The story of *er*

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Abstract

The English comparative *-er* is a particular challenge for contemporary morphological analysis. The comparative and superlative in English are in an ABB suppletion relationship, which strongly suggests a containment relationship. This in turn suggests that *-er* and *-est* are in competition with each other. This is a challenge for both morphemic and word-based models of morphology. Word-based models are particularly challenged by competition between morphological and periphrastic exponence. Morphemic models, like L_RFG (the model assumed here), have to deal with complex constraints on the affixal form. *More* and *-er* are in (mostly) complementary distribution, suggesting that they are allomorphs. The blocking of *-er* is not only triggered by phonology, but also by syntactic triggers and semantic triggers. Sometimes pure complementarity fails and both *more* and *-er* are licit (*I am even madder* and *I am even more mad*), but it does so in predictable ways (in contrast to true optionality). The net of all these properties is that the appearance of *-er* is the result of a complex competition involving two competitors (*more* and *-er*) and phonological, semantic, and syntactic conditions restricting their distributions.

1 Introduction

The English comparative *-er* is a particular challenge for contemporary morphological analysis (see, among others, Lindquist 2000, Mondorf 2003, Mondorf 2007, Hilpert 2008, Matushansky 2013, Dunbar & Wellwood 2016).[†] The comparative and superlative in English are in an ABB suppletion relationship (*good*^{A}, *better*^{B}, *best*^{B}; *bad*^{A}, *worse*^{B}, *worst*^{B}), which strongly suggests a containment relationship (Bobaljik 2012). This in turn suggests that *-er* and *-est* are in competition with each other; i.e., there is a common set of features that is a subset of the features they expone (e.g., COMP +, given Bobaljik 2012) and they expone a shared syntactic position.

Additionally, *more* and *-er* are in (mostly) complementary distribution, suggesting that they are allomorphs. This again suggests that they are in competition with each other. This particular competition is syntactically interesting because *more* is an independent, free form that appears to the left of the adjective, while *-er* is an affix that appears to the right of the adjective. In order for *more* and *-er* to compete with each other, according to realizational models of morphology including Distributed Morphology (DM) and therefore L_RFG, they must have a shared position of exponence. This suggests that, e.g., *more orange* and *redder* have identical c-structures.

The complementarity of *-er* and *more* seems to be such that monosyllabic stems get *-er* and trisyllabic-plus stems get *more* (*bigger* vs **enormouser*). We largely set disyllabic stems aside here, because there seems to be significant idiolectal variation between native speakers about the suitability of *-er* for such forms. For example, some speakers prefer *commoner* to *more common*, while this is reversed for other speakers; see also *little* and *stupid*. Since this competition is resolved based on the phonological nature

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of the stem, we assume that this is caused by individual variation in the phonological restrictions of the affix and thus set it aside.

The blocking of *-er* is not only triggered by phonology, but also by syntactic triggers, as in (1), and semantic triggers, as in (2).

(1) The adornment is more pretty than practical.
$\neq$The adornment is prettier than practical.

(2) De'Aaron Fox was more clutch/*clutcher than any other player last year.

Finally, sometimes pure complementarity fails and both *more* and *-er* are licit

(3) I am even madder.

(4) I am even more mad.

Nevertheless, the variation is structurally and semantically predictable (in contrast to true optionality).

The net of all these properties is that the appearance of *-er* is the result of a complex competition involving two competitors (*more* and *-er*) and phonological, semantic, and syntactic conditions restricting their distributions.

2 Theoretical desiderata

The complex nature of this competition, which draws on mappings to multiple distinct representations, lends itself to a constraint-based, modular framework, such as LFG or L_RFG (for some recent work, and further references, see Asudeh & Siddiqi 2023, Asudeh, Bögel & Siddiqi 2023).

The overt competition of an affix and a free form (periphrasis) lends itself to a *lexical-realizational* (Stump 2001) approach, such as L_RFG. The designation *lexical* here means that morphological formatives are independent listed items and that these combine in complex forms. The designation *realizational* means that morphology *expresses* grammatical contrasts.

Given the complexity of the competitions, the English comparative represents the ideal morphological phenomenon to showcase all the different aspects of analysis in L_RFG and to provide the basis for a 'soup-to-nuts' demonstration of the framework, which is constraint-based, modular, and lexical-realizational. The English comparative thus also presents an opportunity for a a step-by-step primer on L_RFG analysis.

