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J. Linguistics **52** (2016), 277–310. © Cambridge University Press 2015
doi:10.1017/S0022226715000134 First published online 24 July 2015

Negation through reduplication and tone: implications for the Lexical Functional Grammar/Paradigm Function Morphology interface[1]

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(Received 24 July 2013; revised 26 February 2015)

Morphological marking of negation through verbal reduplication and tone is a typologically rare phenomenon attested in Eleme (Niger-Congo; Nigeria). Using Lexical Functional Grammar (LFG) and Paradigm Function Morphology (PFM) to model first-hand data, I argue that reduplication is not a direct exponent of negation in Eleme, but an asemantic morphomic process, indirectly associated with the presence of a negative polarity feature in LFG's m(orphological)-structure. While negative verb forms of this kind are typologically unusual, the data can be explained by independently motivated morphology-internal principles. The empirical facts thereby provide support for an m-structure, characterised by its own principles and rules, which interfaces with a bifurcated lexicon that separates content from form.

1. Introduction

Morphological marking of negation through verbal reduplication and tone is an extremely rare phenomenon (see Dahl 1979, Dryer 1989, Payne 1985, Miestamo 2005) attested in certain negative predicates in Eleme (Niger-Congo; Nigeria). For instance, while Habitual predicates are distinguished by the presence of a Habitual suffix *-a* on the lexical verb stem, as in (1a), Negative Habituals are formed through the obligatory pre-reduplication of the first mora of the verb

[1] This research is based, in part, on earlier descriptive work produced in collaboration with Greg Anderson (Anderson & Bond 2003) and a theoretical analysis produced in collaboration with Maria Flouraki (Bond & Flouraki 2011). The analysis presented here has benefitted greatly from the input of various other colleagues, including several anonymous reviewers, as well as audiences at the South of England LFG Meeting at SOAS in October 2011, the Linguistics Department Seminar Series at Stockholm University in May 2012 and the South East Morphology Meeting in Guildford in January 2013. This research could not have been instigated without the invaluable support of my Eleme consultants who are too many to name individually, but each contributed to the corpus from which these conclusions are drawn; I thank each one for their time and patience. Thanks are also due to Marina Chumakina, Grev Corbett and Tim Feist for providing helpful feedback on a final draft of the paper. I gratefully acknowledge the role of the ESRC (award no. PTA-026-27-0883) and AHRC (Doctoral Award) in providing financial support during the early stages of this research. Any errors in the analysis are my own.

https://doi.org/10.1017/S0022226715000134 Published online by Cambridge University Press

stem, as in (1b). The presence of the Habitual suffix *-a* is not attested in Negative Habituals.[2]

(1) (a) ǹ-sí-a
1SG-go-HAB
'I (usually) go.'

(b) ǹ-sí∼sì
1SG-NEG∼go
'I don't (usually) go.'

While verb-stem reduplication is fairly pervasive throughout the negation system of Eleme, it is not obligatory in all negative constructions. For instance, although permitted in Negative Perfectives, reduplication is not necessarily present in such constructions (see Section 2.1). Similarly, reduplication is not employed in the negation of non-verbal predicates or in prohibitions.[3]

Negation marked by reduplication is interesting from a theoretical viewpoint because different approaches to the role of morphology as an autonomous part of the grammatical architecture will make radically different predictions about the consequences of marking negation through (non-concatenative) stem modification. Theoretical formalisms that equate morphology and syntax need to account for productively reduplicated stems using the same general principles that account for syntactic structure. In lexicalist theories of grammar such as Lexical Functional Grammar (LFG), where morphology and syntax are distinct components of grammar, the division of labour between the two is such that either should be able to realise functional features such as negation (Börjars, Vincent & Chapman 1997, Bresnan 1998, Nordlinger 1998, Bresnan 2001, Nordlinger & Bresnan 2011). Despite ongoing work into the interface between morphology and syntax, exactly how morphology should be modelled within LFG remains an open question. However, the most descriptively adequate treatments of morphology posited so far have favoured an inferential–realisational approach to morphological structure (see contributions in Sadler & Spencer 2004).

The descriptive aim of this paper is to give an account of several disparate negative (and affirmative) constructions from Eleme in order to explain and model the typologically unusual use of reduplication and tone to realise negative

[2] All data were collected by the author during fieldwork in Nigeria and the UK between February 2003 and March 2006. Examples are presented in a phonemic orthography consistent with the IPA, with the exception of <r> used for [ɪ] and <y> used for [j]. Eleme has three tones: high (marked with an acute accent), mid (unmarked) and low (marked with a grave accent). All examples are glossed following the conventions of the Leipzig Glossing Rules (http://www.eva.mpg.de/lingua/resources/glossing-rules). Note, in particular, that a tilde connects a reduplicant to its base. Interlinear glosses in square brackets indicate that the value has no corresponding segmental exponent. Additional abbreviations used are ANT = anterior, AP = anterior-perfective, CONT = continuous, EPEN = epenthetic, SPF = specific.

[3] Non-verbal negative predicates are formed using an inherently negative verb or a negative copula, neither of which is reduplicated. Negative existential, negative locative and negative attributive predicates are negated using the verb *ǹʧe*. Nominal predicates are negated using the negative copula *si* and a clause final clitic *=ri*. Prohibitions are formed using the verbal prefix *ka-* and the clause final clitic *=ri*.

https://doi.org/10.1017/S0022226715000134 Published online by Cambridge University Press

verb forms. Specifically, I argue that reduplication in Eleme is not an exponent of negation *per se*, but results from an asemantic stem selection process internal to the morphological component of grammar. As a consequence, I argue that negation is realised across a morphomic stem through the application of tone rules indexed to a set of feature values. This analysis will account for the obligatory occurrence of reduplication in (1b) and the optional occurrence of reduplicated stems in other negatives (described in Section 2). The theoretical aim of the paper is to demonstrate that, while the use of reduplication to form negative verb forms is cross-linguistically rare, the use of such forms arises as a result of commonly encountered morphology-internal principles, formalisable in the morphological component of grammar. In doing so, I argue that the relationship between morphological realisations achieved in m(orphological)-structure and their content-featural information relevant to other parallel structures is best modelled within LFG architecture using Ackerman & Stump's (2004) distinction between a lexical item's CONTENT-PARADIGM and its corresponding root's FORM-PARADIGM (Section 3.1).

In accounting for the morphological representations of m-structure within LFG, I use Paradigm Function Morphology (PFM) to construct a set of realisation rules that interface with f(unctional)-structure, c(onstituent)-structure and s(semantic)-structure through correspondences between sub-parts of the lexicon, characterised in turn by correspondences between content-paradigms and form-paradigms (Section 4). In doing so, I provide the first detailed account of the morphological expression of negation within LFG, an account of reduplication and tone in PFM and the first formal analysis of reduplication as an obligatory part of negation constructions.

The rest of the paper is structured as follows. In Section 2, I provide an overview of negation in Negative Perfective and Negative Habitual clauses. Then, in Section 3, I examine previous treatments of negation within LFG. In Section 4, I present a set of realisation rules modelled in PFM to account for the disparate expression of negation across different constructions, before summarising the implications the analysis has for the interface between m-structure and other components of the LFG architecture in Section 5.

2. NEGATION IN ELEME

Eleme is an Ogonoid language (Cross River, Benue-Congo, Niger-Congo) spoken in Rivers State in South-east Nigeria. It is characterised by a dominant SVO word order, pervasive verbal inflection and a complex system of participant reference marking. The Eleme negation system comprises a wide variety of negative strategies including the use of inherently negative verbs, a negative copula and negative enclitics.[4] In this paper, I restrict the analysis to those strategies used to

[4] For instance, the negative existential verb *ǹʤe* is employed in the negation of existential and locative predicates, while the negative copula *si* and the predicate final enclitic *=ri* are used together to predicate the non-identity of two referents.

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express Negative Perfectives and Negative Habituals. These predicates involve a range of morphological means for expressing negation including affixation, reduplication and tone, on simplex and periphrastic stems, providing an ample sandbox for exploring different facets of the exponence of negation within a single language. I begin by outlining the more conventional aspects of negative predicate formation before spelling out the challenges the data pose for the theoretical analysis.

2.1 *Negative Perfectives*

The most straightforward expression of morphological negation (not involving reduplication) in Eleme is found in certain Negative Perfectives, using a set of prefixes with the shape *rV́-*. The realisation of the negative prefix is dependent on several factors, namely (i) the person and number of the subject, (ii) vowel harmony with the initial segment of the reduplicated stem and (iii) apparently free variation in the realisation of the initial consonant, which varies between an alveolar nasal and alveolar approximant. Variants with alveolar approximants are used significantly more often than their nasal counterparts.[5] A paradigm of these prefixes is provided in Table 1.

	SG	PL
1	*rɪ̃́-*	*rɛ̃́-*
2	*ró-/rɔ́-*	
3	*ré-/rɛ́-*	

Table 1
Negative prefix paradigm in Eleme.

An example of a Negative Perfective predicate is provided in (2), where the verb of the second clause, *dã́* 'hear', bears the high-tone harmonic negative third-person prefix *rɛ́-*.[6] This clause describes a specific hearing event that did not

[5] All of the described Ogonoid languages exhibit negative forms with a reflex **n(V)*. While the exact form of these negative markers differs from language to language, comparable third-person particles include *náè* in Gokana (Wolff 1964: 84), *naa* in Kana (Ikoro 1996: 339), *náa* in Tai (Nwí-Bàrí 2002: 22) and the long forms *rɛ́ɛ́/nɛ́ɛ́* in Eleme. While each of these four languages has a negative morpheme with an alveolar nasal in the onset, only Eleme has an alternative (preferred) realisation with an alveolar approximant. See Bond (2006: 56–58) for discussion of this alternation.

[6] While the negative formative *rV́-* is realised as a prefix, there are alternate preverbal long forms (e.g. *rɛ́ɛ́*), which do not coalesce with the verb stem. In the interest of space, these will not be discussed here. However, in each case, it is not possible to insert any material between the negative formative and the inflected verb stem, indicating a close structural relationship between the two.

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occur, allowing the listener to infer that the passers-by referred to by the speaker would not have been able to help him.

(2) Context: an arrested man attempts to attract the attention of some Eleme passers-by as he is taken away by the police.

òku èpolis na tʃú-mi ãmã; òku-ò
people police do take-OBJ.1SG away people-SPF
rɛ́-dɑ̃́-ri
NEG.3-hear-3PL
'The police took me away; the people [i.e. the passers-by] didn't hear.'

(Personal narrative: 31.22-05-03)

Expression of negation by affixation (particularly prefixation) is extremely common across the world's languages. For instance, in the 1159 languages investigated by Dryer (2011b), negation is expressed by an affix in 396 languages (34.2%), second in number only to the 502 languages employing negative particles (43.3%).

