A Construction-Based Approach to Multiple Exponence

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Abstract This study brings to bear Optimal Construction Morphology (Caballero and Inkelas 2013) on the phenomenon of multiple exponence (ME), in which the same morphological property is exponed by more than one morphological component of a complex word. ME is a prevalent phenomenon that should receive central coverage in any morphological theory. OCM is well suited to capture ME through its intrinsic architecture of local optimization choices driven by the goal of achieving a target meaning for each word that the morphological grammar is tasked with producing. Each type of ME elucidated in Harris (Multiple exponence. Oxford University Press, Oxford, 2017) is discussed and shown to be emergent from existing principles of OCM; the article pays special attention to compounding-style ME, which is argued to draw upon the same basic construction type utilized by Inkelas and Zoll (Reduplication: doubling in morphology. Cambridge University Press, Cambridge, 2005) in a construction grammar approach to reduplication.

Keywords Phonology-morphology interface · Typology · Multiple exponence · Compounding · Stem-identity

1 Introduction

Multiple (extended) exponence, the one-to-many mapping between meaning and form in morphological expression, has been the topic of much recent debate in the morphological theoretical literature (Anderson 1992; Halle and Marantz 1993; Noyer 1997; Stump 2001; Harris 2009, inter alia), though it is only until recently that its cross-linguistic distribution and typological properties have been addressed

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(Caballero and Harris 2012; Harris 2017). In this paper we show that multiple exponence, in its various forms, can arise organically from basic principles of Optimal Construction Morphology (OCM), a construction-based theory of morphology. In a previous paper (Caballero and Inkelas 2013) we proposed a basic typology of multiple exponence patterns and offered OCM analyses of some types of multiple exponence. In this paper we review a fuller typology, based on Harris (2017), and incorporate a principle independently needed for analyzing reduplication to handle a type of multiple exponence not discussed in the previous paper, which involves constructions that are synchronically and/or diachronically related to compounding requiring stem-identity.

We also draw attention, with Harris (2017), to the fact that while multiple exponence is often discussed in the context of inflection, it also occurs with derivational morphology. This is predicted in OCM, a theory which is designed around the step-by-step construction of words in reference to a meaning target. The meaning target includes information that both inflectional and derivational morphology can provide, and therefore multiple exponence can be found in both domains. We illustrate the role of inflectional and derivational multiple exponence though examination of Lusoga (Bantu; Hyman and Inkelas to appear), a language exhibiting redundant expression of both inflection and derivation in its verbal paradigms.

2 What Is Multiple Exponence?

Harris (2017: 9) defines multiple exponence as follows:

> Multiple (or extended) exponence is the occurrence of multiple realizations of a single morphosemantic feature, bundle of features, or derivational category within a word.[1]

Multiple exponence (henceforth ME) is illustrated in (1) in the following example from Meskwaki (Fox), an Algonquian language:[2]

(1) Meskwaki (Fox) (Algonquian; Dahlstrom 2000:74)

a. ne-nowi:	'1-go.out'
b. ke-nowi:	'2-go.out'
c. **ne**-nowi:-**pena**	**'1**-go.out-**1.**PL'
d. **ke**-nowi:-**pwa**	'**2**-go.out-**2**.PL'

[1] A broader definition is given in Caballero and Harris (2012), where multiple realizations of meaning are realized in more than a position within a *domain*, both single words but also syntactic constructions. We limit ourselves here, like Harris, to examining multiple exponence within a single word.

[2] Abbreviations used in this paper are: *A* agent, *AN* animate, *AOR* aorist, *APPL* applicative, *CAUS* causative, *CM* class marker, *COMP* competive, *DIM* diminutive, E exclusive, *ERG* ergative, *EXT* extensions, *FUT* future, *FV* final vowel, *IRR* irrealis, *NOM* nominative, *NS* non-singular, *NUM* number, *OBJ* object, P patient, *PART* partitive, *PERS* person, *PL* plural, *PRES* present, *PST* past, *REC* reciprocal, *SBJV* subjunctive, *S, SG* singular, *SUBJ* subject, *TNS* tense, *TR* transitive.

ME is highly relevant to competing morphological theories because of observations that it is typologically unexpected. Various universal (if violable) principles banning it have been proposed in Anderson (1992), Kiparsky (2005), Noyer (1997), Siddiqi (2006), Menn and McWhinney (1984), among others. The nature of the principle, and even its functional underpinnings, vary according to the model of morphology being assumed. Kiparsky (2005) and Siddiqi (2006), operating in a general item-based approach to morphology, express the prohibition against ME as a preference for structural simplicity, or economy, summarized in (2):

(2) a. ECONOMY: "Among equally expressive expressions, the simplest is optimal" (Kiparsky 2005:114)
b. MINIMIZE EXPONENCE: "The most economical derivation will be the one that maximally realizes all the formal features of the derivation with the fewest morphemes" (Siddiqi 2006: 14, 162)

Anderson (1992), adopting a realizational approach in which features in the inflectional descriptions of words trigger phonological rules spelling out those features, proposes a universal principle whereby a spell-out rule is blocked if the feature in question is already lexically present on the word or has been spelled out by a previous rule. Menn and McWhinney (1984), in a discussion of the Repeated Morph Constraint (a phenomenon related, though not identical, to ME), adopt a related stance: inflectional rules are blocked if the stem they would apply to already bears the formative that the spell out rule would supply. Menn and McWhinney suggest that parsing, or an 'affix-checking' consideration, motivates this principle. If a word is already sufficiently marked for a given morphological property, there is no need to mark it again. Redundancy is thus avoided.

Given these assumptions and mechanisms, some cases of ME receive alternative analyses that exclude redundancy. This is, for instance, the case of German plural marking in nouns, exemplified in (3):

(3) German plural noun marking

Singular	*Plural*	*Gloss*
a. Arm	Arm-**e**	'arm'
b. Bild	Bild-**er**	'picture'
c. Vater	V**ä**ter	'father'
d. Boden	B**ö**den	'earth'
e. Wurm	W**ü**rm-**er**	'worm'
f. Hals	H**ä**ls-**e**	'neck'

Matthews (1974: 149) adduces the forms in (3e-f) as examples of ME, since two markers that independently mark plurality (an *-e* suffix and umlaut) co-occur in these nominal forms. In an alternative analysis, umlaut is not a separate exponent of plurality, but instead emerges in plural marking as an abstract ('floating') feature; cf., e.g., Wiese (1996). But while the status of patterns like the one exemplified in (3) may be treated as ME or not depending on analytical choice, other cases are harder to reanalyze away in this fashion.

Stump (2001), who departs from the sources cited so far and explicitly recognizes the prevalence of ME cross-linguistically, builds an affordance for ME

directly into his theory of Paradigm Function Morphology. For Stump, ME occurs whenever there is duplication of inflectional spell out rules across the different blocks/functions of the inflectional module of the grammar. The prediction is, contra Anderson and others cited above, that ME is expected, though ME is only expected in inflection.

Harris's (2017) cross-linguistic survey of ME reveals that this phenomenon is in fact not uncommon. Many cases of ME identified by Harris involve inflectional morphology, as expected in Paradigm Function Morphology, including agreement, negation, number, etc. However, Harris also presents cases documented in the literature of ME involving derivational morphology (e.g., reciprocals in Chichewa, applicatives in Choguita Rarámuri, among other cases) (see also Caballero and Harris 2012). An example of derivational ME is found in Svan, a Kartvelian language of Georgia, where medio-passives, pluractionals and causatives exhibit ME (Harris 2017:63). Svan causative ME is exemplified in (4) (doubled causative exponents are bolded):

(4) Svan causative ME (Topuria 1967 [1931]; cited in Harris 2017: 63)[3]

a.	xägem-**n-un**-e	'causes to build'	[Lent'ex dialect]
b.	xamar-**n-un**-e	'causes to prepare'	[Bečo dialect]
c.	xašx-**un**-āl-**wn**-e	'causes to invite'	[Lašx dialect]
d.	xak'r-**un**-a-**wn-**e	'causes to open the door'	[Lower Bal dialect]

It is clear that any theory of morphology needs to be able to generate ME, not just rule it out. Moreover, ME needs to be generated both for inflection and for derivation. In this paper we illustrate the capacity of OCM to generate the diversity of ME patterns documented to date.