3 Morphological analysis

3.1 Determine allomorphy

Complementary distribution and blocking are the best ways to determine a suppletive allomorphy relationship (see Siddiqi 2024 for discussion). In the case of regular affixal morphology, we identify a systematic phonological alternation covarying with a systematic semantic/formal alternation. In the case of irregular allomorphy, we use the existence of that regular covariance to justify our assumption that a different phonological alternation is an irregular covariance with the same semantics (i.e., the irregular and the regular are in complementary distribution). We accept a proposed irregular covariance specifically when it blocks the regular covariance.

Following Bobaljik (2012), a standard approach to the distribution of comparatives and superlatives is some type of feature containment.[1] This is because G(rade) is the standard-bearer for the so-called **A/B/A* pattern. We assume that G is the syntactic category that hosts the features COMPARATIVE and SUPERLATIVE, i.e. G is the category of *-er/-est/more/most* and these project a Grade Phrase.[2] The typological claim here is as follows: if the comparative is suppletive for a given root, the superlative is never regular. The theoretical claim is that this pattern arises precisely because superlatives also express the featural content of comparatives (in addition to the feature that marks superlative). In the specific case of *-er* and *-est*, the *A/B/B* pattern occurs and *A/B/A* never occurs, as expected. There is thus arguably a subsumption relationship between the comparative and the superlative in English, such that the superlative properly contains the comparative information and therefore blocks it.

The blocking relationship between *more* and *-er* is perhaps more nuanced because it involves periphrasis (among others, Poser 1992, Embick & Noyer 2001, Kiparsky 2005, Ackerman et al. 2011), but in this case we can glean from the history of *-er* that, in contemporary English, *more* has changed from supporting *-er* to competing with it (Huddleston & Pullum 2002). We assume that *-er/-est* is morphophonologically restricted, while *more/most* is the elsewhere form.

We thus have four vocabulary items in English expressing the category G(rade): *-er*, *-est*, *more*, and *most*. As above, the superlatives outcompete the comparatives in superlative environments. The affixes outcompete the free forms in morphophonologically restricted environments. This complex competition is summarized in Table 1.

	Containment		
Morphophonologically unrestricted	*more*	$\sqsubset$	*most*
Morphophonologically restricted	*-er*	$\sqsubset$	*-est*

Table 1: English markers of comparative and superlative

3.2 Determine the vocabulary structure for each vocabulary item

The vocabulary items for *-er* (5a), *-est* (5b), *more* (5c), and *most* (5d) are listed below. The exponenda are in angled brackets (category, morphosyntactic features and interpretation). These map to the v(ocabulary)-structures (exponents; Asudeh, Bögel & Siddiqi 2023) in terms of descriptions of v-structures on the right hand side of the ν-mapping. However, it is more convenient and probably clearer to show the feature structure that satisfies the description than it is to show the description itself; we therefore continue to

[1]We remind the reader that, in L$_R$FG, more morphologically complex forms compete with less morphologically complex forms for exponence. For example, *feet* is competing with *foot* in the plural context. Bobaljik (2012) convincingly argues that the superlative is more complex than and includes the comparative. Therefore, all superlative forms are competing with comparative forms.

[2]We base Grade on Huddleston & Pullum (2002: 1580). We have not used the perhaps more familiar CmprP and SuprP, because we have no need for two syntactic positions. We could have used Degree (Phrase) or something else instead of Grade (Phrase).

use this representational convenience. For more discussion of this point and for further explication of v-structure features, see (Asudeh, Bögel & Siddiqi 2023):[3]

(5) a. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu}$
$\lambda\mathcal{P}_{es}.[\textbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$$\left[\begin{array}{ll} \text{PHONREP} & /\text{ə}\text{ɹ}/ \\ \text{PFRAME} & ((\ )_\sigma(\cdot)_\sigma)_{ft} \\ \text{PDOMAIN} & (\ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \left[\begin{array}{ll} \text{IDENT} & + \\ \text{PFRAME} & (\ )_\sigma((\ )_{\sigma=\mu}) \end{array}\right] \end{array}\right]$$