The negative prefix is obligatorily realised on Negative Perfective verb forms.[7] It is the only clear exponent of negation in (2). However, in certain discourse contexts, prefixation is accompanied by pre-reduplication of the initial mora of the verb stem. This results in full reduplication of monomoraic stems and partial reduplication of bimoraic stems, as in (3) and (4).

(3) (a) ǹ-sí
1SG-go
'I went.'

(b) rī́-(si)∼sí
NEG.1SG-(NEG)∼go
'I didn't go.'

(4) (a) è-kparí
3[SG]-sweep
'He swept.'

(b) rɛ́-(kpa)∼kparí
NEG.3[SG]-(NEG)∼sweep
'He didn't sweep.'

In Negative Perfectives, the verb stem retains the tonal pattern associated with (affirmative) finite forms for its tone class (i.e. its default tone pattern) and the reduplicant does not bear a tone. This variation results in an instance of OVERABUNDANCE 'where two or more forms are available to realise the same cell in an inflectional paradigm' (Thornton 2012). The 'optionality' of reduplication – indicated with parentheses in (3b) and (4b) – demonstrates that it is not an obligatory exponent of negation in predicates of this kind; however, reduplication is possible with all lexical verbs.

[7] Perfectivity is a default category in Eleme and is not overtly realised on verb stems by segmental morphology.

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An example of a reduplicated Negative Perfective verb form from discourse is provided in (5), where the verb stem *ʤu* 'come' is reduplicated and prefixed by the third-person negative prefix *rÉ-* (in the harmonic form *rɛ́-*).

(5) Context: a father is searching for his eldest daughter, Osila, who has gone missing in the bush.

a-biná; òsílàkà rɛ́-ʤu∼ʤú
3SG.AP-ask Osila.mother NEG.3[SG]-NEG∼come
'He [i.e. the father] called out [lit. asked]; Osila [lit. mother's eldest daughter] didn't come.'

(Traditional narrative: 33.13-05-03)

Unprimed, decontextualised elicited constructions nearly always exhibit reduplication, indicating that it is a highly salient feature of negation for speakers (or for the context they construct for non-primed negatives). The use of non-reduplicated Negative Perfectives such as (2) is nevertheless fairly common, indicating that reduplication is not an obligatory component of this negation strategy. Both reduplicated and non-reduplicated forms are apparent in the speech of all age groups/dialects. Introspection leads speakers to claim that stems without reduplication are stylistically less conservative than reduplicated ones. Constraints on the use of reduplication in Negative Perfectives remain unclear. Either the alternation between stems is a genuine case of systematic overabundance or the difference is motivated by a highly subtle information-structural or illocutionary property of the clause. Note that if distributional differences were found between the two competing 'overabundant' forms, the burden of describing the difference would fall back on the feature geometry that creates the description of the paradigm cells. In such a case, we would still not be dealing with an exponent of negation, since the inflected stems are used for negation whether reduplicated or not.[8]

These data provide a number of challenges for a theoretical account of morphological marking of negation. The first concerns how to best model the variation between the use of the bare stem and 'optional' reduplication in Negative Perfectives. The task of accounting for variability in the selection of stems is complicated by the presence of obligatory pre-reduplication of the verb stem in Negative Habituals (Section 2.2) and elsewhere. I propose that an adequate formalisation will need to offer different stem selection principles to account for this variation. I argue in Section 4.3 that this optionality is a natural consequence of the existence of morphomic stems selected by rules in the morphological component of grammar.

[8] I am grateful to an anonymous reviewer for highlighting the consequences of this issue.

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2.2 *Negative Habituals*

Negative Habituals in Eleme are formed through pre-reduplication of the first mora of the verb stem and do not involve any other segmental exponence of negation. Instead, their polarity and aspect values are indicated by a tonal pattern across the stem that distinguishes them from other segmentally identical verb forms. For instance, in (6a) the verb stem *dé* 'eat' is reduplicated to form the Negative Habitual form of the verb. Unlike in Negative Perfectives, there is no negative prefix in the Negative Habitual construction, and the inclusion of such a prefix renders the construction ungrammatical. In (6b), the same reduplicated stem is employed in an affirmative predicate with Future tense. The HL tone pattern on the reduplicated stem in (6a) distinguishes the Negative Habitual form from the Future verb form in (6b) which has a HH pattern (see Section 4.1 for further details).

(6) (a) è-dé∼dè òfí
3[SG]-NEG∼eat mango
'He doesn't (usually) eat mango.'

(b) é-dé∼dé òfí
3[SG]-FUT∼eat mango
'He will eat the mango.'

Negative clauses of the type in (6a) are highly unusual from a cross-linguistic perspective because (i) there is no dedicated segmental negator and (ii) they make use of a rare means of marking negation, namely tone, and a productive and predictable stem alternation involving reduplication. Dryer (2011a, b) indicates that of 1326 languages investigated for a study of minor morphological means of signalling negation, only 10 languages involve non-concatenative morphological processes. Seven languages used tone as part of their strategy to mark negation, and all of these languages were spoken in a contiguous zone stretching from West to East Africa; other minor strategies used in the formation of negatives listed by Dryer (2011b) include infixation (two languages) and stem changes (one language). Although apparently rare, (partial or total) reduplication is found as a process in the formation of negative verb forms in a diverse range of languages. It was first reported in the typological literature by Dahl (1979) for Tabassaran (Lezgic, Nakh-Daghestanian; Russia), as described in Xanmagomedov (1967), and later reported for Eleme (Cross-River, Niger-Congo; Nigeria) by Anderson & Bond (2003). Other languages exhibiting this property include Chepang (Bodic, Tibeto-Burman; Nepal), Coast Tarangan (Central Malayo-Polynesian, Austronesian: Indonesia), Linda (Ubangi, Niger-Congo; Central African Republic) and Mono (Ubangi, Niger-Congo; Democratic Republic of Congo) (Bond 2012, 2013).

It is not straightforward to provide a coherent (morphological) feature based analysis that could account for the stems in (6). For instance, there is no independent evidence for associating the HL tonal pattern or reduplication only

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with a feature for Habitual aspect since it is not apparent in affirmative Habituals (e.g. (1a)); the same line of argumentation holds in relation to negation, since the same HL tonal pattern is not used in all types of negatives (e.g. (3b)) and verbal stem reduplication is found in some affirmative constructions (e.g. (6b)). There is likewise no independent evidence to motivate a feature value such as *irrealis* to link together the reduplicated verb forms like (6a) and (6b). This is supported by the shape of the Negative Future forms, which do not have reduplicated stems, but do realise the negative prefix found in Negative Perfectives (see Section 4.2.3 for discussion).

Consequently, I shall argue, in Section 4, that verbal reduplication in Eleme negatives is not determined directly by rules of exponence realising feature values, but by morphomic stem selection rules. First, in Section 3, I provide an overview of existing treatments of negation in LFG and spell out some of the consequences of morphological negation within the framework, based on the Eleme data examined.

3. Negation in LFG

As a parallel-constraint based grammar, representations of negation as a feature or unit of meaning are apparent in multiple structures of the LFG architecture. The literature review in Section 3.1 discusses major contributions to the topic and the consequences they have for the representation of synthetic negation. Possible applications of existing analyses of negation to Eleme data are explored in Section 3.2.

3.1 *Previous accounts of negation in LFG*

Most analyses of negation in LFG to date, such as Niño (1997), Sells (2000) and Alsharif & Sadler (2009), have focused on the syntactic properties of negation constructions by examining the role of negation as a feature at f-structure (Section 3.1.1). Dalrymple & Nikolaeva (2011) discuss the semantic contribution of negation (Section 3.1.2), while Ackerman & Stump (2004) examine issues related to morphology and the lexicon (Section 3.1.3).

3.1.1 *Negation in c-structure and f-structure*

Niño (1997) discusses negation within a broader exposition of controversies surrounding the multiple expression of the same grammatical information split across different nodes of a constituent structure. In her paper she provides an account for the distribution of subject agreement in Finnish Negatives, arguing that the syntactic patterns observed result from the interaction between morphology and syntax. In her representation of negative predicates, [POLARITY] is present in the f-structure as an attribute with a minus value [–], and thus negation is represented by an f-structure feature with binary values. Since negation is found

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in every language (unlike other feature value sets such as tense and aspect) this representation suggests that within each clausal f-structure, the polarity feature must be expressed. A similar representation of [POL –] within f-structure is used by Bresnan (2001: 183). Niño carefully argues for a lexicalist approach to syntax in which the unification of information ensures that inflectional information marked on different co-heads unifies into a single f-structure value.

In Sells' (2000) account of negation in Swedish, word forms identified as negative by virtue of restrictions on their participation in negative constructions (e.g. negative particles, negative indefinite pronouns) bear the attribute-value pair [NegForm:+]. Sells (2000: 13) explicitly describes this as 'c-structure information', and indeed represents this information in c-structure annotations, although the accompanying discussion suggests that this is perceived to be a 'morphological feature' associated with a negative word form, projected from f-structure information.[9]

He distinguishes between two distinct instances of negation with different scope properties. Constituent negation occurs when a word form identified as [NegForm:+] (i.e. negative) has narrow scope over a constituent that it immediately dominates; clausal negation occurs when a word form identified as [NegForm:+] has 'clausal' scope. According to Sells, both constituent negation and clausal negation involve the presence of [NEG +] in f-structure and that there may be only one instantiation of [NEG +] in each f-structure nucleus. To account for the scopal differences between the two different types of negation he invokes a set of projection principles (from f-structure to 'morphological expression'). These principles are used to account for the specific language facts of Swedish, essentially by listing correspondences between f-structure properties, the syntactic constituency of the clause and the position of a [NegForm:+] node in c-structure.

This account has several important consequences. Sentences that involve multiple negation (i.e. 'double negation' of the kind exhibited by Standard British English *I'm not doing nothing*) have more than one f-structure nucleus with the [NEG +] specification. Crucially, they have a strict match between the number of semantic occurrences of [NEG +] and the number of constituents that have the morphological specification [NegForm:+] as part of their c-structure information (Sells 2000: 16). Such sentences contrast with constructions exhibiting negative concord, which do not exhibit this strict match (accounted for using a constraining equation).[10]

Although not discussed in his paper, Sells' (2000) analysis has an important consequence for the synthetic realisation of negation too; since inflecting negative

[9] In this way, Sells (2000) follows ideas in manuscripts by Frank & Zaenen and Spencer & Sadler, published as Frank & Zaenen (2002, 2004) and Sadler & Spencer (2001).

[10] Sells (2000) argues that an alternative analysis in which each negative element is annotated with a defining equation (↑ NEG)=+ cannot adequately account for the scope possibilities of the various negators encountered in the language and that such an approach would sometimes be theoretically meaningless.

