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Morphological length and prosodically defective morphemes. By Eva Zimmermann. Oxford: Oxford University Press, 2017. Pp. xii, 350. ISBN 9780198747321. $99 (Hb).

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Eva Zimmermann offers an elegant and meticulous monograph on morphological length-manipulation (MLM) phenomena, that is, length alternations bound to morphological contexts. The work is based on the general claim that all nonconcatenative processes—additive and subtractive alike—arise from an 'enriched notion of affix' (1) that involves prosodic nodes as primitives. The main argumentation in the book aims at establishing that all morphology is additive, a claim that is empirically supported by an impressively broad typological survey that includes representative data sets for attested morphological length-manipulating patterns culled from sixty-two languages. Furthermore, the author argues that MLM operations are best analyzed in a theoretical framework named prosodically defective morphemes (PDM), which, in addition to morphemic prosodic nodes, includes a rather rich representational apparatus, a constraint-based computational component that regulates the integration of such prosodic nodes into larger structures, and a handful of conditions that impose restrictions on gen. PDM not only succeeds in predicting all attested patterns and systematically excluding imaginable yet unattested ones, but also circumvents several problems encountered by alternative accounts. More importantly, it makes some insightful predictions about, for instance, the possible interaction and coexistence of additive and subtractive operations within the same language.

Z sets an ambitious goal: to show that 'all kinds of subtractive MLM can be derived if one takes into account the full range of prosodic nodes and their possible (defective) integration into a base' (34). This way she challenges the shared assumption that subtractive phenomena have a processual character and delivers a model that is consistent with an item-and-arrangement (Hockett 1954) morphology framework and the basic tenets of its more sophisticated version, namely distributed morphology (Halle & Marantz 1993). The core idea, defended throughout the book, is that nonconcatenative morphology (i.e. addition and subtraction) is epiphenomenal and results from the affixation of morphemic prosodic nodes. In order to achieve this goal, Z develops an extended version of GENERALIZED NONLINEAR AFFIXATION (Bermúdez-Otero 2012), in which prosodic nodes (μ, σ, Φ) are treated as independent phonological objects related to each other via association lines and not by projection, as standardly assumed in the PROSODIC HIERARCHY (Nespor & Vogel 1986).

A representative example of additive suffixation is presented in 1a. In Wolof, the reversive suffix /-i/ is lexically specified to trigger gemination (pp. 5–6). Under the PDM framework, gemination is caused by a floating morphemic mora that escorts /-i/ and, more specifically, by its integration into the structure through association to the final root consonant. Subtraction, attested with the causative suffix /-al/ (1b) in the same language (p. 8), is taken to be the surface result of the integration of an underlyingly mora-less vowel. That is, the vowel of the suffix /-al/, which lacks its own mora, takes over the mora of the preceding moraic consonant, yielding the surface effect of degemination.

(1) a. Gemination in Wolof (Ka 1994:87, 88)

BASE	REVERSIVE	
ub	ub:i	‘to open’
teg	teg:i	‘to remove’

b. Morphological consonant shortening in Wolof (Ka 1994:96, 97)

BASE		CAUSATIVE	
seg:	‘to filter’	segal	‘to press oily products’
son:	‘to be tired’	sonal	‘to tire, bother’

Based on Prince and Smolensky’s (1993) notion of CONTAINMENT (‘every element of the input must be contained in the output’) and following previous work on the topic (e.g. van Oostendorp 2006, Revithiadou 2007), Z develops a comprehensive theory that consists of three key components: colored phonological objects, association relations, and the constraints that regulate their mapping.

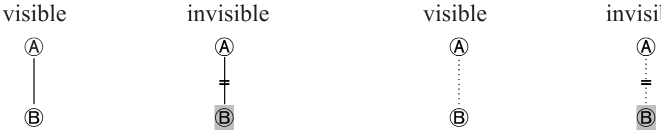
First, she argues that all phonological objects that are part of the underlying representation of a morpheme share the same information about morphological affiliation: that is, they have the same COLOR (indicated as a subscribed symbol, e.g. $V_{\circ}$, $C_{\bullet}$, $\mu_{\square}$, etc.). A phonological object’s morphological color cannot be deleted or changed, although it can be enriched (as explained below in the discussion of color reflection and fusion).