b. $\langle$ [G], @SUPR $\rangle \xrightarrow{\nu}$
$\lambda\mathcal{P}_{es}.[\textbf{supr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$$\left[\begin{array}{ll} \text{PHONREP} & /\text{əst}/ \\ \text{PFRAME} & ((\ )_\sigma(\cdot)_\sigma)_{ft} \\ \text{PDOMAIN} & (\ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \left[\begin{array}{ll} \text{IDENT} & + \\ \text{PFRAME} & (\ )_\sigma((\ )_{\sigma=\mu}) \end{array}\right] \end{array}\right]$$

c. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu} \left[\begin{array}{ll} \text{PHONREP} & /\text{mo}\text{ɹ}/ \\ \text{PFRAME} & (\cdot)_\omega \end{array}\right]$
$\lambda\mathcal{P}_{es}.[\textbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$
$(\ \lambda P_{et}.[\textbf{grade}_{\langle et,es\rangle}(P)]_{es}\ )$

d. $\langle$ [G], @SUPR $\rangle \xrightarrow{\nu} \left[\begin{array}{ll} \text{PHONREP} & /\text{most}/ \\ \text{PFRAME} & (\cdot)_\omega \end{array}\right]$
$\lambda\mathcal{P}_{es}.[\textbf{supr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$
$(\ \lambda P_{et}.[\textbf{grade}_{\langle et,es\rangle}(P)]_{es}\ )$

Note that we will return to further discussion of the **grade** function in §5 and §6.4. In the case of *more*, (5c), and *most*, (5d), since they are free forms, the v-structure is limited to its phonological and prosodic form. In the case of *-er*, (5a), and *-est*, (5b), which are instead affixes with phonological and prosodic restrictions, the v-structures encode these restrictions in their PFRAME and PDOMAIN features. They are suffixes, so they have left dependency (DEP(ENDENT) LT). There are phonological and syntactic restrictions on the nature of these affixes' hosts, so they have HOST features as well. In particular, [HOST [IDENT +]] specifies that the affix must be hosted by the c-structurally closest head that shares its v-structure. The other HOST feature, PFRAME, restricts the prosody of candidate hosts, such that the host must be no larger than a foot.[4]

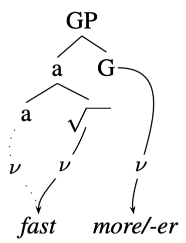
[3] Note that $\cdot$ represents the ρ-mapping of the current v-structure.

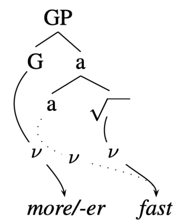
[4] In general, *-er* can be safely suffixed to monosyllabic hosts, but speakers vary somewhat as to which disyllabic hosts it can be suffixed to. We have taken a first step towards capturing this, by allowing an

4 Syntactic analysis

4.1 Determine shared c-structures

Because of the nature of lexical-realizational morphology, the c-structure is agnostic to the particular v-structures that it maps to. Therefore, when two vocabulary items (VIs) are shown to be in competition, they must share a position of exponence in the c-structure. There are two possible c-structures to consider because *more* surfaces on the left and *-er* surfaces on the right. We hypothesize—for simplicity and in the spirit of the standard LFG assumption that c-structure is surface-true barring prosodic effects—that one of the two candidates surfaces in its c-structural position, so we are considering only two underlying c-structures (6a,b).

(6) a.


b.


The VI for *more* (5c) does not have any phonological or syntactic constraints that would cause the order of its prosodic/phonological realization to differ from the order of its c-structure yield, so we would by default assume that (6b) is the shared c-structural representation. Furthermore, *-er* (5a) does have HOST and DEP properties that would trigger a mismatch, so we can reject (6a) as the shared representation. In short, for these reasons, when an affix and a free form are in competition, we by default assume that the free form's position is the underlying c-structural position. In the case of English, which is by hypothesis a head-initial language, general headedness properties would also lead us to assume that the functional/synthetic comparative head, which selects for an adjective, appears on the left.

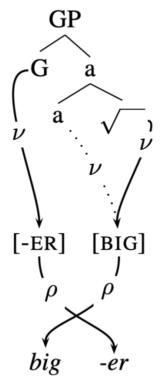
4.2 Determine realized linear order

We now have to identify the mechanism by which *-er* occurs on the right while *more* occurs on the left. The DEP feature of *-er* (value LT) requires *-er*'s host to appear to the left of the affix. The [HOST [IDENT +]] feature requires that *-er*'s host is the adjective, which is the nearest head. This triggers prosodic inversion (Asudeh, Bögel & Siddiqi 2023).