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verb forms are generated in the morphological component of grammar, the multiple exponence of negation in a paradigm cell will only ever count as one instance of the specification [NegForm:+] (and not multiple instances). This view of morphological negation predicts that there will never be an instance where multiple negation (which must involve multiple [NEG +] specifications) is expressed by two inflectional expressions of negation on the same verb form without the presence of a further [NegForm:+] with a [NEG +] specification at f-structure.

Alsharif & Sadler (2009) examine negation in Modern Standard Arabic. They propose that the negative particles *laa*, *lam* and *lan* and the negative auxiliary *laysa* each have the [POL] specification [NEG] in their lexical entries, and demonstrate how the particles differ from the auxiliary in terms of their syntactic behaviour. In their analysis, Alsharif & Sadler (2009) argue that *laysa* is a fully projecting I, taking a range of complements, and is not subject to verb-adjacency restrictions. The particles, conversely, are proposed to be non-projecting categories (Toivonen 2003) that are not heads of phrases, but adjoin to heads. Their analysis demonstrates that while the auxiliary and particles share the same f-structure specification for polarity, they exhibit different behaviour in c-structure. Like other attributes in the f-structure such as [TNS] and [ASP], the [POL] specification has more than one possible value, i.e. [AFF] and [NEG]. Such a view clearly permits the possibility that equations linking f-structure to other components of the grammar reference these values.

While each of the accounts discussed so far provides useful insight into how to best model negation within LFG, it is clear that a variety of means have been adopted to represent the presence of negation in f-structure, with the most popular approach positing a [POL] attribute, with binary ± values. In each case, the predicate negators discussed are inherently negative lexemes; they always contribute the specification [POL –] to f-structure. To avoid unnecessary confusion around my view of polarity, I adopt Alsharif & Sadler's (2009) notation convention on the basis that affirmative and negative polarity are members of a (binary valued) opposition, not a unary feature, and that rules can make reference to either value (see Corbett 2012 for discussion of the distinction between unary, binary and multivalued features).

3.1.2 *Negation in s-structure*

While most discussions of negation in LFG concern the representation of the syntactic properties of negative clauses, Dalrymple & Nikolaeva (2011: 86–90) provide insight into how the semantics of verbal predicate negation might be formalised in a discussion of topic and focus in English.[11] They propose that the semantics of negative formatives are represented in s(emantic)-structure

[11] As with Niño's (1997) representation of f-structure, [POLARITY] is treated as a feature with binary ± values, and negative polarity is indicated with the minus value [–].

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using MEANING CONSTRUCTORS. Their meaning constructor for English *not* is provided in (7) (Dalrymple & Nikolaeva 2011: 88).[12] The label of this meaning constructor appears in boldface to the left of the notation, and the meaning constructor itself appears on the right.

(7) **not** $\lambda P.\mathit{not}(P) : l_\sigma \multimap l_\sigma$

A meaning constructor consists of two parts: a MEANING EXPRESSION to the left of the colon and an expression relating to SEMANTIC STRUCTURE (i.e. how to combine meanings) to the right of the colon.[13]

The meaning expression identifies that *not* modifies the meaning of its argument P, where P stands for the (unmodified) propositional meaning of a semantic predicate (the predicate with which *not* combines). For instance, in the sentence *John didn't love Rosa*, *not* takes the meaning *love(john,rosa)* as its argument P. Now, consider the semantic structure information to the right of the colon. In the notation, l_σ represents the semantic structure associated with the f-structure l (for instance, for the example discussed above, l is the f-structure whose PRED is 'love'), while $\multimap$ expresses the linear logic operator LINEAR IMPLICATION. Therefore, $l_\sigma \multimap l_\sigma$ indicates that the semantic structure of an affirmative proposition (linearly) implies a semantic structure associated with the corresponding proposition negated by 'not'. Put another way, the meaning constructor in (7) indicates that the modified propositional meaning of the predicate *not*(P) is associated with the semantic projection of the f-structure l, just as the unmodified propositional meaning of the predicate P is associated with the semantic projection of the f-structure l (Mary Dalrymple, personal communication). Consequently, it is not possible to structure the meaning of the negative clause containing *not* without knowing the semantic structure contributed by the verb. A semantic analysis that separates semantic 'meaning' from semantic 'structure' in this way allows for the possibility that (in some languages) negators can restructure the semantics of a clause, as well as bring meaning to it. An important consequence of this analysis for the semantic projection of negative formatives is that negative and affirmative forms of the same verb must have different meaning constructors.

3.1.3 *Negation and the structure of the lexicon*

Arguably, the most important contribution to the LFG literature on the expression of negation as part of a verb's inflectional paradigm is presented by Ackerman & Stump (2004). In their paper on the periphrastic expression of negation, they propose a radical rethinking of the structure of the lexicon, proposing that it has a bipartite structure with respect to its content and form. Building on ideas first

[12] The meaning constructor of the negative indefinite pronoun *nobody* is discussed in Dalrymple (2001: 308–311).

[13] The use of a sans serif font indicates that *not* stands for the meaning of **not**.

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presented in Stump (2002), they distinguish between two component parts, the LEXEMICON and the RADICON, each with its own set of entries. The lexemicon's entries consist of lexemes, bearing lexical meanings.

Each entry L in a language's lexemicon is associated with a content-paradigm consisting of cells in which L is paired with a complete set of morphosyntactic features, σ. These CONTENT CELLS contain values from which the semantically interpretable functional features' relevant f-structure are projected (Ackerman & Stump 2004: 123). The lexical information associated with each cell also provides information in the form of meaning constructors (i.e. the semantic contribution of an item consisting of meaning expressions and semantic structures that are combined in s-structure to derive sentence meaning). For instance, the content-paradigm for the Eleme lexeme SI 'go' pairs the meaning of the lexeme L with each possible combination of (semantically interpretable) functional features relevant for that lexeme. A fraction of the content-paradigm for SI 'go' is provided in (8).

(8) *Negative Habitual content-paradigm of the Eleme lexeme SI 'go'*

(a) ⟨SI, {1st singular habitual negative}⟩
(b) ⟨SI, {2nd singular habitual negative}⟩
(c) ⟨SI, {3rd singular habitual negative}⟩
(d) ⟨SI, {1st plural habitual negative}⟩
(e) ⟨SI, {2nd plural habitual negative}⟩
(f) ⟨SI, {3rd plural habitual negative}⟩

Within a language's radicon, each entry r is a root associated with a form-paradigm consisting of FORM CELLS. In these cells, r is paired with the set of feature values, σ, required to realise the form of the cell using realisation rules. The need for two sets of feature values (i.e. the content feature value set and the form feature value set) is motivated by a range of independent morphological evidence that is not directly relevant to the discussion here (see Ackerman & Stump 2004 for details).

A fraction of the form-paradigm for the root *si* is given in (9). Since information about the tone class (i.e. inflectional class) of a root is not predictable based its phonological properties, yet affects the formal realisation of a stem, I assume that this is part of the information specified in the form-paradigm of an Eleme root (as specified by the index [tc1] for tone class 1 in (9)).

(9) *Negative Habitual form-paradigm of the Eleme root* si *'go'*

(a) ⟨si$_{V[tc1]}$, {1st singular habitual negative}⟩
(b) ⟨si$_{V[tc1]}$, {2nd singular habitual negative}⟩
(c) ⟨si$_{V[tc1]}$, {3rd singular habitual negative}⟩
(d) ⟨si$_{V[tc1]}$, {1st plural habitual negative}⟩
(e) ⟨si$_{V[tc1]}$, {2nd plural habitual negative}⟩
(f) ⟨si$_{V[tc1]}$, {3rd plural habitual negative}⟩

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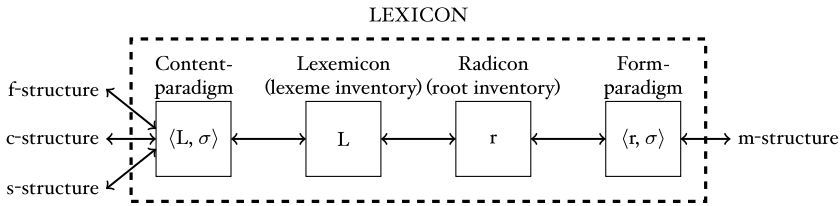


Figure 1
Schematic representation of the lexicon, with linkages between component parts and interfaces with parallel structures.

Each cell in the content-paradigm of a lexeme ⟨L, σ⟩ corresponds to a cell in the form-paradigm of a root ⟨r, σ⟩, referred to as the FORM-CORRESPONDENT (FC) of ⟨L, σ⟩. In most cases of synthetic morphology, the correspondence between a content cell and its form cell is straightforwardly defined by a universal default rule of paradigm linkage, given in (10).

(10) *Universal default rule of paradigm linkage* (Ackerman & Stump 2004: 120)
If root r is stipulated as the primary root of a given lexeme L, then the FC of the content cell ⟨L,σ⟩ is the form cell of ⟨r,σ⟩.

This conception of the lexicon is particularly pertinent when there are mismatches between the features that are relevant to morphology and those that are relevant to syntax and semantics. For instance, the default rule of paradigm linkage may be overridden when dealing with certain morphological phenomena such as heteroclisis and deponency (Ackerman & Stump 2004: 121–122). However, for the present example, the FC between content and form-paradigms is the default, such that the FC of the content cell in (8a) is (9a), and (8b) corresponds to (9b), and so on. The form cells in (9), consisting of a root r and a complete set of feature values relevant for realising that form, comprise the input to PFM rules, to be discussed in Section 4.

A schematic representation of the lexicon is provided in Figure 1 to help to elucidate these linkages. The dotted line surrounds the elements of architecture that contain the information usually associated with the lexicon. The lexemicon is an inventory of lexemes (L^1, L^2, L^3, etc.) and the radicon is an inventory of roots (r^1, r^2, r^3, etc.). In the most straightforward cases there is a one-to-one correspondence between a lexeme (e.g. L^{15}) and a root (e.g. r^{15}). Similarly, each lexeme is linked to its own content-paradigm (i.e., L^{15} and L^{16} have their own content-paradigms), and each root r is linked to its own form-paradigm. For simplicity, only one relation of this kind is shown in Figure 1. In the conception of the LFG architecture favoured in this paper, the form-paradigm of a root r interfaces with the morphological component of grammar that processes realisation rules (i.e. m-structure). The content-paradigm interfaces with the other structures of grammar.

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This view of the lexicon is useful because it naturally provides a mechanism by which to make the notion of the paradigm central to our conception of inventories of lexemes and roots, and provides the mechanism to separate the form of a word (determined by morphological realisation rules) from its semantically interpretable content. This separation of meaning and form is central to Ackerman & Stump's (2004) analysis.

