen to be true, their typological value is nil. What they are meant to illustrate are the paradoxes of material implication. Any proposition implies a true proposition; thus, since ALL languages have oral vowels, any arbitrary *implicans* could have been chosen in (24) and (25). A false proposition implies any proposition; thus, since NO language lacks oral vowels, any arbitrary *implicatum* could have been chosen in (26). Those actually chosen by Howard and Greenberg were probably intended as the most far-fetched ones conceivable, matching sound inventory with word order or the particulars of a grammatical category.

Although there is nothing paradoxical about them, the possible truth of the implications (27) and (28) (from Plank 1996: 103) is not to benefit typology a great deal either.

- (27) For any language, if it lacks the bilabial nasal (/m/), perhaps and/or bilabial plosives (/b, p/), it will be noun-incorporating.
- (28) For any language, if it has a three-way phonemic length opposition both in consonants and vowels, it will not be noun-incorporating, it will lack gender, it will have at least three spatial cases (location at, motion towards, motion from), and its attributive adjectives will agree with nouns in case and number.

Notwithstanding the universal quantifier, these may not be laws of language but observations about families and individuals—given that such basic deficiencies in labials as mentioned in the *implicans* of (27) are only encountered in the Iroquois family, and that Estonian is alone in the world in going to such extremes in contrasting segmental duration as stated in the *implicans* of (28).<sup>17</sup>

### 13. Chimera or vision?

Over the last 250 or so years it has not been established that phonology co-varies with morphology and syntax. But then, it has not been established either that it does not. Holistic optimists may take comfort from the fact that the more conventional INTRA-level implications have not

really been doing much better than INTER-level ones: the question of the truth of most of those could hardly be more open, too. All of typology is a programme of research in progress. If holistic typology has been progressing even slower than word order, relational, morphological, or other partial typologies (and both proof and disproof of a correlation would count as progress), it may be because there has been even more reluctance to pursue its programme methodically, and of course also because of its grander dimensions.

An assertion repeated, even independently, does not become true. Otherwise, on the evidence of the present catalogue, the likeliest candidates for true cross-level links would be agglutination/flection and perhaps morpheme and word size in morphology, constituent order in syntax, and segment inventories, phonotactics, vowel harmony processes, and rhythm in phonology. For all of these parameters it is yet to be seen whether frequency of mention will be confirmed by the sounder evidence of reasonable cross-linguistic samples.

Apart from variation and invariance across languages, diachrony is another source of relevant evidence that is worth being exploited far more systematically: what changes in concert, in one language or in several, may do so for a reason. And changes in phonology have too rarely been perceived as potentially implicationally related to changes in morphology and syntax.

Sometimes typology has given the impression of being a naive inductive search, taking the language-particular facts awaiting to be correlated for granted. To do so would be especially detrimental if it is the cohesion of entire grammatical systems that is at issue. The focus then ought to be on organizing principles of systems that are abstract enough to structure both sound and meaningful form—and these only reveal themselves through analysis and in light of theories. One such parameter might be the relative weight of units, of whatever kind, phonological or morphosyntactic, that occur in syntagmatic combination, and the rhythm that ensues from how strong and weak, or head and dependent, are arranged one after the other. What weak and strong mean and how they interact are complex stories, and different theories will tell them differently; but these would seem stories that holistic typology might thrive on.

And only if it is about general principles of grammar will it really matter to know whether the co-variation of phonology with morphology and syntax is a chimera or a vision.

*Received: 23 August 1997*  
*Revised: 10 February 1998*

*Universität Konstanz*

## Notes

This is a revised and expanded (English) version of a paper read at the conference “Lingvistika na ishode XX veka: Itogi i perspektivy”, Moscow, 1–4 February 1995, and published as Plank (1996). Parts of it were presented at the Inaugural Meeting of the Association for Linguistic Typology, Vitoria-Gasteiz, 7–10 September 1995.