In section 3 we present a finer-grained descriptive typology of ME, based on Harris (2017). In section 4, we review from Caballero and Inkelas (2013) how OCM generates several of these subtypes. In section 5, we discuss a subtype that Caballero and Inkelas (2013) did not address, and propose an analysis within OCM. In section 6 we relate this analysis to the construction-based analysis of reduplication offered in Inkelas and Zoll (2005), showing that although neither phenomenon reduces to the other, the same basic apparatus can be invoked for both.

3 A Descriptive Typology of ME

Based on a survey of 270 patterns of ME in 200 languages, Harris (2017) provides a classification ofME into several subtypes based on historical origin, which show

[3]The Svan examples are represented as given in Harris 2017 (with morpheme breaks and free translations of the complex words, but no morpheme-by-morpheme glosses).

Table 1 Multiple exponence types in Harris (2017)

Harris' ME types	Characteristics
Type 1 "periodic"	The presence of a certain "carrier" morpheme (C) is always accompanied by a "dependent" exponent E; when the base of affixation already contains E, ME results (e.g. B[ase]-E-C-E)
	The E morphs involved in periodic ME are often featurally and formally identical and are typically non-adjacent
	Found in Nakh-Daghestanian languages, Archi, Breton, Camling, Noon, Sentani, Laz
Type 2 "alternating"	Similar to type 1, but carrier morpheme C requires E to be added along with it only if E is already present in the base.
	Suggested to be only inflectional (2017: 54)
	The morphs involved in ME are generally featurally and formally identical and always non-adjacent
	Found in Icelandic, Latin, Georgian, dialects of Mexican Spanish
Type 3 "reinforcement"	ME not dependent on a carrier morpheme C
	ME morphs are formally distinct in surface form and typically adjacent
	The morphs involved in ME are generally featurally identical
	Found in Svan, Rarámuri, Udi, Oromo, Kinshasa Lingala
Type 4 "accidental"	No dependency on a carrier morpheme
	ME morphs are never formally identical, and may be adjacent or not
	The morphs involved expone distinct features (in addition to the shared feature they both expone); thus ME is never superfluous
	Found in Tsakhur, Munsee, Jijeli Arabic, Vogul and Batsbi

recurrent properties in their current, synchronic states. This typology is summarized in Table 1 (where each type is provided with the label used in Harris' survey).

Type 4 is the only case we will not develop an OCM analysis of here going forward, since this type of ME always involves exponents that make unique contributions to meaning in addition to the categories that are multiply expressed. Referred to as 'overlapping' in Caballero and Inkelas (2013), Type 4 ME is exemplified in Munsee (Eastern Algonquian). As shown in (5), animacy (abbreviated as AN' in the glosses) is realized in the stem (*–ne·w-* 'see') as well as, redundantly, in every subsequent morpheme, all of which also uniquely express other inflectional features (Harris 2017: 66):

(5) ME of animacy features in Munsee (Harris 2017: 66)
kə-**ne·w-á·-w-ak**
1-see(**AN**.OBJ)-LOWER.**ANIMATE**.OBJECT[4]-3**AN**.OBJ/SUBJ-**AN**.PL
'You (sg) see/saw them (animate)'

OCM (as well as most other morphological frameworks) can handle this phenomenon with ease, as discussed in Caballero and Inkelas (2013).[5] In this paper we focus instead on the more difficult problem of layers of morphology which seem to be entirely redundant at the point at which they are added – what Caballero and Inkelas (2013) term 'superfluous exponence'. These can be found in Harris's first three types. Examples are provided in (6)–(8).

Type 1, illustrated in (6) for Batsbi with E-B-E-C affix order, occurs when addition of the "carrier" transitivizer *-i* suffix (C, in the E-B-E-C schema) combines with a stem which contains an exponent (E) of gender (*y*, glossed as "CM," for class marker). The transitivizer is obligatorily accompanied by addition of another gender exponent, so that adding it to a gender-marked stem E-B entails the duplication of -E, yielding E-B-E-C (Harris 2017: 56):

(6) Type 1: E-B-E-C, illustrated here for Batsbi; "B" is the root, "E" marks gender, and "C" is a transitivizer:
i. **y**-eʔ-e^{n}
CM$_{E}$-come.SG$_{B}$-AOR 'she came'
ii. **y**-oʔ-**y**-i-e^{n}
CM$_{E}$-bring$_{B}$-**CM**$_{E}$-TR$_{C}$-AOR 's/he brought her'

Type 2, illustrated in (7) for Czech (Harris 2017: 60) with B-E-C-E affix order, occurs when a "carrier" element that does not itself independently require "E" triggers a second addition of "E" when combining with a base that is already marked for "E". In Czech, "E" is case, and "C" is an optional particle, not glossed by Harris. The pattern holds for all six cases; only nominative is illustrated here:

(7) Type 2: B-E-C-E, illustrated here for Czech; "B" is the root, "E" marks case, "C" is an optional particle:
i. te-**n**
this-**NOM** 'this, that'
ii. te-**n**-hle-**n**
this-**NOM**-PART-**NOM** 'this, that'

[4]This suffix is glossed as 'LAO' in the original description; Harris describes its function as indicating that the object is animate and lower on the person hierarchy than the subject (Harris 2017:67).

[5]This is because in 'overlapping' multiple exponence, as attested in Munsee and many other languages, no single exponent is truly redundant. Given that each exponent in this kind of pattern makes a unique semantic contribution to a complex word, it can be modeled in a variety of frameworks as the requirement to realize each non-redundant inflectional feature, bundle of features or derivational information in a complex word (e.g., primary vs. secondary exponence in Distributed Morphology (Noyer 1997)).

As discussed in Harris, this pattern of ME in Czech is Type 2 rather than Type 1 because the particle *hle* does not occur independently with cases (e.g., there is no **hlen, *hlenho*, etc.) (2017:60).

Type 3, illustrated here in (8) for Maay (Paster 2007, 2008), with B-E-E(-E) affix order, is the type in which one exponent is optionally followed by another with the same meaning. Harris terms this "reinforcement", citing examples from Oromo, Svan, Khinaliq, and other languages (Harris 2017: Chapter 3).

(8) Type 3: B-E-E, illustrated for Maay; "B" is the noun root, and "E," of which there are two suppletive but equivalent allomorphs, encodes plural:

a.	gaʔam-o ∼ gaʔañ-yal ∼ gaʔam-o-yal	'hand-PL(-PL)'
b.	ees-o ∼ ees-yal ∼ ees-o-yal	'grass-PL(-PL)'
c.	basal-o ∼ basal-yal ∼ basal-o-yal	'onion-PL(–PL)'

Harris's Types 2 and 3 are the ME types analyzed in Caballero and Inkelas (2013). We will recapitulate those analyses in section 4, in which we introduce OCM. The new focus of this paper, in section 5, is on Harris's Type 1.