Adopting a bifurcated view of the lexicon also has consequences for the interpretation of previous analyses of negation within LFG. For instance, considering the analysis of negation proposed by Sells (2000), one might assume that inherently negative items listed in the lexicon that do not show evidence of having a paradigm (e.g. negative particles and negative indefinite pronouns) nevertheless have a content cell (or equivalent), including a feature value pair [POL NEG] that projects to f-structure. However, since the bifurcated lexicon approach advocates distinguishing content from form, any morphological feature value pair (such as the purportedly morphological [NegForm:+]) could not genuinely be relevant for accounting for properties of constituent and clausal negation because feature values of this kind are projected from the lexicon (not f-structure), and feature values in the form-paradigm cells of the lexicon are only relevant for correctly determining the form of a word, not its role in syntax or semantics.

Issues of analysis also arise in dealing with the semantics of synthetic verbal negation (i.e. when a verb's paradigm includes both affirmative and negative forms), which requires a slightly different analysis to analytic verbal negation (where the verb and its negator occupy different nodes in c-structure). In the model favoured here, content cells (but not form cells) contain semantically interpretable functional features such as [POL] (with values [AFF] or [NEG]). They also provide semantic information associated with a lexeme in the form of a meaning constructor. In languages with an analytic negator (such as a negative particle), the semantics of negation and the (otherwise affirmative) predicate are combined in s-structure, as proposed by Dalrymple & Nikolaeva (2011). However, when languages have synthetically negative and affirmative verb forms in the same paradigm, various different possibilities could be considered to arrive at the correct s-structure representation. One might assume that (in straightforward cases) the negative semantics of a negative verb form is provided directly by the lexicon – i.e. that the meaning constructor is listed in the verb's lexical entry. An alternative position favours a more compositional view. In this approach the lexemicon provides the same basic semantic information associated with a PRED relevant for s-structure, but the pairing of this meaning constructor with the negative polarity feature in the content-paradigm (and consequently at f-structure) is responsible for the correct interpretation of the negative semantics in s-structure.[14]

[14] A more sophisticated account of this interface would be required if the presence of the negation feature resulted in a change in the semantic structure contributed by the lexical meaning of L.

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With these claims in mind, I propose that the negative clauses discussed in Section 2 only appear to be unusual because of the morphological processes that realise their forms. There is a straightforward pairing between the lexemes (L) listed in the lexicon and the roots (r) listed in the radicon. The content-paradigm of each lexeme interfaces with f-structure, c-structure and s-structure in a regular way.

3.2 *Modelling Eleme Negatives in LFG*

As part of the model of Eleme Negatives proposed here, the following assumptions will be made.

(i) Polarity is a binary feature that can have either of its values [NEG] or [AFF] referenced by rules of grammar.
(ii) Negative clauses have the attribute-value pair [POL NEG] in their f-structure.
(iii) Only one specification of the polarity attribute can be made in each f-structure nucleus.
(iv) Syntactic constraints imposed by negation are attributable to the specification of these properties in f-structure and c-structure.
(v) The semantic scope of negation is determined in s-structure.
(vi) M-structure comprises the rules that realise word forms.
(vii) The lexicon is composed of two inventories – a lexemicon and a radicon – linked by form correspondences.
(viii) Each entry L in the lexemicon corresponds to a content-paradigm, while each entry r in the radicon corresponds to a form-paradigm.
(ix) Content-paradigms interface with f-structure, c-structure and s-structure, while form-paradigms interface with m-structure.

To illustrate how these principles map to real data, consider the examples from Eleme in (11).

(11) (a) òsáro kɔ́ [àg^{w}íí àfīī è-sí∼sìì èpɔrɔ̀lù]
Osaro say musk.shrew 3[SG]-NEG∼smell bad.smell
'Osaro said the musk shrew doesn't smell bad.'

(b) òsáro rɛ́-kɔ∼kɔ́ [àg^{w}íí àfīī síí-y-e
Osaro NEG.3[SG]-NEG∼say musk.shrew smell-EPEN-HAB
èpɔrɔ̀lù]
bad.smell
'Osaro didn't say the musk shrew smells bad.'

In (11a) the predicate in the embedded clause is negated while the matrix clause is affirmative. Since the non-occurrence of this event is a persistent (i.e. a habitual) characteristic of an extended temporal period, the verb form is characterised by a reduplicated stem and a tonal pattern associated with the [ASP HAB, POL NEG] feature value pairs. In (11b), the predicate of the matrix clause is negated. Since

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this clause refers to the non-occurrence of a specific bounded event, i.e. it is Negative Perfective, negation is manifested through (optional) reduplication, tone and the negative prefix preceding the verb.

I assume that (for most languages) the syntactic domain of negation is limited to the clausal f-structure in which [POL NEG] is located. This assumption allows me to posit the f-structure in (12) for sentence (11a) and the one in (13) for (11b).

The f-structure in (12) has a [POL AFF] specification in the f-structure of the matrix clause and a [POL NEG] in the complement clause, while the reverse is true of (13).

Annotated c-structures are provided in (12′) and (13′) respectively. The c-structures in (12′) and (13′) demonstrate that the inflected negative verb forms occupy a single node in a syntactic tree. Note that since the specification [NegForm:+] has no consequences here, it is not marked in the tree.[15]

While the f-structures in (12) and (13) differ in terms of their attributes and values, the phrase structure of the trees is identical. In Section 4 I outline m-structure using a inferential–realisational model of morphology, in order to explain the exponence of tense–aspect and negation in these Eleme sentences.

(12)

$$\begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{Osaro}\text{'} \end{bmatrix} \\ \text{ASP} & \text{PFV} \\ \text{POL} & \text{AFF} \\ \text{PRED} & \text{`}\textit{say}\langle \text{SUBJ, COMP} \rangle\text{'} \\ \text{COMP} & \begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{musk shrew}\text{'} \end{bmatrix} \\ \text{ASP} & \text{HAB} \\ \text{POL} & \text{NEG} \\ \text{PRED} & \text{`}\textit{smell of}\langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{bad smell}\text{'} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

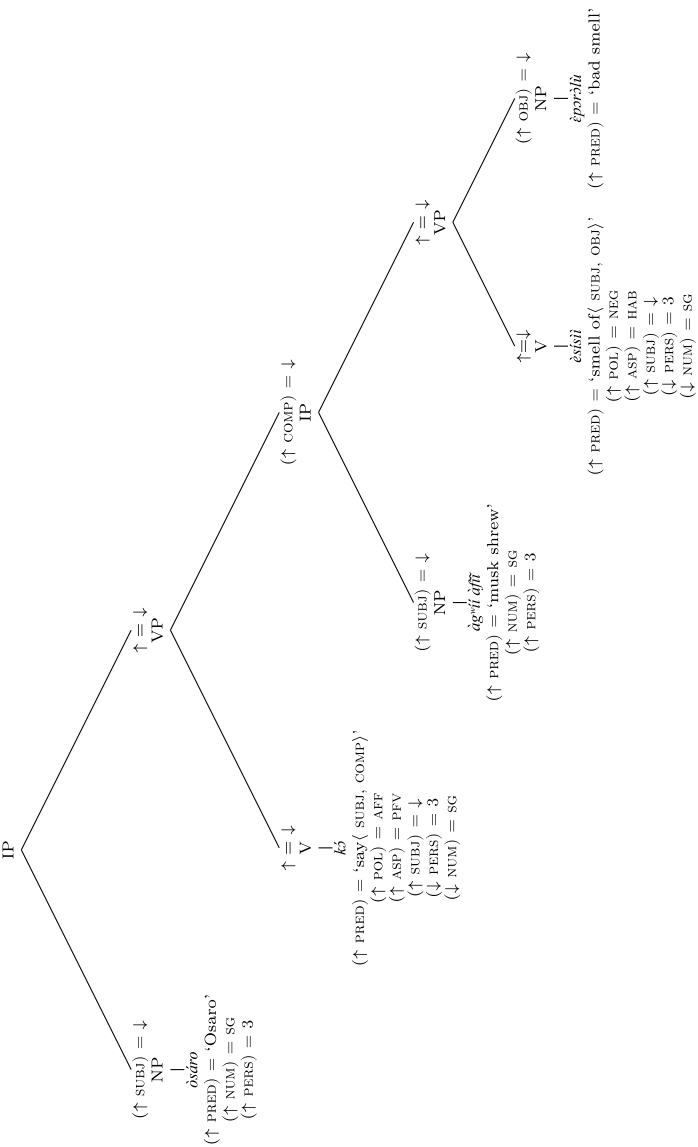
(13)

$$\begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{Osaro}\text{'} \end{bmatrix} \\ \text{ASP} & \text{PFV} \\ \text{POL} & \text{NEG} \\ \text{PRED} & \text{`}\textit{say}\langle \text{SUBJ, COMP} \rangle\text{'} \\ \text{COMP} & \begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{musk shrew}\text{'} \end{bmatrix} \\ \text{ASP} & \text{HAB} \\ \text{POL} & \text{AFF} \\ \text{PRED} & \text{`}\textit{smell of}\langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`}\textit{bad smell}\text{'} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

[15] Note that adopting Ackerman & Stump's (2004) view of the lexicon leads to the observation that [NegForm:+] is a property of the content-paradigm of a lexeme, not necessarily of all manifestations of that lexeme.

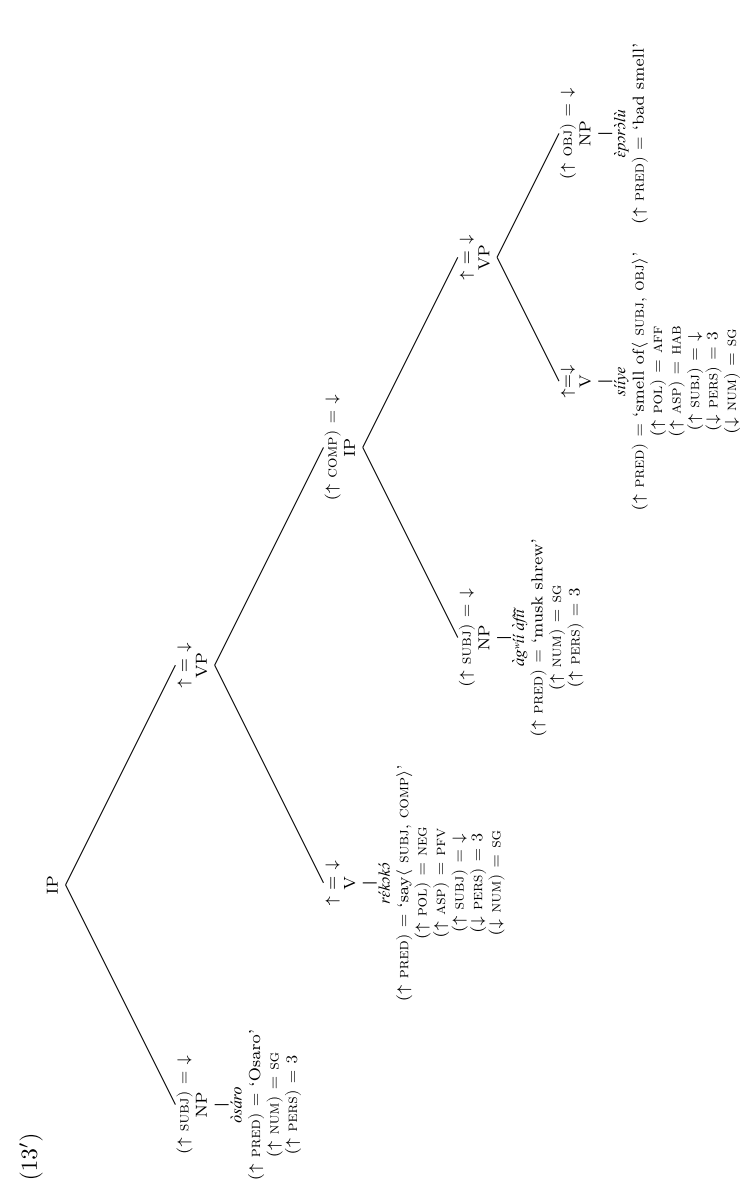
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(12′)