Second, remaining faithful to an extended version of containment that requires the whole input (e.g. segments, features, prosodic nodes, AND their association relations) to be reconstructable from the output at any time, Z identifies four different types of association relations between phonological objects. MORPHOLOGICAL ASSOCIATION LINES (2a) are underlyingly present and can never be erased; they may, however, be silenced if not interpreted by phonetics (2b). Association lines that are introduced during the phonological computation are called EPENTHETIC, and they can also be visible (2c) or invisible (2d). As expected, an element associated with an invisible (morphological or epenthetic) association line becomes invisible as well (and is shaded in the representations).

(2) Types of association lines (p. 44)

MORPHOLOGICAL ASSOCIATION LINES — EPENTHETIC ASSOCIATION LINES

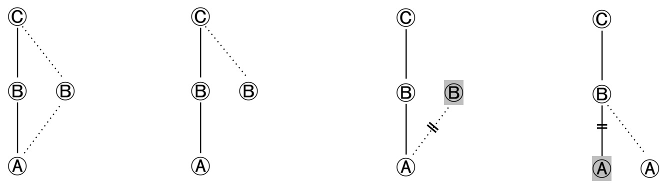
a. phonetically visible b. phonetically invisible c. phonetically visible d. phonetically invisible



Third, a system of constraints regulates—either top-down (‘α dominates β’; α > Do > β) or bottom-up (‘β is dominated by α’; β < DD < α)—the association of a prosodic node of a particular tier with nodes on a higher or a lower tier. For instance, $\mu > Do_p > S$ penalizes a mora that does not dominate a segment in a phonetically visible way (48), as in 2d. If domination constraints are ranked high enough in the grammar, the result is full integration of a morphemic prosodic node in the structure (3a), which gives rise to an additive phenomenon. All other types of integration (3b–d) potentially induce MLM effects.

(3) Basic configurations in PDM (p. 40)

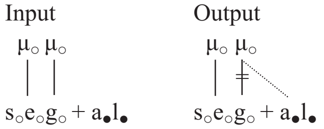
a. Full integration b. Defective integration I c. Defective integration II d. Usurpation



Evidently, the notion of prosodic defectiveness is pivotal in the PDM framework and should be understood as a prosodically incomplete structure where a prosodic node is not dominated by or does not dominate another prosodic node (38–39). According to this definition, a morpheme representation can be prosodically defective not only in the output (e.g. 3b–c) but also in the input (e.g. a segment not associated to a mora). Z argues that the latter type of defective morpheme representations should not be excluded by RICHNESS OF THE BASE because it may lead to MLM phenomena, as is the case with degemination in Wolof. In 4, the underlyingly mora-less causative suffix /-al/ usurps the mora of the preceding moraic consonant, forcing it to surface as a singleton.

(4) Mora usurpation (p. 98)

Input Output



Z completes her framework by introducing a set of restrictions on the representations generated by GEN, such as the RECOVERABLEMORPHEMEORDER condition (RMO, p. 72), which requires the order of morphemes, $M_{\circ} \gg M_{\bullet}$, to be detectable at all tiers. Morpheme order is mirrored as the order of elements 'reflecting' a certain morphemic color: their own (indicated as individual squared colors ⊡, ◼) or the one acquired via domination of a colored element (indicated as sequential squared colors ○●). Given the RMO, instances of nonlocal subtractive affixation, depicted with the abstract example in 5b, are rendered illegitimate. The affixal mora ($\mu_{\bullet}$) usurps the mora of the antepenultimate long vowel of the base and, by doing so, disrupts the order of the morphemes, since it is both preceded and followed by a mora of a different color (i.e. $\mu_{\circ}$). (By crossing the last two association lines, it also violates the NOCROSSING condition; p. 49.)

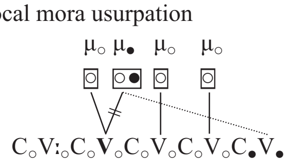
(5) a. Nonlocal subtractive affixation (p. 278)

BASE: $C_{\circ}V\!\!:_{\circ}C_{\circ}V\!\!:_{\circ}C_{\circ}V_{\circ}C_{\circ}V_{\circ}\text{-}C_{\bullet}V_{\bullet}$

DERIVED FORM: $C_{\circ}V\!\!:_{\circ}C_{\circ}\mathbf{V}_{\circ}C_{\circ}V_{\circ}C_{\circ}V_{\circ}C_{\bullet}V_{\bullet}$

b. Nonlocal mora usurpation

RMO ↯



Crucially, the above restriction on GEN predicts nonlocal instantiations of subtractive affixation to be typologically impossible within the PDM framework. Z convincingly shows that her model is also successful in making accurate typological generalizations with respect to attested MLM patterns (Ch. 6, pp. 239–78). Her typological investigation, which includes sixty-two languages from thirty-three different language stocks (covering all seven continent-sized macro-areas; p. 241), reveals 100 different MLM patterns, as shown in Table 1.