4 Optimal Construction Morphology

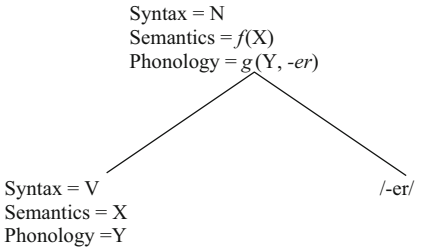
Optimal Construction Morphology (OCM; Caballero and Inkelas 2013) is a construction-based theory of morphology in which word structure emerges from the bottom-up, optimizing one-by-one combination of morphological structures, driven by constant pressures of well-formedness and faithfulness to a target meaning M.

In OCM, exponence in general, and ME in particular, emerge from the interaction of different constraints with the available constructions in the lexicon, or constructicon. ME is neither directly required nor directly banned.

4.1 The Constructicon

In OCM, morphological structures are derived through constructional schemas (e.g., Booij 2010) that encode relationships between the form of morphological elements (phonological form as well as any syntactic specification) and meanings (semantic operators). Morphologically complex words are built from two-level constructions involving lexical bases plus morphological operations. This is exemplified in (9), using two different notations for a morphologically complex word in which a daughter 'base' node (here, a verb) combines with an affix (here, the agentive *-er* suffix in English). (9a) uses the graphical notation of Sign Based Morphology (Orgun 1996), in which the base and affix are daughters of a branching mother node. A more compact schema, following the notation of Booij (2010), is given in (9b) (e.g. Booij 2010: 32). We will use this latter, more compact notation in the paper.

(9) a. Mother and daughter nodes in a binary-branching schema



b. $[V_i\text{-}er]_{Nj} \leftrightarrow [\text{CAUSER OF ACTION}_i]_j$

4.2 Exponence Strength

In OCM, an important component of the constructicon involves exponence strength. Some constructions, as in the example above, expone morphological properties at full strength. That is, the probability that the construction above creates a noun is 1. However, Caballero and Inkelas (2013) propose that some constructions expone properties only weakly, at partial strength. In such a case, the probability that the construction expones a given feature would be less than 1. Weak exponence can be the result of massive homophony (the more homophonous affixes there are, the less strongly each encodes its associated morphological property); it can also be an effect of the receding productivity of an affix, or any other factor that reduces the decomposability or parsability of such an affix as treated in the literature that addresses processing aspects of morphological complexity (Hay 2002; Hay and Baayen 2002, 2005; Hay and Plag 2004, inter alia). 'Weak exponence' in this sense is the synchronic equivalent of what in the diachronic literature is known as 'hypercharacterization', a change in stem or word form when an inner marker is not marking a category transparently enough, triggering a second layer of morphological exponence to 'support' or 'supplement' the loss of contrast in a morphologically complex word (Donohue 2003; Dressler 2004; Lehmann 2005; see also the discussion in Harris 2017). Weak exponence plays a role in ME, as we will see below.

4.3 Constraints

The constraints that optimize the collection of constructions combining in any given word consist of faithfulness and markedness, or well-formedness constraints. These are described in detail below.

4.3.1 Faithfulness

Faithfulness constraints compare candidates, on each cycle of competition, to the meaning target that exists for every word throughout its derivation. The meaning target ('M') includes semantic content, inflectional features (e.g., person, polarity, number, tense, aspect, mood, etc.), part of speech information, verbal argument structure (including number of arguments and the thematic roles to which they link), as well as lexical meanings. Candidates formed via constructions that achieve greater target faithfulness are better, all else equal, than candidates which are less faithful to the target meaning M.

(10) Example M target: [CAT = NOUN, NUM = PLURAL, SEM = MOTHER]

(11) FAITH-M: Assess violations proportional to the mismatch between the M components of the target and the candidate.
(A component of a candidate not present in M will incur 1 violation;
a component of M not expressed in a candidate will incur 1 violation;
a component of M expressed only weakly in a candidate will incur a violation greater than zero but less than 1; etc.)

As described above, M is a broad category. OCM is neutral on the formal details of how syntactic and semantic information should be represented. Certainly the more precise a model, the finer-grained the assessment of M-faithfulness will be. In this paper we are relatively informal about the content of M, sticking to simple dimensions like those in (10).

Because of the rich content of M, it would make sense to treat Faith-M as a family of different types of faithfulness. It would also make sense to assign the highest weight to faithfulness to properties with the richest information content, or content that is in some way valued as most important to express in any given word (perhaps along the lines of Bybee's (1985) Relevance Principle). (See Inkelas 2016 for one attempt in this vein.)

For simplicity in interpreting tableaus here, however, we show only one Faith-M constraint per tableau and list all of the violations in each cell.[6] An example of how Faith-M selects among candidates is shown below, in which various constructions that could combine with the stem *mother* are comparatively assessed by Faith-M:

[6]Violations here are calculated in terms of conflicting or missing information that candidate forms have in relation to the meaning target M.

(12)

	Input: [mother] MOTHER NOUN		Target M: MOTHER NOUN PL	FAITH-M
a.	(ID)	[mother]	MOTHER NOUN	*! (NUM=PL)
☞ b.	*-s* PL	[mothers]	MOTHER NOUN PL	
c.	*-ly* ADJ	[motherly]	MOTHERLY ADJ	*!** (SEM, CAT, NUM)
d.	*-Ø* VERB	[mother]	ACT AS MOTHER VERB	*!** (SEM, CAT, NUM)

The winning candidate in each tableau, or round of construction competition, is the input to another round, unless the identity candidate wins. In this respect, OCM resembles Harmonic Serialism (e.g., McCarthy 2000, 2010; Wolf 2008).

4.3.2 Well-Formedness

Well-formedness constraints come in several varieties (Caballero and Inkelas 2013). Three salient types of constraints figure in this paper: the pressure to be as close to "Word" as possible on the wordhood scale, phonological stem shape considerations such as minimal or maximal size, and paradigmatic uniformity (or non-homophony) constraints. Here, we mention only BE-WORD, as it is specific to OCM.

To be well-formed, the output of the morphological component must be of category "Word." Building on concepts in the literature of X-bar categories (Selkirk 1982), types (Riehemann 1998; Orgun 1996), strata (Kiparsky 1982, 2000) and ordered rule blocks (Anderson 1992; Stump 1991, 2001), Caballero and Inkelas (2013) posit a wordhood scale whose endpoints are Root and Word and which can contain any number of (potentially unordered) intermediate Stem types. The layers of every morphological construction in the constructicon are specified for points on this scale. Some constructions apply to Roots and produce Roots; others apply to Roots and produce Stems, etc. Because the "goal" of the morphological grammar is to produce words, Caballero and Inkelas posit a markedness constraint assessing candidates' penalties in proportion to their scalar distance from Word, along whatever scale is appropriate for the language in question (on scalar markedness constraints, see Mortensen 2006). A candidate labelled "Root" in a language with a three-point Root-Stem-Word scale would violate BE-WORD twice.

(13) BE-WORD: For a candidate at point *i* on the *n*-point Wordhood scale (where Root is at point *1* and Word is at point *n*), assess *n-i* violations

BE-WORD has the effect of motivating affixation that will bring a Root or Stem closer to Wordhood.

4.4 Multiple Exponence in OCM

In OCM, multiple exponence (ME) can result from the interaction of any of the faithfulness and markedness constraints of OCM. Below we describe how the ME types in Harris' typology emerge from this model.

4.4.1 Harris' Type 3 ("Reinforcement")

In ME type 3, 'reinforcement' ME, an outer exponent is added to an inner exponent that is less productive or less phonologically segmentable. 'Reinforcement' ME is characterized as generally involving adjacent exponents, though Harris clarifies this is not a definitional characteristic of reinforcement ME (Harris 2017: 62). OCM offers two different (compatible) sources for this kind of pattern: differential exponence strength, and the advancement of words-under-construction along the wordhood scale. A second exponence of the same property can accomplish one or both of the goals of strengthening degree of exponence and advancing the word-under-construction towards the goal of wordhood.