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(13′)



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4. NEGATION IN PFM

Paradigm Function Morphology (PFM) is an INFERENTIAL–REALISATIONAL theory of morphology. In REALISATIONAL approaches to the formation of inflected word forms the association between a 'word' (i.e. a root paired with a lexeme) and a particular set of morphological feature value pairs licences the inflectional exponents of those properties (Stump 2001: 2).[16] In an INFERENTIAL morphological model such as PFM, inflectional affixes are not lexical entries that contribute a meaning of their own, but the exponents of morphosyntactic feature sets, realised as part of a word form constructed using realisational rules. In the view of LFG architecture adopted here, m-structure is the component of grammar responsible for the realisation of inflected word forms. These rules are enacted once a root is paired with a complete set of morphosyntactic feature values to realise that form (as specified in a root's form-paradigm).

In my analysis of m-structure, I treat reduplication in Eleme as a morphology-internal stem formation process, while affixation, periphrasis and tone are treated as exponents of morphological feature sets. Such an analysis results in the conclusion that reduplication in Eleme is not a genuine exponent of negation, but that the rule of exponence that realises negation is indexed to a morphomic reduplicated stem. In Section 4.1, I introduce the general principles of stem formation pertinent to the analysis. In Section 4.2, I discuss the rules required to account for the exponence of concatenative morphology, before discussing the selection of morphomic stems in Section 4.3 and the paradigm function in Section 4.4. In Section 5, I summarise the contribution these data and the analysis can make to understanding the interface between m-structure and the lexicon.

4.1 *Stem formation*

The central claim of this paper is that reduplication in Eleme does not result from the application of a morphological realisation rule, but results from a morphology-internal process that is not directly associated with the *neg* feature value. Following Aronoff (1992, 1994) and Stump (2001), I propose that reduplicated stems in Eleme are formed through an asemantic process, and that the reduplicated stems have the same featural and lexical content as non-reduplicated stems. Crucially, although both Negative and Future predicates have reduplicated verbal stems, this cannot be synchronically attributed to the forms sharing a morphological feature value (see Section 2.2). Instead, the stems are formed and selected using morphomic rules – those that have 'no role in the grammar beyond

[16] In contrast, INCREMENTAL theories are information increasing, whereby 'words acquire morphosyntactic properties only as a concomitant of acquiring the inflectional exponents of those properties' (Stump 2001: 2).

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the autonomous workings of the morphological component' (Stump 2001: 169).[17] Stump (2001) argues that the occurrence of morphomic stems is not an unusual property of word formation:

> ...it frequently happens that the distributional difference between two stems follows neither from any systematic difference between meaning or morphosyntactic feature content, nor from phonological considerations. In view of the widespread incidence of such cases, one must simply assume that a lexeme's stems often carry indices whose sole function is to distinguish their mode of interaction with realizational rules (and, more broadly, with rules of derivation and compounding). (Stump 2001: 169)

With this in mind, I propose that the STEM INVENTORY for each verb root in Eleme consists of two stems which belong to distinct morphomic categories (i.e. categories internal to morphology). I call these categories Default and Redup, and propose that certain realisation rules index these labels to ensure that the correct stem is realised in any given cell of a paradigm.

These stems (and the label acting as their index) are not listed as roots in the radicon; instead Stump (2001: 169–173) argues that where members of the same stem inventory are related through generalisable (morpho)phonological regularities, they are described by STEM-FORMATION RULES. This captures the fact that relationships between two different realisations of the same root of a lexeme are often predictable and generalisable across a class of lexemes (rather than being idiosyncratic and necessarily listed in the lexical entry). Therefore, while roots of lexemes are listed in the radicon (itself part of the bifurcated lexicon), stems are formed from roots (or other stems) within the morphological component of grammar. In LFG terms, inflectable stems are realisations of roots formed in m-structure. There are two general stem formation rules for Eleme verbs, provided in (14).

(14) Stem formation rules
i r's default stem 'Default' is X, where X = r
ii r's reduplicated stem 'Redup' is LMμ $\sim$ X

Rule (i) is a default identity rule that ensures identity between a root r (listed in the radicon) and a stem X. For instance, the tone class 1 root *si* associated with the lexeme SI 'go' can be used as the input to other morphological rules without further modification. This is known as the Default stem. While the first

[17] An alternative analysis might attribute a phonological motivation for stem selection, whereby the tone rules posited in (30) require a bimoraic stem to provide an adequate domain over which the appropriate pitch contour can attain. However, there are two pieces of evidence that suggest this might not be the case. First, reduplicated stems are required in the relevant contexts outlined above even if the non-reduplicated stem variant already has a bimoraic structure. Second, the application of the same tone rule across 'optionally' reduplicated and non-reduplicated stems in the formation of Negative Perfectives suggests that the tone rules of Eleme do not always drive stem selection. Even if stem selection were ultimately found to be attributable to a phonological generalisation, it would not weaken the claim that reduplication is not an exponent of negation.

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rule ensures identity between r and X, the second rule forms a new stem type from X. Rule (ii) states that the reduplicated stem of a root r, called Redup, is formed through pre-reduplication (indicated in the notation with a pre-stem ∼) of the leftmost (LM) mora (μ) of the stem X (i.e. the Default stem for a given root). This ensures that the regular formation pattern of Redup stems from the Default stems regardless of their tone class. Some examples of the application of this rule to verbs with different moraic structures are provided in (15).

(15) Application of the stem formation rule for 'Redup'
be → *bebe* 'fight'
sii → *sisii* 'smell'
kpari → *kpakpari* 'sweep'

While most concatenative morphological processes that occur at stem boundaries (i.e. prefixation and suffixation) do not require a notation device (such as a hyphen) in traditional PFM rules, the tilde is adopted here to signify that the segmental material added at the left boundary of X is determined based on the phonological structure of the stem X. It takes an argument that identifies the type of unit (in this case a mora, μ) that is reduplicated and that unit's absolute position. The position of the tilde itself is important as it indicates where the segmental material occurs relative to the stem X; post-reduplication would be indicated with a tilde after the stem X. Since the phonological constituency of the stem is opaque to strictly morphological rules, I propose that this formation rule provides instructions for the phonological component of grammar to enact. With this in mind, I propose that where only the reduplicated stem is found with a given feature specification, selection of the correct stem is achieved through indexation of the stem within the relevant realisation rule, and that the non-reduplicated stem is selected by default in all other circumstances. While the reduplicated stem formation process follows a regular morphophonological rule, and therefore is entirely predictable, the tonal pattern associated with negation is determined by the combination of features associated with the stem in relation to the tonal class (i.e. tonal conjugation class) of the verb.

In PFM, stem formation rules such as those in (14) are listed in a special RULE BLOCK called Rule Block 0 (Stump 2001: 175). The stems formed in this rule block are available as the realisation of a root to which subsequent blocks of rules may apply. In order for a stem formed through a stem formation rule to be selected, realisation rules may either specifically index the (morphomic) stem over which they operate, or operate over the Default stem. In Section 4.3, I propose that realisation rules for both Future and Negative Habitual verb forms index the same Redup stem defined in (14), and that certain rules allow disjunction between the Default and Redup stems, with the Default used (by default) in all other instances.

4.2 *Exponence of morphological feature sets*

Within PFM, the realisation of morphological exponents is determined by realisation rules that operate over an input. A viable input consists of a stem (i.e. an

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inflected or uninflected realisation of the root defined in Rule Block 0) paired with a set of feature values, as defined in the form paradigm of that root. By way of example, consider the form cell for the root *si* associated with the lexeme SI 'go' given in (16). By default, the tone class 1 root *si* will be realised using the Default stem *sí* defined in Rule Block 0. The feature set contains those values that will be relevant for determining whether a realisation rule should apply to a given input.

(16) Habitual form cell from the form-paradigm of the Eleme root *si* 'go'
⟨$\text{si}_{\text{V[tc1]}}$, {3rd singular habitual anterior affirmative}⟩

Rules of exponence are organised into rule blocks in PFM. Rules contained within the same rule block are mutually exclusive operations that apply as alternatives in the formation of a form. The rules within a block are not ordered in a particular way, rather the most specific rule always applies. A PFM principle known as the Identity Function Default ensures that stems that do not have the values specified in the rules (and thus do not undergo the relevant morphological operations) have identical inputs and outputs. The outputs of rules (i.e. inflected or uninflected stems paired with a set of feature values) are the input to the subsequent rule block. The relative order of rule blocks (and thus the order of morphological exponence) is determined by the paradigm function, a formal device that determines a word form by specifying the sequence in which blocks of rules apply to an input. In the most uncontroversial cases of concatenative morphology, the paradigm function determines that rules within Block A apply to a stem (formed in Block 0) before those in Rule B, and rules in Blocks 0, A and B apply before those in Block C. For instance, in Eleme, exponents realising aspect occur closer to the verb stem than any other type of concatenative morphology in the language, and the rules of exponence that realise aspect affixes sequentially precede all other morphological rules other than the stem formation rules in Rule Block 0. In Eleme, rules of exponence for tense–aspect–mood (TAM) categories (Section 4.2.1) apply before rules that realise negation and subject feature values (Section 4.2.2). Examples to support the relative ordering of these rules are provided in Section 4.2.3.

4.2.1 *Exponence of TAM*

TAM categories in Eleme are expressed using a range of morphological exponents, including affixation, periphrasis and tone. The rule block in (17) contains three different rules for realising aspectual exponents through affixation. The notation X_V indicates that the rule applies to realisations of verbal roots. The set of features (σ) contained in braces indicates which set of feature value pairs must be associated with the root for the rule to apply.[18]

[18] In the PFM notation used here, abbreviations of features are provided in small caps, while their values are expressed in lower case.