Interestingly, twenty-four languages display more than one MLM pattern (243–44). The coexistence of additive and subtractive MLM patterns in a single language can only be predicted by a model like PDM that reduces subtractive nonconcatenative operations to simple affixation.

	ADDITION	SUBTRACTION	
	38	24	
	(+ polarity: 1)		
	ADDITIVE AFFIXES	SUBTRACTIVE AFFIXES	
	24	13	
TOTAL	62 (+1)	37	100

TABLE 1. Number of MLM patterns (p. 245).

Moreover, the affixation approach, unlike alternative accounts (Ch. 7, pp. 279–319), can straightforwardly interpret the bias of MLM patterns toward the right edge, demonstrated in Table 2, as a manifestation of the well-known prefix-suffix asymmetry (e.g. Greenberg 1963).

	AFFECTED BASE EDGE:			
	left	right	ambiguous/both	TOTAL
ADDITION:	12	22	4	38
ADDITIVE AFFIXATION:	3	19	2	24
SUBTRACTION:	3	18	3	24
SUBTRACTIVE AFFIXATION:	–	11	2	13

TABLE 2. Right vs. left edge of the base in MLM phenomena (pp. 249, 253).

With this knowledge as background, let us move to a critical discussion of the book's main contributions. Although a somewhat demanding read, due in part to the rather unfamiliar—at first sight, at least—configurations and constraint names (an index of constraints would have proven extremely handy), Z's book is sophisticated, inspiring, and highly informative. It is also impressively well structured and covers an overwhelming array of empirical data. Significantly, Z develops an enriched yet highly principled and coherent apparatus for phonological representations that can easily extend beyond nonconcatenative phenomena. Her most valuable contribution to the phonology-morphology interface, however, is the new insight she offers into subtractive phenomena: not as rule-based processes or as the outcome of stratal phonologies or morpheme-specific computations, but as operations parallel to segmental affixation. In this respect, Z establishes herself as one of the most fervent advocates of the idea that all morphology is additive.

It would be impossible for such a substantial body of work to be free of shortcomings. Here I focus on two issues that are central to the PDM model, pertaining to the different ways an element can be related to a new color and the way this information is interpreted by the phonological component. As explained above, RMO is a condition that restricts GEN by requiring elements to reflect exponents and their respective order on all tiers. RMO has an interesting repercussion for epenthetic elements as it introduces a distinction between, on the one hand, an epenthetic mora that reflects color via domination of a colored segment (6a) and, on the other, a mora that retains its original colorlessness by domination of an also colorless/epenthetic segment (6b). The same configurations are repeated in 7 with visible information on reflected colors.

(6) Epenthetic mora dominating a colored/colorless segment

a. μ ⋮ S○   b. μ ⋮ S   (S = segment)

(7) Color-informed epenthetic mora dominating a colored/colorless segment

a. μ ⊡ ⋮ S○   b. μ □ ⋮ S

The above configurations may lead one to ask: when does color reflection via domination take effect? Is reflected color visible to constraints during evaluation? Interestingly, when the representations in 6 are evaluated by constraints that refer to epenthetic elements, such as COL!μ (which penalizes any mora not licensed by morphological color; pp. 51, 61), both are taken to be equally violated. This suggests that the epenthetic mora in 6a, which in a sense 'acquires' color via domination, fails to reflect it during evaluation—or possibly it does, but somehow the relevant constraint is insensitive to this type of morphophonological information. An alternative hypothesis would be to assume that color reflection takes place AFTER the phonological system has selected an optimal output. Such an assumption entails that the color-informed correspondent to 6a, depicted in 7a, is phonologically available after the phonological computation is completed.