In Choguita Rarámuri (Uto-Aztecan, Mexico; Caballero 2008), classified in Harris' typology as Type 3, both of these factors contribute to the double exponence of applicative marking. An inner, Root-level applicative suffix (-APPL_R) weakly expones the information that the verb has acquired a new argument; this suffix produces a Stem, advancing the Root one degree along the wordhood scale (Root-Stem-Word). However, applicative is too weakly exponed to fully satisfy M-Faith. The weakness of these applicative suffixes is due to the fact they are lexically conditioned, relatively unproductive and phonologically reduced (Caballero 2008). A second, Stem-level exponent of applicative (-APPL_S), which is stronger (fully productive and phonologically unreduced), fulfills this need. The resulting word has full-strength exponence of applicative:

(14) Choguita Rarámuri applicative ME

a.	sú-**n**-**ki**-ma	'sew-**APPL**$_\text{R}$-**APPL**$_\text{S}$-FUT.SG'
	boto-bú-**n**-**ki**-ma	'sink-TR-**APPL**$_\text{R}$-**APPL**$_\text{S}$-FUT.SG'
b.	pá-**s**-**ki**-ma	'throw-**APPL**$_\text{R}$-**APPL**$_\text{S}$-FUT.SG'
	sú-**n**-ti-**ki**-ma	'sew-**APPL**$_\text{R}$-CAUS-**APPL**$_\text{S}$-FUT.SG'
	rarí-**w**-ti-**ki**-ma	'buy-**APPL**$_\text{R}$-CAUS-**APPL**$_\text{S}$-FUT.SG'

The inner (APPL_R) and outer (APPL_S) applicative suffixes exemplified in (14) are identical in terms of their meaning (increasing the valence of the verb by adding a benefactive argument), but differ in terms of their relative placement

within a strength scale and their structural properties.[7] The relative placement of applicative suffixes in this language within a strength-of-exponence scale is schematized in (15):

(15)

Weakest.....		.....Strongest
0	0.5	1
No exponence	*weak exponence*	*strong*

The local, incremental OCM analysis of this pattern is as follows: the inner suffixes, with restricted lexical distributions and reduced forms (*-n, -s, -w*), are weak exponents of the applicative that combine with roots to produce an inner Stem constituent ('Stem 1').[8] This is exemplified in (16) in the derivation from a root input to a Stem level 1 output.

(16)

	Input = [su]$_{\text{ROOT}}$ SEW		M: SEW FUT SUBJ = SG APPLICATIVE	M-FAITH	BE-WORD
☞ a.	[[ ]$_{\text{ROOT}}$ -n]$_{\text{STEM1}}$ APPLICATIVE (.5)	[sun]$_{\text{STEM1}}$	SEW APPLICATIVE (.5)	.5	**
b.	[[ ]$_{\text{ROOT}}$ -Ø]$_{\text{STEM1}}$ Ø	[su]$_{\text{STEM1}}$	SEW	1	**
c.	IDENTITY FUNCTION	[su]$_{\text{ROOT}}$	SEW	1	***

While unproductive and phonologically reduced, the inner applicative suffixes are the only constructions available at this stage of the derivation for words under construction that have applicative within their M target.[9] That is, the inner applicatives attach to Roots to form Stem 1 constituents.

[7]In OCM, individual constructions in a given language may specify the input they may combine with (e.g., Root vs. Stem) or the type of output they produce (i.e., advancing, preserving or lowering stem type), or they may be unspecified for these properties. Constructions that specify input and/or output type are limited by that specification as to what they can combine with and what type of constituent they can produce. Constructions that are not specified for input type can combine with any type of input (see more discussion in Caballero and Inkelas 2013).

[8]These suffixes are always unstressed (vs. suffixes that may be stressed in the language) and may be the target of general phonological processes (e.g., round vowel harmony) or may undergo post-tonic vowel reduction (to schwa) or deletion (Caballero 2008). These phonological properties render these suffixes homophonous with other constructions in the language. This greater degree of homonymy in morphological exponence renders these affixes as weak exponents of the applicative construction in the sense described above.

[9]In this tableau we only consider candidates that include the affixes that are lexically selected by the input stems (i.e., there is no evaluation of candidate [suw] or [sus]). The lexically incompatible stem-applicative combinations can be modeled within OT through constraint indexation (Pater 2000), cophonologies (Inkelas et al. 1997) or another framework that models lexically and morphologically conditioned variation. We leave discussion of these alternatives outside of the scope of this paper.

The outer *-ki* suffix, fully productive and always aligned with a syllable boundary, is a strong exponent of the applicative that combines with 'Stem 1' constituents and produces 'Stem 2' outputs. The candidate output with ME is optimal given the imperative to have strong exponence of the applicative in this language.

(17)

	Input = [sun]$_{STEM1}$ SEW, APPLICATIVE (.5)		M: SEW FUT SUBJ = SG APPLICATIVE	M-FAITH	BE-WORD
a.	[[ ]$_{STEM1}$ -Ø]$_{WORD}$ Ø	[sun]$_{WORD}$	SEW APPLICATIVE (.5)	.5	
☞ b.	[[ ]$_{STEM1}$ -ki]$_{STEM2}$ APPLICATIVE (1)	[sunki]$_{STEM2}$	SEW APPLICATIVE (1)	1	*
c.	IDENTITY FUNCTION	[sun]$_{STEM1}$	SEW APPLICATIVE (.5)	.5	

This analysis parallels the proposed diachronic source of this pattern, where an outer exponence 'reinforces' an inner exponent that has lost productivity and is phonologically opaque or difficult to parse within the complex word, a process described in the literature as 'hypercharacterization' (Dressler 2004; Lehman 2005, inter alia).

In a different type of pattern, a morphological construction realizes a given feature F and moves the input from Root to Stem, and an outer morphological layer which expones a new feature, G, while also redundantly exponing feature F, promotes the construct from Stem to Word. This pattern is exemplified in Archi (North Caucasian) ME of number (data from Müller 2006; citing Kibrik 1991). In Archi, the inner plural suffix in (18c-d), exponing number, appears superfluous, given that the outer suffix encodes both case and number:

(18) Archi

Singular		Plural	
a.	gel-li	c.	gel-**um**-čaj
	cup.SG-ERG.SG		cup-**PL**-ERG.PL
b.	qIonn-i	d.	qIinn-**or**-čaj
	bridge.SG-ERG.SG		bridge-**PL**-ERG.PL

However, from a bottom-up perspective, neither suffix is redundant. Both do work in advancing the construct from root to word.

In Caballero and Inkelas's (2013) OCM analysis of Archi, the schemas for the relevant Archi constructions are provided in (19):

(19)

Pl suffixes: take Root to Stem	[[ ]$_{ROOT}$	-um]$_{STEM}$
Zero construction: takes Root to Stem	[[ ]$_{ROOT}$	]$_{STEM}$
Case suffixes: take Stem to Word	[[ ]$_{STEM}$	-čaj]$_{WORD}$
	[[ ] $_{STEM}$	-li]$_{WORD}$

Each construction specifies either content (syntactic or semantic properties), stem type information, or both. Thus each has something to contribute. The incremental analysis of Archi is illustrated in the following tableaux. In (20a), which starts with a "Root" as input and has an ergative, plural word as its target output, the only viable candidates are ones formed by constructions that take "Root" as their base. Of these, the construction with the Stem-forming plural suffix (20aii) best matches the meaning target M. The resulting Stem is then input to (20b), in which Stem-attaching constructions compete; of these, the construction which produces an ergative plural Word (20bii) is judged as optimal.