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For instance, if the form cell pairing in (16) were the input to this rule block, TAM1(i) would apply because *sí* is the default realisation of a verbal root, and has the feature values {ASP: hab, POL: aff} in its feature specification. The output of rule TAM1(i) is given after the arrow to the right of the notation, where the variable X stands for the input to the rule. In this case, the Default stem of verb, i.e. *sí*, is the input, paired with the feature value set in (16). The rule output is *sía*. The stem outputs of rules TAM1(ii) and TAM1(iii) would be *kasí* and *kísí* respectively. The outputs to the rules in (17) demonstrate that aspect may be indicated through suffixation (as with the Habitual aspect) or prefixation (as with Proximative and Continuous aspects). Since the rules specify the polarity feature value {POL: aff}, these exponents only occur in affirmative predicates. Therefore, the first rule in (17) ensures that the suffix *-a* is found in Affirmative Habituals but not in Negative Habituals.

(17) Rule block for TAM 1 (TAM1)

TAM1:	i	X_V, σ : {ASP: hab, POL: aff}	→ *Xa*
	ii	X_V, σ : {ASP: cont, POL: aff}	→ *kaX*
	iii	X_V, σ : {ASP: prox, POL: aff}	→ *kíX*

A second rule block provided in (18) is applied after the one in (17). This rule block introduces periphrastic forms consisting of the stem input plus *bere* for anteriors or *bá* for negative future stems. The rule for the anterior stem does not specify a particular polarity value as it applies in the formation of negative and affirmative verb forms. The rule in this block applies to the outputs of the TAM1. Given the feature specification in (16), the input *sía* would be realised as *bere sía* following the application of rule TAM2(i).

(18) Rule block for TAM 2 (TAM2)

TAM2:	i	X_V, σ : {TNS: ant}	→ *bere X*
	ii	X_V, σ : {TNS: fut, POL: neg}	→ *bá X*

Examples of outputs from each of these rules will be provided in Section 4.2.3 after discussion of the rules that determine the exponence of negation and the person–number features of the subject in Section 4.2.2.

4.2.2 *Exponence of negation and subject feature values*

Having discussed the realisation of aspect, consider now the (simplified) realisation rule for negation in (19). This rule indicates that if a stem X, belonging to the lexical category of verbs $_V$, has the polarity feature value {POL: neg}, then the combination of that stem with its feature specification σ (i.e. whatever features and values are associated with a given form cell) will result in an output consisting of the same stem X, with a prefix comprised of an alveolar approximant and some underspecified vowel with a high tone (V́). Note that this rule is not sensitive to the shape of the stem; this is important because it may apply to both reduplicated and non-reduplicated stems in Eleme (as discussed in Section 2.1 and then formalised in Section 4.3).

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(19) Simplified realisation rule for negation

Neg: $X_V, \sigma : \{\text{POL: neg}\} \rightarrow$ rV́X

The vocalic properties of the negative prefix in Eleme are determined by the person and number values of the subject and partly by vowel harmony with the stem, as first illustrated in Table 1. Consequently, this broad rule would be better replaced by a rule block, consisting of a set of four mutually exclusive rules to account for the four different negative prefixes attested. Given that PFM is an inferential theory of morphology (as opposed to a 'lexical' one), I do not need to propose that there are four distinct negative prefixes listed in the lexicon (as realised by the rules of exponence in (21a)).[19] This fact makes the morphological expression of negation different from analytic types of negation already discussed in the LFG literature where each negative particle or negative verb has its own lexical entry.

Differences in the morphological form of targets based on the properties of their controllers can be accounted for in PFM by specifying the morphosyntactic features relevant for agreement with the subject as a set of permissible values for agreement AGR (su), as defined in (20), based on Stump (2001).

(20) Exposition of AGR (su)

AGR (su) (a set τ such that for one choice of permissible values α, β, $\{\text{PER: } \alpha, \text{NUM: } \beta\}$ is an extension of τ)

With this in mind, the following rule block for negation (Neg) contains a number of rules of exponence that account for the distribution of negative prefixes in Eleme. Vowel harmony is dealt with by a further general phonological rule (not discussed here). Note that the upper case *É* and *Ó* in the rules for second-person and third-person in (21) indicate harmonic variation between front and back, and the open and close vowels (i.e. *é/ɛ́* and *ó/ɔ́*). The rule block also contains a RULE OF REFERRAL, acting as a default, which indicates that the subject agreement pattern for verb stems with any other combination of feature values is determined in a different rule block, namely Agr1, given in (22).

(21) Rule block for Negation (Neg)

(a) Rules of exponence

Neg:
- i $X_V, \sigma : \{\text{POL: neg, AGR(su): } \{\text{PER: 1, NUM: sg}\}\} \rightarrow$ rḯX
- ii $X_V, \sigma : \{\text{POL: neg, AGR(su): } \{\text{PER: 1, NUM: pl}\}\} \rightarrow$ rɛ́X
- iii $X_V, \sigma : \{\text{POL: neg, AGR(su): } \{\text{PER: 2}\}\} \rightarrow$ rÓX
- iv $X_V, \sigma : \{\text{POL: neg, AGR(su): } \{\text{PER: 3}\}\} \rightarrow$ rÉX

(b) Rule of referral

Where σ is a complete extension of $\{\text{AGR(su): } \tau\}$,

$X_V, \sigma : \{\text{AGR(su): } \tau\} \rightarrow Y_V, \sigma$ where $<Y_V, \tau> = <X_V, \tau>$: Agr1

[19] Note that 'lexical' theories of morphology are quite different from 'lexicalist' theories of syntax, despite the unfortunate use of similar terminology.

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(22) Rule block for Default Subject Agreement 1 (Agr1)

Agr1:	i	X_V, σ : {AGR(su): {PER: 1, NUM: sg}}	→ ǹX
	ii	X_V, σ : {AGR(su): {PER: 1, NUM: pl}}	→ rɛ̃X
	iii	X_V, σ : {AGR(su): {PER: 2}}	→ ÒX
	iv	X_V, σ : {AGR(su): {PER: 3}}	→ ÈX

The exponents in the Neg rule block and the Agr1 rule block exhibit a degree of overlap in terms of their form. This suggests that it would be possible to distinguish separate sequential rules for the realisation of person and number marking and negative polarity. In such an analysis, Agr1 rules would apply first, in all relevant cases, followed by a single negative prefix realised as an alveolar consonant with a following floating tone that over-rides the tone properties of the Agr1 prefix. To arrive at the correct realisation, further phonological rules would be required to resolve the form of the first-person singular and plural forms. For instance, in the case of the first-person plural, this would require reference to a rule that deals with haplology. Such an analysis would be diachronically well motivated, as fusion between a negative particle and subject prefixes is almost certainly the source of the negative forms. The benefit of such an analysis would be the retention of iconicity in the morphological system through linear sequencing of feature realisations. However, this would create some problems in terms of the broader analysis proposed here without introducing any explanatory power about the distribution of the forms attested in the language. There are a number of reasons to believe that the negative subject agreement prefixes are realised by a single rule, not a sequence of rules.

(i) The negative prefixes (as defined) never co-occur with (i.e. are in complementary distribution with) the other types of agreement affixes attested in the language.

(ii) Negative prefixes in the third-person have a different distribution from the default prefixes in terms of their co-occurrence with an NP subject. Third-person default subject prefixes are usually absent when an NP or independent pronoun is used as the subject. This is not the case with the negative prefixes, as illustrated in (5) and (11).

(iii) Not all negative verbal constructions in Eleme have a prefix from the Neg rule block (e.g. Negative Habituals), but those that do are linked by no other common feature value than their negative polarity. Consequently, rule block ordering combined with feature specification appears to be an important factor in arriving at the correct morphological realisations in Eleme because featural specification alone would not realise the correct forms.[20]

[20] Even if we adopt an analysis in which this is a sequence of rules, we would still need to have a portmanteau rule block like the one discussed in (32) in Section 4.4 to exempt Negative Habituals from receiving a negative prefix. PFM advocates the application of the specific rules before general ones, such that defaulting to a generally applicable agreement paradigm is also appealing.

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The Neg and Agr1 rule blocks account for the distribution of the negative agreement prefixes and the default agreement prefixes on subjects.[21] For instance, each of the inflected stems in (23) corresponds to a rule output for the realisation rules in (21) with the non-reduplicated stem of *sí* 'go' (after the application of a vowel harmony rule not discussed here). These realisation rules will apply to any stem provided that (i) this rule block applies to that input (as defined in the paradigm function, discussed in Section 4.4) and (ii) the input meets the featural specification for the rule. For explicitness, the relevant featural specification of the subject is provided in square brackets after the stem in (23). Since these are also viable predicates, a translation is also provided after the feature specification. Note that unless otherwise morphologically specified, Perfective is the default aspectual characterisation of verbs in Eleme. Plural number of second- and third-person subjects is not marked by this series of prefixes; these properties are therefore not relevant for this rule. The examples in (23c) and (23d) are therefore well-formed predicates if the subject is singular (but not if the subject is plural).

(23) (a) *rɪ̃́sí* [NEG.1SG] 'I didn't go.'
(b) *rɛ́sí* [NEG.1PL] 'We didn't go.'
(c) *rósí* [NEG.2] 'You (SG) didn't go.'
(d) *résí* [NEG.3] 'He/she/it didn't go.'

The rule of referral in (21b) ensures that verb forms that do not have the negative polarity feature value are referred to rule block Agr1 in (22) for the exponence of subject agreement morphology. Since the rule of referral in (21b) is a default rule in the Neg rule block, any input that meets the criteria set out in rules (i–iv) in (21a) will not be directed to this rule block. In this way, double realisation of subject agreement exponents (e.g. **èrésí* for 'He/she/it didn't go.') is avoided. The stems in (24) correspond to a rule output for the realisation rules in (22). These are also well-formed predicates in Eleme, and thus translations are provided after the relevant feature specification.

(24) (a) *ǹsí* [1SG] 'I went.'
(b) *rɛ̃sí* [1PL] 'We went.'
(c) *òsí* [2] 'You (SG) went.'
(d) *èsí* [3] 'He/she/it went.'

Since plurality of second-person subjects is marked by a verbal suffix *-i*, a further rule block applicable to both negatives and affirmatives, namely Agr2, is provided in (25) to account for its distribution. This is treated as a separate rule, in a separate rule block, as the realisation of this affix is independent from the prefixes. Similarly, it does not have the same distribution as the clitic *=ri* used to mark third-person plural subjects. For detailed discussion of the distribution of the plural subject agreement markers and their different properties, see Bond (2010).

[21] Eleme has a vast array of subject agreement prefixes, discussed in detail in Bond (2006, 2008, 2010).