Grateful acknowledgment is made of various kinds of help with this *catalogue raisonné*, received in discussion (after the talks at Moscow and Vitoria), in conversation and correspondence (with Pier Marco Bertinetto, Gertraud Fenk-Oczlon, David Gil, Bernhard Hurch, Aditi Lahiri, Edith Moravcsik, Juan Carlos Moreno, Johan van der Auwera, František Vrhel), in instruction (at Konstanz and Århus), and in anonymous reviewing for this journal.

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1. In fact, three such implications are to be found in Greenberg (1978: 51), but they are intentionally fallacious. See Section 12 below.
2. The words appear to be Antoine Meillet's ([1906] 1921: 16), but the holistic spirit is of remoter ancestry. Earlier views of languages as mechanisms or organisms were no less conducive to holism than structuralism was.
3. See Plank (1991) on the source(s) and background of the Gabelentz quotation, and Plank (1992, forthcoming) on early typology in general, providing a context also for some of the following sections.
4. His eccentricity has sometimes been exaggerated; see Plank (1993).
5. And for this fundamental parameter itself Byrne could rely on a considerable tradition of attempts to generalize from individual to national or racial temperaments. The most respectable of thinkers had succumbed to that temptation.
6. In actual fact, the size of phoneme systems has been claimed to correlate with a sociolinguistic variable. According to Haudricourt (1961), phonemes are the more numerous, the more intensively a speech community practices “egalitarian bilingualism”, with phonemes being prone to get borrowed among the languages in such close contact. In a similar vein, likewise attributing increases in phonemes to borrowing, Trudgill (1997) suggests that small phoneme inventories are characteristic of (i) isolated, low-contact languages (such as Hawaiian) and (ii) high-contact languages where contact is short-term and/or involves imperfect language-learning by adults (as, prototypically, in pidgins), while large phoneme inventories are limited to high-contact language where contact is long-term and involves child-bilingualism (as in Ubykh). And intensity of contact has commonly been held responsible for all kinds of morphosyntactic properties, including the impoverishment of inflection and the rigidity of word order.
7. Milewski's choice of Aranda for illustration was unfortunate since his source credits this language with far fewer phonemes than it actually has, with consonants alone numbering about 30.
8. I use “flective” and “flection” rather than the ambiguous “inflection(al)” in reference to the morphological type.
9. See van der Hulst & van der Weijer (1995) for a recent survey, not specifically focusing on directionality, though. Evans (1995: 741–742) surveys Australia and mentions Warlpiri as showing both regressive and progressive vowel harmony.
10. Equally holistic in its aspirations is Klimov's “contentive typology”, based on the morphosyntactic renderings of subject–object structures (see, e.g., Klimov 1983). Although in programme it is to encompass also phonological or morphonological variation, this side of it has remained undeveloped.

11. Had the Pama-Nyungan languages of Australia been better represented in Skalička's cross-linguistic selection, he would hardly have correlated agglutinative morphology with the absence of agreement. Skalička was in fact aware of Ancient Near Eastern languages such as Hurrian, Urartian, and Elamite, which likewise combine immaculate agglutination with exuberant agreement, but this is belittled as "a kind of primitive concord" (Skalička 1950: 487; see further Plank 1995: 36–37).
12. However, Gil's statistics have been criticized by Schweiger (1990).
13. In a sample-based study, Bybee et al. (1997) question these correlations and conclude that, if anything, initial (trochaic) stress leads to stress-timing. However, what Bybee et al. have investigated was word stress rather than phrasal stress.
14. A point also made, for example, by Bertinetto (1977, 1989) and Dauer (1983, 1987), though without explicit implications for morphology and syntax.
15. Concerning the parenthesis, there are (predominantly) isolating languages, however, whose syllable structures got simpler in the course of their old agglutinative morphologies being lost—e.g., arguably, Chinese.
16. Which on the whole should please Donegan–Stampe more than Gil.
17. Actually, Tlingit (Na-Dene, hence not even a distant relation of the Iroquois family) may also lack labials (according to Ruhlen 1976: 279). Also, it depends on how one analyses the quantity contrasts of Livonian and Sami whether (28) is a "universal" ranging over an individual or a family. (And the three-way contrast of Estonian itself is not beyond doubt either.)

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