(20) Derivation of gel-**um**-čaj ('cup-**PL**-ERG.PL')

a. Initial round of affixation: Root → Stem

	Input = [gel]$_{ROOT}$ CUP		M: CUP ERG PL	M-FAITH	BE-WORD
i.	[[ ]$_{ROOT}$ Ø]$_{STEM}$	[gel]$_{STEM}$	CUP	**! (ERG,PL)	*
☞ ii.	[[ ]$_{ROOT}$ um]$_{STEM}$ PL	[gelum]$_{STEM}$	CUP PL	* (ERG)	*
c.	ID FUNCTION	[gel]$_{ROOT}$	CUP	**! (ERG,PL)	**

b. Next round of affixation: Stem → Word

	Input = [gelum]$_{STEM}$ CUP PL		M: CUP ERG PL	M-FAITH	BE-WORD
i.	[[ ]$_{STEM}$ li]$_{WORD}$ ERG, SG	[gelumli]$_{WORD}$	CUP ERG SG	*!* (SG,PL)	
☞ ii.	[[ ]$_{ROOT}$ čaj]$_{WORD}$ ERG, PL	[gelumčaj]$_{WORD}$	CUP ERG PL		
iii.	ID FUNCTION	[gelum]$_{STEM}$	CUP PL	*! (ERG)	*

A subsequent round of evaluation, in which (20bii) is input, would result in the ID candidate being the winner; this step, not shown here, ends the derivation and results in [gelumčaj] as the output of the morphological grammar, given target [CUP, ERG, PL]. In this case, ME is an emergent effect, resulting from coincidental duplication of the feature [plural] across affixes of different types in the lexicon. It is neither forced, nor, prohibited, by any explicit principles referring to ME.

4.4.2 Harris' Type 2 ("Alternating")

In ME type 2 'alternating,' the addition of an outer 'carrier' affix causes an inner exponent E to be added again, outside the 'carrier' affix, even though the carrier affix itself does not generally have to co-occur with that exponent.

In OCM, this pattern can result when the outer affix demotes the stem on the wordhood scale in a manner that adding another instance of E can repair. It can also result when the outer affix negates the contribution made by the inner affix to M-faithfulness, which is repaired by a subsequent addition of E. An account combining M-faithfulness and the wordhood scale is developed by Caballero and Inkelas (2013) for Type 2 ME in Breton diminutives, which exhibit surprising repetition of the plural suffix, both inside and outside of the diminutive.

(21) Breton diminutive plurals: root-PL-DIM-PL

	root	root- PL	root-DIM (sg)	root- PL-DIM-PL
'boat'	bag	bag-où	bag-ig	bag-où-ig-où
'prayer'	pedenn	pedenn-où	pedenn-ig	pedenn-où-ig-où

Caballero and Inkelas derive ME of the plural suffix from the interaction of M-Faith and Wordhood with the following constructicon fragment:

(22) Breton constructicon fragment:

Construction		Comments
a. Plural suffix:	[[ ]$_{N}$ -où]$_{N, Pl}$	Attaches to any type of noun base (Root and Stem); type-preserving, adds Plural feature
b. Diminutive suffix:	[[ ]$_{STEM, N}$ -ig]$_{STEM, N, Dim, Sg}$	Attaches to Stem; type-preserving; adds Diminutive, Singular features
c. Null construction:	[[ ]$_{n}$]$_{n+1}$	Advances stems one step on wordhood scale, from Root to Stem or Stem to Word; no featural contributions

Because the (semantically rich) root is always the first element selected in any round of morpheme/construction competition, the second round of selection only compares constructions that are able to combine directly with Roots. In this grammar fragment, on that round of selection, only the Plural suffix (which combines with any type of input) and the null type-promoting construction compete. If the target meaning is plural and FAITH-M outranks BE-WORD, the Plural suffix will win, setting up a third round of competition. On this third round, the competitors are, again, the Plural, which improves neither faithfulness nor wordhood, the Diminutive, and the null construction. Assuming that faithfulness to Diminutive outweighs faithfulness to number, the Diminutive wins, producing an output Stem

which is now singular.[10] On the fourth round of selection, the candidates are the plural, which produces a Stem which is Diminutive and Plural, the Diminutive, which does not improve faithfulness, and the null construction, which produces a Word. Given that faithfulness outranks Be-Word, the Plural candidate wins. Finally, on the fifth round, the null construction produces the most harmonic candidate, and the derivation ends.

In sum, both 'alternating' and 'reinforcement' ME patterns (Types 2 and 3) in Harris' typology fall from mechanisms already proposed as part of the architecture of OCM. In the next section we address a type of ME (Type 1) not previously addressed within the OCM framework and relate it to a larger set of phenomena involving agreement in compounding.

5 Agreement in Compound Structures As a Source of Multiple Exponence

Harris (2017) discusses the compounding of stems, both of which are inflected for the same properties, as a possible diachronic source - and synchronic analysis - of ME. As one example, Harris presents the case of so-called "twin words" in Uralic languages, in which inflected verb stems are compounded, resulting in the doubling of TAM and person number agreement. In this example, roots are underlined and the relevant inflectional exponents are bolded:

(23) Compound-style ME in Hungarian (Harris 2017: 73)

a. fut-**ott-am**
run-PST-1SG
'I ran'

b. lot-**ott-am**-fut-**ott-am**
bustle-PST-1SG-run-PST-1SG
'I bustled about'

Harris also cites examples of Yabem (Oceanic) compounds with doubling of person-number agreement and Abkhaz (Caucasian) compounds with possessive doubling, among other cases (Harris 2017: 72–82). Harris remains agnostic as to whether all cases of doubling of inflection in compounding constitutes ME or not, and considers some cases to be better candidates of ME in compounds than others. Specifically, cases where the same morphosyntactic features are shared among constituents would be considered true compounds showing ME, vs. cases where

[10] Breton ME has been analyzed in a variety of frameworks (see Harris 2017 for a summary and discussion). In the OCM analysis of Breton summarized above, the inflectional features contributed by the inner plural suffix are attenuated by the diminutive suffix, causing the plural to be added again (Caballero & Inkelas 2013). This analysis is similar to Stump's (2001) proposal that the Breton plural is head-inflecting, given that it has special privilege of attaching directly to the root.

each constituent would inflect separately. Harris considers a pattern found in San Juan Quiahije Eastern Chatino to be an unambiguous case of ME in compounding: originally analyzed in Cruz and Woodbury (2013: 7–8), this language features ME of person agreement, encoded through nasalization of the stem vowel and tone (the tones are represented separately from the segmental representation and are L(ow), M(id), H(igh), and 0 (superhigh)).

(24) ME in compounding in San Juan Quiahije Eastern Chatino (Harris 2017: 77)

a. snyɻ — T: M0
grab.COMP.1SG

b. yk**o̱**-jy**a̱**ʔ — T1: **H**, T2: **LM**
eat.COMP.**1SG**-amount.**1SG**
'I tasted'

c. yku-jyaʔ = rẹʔ — T1: toneless, T2: LM
eat.COMP-amount.**3PL** = **3PL**
'They tasted'

In (24a), a lexically-conditioned tone (M0) and nasalization encode first person singular agreement on the verb. In compounding, both the verb and its complement or modifier may be marked for person agreement: in the case of (24b), with nasalization and H tone in the verb and nasalization and a LM tone on the complement *jyaʔ* 'amount'. Harris cites (24c) to show that there are compound constructions in this variety which lack doubling of inflection: in this case, agreement involves third person plural, marked on the compound modifier (where the lack of nasalization yields the contrast between first singular and third plural agreement in (24b) and (24c)) and redundantly in a dedicated third person plural enclitic.