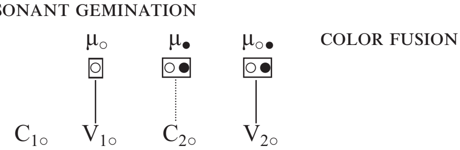
The major problem with this scenario, however, is that it introduces via the back door the RMO as a second, very powerful evaluation mechanism. Phonologically optimal structures may fail to surface not because they are eliminated by the constraint evaluation system but because—when all colors are reflected—they may be rendered illicit by the RMO. Essentially, the gist of my critique pertains to the dimension of timing and, in particular, the point at which the RMO and color reflection become relevant information for phonological computation, an issue that is not addressed at all by Z. From my perspective, the RMO should not be treated as part of phonology proper but, rather, should be viewed as a component of the linearization procedure responsible for the order of exponents. It is an open question, of course, what operations and restrictions are at work during linearization and how exactly they interact with phonological entities.

Importantly, that RMO is too strict a condition is acknowledged by Z with respect to infixation, which is virtually impossible in PDM; affixation of prosodic nodes can meddle with segments and nodes at the edge of the base but not further inside (see 5b). In order to remedy this problem without abandoning the much-needed RMO condition, Z is forced to introduce the notion of COLOR INDEX: an abstract element in the phonological representation that contains strictly morphological affiliation information on a specific tier and functions as a placeholder for a phonological element on this tier (pp. 74–75). As shown in 8, an exponent must have maximally one empty color index at some edge (indicated with the solitary black circle). Z does not explain this arbitrary restriction but she does admit that the motivation for the color index is purely empirical (75).

(8) Segmental infixation with a color index on the moraic, syllabic, or foot tier
 a. $\mu/\ \sigma/\ \Phi_{\bullet\,\bullet}$
 b. $_{\bullet\,\bullet}\,\mu/\ \sigma/\ \Phi$

An empty (e.g. mora-less) color index '$_\bullet$' can acquire a phonological object when fused with an element on the same tier via the operation of INDEX FUSION, illustrated in 9. Here, the additional color index that follows the suffixing morphemic mora is fused with the underlying mora at the base edge. In total defiance of CONSISTENCY OF EXPONENCE, that is, the assumption that the morphological affiliation of phonological objects cannot be changed (McCarthy & Prince 1993), fusion results in an element with two morphological affiliations, namely $\mu_{\circ\bullet}$. (Note that the double color below the affixal (penultimate) mora is assigned via domination of $C_{2\circ}$ and hence represents color reflection, not fusion.)

(9) Exponent order: $M_\circ \gg M_\bullet$ (p. 260)
 Input suffix: /-$\mu_{\bullet\,\bullet}$/
 CONSONANT GEMINATION



The color index and the mechanism of index fusion are both elegantly employed in PDM and are pivotal in deriving the typology of MLM phenomena. They also play a crucial role in capturing the landing sites of infixation (see Yu's (2007) pivot points) within a framework that by design is required to treat infixation as a form of affixation. However, the fact that one of the main pillars of the PDM model lacks a solid theoretical foundation weakens the model's explanatory force and predictive power.

Another significant problem pertains to the relation between color reflection and color fusion. In what respect are these notions different from each other? In a sense, they both seem to provide color information for a phonological object—the same notational convention of boxed color information is used for both mechanisms—but, for a reason not (explicitly) addressed in the book, fusion seems to have a much stronger effect. For instance, epenthetic moras fused with the empty color index of an affix are immediately assigned the affixal color and can no longer be treated as colorless by Col!-type and other epenthesis-sensitive constraints (see e.g. the discussion on Balangao, pp. 210–11). In other words, fused colors can be 'seen' by constraints during evaluation, which is definitely not the case with color reflection.

Summing up, it is evident from the discussion so far that pivotal notions in Z's framework, such as 'reflection of color' and 'acquiring morphological color through fusion', and the associated assumptions (RMO, color index) or mechanisms (color fusion) that lie behind them should have been spelled out more carefully and should have received a more robust theoretical substantiation in the book. It does not come as a surprise, however, that the more disputable aspects of the PDM framework pertain to issues of linearization, one of the least explored areas of phonological research. Z, however, gallantly takes up the challenge to address these issues and makes a good start in working out the fine-grained details of linearization from a phonologist's perspective. If nothing else, she makes it clear what a daunting task it all is.

To conclude, Z maps out the terrain of MLM patterns with admirable devotion to the empirical data and consistency with the theoretical model she develops. Despite some weaknesses discussed above, she succeeds in delivering an impressive piece of research, an absolute must-read book for anyone interested in the study and typology of MLM phenomena and, by extension, in the morphology-phonology interface.

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