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(25) Rule block for Default Subject Agreement 2 (Agr2)
Agr2: X_V, σ : {AGR(su): {PER: 2, NUM: pl}} → Xi

The rule in (25) ensures that verb forms that agree with a second-person plural subject bear the exponent *-i*. We will examine the relative order of the application of these rule blocks (and others) in Section 4.2.3 below and again in Section 4.4 when discussing Eleme's paradigm function, but for the time being, there are two possible realisations for verb forms with second-person plural subjects to which both Neg (and thus Agr1 if relevant feature specifications for Neg rules are not met) and Agr2 apply. The stems in (26) correspond to the rule output for the realisation rules in (21), (22) and (25). Translations are provided after the feature specification relevant for the realisation rules responsible for the formation of these verb forms.

(26) (a) *rósíi* [NEG.2PL] 'You (PL) didn't go.'
(b) *òsíi* [2PL] 'You (PL) went.'

Given the potential complexity of the analysis, I will not discuss the distribution of the third-person clitic here; instead, see Bond (2010) for a detailed account. For clarity, the negative and affirmative verb forms that complete the paradigm are given in (27), with their feature specifications and translations.

(27) (a) *résíri* [NEG.3PL] 'They didn't go.'
(b) *èsíri* [3PL] 'They went.'

4.2.3 *The relative ordering of rule blocks*

The ordering of rules blocks in PFM is formally constrained by the paradigm function. An informal characterisation of this can be achieved by exploring the order in which morphological exponents are realised. In Eleme, rules relating to the realisation of person and number values of the subject and negation given in (21) and (22) apply after the rules in (17) and (18), as demonstrated by the examples in (28), from Bond (2006: 187, 195, 189). The reason for positing two separate TAM rule blocks (TAM1 and TAM2) is made clear by (28c), where the habitual suffix and periphrastic anterior stem co-occur.

(28) (a) ɔ̀-fɛ́-á-i ǹɑ̀ɣirá
2-catch.fish-HAB-2PL fish
'You (PL) usually catch fish.'
(b) ɔ̀-ka-sí-i ɔ̀tɔ̀ɔ̀
2-CONT-go-2PL house
'You (PL) are going home.'
(c) ò-bere kɛ-a-i m̀bó
2-ANT slaughter-HAB-2PL goat
'You (PL) used to slaughter goats.'

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The examples in (29) demonstrate that the negative prefixes can be used on the periphrastic verb stems.

(29) (a) rɨ́-bere fɔ́ àkùkùrì, ǹ-fɔ́-a ǹsógũ
NEG.1SG-ANT plant[HAB] corn 1SG-plant-HAB pumpkin
'I didn't used to plant corn, I plant(ed) pumpkins.'

(b) rɨ́-bá dé
NEG.1SG-NEG.FUT eat
'I will not eat.'

To summarise, the realisation rules proposed here apply to stems formed in Rule Block 0, given in (14), in a fixed sequence, such that TAM1 rules in (17) precede TAM2 rules in (18). Person and number agreement morphology is realised next through the application of the realisation rules in the Neg rule block in (21), where applicable, or by the Agr1 rule block in (22) by default. The application of these rules is followed by the Agr2 rule block in (25). The explicit ordering of rules blocks is constrained by the paradigm function, to be discussed in Section 4.4. Having described how PFM rules blocks can be used to correctly produce affirmative and negative stems through concatenation, in Section 4.3 we will explore the principles of stem selection and how they relate to the morphomic use of reduplication in Eleme.

4.3 *Stem selection and tone*

While the rules of exponence in Eleme exemplified in Section 4.2 each apply to the Default stem, several rules index its morphomic Redup stem, defined in (14). In such cases, the morphomic stem can only be selected provided that the Default stem variant has not already been operated on by an earlier realisation rule. Although rules in PFM are 'blind' to the internal morphological structure of an input, rules that select particular stems appear to be sensitive to some sort of index on inputs that flags when they have already undergone a morphological operation outside of Rule Block 0 (thus blocking selection of a particular stem from the stem inventory).

Both Future and Negative Habitual verb forms index the same Redup stem defined in (14) and in each case the tonal pattern of the stem is different, as first illustrated in (6). For instance, for a tone class 1 verb, like *si* 'go', the reduplicated stem will bear a HH tone pattern when it is associated with the feature values {TNS: fut, POL: aff}, i.e. *sísí*, and have a HL pattern when associated with the feature values {ASP: hab, POL: neg}, i.e. *sísì*.

This difference is accounted for in the Tone rule block in (30). This block contains realisation rules that ensure the application of the correct tonal pattern to a (reduplicated) stem, given the verb's conjugation class and the feature values of the form cell. For simplification, I show only tone class 1 here. Since different tonal patterns are at play across one and the same conjugational tone class, two distinct tone rules are required within this block for tone class 1 verbs.

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(30) Rule block for Tone (Tone)
Tone: i $X_{V[tc1]}$, σ : {TNS: fut, POL: aff} → Y⌢T1, where Y is X's Redup stem
ii $X_{V[tc1]}$, σ : {ASP: hab, POL: neg} → Y⌢T2, where Y is X's Redup stem

In (30), the two realisation rules index distinct tone rules (i.e. the phonological rules T1 and T2) as well as the type of stem required for this rule (i.e. stem Y of X). The tone rules are indicated using a tiebar ⌢ and take a suprasegmental phonological rule as an argument (T1, T2, etc.). The first realisation rule in this rule block ensures that if a verb stem belonging to tone class 1 is associated with the feature values {TNS: fut, POL: aff} then it will have the tonal pattern provided by the phonological rule T1. The second rule ensures that if a verb stem belonging to tone class 1 is associated with the feature values {ASP: hab, POL: neg} it will have the tonal pattern provided by the phonological rule T2. In this analysis there is nothing to stop T1 and T2 from being general tone rules, or being specific to only this morphological environment, however, T1 ensures that the stem has a HH pattern across the stem, while T2 ensures a HL pattern.

The rule block for tone appears to apply only after the two TAM rule blocks. One reason to claim this is that stems associated with the feature values {TNS: ant, ASP: hab, POL: neg} do not have reduplicated stems, as illustrated by (29a). Assuming that stems that have already undergone operations do not participate in rules that index other stems, the inflected outputs from TAM1 and TAM2 cannot participate in the Tone rule block even when their feature values are relevant for the rules therein.

While the Redup stem is always indexed by the rules in the Tone rule block, reduplicated stems in Negative Perfectives are not selected in exactly the same way because both Default and its morphomic stem Redup can occur with the negative prefixes without a difference in feature specification. One possible way to model asemantic variation between stems selected by a single rule would be to allow disjunction between X (the Default stem) and Y (the Redup stem). In a rule this could be represented by a notation device such as X∨Y . Since X and Y are semantically identical, and the differences in their form are not determined by variation in their feature values, optionality here is purely morphological. A revised set of rules for the Neg rule block that includes the possibility of disjunction between stems is provided in (31).

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(31) Rule block for Negation (Neg)

(a) Rules of exponence

Neg: i X_V, σ : {POL: neg, AGR(su): {PER: 1, NUM: sg}} → rĩZ, where Z is X∨Y

ii X_V, σ : {POL: neg, AGR(su): {PER: 1, NUM: pl}} → rɛ̃́Z, where Z is X∨Y

iii X_V, σ : {POL: neg, AGR(su): {PER: 2}} → rÓZ, where Z is X∨Y

iv X_V, σ : {POL: neg, AGR(su): {PER: 3}} → rÉZ, where Z is X∨Y

(b) Rule of referral

Where σ is a complete extension of {AGR(su): τ},

X_V, σ : {AGR(su): τ} → Y_V, σ where $<Y_V, \tau> = <X_V, \tau>$: Agr1

Again, such an analysis assumes that rules that choose between stems through indexation are free to do so provided that a previous rule has not already determined which stem from Rule Block 0 has been selected. That is, rules that index optional stems are able to choose between Rule Block 0 stems only if the input to the rule has not undergone any rules of exponence in earlier rule blocks and is identical to one of the Rule Block 0 stems. This accounts for why reduplication is optional in Negative Perfectives but not attested in the negative periphrastic stems exemplified in (29).

4.4 *Portmanteau rules and the paradigm function*

While the ordering of rule blocks outlined in Section 4.2.3 can successfully account for the form of Habituals, Perfectives and Negative Perfectives (with and without reduplication), it is not sufficient to account for the morphological form of Negative Habituals because there is no clear point at which adding the Tone rule block to this sequence of blocks would result in the attested Eleme forms. For instance, if the Tone rule block in (30) were added to this linear sequence at the stage after the TAM rule blocks and immediately before the application of the Neg rule block, then a verb stem with the feature value set {ASP: hab, POL: aff, PER: 3} would have the form *sía* as input to the Neg block, while a stem with the feature value set {ASP: hab, POL: neg, PER: 3} would have the form *sísì* at the same stage. The subsequent application of the Neg rules would wrongly ensure that Negative Habituals with the feature specification {ASP: hab, POL: neg, PER: 3} receive a prefix from the rule block for negation in (31) through application of rule Neg(iv) rather than Agr1(iv) from the rule block for default subject agreement in (22), because specification of the {POL: neg} feature value (together with appropriate values for person, and possibly number of the subject) would ensure that the more specific rule is applied. This would result in the ungrammatical stem **résísì* instead of the attested *èsísì* 's/he doesn't (usually) go'.

To account for this, I propose that there is a highly specific PORTMANTEAU RULE BLOCK for the formation of Negative Habitual and Future verb stems

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that stands in paradigmatic opposition to the Neg rule block proposed above. Portmanteau rule blocks contain specific rules that default to a sequence of more general rules contained in the (set of) block(s) over which they span (Stump 2001: 141–142). If the input to a portmanteau rule block satisfies a rule that results in the exponence of a set of feature values, an output of the rule is generated. If it does not satisfy any of the rules of exponence within the portmanteau block, a rule of referral redirects the input to the block(s) over which the portmanteau block spans. Consequently, the rules in portmanteau rule blocks will always be more specific than the rules that they are in paradigmatic opposition to. This behaviour is formally characterised by Stump's (2001: 142–143) Function Composition Default and the Identity Function Default.

The portmanteau rule for Future is given in (32i), while the portmanteau rule for Negative Habituals is given in (32ii). Port(i) indicates that if the input to a rule has the feature specification {TNS: fut, POL: aff} then the Tone block should be applied, followed by the Agr1 block. For Port(ii) the relevant feature specification is {ASP: hab, POL: neg}. This ensures that a reduplicated stem is selected from Rule Block 0 and that a HL tone pattern applies to tone class 1 verbs like *si* 'go'. The output of this rule (i.e. *sísì*) is the input to the Agr1 block.

In summary, the rules within the Tone rule block given in (30) index the Redup stem and a distinct phonological tone rule for each set of feature values. Application of the Agr1 rule block ensures that the correct default agreement prefix is realised. If the input to the portmanteau block does not meet the feature specification of Port(i) or Port(ii), it defaults to the rule blocks over which Port(iii) spans. In this case the spanned block is Neg. Note that there is an empty set of features for Port(iii) because any input that meets the specification for Port(i) or Port(ii) will already have redirected, and rule blocks spanned by Port(iii) will apply to all other inputs.