In some cases, identity between stems is partial. This is exemplified below in Batsbi (25) and Udi (26):

(25) Batsbi class marker agreement in compounding (Harris 2017: 74)
šobi-l^{w} xširoš **v**-uyt'-**v**-aɣ-o-s
Pšavs-ALLII often **CM**-go-**CM**-come-PRES-1SG.ERG
'I (masculine) often come and go among the Pšavs'

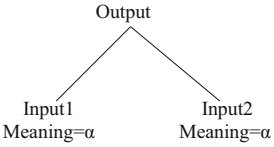
(26) Udi TAM agreement in compounding (Harris 2017: 75)
bayɣa-beʕɣa = z
bay-ɣ-**a**-beʕɣ-**a** = z
in-go-**SBJVI**-look-**SBJVI** = 1SG
'I should go in and look'

In Batsbi, case markers (CM) are required in each member of a compound, but TAM and person-number agreement (*-o* 'present' and *-s* 'first person singular ergative') only show up with the final element. In Udi, TAM suffixes (in this case subjunctive) are required by each member of the compound, but there is a single set of agreement marking in a word (the enclitic = *z* for first person singular).

6 Multiple Exponence As Agreement in Compound Structures

We propose, building on Harris's insights and analysis, that Type 1 ME results when a language possesses a compound-like construction requiring agreement, in some property or properties, between its daughters. While this may seem like an explicit stipulation requiring ME, in fact the construction needed to model this phenomenon already exists in CM, in the form of the so-called 'morphological doubling' construction invoked by Inkelas and Zoll (2005) to handle synonym compounding, antonym compounding, and reduplication. It is schematized in (27) for an instance of synonym compounding. These two stems must have identical meaning:

(27)



(In abbreviated notation: [[ ]$_{\text{Input1,SynStem=}\alpha}$ [ ]$_{\text{Input2,SynStem=}\alpha}$]$_{\text{Output}}$

This doubling construction is highly suitable for synonym compounding in an example like that in (28), from Khmer, in which noun-noun compounds involve semantically identical (or nearly identical) nouns that are lexically divergent (28):

(28) Khmer synonym compounds (Ourn and Haiman 2000: 485, 500)

a.	cah+tum	'old+mature'	'village elder'
b.	chap+rɔhah	'quick+fast'	'fast'
c.	clooh+prɑkaek	'squabble+argue'	'quarrel'
d.	cbah+prakɑt	'exact+exact'	'exact'

Inkelas and Zoll (2005) argue that reduplication follows from a construction of the type in (27). Total reduplication, illustrated below with data from Acehnese, differs from synonym compounding only in requiring that the two daughters are phonologically as well as semantically identical – conditions that can be satisfied only if they are two instances of the same lexeme.

(29) Achenese emphatic total reduplication (Durie 1985: 39–40)

a.	tambô-tambô	'drum-drum'
b.	ma-ma	'mother-mother'
c.	tuleueng-tuleueng	'bone-bone'
d.	jamee-jamee	'guest-guest'

In the case of partial reduplication, a variant of the doubling construction is used; it is associated with a cophonology that enforces phonological truncation on one (or in some cases two; see e.g. Caballero 2006) of the two identical daughters. Inkelas and Zoll (2005) demonstrate that echo reduplication, such as 'fancy-shmancy' and other well known patterns, are also amenable to analysis in these terms.

Following Inkelas and Zoll (2005), we posit a construction related to the one in (27), with built-in identity constraints as the source of ME in compounding structures. Instead of requiring total semantic and syntactic identity, however, the construction required for ME requires identity only in specific properties.[11]

For the example of inflectional ME in Hungarian, we assume a compounding construction whose daughters are verb stems constrained to agree in tense, person and number:

(30) $[[\quad]_{V1,TNS=\alpha,PERS=\beta,NUM=\gamma}\ [\quad]_{V2,TNS=\alpha,PERS=\beta,NUM=\gamma}]_V$

Support for this compounding structure is that bipartite verbs clearly exist in many languages (a typological overview is found in Bickel and Nichols 2007); the constructicon thus requires a construction to represent them. ME, in particular, arises in bipartite verbs when, in the construction licensing such structures, the two parts of a bipartite verb have to agree (via co-indexed features, as in (30)). Absent that latter restriction, the grammar can generate singly-inflected complex verbs, including cases like Chintang (Bickel et al. 2007), where either part might be inflected, but it is not necessary for both to be.

Harris (2017) is ultimately noncommittal as to whether compounded inflected stems are true instances of ME. We take the stronger position here that they are. Moreover, we suggest that, if the compounding construction is broadened to include inflected morphemes that are not canonical roots, some if not all instances of Harris's Type I reduplication can be analyzed using the same type of construction invoked for compounding.

6.1 Stem-to-Stem Identity Involving Inflection: Noon and Camling

We turn in this section to two examples of non-canonical compounding constructions that go beyond the canon of root-root or stem-stem compounding, but fit within the more general compounding frame. In these cases the inflected elements are asymmetric: one is the root and the other, a suffix. The constructions, like that in Hungarian above, involve doubly exponed inflection.

The first example, drawn from Harris (2017), involves Noon, a Niger-Congo language (Cangin) originally described in Soukka (2000: 62). In Noon, nouns belong to six declensions, four of which have prefixed class markers in the singular

[11] In contrast, phonological identity approaches to reduplication do not make use of the mechanism proposed here. The debate about the analytical advantages of phonological identity approaches to reduplication vs. morphological doubling ones are outside the scope of the paper (for an overview, see Inkelas and Downing 2015 and Downing and Inkelas 2015). To the extent that, as observed here, certain cross-linguistic patterns of reduplication and compounding can be analyzed with a morphological doubling construction, we argue that this lends further support of the analysis presented here.

and plural paradigms. As shown in (31) below, when the definiteness *-aa* suffix is added to a noun, a redundant class marker is required to appear between the stem and the definiteness suffix. ME is bolded.

	Singular			Plural		
Class	Indefinite		Definite	Indefinite		Definite
1	waas	‘road’	waas-aa	waas	‘roads’	waas-c-aa
2	kaan	‘house’	kaan-f-aa	kaan	‘houses’	kaan-c-aa
3	m-esip	‘sauce’	**m**-esip-**m**-aa	m-esip	‘sauces’	**m**-esip-**c**-aa
4	k-edik	‘tree’	**k**-edik-**k**-aa	t-edik	‘trees’	**t**-edik-**t-**aa
5	p-ëlkit	‘thread’	**p**-ëlkit**-p**-aa	t-ëlkit	‘threads’	**t**-ëlkit-**t**-aa
6	j-okon	‘finger’	**j**-okon-**j**-aa	t-okon	‘fingers’	**t**-okon-**t**-aa

Nouns belonging to classes 3– 6 have class prefixes in the singular (*m-, k-, p-* and *j-*) and plural (*m-* for class 3 and *t-* for classes 4–6). In the definite paradigm, the redundant class markers are identical to the class prefixes in the singular and plural, except for class 3 definite plurals, which require a *-c* suffix before the definiteness suffix (e.g., *m-esip-**c**-aa*).

In a second example, Camling (Kiranti; Tibeto-Burman), we find ME of subject and object marking in stems, where a third person non-singular patient (*−c*) suffix is a carrier morpheme requiring doubling of inflection. The examples below are from Ebert (1997: 20). The carrier morpheme is highlighted with underlining.

(32) ME in Camling (Harris 2017: 56)

a. lod-**u-ng**-c-**u-ng**
tell-3P-1s-3ns.P-3P-1s
‘I told them’

b. lod-**u-m**-c-**u-m**-ka
tell-3P-1/2pA-3ns.P-3P-1/2pA-E
‘We told them’

We propose that the ME patterns in Noon and Camling arise from compounding, or at least from a compound-like construction in which two potentially complex subconstituents must agree in a specified property or set of properties. In the case of Noon, ME results when two stems in the same compound structure must agree in class. One stem contains the root; the other contains the definite marker. Both must combine with the same class-marking prefix in order to be class-identical. In the case of Camling, ME results from compounding two stems which must agree in both subject and object marking. One stem contains the root; the other contains the third non-singular patient marker.

6.2 Stem-to-Stem Identity Involving Derivation

So far we have focused on ME of inflection in our discussion of compounding. However, OCM also predicts derivational ME under certain circumstances. ME

results from agreement of two stems in a particular property. If there is a property that is uniquely associated with a given derivational morpheme, then we predict that ME could result from an agreement requirement for that property. For example, we would not expect ME of a nominalizing affix in a construction where both stems are required to be nouns, if the language in question has both monomorphemic and derived nouns. Agreement in the property "noun" cannot by itself distinguish between a monomorphemic noun and nominalized adjective or verb. But we could expect ME in a construction, where, for example, both stems are required to be participles and the only way to form participles in the language is by means of an affixal construction, or in a construction where both verbs are reciprocal and the only way for a verb to be reciprocal in the language is by combing with a reciprocalizing affix.

We find situations like these in Lusoga (Soga, Olusoga), a Bantu language spoken in Uganda, in which ME involves both inflectional and derivational affixes in reciprocal verbs.

6.3 Case Study: Lusoga Multiple Exponence

Lusoga, like other Bantu languages, has an agglutinating morphological structure with several argument structure changing suffixes (referred to as "extensions" in the areal literature), inflectional prefixes and suffixes, as well as complex morphotactics. Here we focus on Lusoga ME, which involves superfluous exponence of derivation (e.g., causatives and applicatives in (33)), final vowel inflectional suffixes (e.g., irrealis in (34)), or both derivation and inflection (35). In all cases, ME is exclusively attested in morphologically complex words containing the reciprocal morpheme -*agan*. The data below all come from Hyman and Inkelas (to appear).

(33) Lusoga ME of derivational morphology

a.	bà-[tùùn**z**-ágán-**y**-á	3PL-sew-**CAUS**-REC-**CAUS**-FV	'They make each other sew'
b.	bà-[tùùng-**ís**-ágán-**y**-á	3PL-sew-**CAUS**-REC-**CAUS**-FV	'They make each other sew'
c.	bà-[kùb-**ír**-ágán-**ír**-á	3PL-beat-**CAUS**-REC-**CAUS**-FV	'Where do they beat e.o.?'

(34) Lusoga ME of inflectional morphology

a.	mù-[bàl-**é**-gàn-**é**	2PL-count-**IRR**-REC-**IRR**	'Count (pl.) each other!'
b.	mù-bì-[bál-ìr-**è**-gàn-**é**	2PL-count-APPL-**IRR**-REC-**IRR**	'Count (pl.) them for e.o.!'

(35) Lusoga ME of derivation and inflection

tù-lùm-**y-é**-gan-**y-é**	1PL-injure-**CAUS-IRR**-REC-**CAUS-IRR**	'Let's injure each other'

All of these ME patterns are completely superfluous, in the sense of involving multiple morphs that contribute exactly the same information. Causative ME may involve suffixation of two distinct causative morphs, *-is* and *-y*, referred to in the literature as 'long' and 'short' causatives, respectively, which are semantically equivalent, encoding both causation and instrumentals. The short causative (/-i/) surfaces as spirantization of a stem final consonant (33a) or a palatal glide before the final vowel (33a-b). Causative ME may also involve doubling of the short causative (33a). As with the rest of the ME patterns, the redundant causatives, whether the same or different, appear before and after the reciprocal *-agan* suffix.[12] All other ME patterns in Lusoga involve doubling of the same affixal morph.

Finally, ME in Lusoga is optional, whether derivational or inflectional. This is shown in (36).

(36) Optional ME in Lusoga

a.	bà-[tùùn**z**-ágán-**y**-á	sew-**CAUS**-REC-**CAUS**-FV	'They made each other sew'
b.	bà-[tùùng-ágán-**y**-á	sew-REC-**CAUS**-FV	
c.	bà-[tùùn**z**-ágán-á	sew-**CAUS**-REC-FV	
d.	mù-[bàl-**é**-gàn-**é**	2PL-count-**IRR**-REC-**IRR**	'Count (pl.) each other!'
e.	mù-[bàl-ágàn-**é**	2PL-count-REC-**IRR**	

As exemplified in (36a-c), when both the reciprocal and the (short) causative are marked, the short causative may be marked twice (before and after the reciprocal), or only once, either after the reciprocal (36b) or before it (36c). And as shown in (36d-e), only two patterns are available with final inflectional suffixes when a verb contains the reciprocal suffix: the final inflectional vocalic suffix appears doubled (36d) or as single exponence after the reciprocal (36d).[13] While single exponence is available, the double marking patterns are preferred.

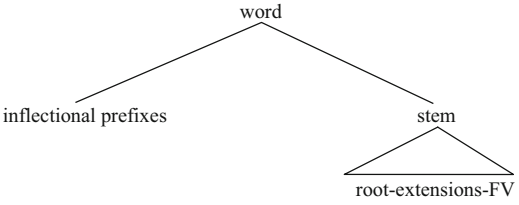
Hyman & Inkelas (to appear) propose that the Lusoga ME patterns are the result of a historical reanalysis of the original structure of the Lusoga verb in verbs

[12]Hyman & Inkelas (to appear) provide evidence that causatives in ME patterns may exhibit other orders with respect to each other and the reciprocal morpheme. These alternative orders, however, while possible, are not preferred. In this paper we focus on the ME patterns that exhibit the preferred order of exponents.

[13]There is also ME of the perfective /-ile/ suffix in verbs containing the reciprocal. These cases involve a complex pattern of allomorphy involving the application of several phonological processes and interfixation. We refer the reader to Hyman & Inkelas (to appear) for the details. Here we only note that, like the pattern of ME of the irrealis suffix, ME of imperfective also displays optionality between single exponence of the inflectional suffix ordered after the reciprocal and doubling of the imperfective before and after the reciprocal.

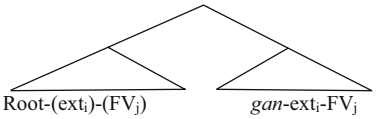
containing the reciprocal. The original morphological structure of Lusoga verbs involves a pan-Bantu template of verbal extensions with the order C(ausative)-A(pplicative)-R(eciprocal)-P(assive) (CARP) (Hyman 2003a, b). In the case of Lusoga, the template includes an additional position for the short causative *-i-* (symbolized as 'I') between the reciprocal and passive morphemes (CAR**I**P) (see discussion in Bastin 1986 and Good 2005 for its historical motivation and reflexes across Bantu languages).[14] Together with inflectional final vowel suffixes, the Lusoga CARIP template constitutes a stem to which inflectional prefixes attach, the domain of ME. This morphological structure is schematized in (37).

(37) Bantu morphological verb structure



In the reanalysis hypothesis, the reciprocal is interpreted as a bimorphemic stem *-a-gan* given its unique phonological properties (the only disyllabic derivational suffix that is *a* initial). In this new morphological structure (schematized in (38)), reciprocalized verbs are compound constructions with two roots, a lexical root plus the reciprocal *-gan* root, both of which head up stems that are optionally required to be identical in their argument structure and inflectional properties

(38) Lusoga compound reciprocal verb structure



Thus, the original structure with a single stem (schematized in (39a)) gives rise to the reanalyzed structure in (39b) with an internal stem boundary ('#') and the analogical extensions with reciprocalized verbs containing other inflectional final vowels (39c).