(32) Portmanteau rule block (Port)

Port: i X_V, σ : {TNS: fut, POL: aff} = (<X_V, σ> : Tone) : Agr1
ii X_V, σ : {ASP: hab, POL: neg} = (<X_V, σ> : Tone) : Agr1
iii X_V, σ : { } = <X_V, σ> : Neg

Portmanteau rules like those in (32) form part of the paradigm function in Eleme, which can be (partially) characterised by the notation in (33).[22]

(33) Partial paradigm function for Eleme

Where σ is a complete set of morphosyntactic properties for lexemes of category V, PF(<X_V, σ>) = (((<X_V, σ> : TAM1) : TAM2) : Port) : Agr2

The paradigm function specifies that the TAM1 and TAM2 rule blocks apply first, followed by the Port rule block. The Port rule block (consisting of the Tone and Agr1 blocks) defaults to the Neg rule block, which in turn defaults to the Agr1

[22] Given the complexity of verbal morphology in Eleme, this is necessarily a partial characterisation of the paradigm function. A full characterisation cannot be undertaken here.

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rule block. The final rule block is Agr2. The realisation rules in each block apply to the Default stem, except where a realisation rule indexes the morphomic stem Redup (as in Port) or allows disjunction between the two morphomic stems (as in Neg).

5. Conclusions

Not all morphological operations are directly associated with the exponence of morphological feature sets. Despite superficially appearing to be an exponent of negation in Eleme, I have argued that reduplication is a regular morphophonological process used for morphomic stem formation throughout the language; this is a purely asemantic process: default and reduplicated stems have identical semantic and lexical content. Asemantic relationships between stems give rise to the possibility that optionality between stems may be encountered if rules of exponence permit variability in the selection of morphomic stems.

Within a lexicalist theory of grammar like LFG, the contribution that a verb form makes to a structure can be evaluated in terms of the featural content it provides, not the morphology-internal processes responsible for word formation.[23] Following Ackerman & Stump (2004), I propose that the information associated with a lexeme's f-structure representation is projected from the information in its content-paradigm, specifically from the cell $\langle L, \sigma \rangle$ in the content-paradigm of the lexeme L. Consequently, a lexeme paired with its feature set will provide f-structure, c-structure and s-structure with the appropriate attributes and values associated with a PRED. The form-paradigm of the root r provides the inflectional information necessary to ensure the realisation of rules responsible for the morphological exponence of feature sets.

Under the analysis advanced here, a lexeme that has both affirmative and negative forms (and thus cannot be claimed to be inherently negative) exhibits a straightforward mapping between its content-paradigm and the f-structure of its clause, just as the featural specifications of lexical entries that do not have paradigms project from the lexicon to f-structure. The projection from the form-paradigm of a root to m-structure is also straightforward.

Although reduplication and tone are typologically unusual means of constructing negative verb forms, there is nothing even remotely unusual about the projection from the content-paradigm of any cells of Eleme negative verbs; the analysis proposed here uses exactly the same principles of projection that would be invoked to deal with negative verbs through affixation. The typologically unusual characteristics of Eleme negative verbs are internal to the morphology, but can be explained through reference to morphomic stems, rule block ordering and rules of referral that default to blocks containing less specific rules or exponence.

[23] Possible exceptions to this generalisation are periphrastic cells of a paradigm where the output of rules of exponence occupies more than one node in c-structure. For a detailed discussion of these issues, see Ackerman & Stump (2004).

https://doi.org/10.1017/S0022226715000134 Published online by Cambridge University Press

REFERENCES

Ackerman, Farrell & Gregory T. Stump. 2004. Paradigms and periphrastic expressions. In Sadler & Spencer (eds.), 111–157.

Alsharif, Ahmad & Louisa Sadler. 2009. Negation in Modern Standard Arabic: An LFG approach. In Miriam Butt & Tracy Holloway King (eds.), *LFG09*, 2–25. Stanford, CA: CSLI Publications; http://cslipublications.stanford.edu/LFG/14/papers/lfg09alsharifsadler.pdf.

Anderson, Gregory D. S. & Oliver Bond. 2003. Reduplication and negation in Eleme. Presented at the World Congress of African Linguistics 4, Rutgers, New Brunswick, NJ, 18 June 2003.

Aronoff, Mark. 1992. Stems in Latin verbal morphology. In Mark Aronoff (ed.), *Morphology now*, 5–32. Albany, NY: SUNY Press.

Aronoff, Mark. 1994. *Morphology by itself: Stems and inflectional classes*. Cambridge, MA: MIT Press.

Bond, Oliver. 2006. *Aspects of Eleme verbal morphosyntax*. Ph.D. thesis, University of Manchester.

Bond, Oliver. 2008. Multiple analytical perspectives of the Eleme Anterior-Perfective. *Current issues in unity and diversity of languages: Collection of papers selected from the CIL 18* [CD-ROM], 1480–1496. Seoul: Linguistic Society of Korea.

Bond, Oliver. 2010. Intra-paradigmatic variation in Eleme verbal agreement. *Studies in Language* 34.1, 1–35.

Bond, Oliver. 2012. Reduplication as an obligatory component (but not necessarily an exponent of negation) in negative constructions. Presented at the Linguistics Department Seminar Series, Stockholm University, Stockholm, Sweden, 24 May 2012.

Bond, Oliver. 2013. Modelling reduplication as a canonical vs. non-canonical exponent of negation. Presented at the South East Morphology Meeting, University of Surrey, Guildford, UK, 25 January 2013.

Bond, Oliver & Maria Flouraki. 2011. Reduplication as an exponent of negation in Eleme: an LFG analysis. Presented at 6th South of England LFG Meeting, SOAS, London, UK, 29 October 2011.

Börjars, Kersti, Nigel Vincent & Carol Chapman. 1997. Paradigms, pronominal inflection and periphrasis. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology 1996*, 155–180. Dordrecht: Kluwer.

Bresnan, Joan. 1998. Morphology competes with syntax: Explaining typological variation in weak crossover effects. In Pilar Barbosa, Danny Fox, Paul Hagstrom, Martha McGinnis & David Pesetsky (eds.), *Is the best good enough? Optimality and competition in syntax*, 59–92. Cambridge, MA: MIT Press.

Bresnan, Joan. 2001. *Lexical-functional syntax*. Oxford: Wiley-Blackwell.

Corbett, Greville G. 2012. *Features*. Cambridge: Cambridge University Press.

Dahl, Östen. 1979. Typology of sentence negation. *Linguistics* 17, 79–106.

Dalrymple, Mary. 2001. *Lexical-Functional Grammar* (Syntax and Semantics 34). New York: Academic Press.

Dalrymple, Mary & Irina Nikolaeva. 2011. *Objects and information structure: Agreement, casemarking and grammatical function*. Cambridge: Cambridge University Press.

Dryer, Matthew S. 1989. Universals of negative position. In Edtih Moravcsik, Jessica Wirth & Michael Hammond (eds.), *Studies in syntactic typology*, 93–124. Amsterdam: John Benjamins.

Dryer, Matthew S. 2011a. Minor morphological means of signaling negation. In Dryer & Haspelmath (2011). http://wals.info/feature/143G.

Dryer, Matthew S. 2011b. Negative morphemes. In Dryer & Haspelmath (2011). http://wals.info/chapter/112.

Dryer, Matthew S. & Martin Haspelmath (eds.). 2011. *The world atlas of language structures online*. Munich: Max Planck Digital Library; http://wals.info.

Frank, Annette & Annie Zaenen. 2002. Tense in LFG: Syntax and morphology. In Hans Kamp & Uwe Reyle (eds.), *How we say WHEN it happens: Contributions to the theory of temporal reference in natural language*, 17–52. Tübingen: Max Niemeyer.

Frank, Annette & Annie Zaenen. 2004. Tense in LFG: Syntax and morphology. In Sadler & Spencer (eds.), 23–65.

Ikoro, Suanu. 1996. *The Kana language*. Leiden: CNWS Publications.

Miestamo, Matti. 2005. *Standard negation: The negation of declarative verbal main clauses in a typological perspective*. Berlin: Mouton de Gruyter.

Niño, María-Eugenia. 1997. The multiple expression of inflectional information. In Francis Corblin, Danièle Godard & Jean-Marie Marandin (eds.), *Empirical issues in formal syntax and semantics*, 127–150. Berne: Peter Lang.

https://doi.org/10.1017/S0022226715000134 Published online by Cambridge University Press

Nordlinger, Rachel. 1998. *Constructive case: Evidence from Australian languages*. Stanford, CA: CSLI Publications.
Nordlinger, Rachel & Joan Bresnan. 2011. Lexical-Functional Grammar: Interactions between morphology and syntax. In Robert D. Borsley & Kersti Böjars (eds.), *Non-transformational syntax: Formal and explicit models of grammar*, 112–140. Oxford: Blackwell.
Nwí-Bàrí, W. K. 2002. *Tèè–English dictionary. Tabtàb Tèè turé bu bèkéé*. Port Harcourt: Onyoma Research Publications.
Payne, J. R. 1985. Negation. In Timothy Shopen (ed.), *Language typology and syntactic description,* vol. I: *Clause structure*, 197–242. Cambridge: Cambridge University Press.
Sadler, Louisa & Andrew Spencer. 2001. Syntax and an exponent of morphological features. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology 2000*, 71–96. Dordrecht: Kluwer.
Sadler, Louisa & Andrew Spencer (eds.). 2004. *Projecting morphology*. Stanford, CA: CSLI Publications.
Sells, Peter. 2000. Negation in Swedish: Where it's not at. In Miriam Butt & Tracy Holloway King (eds.), *LFG00*, 244–263. Stanford, CA: CSLI Publications; http://csli-publications.stanford.edu/LFG/5/lfg00.pdf.
Stump, Gregory T. 2001. *Inflectional morphology: A theory of paradigm structure*. Cambridge: Cambridge University Press.
Stump, Gregory T. 2002. Morphological and syntactic paradigms: Arguments for a theory of paradigm linkage. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology 2001*, 147–180. Dordrecht: Kluwer.
Thornton, Anna M. 2012. Reduction and maintenance of overabundance: A case study on Italian verb paradigms. *Word Structure* 5, 183–207.
Toivonen, Ida. 2003. *Non-projecting words: A case study of Swedish verb particles*. Dordrecht: Kluwer.
Wolff, Hans. 1964. Synopsis of the Ogoni languages. *Journal of African Languages* 3.1, 38–51.
Xanmagomedov, B. G. K. 1967. Tabasaranskij jazyk [The Tabassaran language]. *Jazyki narodov SSSR* [Languages of the peoples of the USSR], vol. IV, 545–561. Moscow: Nauka.

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https://doi.org/10.1017/S0022226715000134 Published online by Cambridge University Press