[14]This template is a key component in understanding affix ordering patterns in most Bantu languages, where patterns of ME of derivational morphology have been analyzed as resulting from the resolution of a mismatch between templatic and scopal constraints (Hyman 2003a, b). Template-scope interactions, while also relevant in Lusoga (Hyman & Inkelas to appear), are not the motivating factor behind the inflectional doubling that occurs in the innovated reciprocal compound construction discussed here, so we do not discuss these template-scope interactions further.

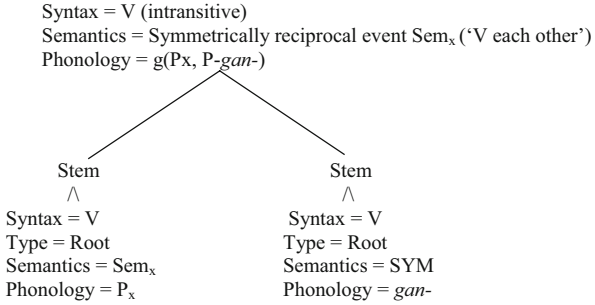
(39)

Inherited		**Innovated**	
a.	ROOT-Reciprocal-FV	b.	ROOT-FV#Reciprocal-FV
	ROOT-agan-a		ROOT-a#gan-a
c.	bàl-ágàn-**é**	d.	bàl-**é**#gàn-**é**
	count-rec-**irr**		count-**irr**#rec-**irr**
	Count (pl.) each other!'		Count (pl.) each other!'

The optionality of ME results from the fact that Lusoga retains the conservative reciprocalized verb structure alongside the preferred, innovative compound structure. This innovative structure fits the characterization of Harris' Type 1 ME, which, we argue, requires a compounding construction.

A sample schema of a simple Lusoga reciprocal verb stem using the Sign Based Morphology formalism is shown in (40). Reciprocals in Bantu are argument-structure changing operations exhibiting what Gaby et al. (2008) have called 'core' reciprocal argument indexation ("the Actor of one instantiation of the event is also the Undergoer of another instantiation of the same event (A1 = U2) while the Undergoer of the first instantiation is the Actor of the second (U1 = A2)" (Gaby et al. 2008: 262; see also König and Kokutani 2006)). In the schema in (40), the semantics of the reciprocal construction is represented as involving symmetric (SYM) events.

(40) Lusoga compounding *-gan-* construction



An abbreviated representation is shown in (41). The right-hand daughter node, the head of the construction, contains a verbal root that encodes a symmetrically reciprocal event that is specified phonologically (*-gan-*).[15] The phonological properties of the compound construction (the mother node) are calculated as a function of the phonological properties of the first stem (described as variable *x*) plus those of the *-gan-* compounding stem.

[15]This schema represents that compounds containing *-gan-* are a type of constructional idiom (Jackendoff 2002; Booij 2009), akin to a representation involving an affix, which captures both the recent diachronic development of the root *gan-* from a reciprocal affix, as well as the general observation that the distinction between compounding and derivational morphology is a gradient one (Booij 2009).

(41) [[*x*]$_V$ [-*gan*-]$_{Vi}$] $_{Vi}$ ↔ '[x]$_V$ each other'
| |
[αF] [αF]

Each member of the compound is linked to a set of morphosyntactic features and argument structure increasing morphology ([αF]). We enrich this compounding schema with the construction with built-in stem-identity exemplified for Hungarian in (30) above. In the case of Lusoga, the compounding construction has daughter verb stems that may agree in their final inflectional vowel (FV), causative and applicative morphology. This is shown in (42).

(42) [[ ]$_{V1, (FV = \alpha, CAUS = \beta, APPL = \gamma)}$ [-*gan*-]$_{V2, FV = \alpha, CAUS = \beta, APPL = \gamma}$]$_V$

As mentioned above, the optionality of ME results from the coexistence of inherited monomorphemic verb structures with a reciprocal suffix, and the innovative compounding structure requiring the construction in (42).

The structure of reciprocal Lusoga verbs with ME is shown below, with doubling of the final inflectional vowel (*-é*) in (43a), of the applicative and final inflectional vowel (*-ír-á*) in (43b), and of the causative and final inflectional vowel (*-y-é*) in (43c).

(43) Lusoga compounding *gan-* construction with ME
a. [[bàl-**é**]$_V$**[**gàn-**é**]$_V$**]**$_{Vi}$ 'count (pl.) each other'
b. [[[kùb-**ír-á**]$_V$ [gán-**ír-á**]$_V$]$_{Vi}$ 'where do they beat each other?'
c. [[tù-lùm-**y-é**]$_V$ [gan-**y-é**]$_V$**]**$_{Vi}$ 'let's injure each other'

In sum, the Lusoga case instantiates a Type 1 ME pattern that recently developed from reanalysis of a monomorphemic verb structure as a compound construction. As predicted in OCM, both inflection and derivation are involved in ME. Harris proposes that Type 1 ME often develops historically from grammaticalization of inflected auxiliaries or determiners, but, as mentioned above, may also arise through compounding. In the case of Camling (discussed in §6.1 above), compounds or constructions that resemble compounds exhibit ME of subject or object marking. As Harris notes, the original analysis in Ebert (1997) explicitly characterizes these forms as compounds, where verbs that have lexical meanings have an allomorph in compounding with a functional meaning (e.g., *-pid* 'to give', used as a benefactive in compounding (2017: 141)). Harris notes these constructions may have already been grammaticalized, but draws a connection between compounding and grammaticalization as related mechanisms that have the potential to be historical precursors of Type 1 ME. In the analysis proposed here, this class of patterns, which may have multiple historical sources, require a single synchronic mechanism of stem-identity.

7 Conclusion

Until recently, ME has been a tricky subject to discuss in morphological theory because of uncertainty about its typological status. Recent work by Caballero and Harris (2012) and Harris (2017) has brought the phenomenon onto center stage. It is not a marginal phenomenon to be explained away in theories that prohibit it; nor is it uniform in its origin or synchronic analysis. This relatively programmatic discussion of ME has attempted to show, in one model of morphology, that ME is an emergent property, following from principles independently needed to construct words without ME. In OCM, these principles determine the selection of constructions that combine, and the hierarchical order in which they do so, to construct words that match a meaning target. In OCM, ME emerges when the optimal collection of constructions that produces a given word happen to expone the same property more than once.

Work on Construction Morphology has shown that word formation and inflectional schemas easily account for patterns where the traditionally held view of the one-to-one association between meaning and form in morphological expression do not hold. Construction-based analyses of ME have been proposed for specific languages (e.g., Harris 2009 for ME in Batsbi). We propose here that a whole class of ME patterns exhibiting recurring characteristics result from a stem-identity mechanism that relates ME to other cross-linguistically common morphological phenomena.

More generally, this case study raises important questions about the phonological representation of morphologically complex words and the relation between morphology and phonology in construction-based approaches. OCM shares with Construction Morphology (CxM; Booij 2010) the goal of accounting for both the phonological (formal) and semantic properties of morphologically complex words using a top-down approach and output-oriented schemas that relate form to meaning. This architecture allows both CxM and OCM to analyze morphological phenomena where a one-to-one association between meaning and form does not hold, as in patterns of multiple exponence. While CxM does so by exploiting the motivational role of schemas in an exclusively word-based approach (see discussion in Booij and Audring 2018, this volume), OCM does assume some constructions may be interpreted as involving pieces of structure and adds the competition structure of Optimality Theoretic approaches. We argue this addition allows us to better understand the role of the phonological component in the construction of complex words.

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