The re-ordering of the affix and host is handled at p(rosodic)-structure, via the ρ correspondence function; see Asudeh et al. (2023) for a comparable example with *blacken* and further discussion. The L$_{\text{R}}$FG c-structure is shown in (8), with additional ρ-mappings.

optional, second monomoraic syllable in the host. We have taken this step because there does seem to be agreement between speakers on these particular disyllabic roots, such as *happy* and *silly*.

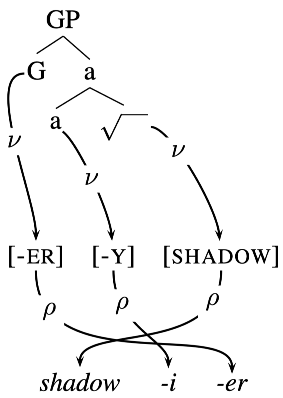
(7)



The dotted line in the c-structure (and the ones in those above) indicate *Pac-Man Spanning*, which is the mechanism that L$_{\text{R}}$FG uses to map otherwise unexponed nodes to an exponent, thus dispensing with empty exponents (for some further discussion, see Asudeh et al. 2023).

Note that, in other cases, the adjectivizer does get realized, as in *shadow-y-er*:

(8)



See §6.3.1 below for further discussion of cases like the latter.

4.3 Determine f-structures in common

We assume here that *more* and *-er* have identical f-structures, because their competition is never resolved via f-structural featural content. The competition is resolved via phonological and semantic conditioning. Turning to *-er* and *-est*, these in contrast are in a straight-forward containment relationship. We know this because any suppletive form that applies to the comparative also applies to the superlative (e.g, *better* and *best*; see Bobaljik 2012). In L$_{\text{R}}$FG, containment relationships are captured via *macros* (originally called "templates" by Dalrymple et al. 2004) which call other macros; see, e.g., the formalization of the Ojibwe person hierarchy in Melchin et al. (2020). In this case, @SUPR calls @CMPR, as in (9).

(9) a. SUPR := (↑ SUPERLATIVE) = +
@CMPR

b. CMPR := (↑ COMPARATIVE) = +

This results in f-structures like the following:

(10) a. $f\begin{bmatrix}\text{COMPARATIVE} & + \\ \text{SUPERLATIVE} & +\end{bmatrix}$ b. $g\begin{bmatrix}\text{COMPARATIVE} & +\end{bmatrix}$

Note that g properly subsumes f ($g \sqsubset f$); i.e. f-structure f contains the information that g does and more.

5 Semantic analysis

5.1 Determine compositional semantics

The semantic analysis of the comparative and superlatives is not our primary aim. However, we postulate that a distinction between the semantics of *-er* vs *more* (and *-est* vs *most*) accounts for *more/most*'s greater freedom of distribution.[5]

(11) De'Aaron Fox was more clutch/*clutcher than any other player last year.

(12) Kudrow's performance was more wooden/*woodener than Sorvino's.

Therefore, we need to present at least a sketch of a semantic analysis to show how the semantics can account for the distinction.

We adapt a basic, lexicalist degree semantics to a Glue Semantics context (Dalrymple 1999, Asudeh 2023). There has been much work on the semantics of comparatives, superlatives, and gradability. The standard reference for most modern approaches are Kennedy (1999, 2007) and Kennedy & McNally (2005), but see Burnett (2017) or Wellwood (2019) for recent monographs and further references therein. Here we build on Wellwood's (2019) characterization of a lexicalist approach.[6]

Wellwood (2019: 23) assumes the following types:

(13) **Semantic types**

a. e, v, s, t are the basic semantic types.

b. If δ, τ are semantic types, then $\langle \delta, \tau \rangle$ is a semantic type.
Notation: $\langle \delta, \tau \rangle \equiv \delta\tau$

c. Nothing else is a semantic type.

The types denote entities (e), events (v), degrees (s),[7] and truth values (t).

We also adopt Wellwood's notational conventions for variables:

(14) **Notational conventions**

a. $x, y, z, \ldots$ range over entities of type e (entities)

b. $e, e', e'', \ldots$ range over entities of type v (events)

c. $d, d', d'', \ldots$ range over entities of type s (degrees)

[5]Note that some speakers disprefer *woodener* due to the root *wooden* being disyllabic; see discussion above.

[6]Wellwood (2019) is in fact about developing an alternative to this approach, but this is the most familiar approach and her presentation is particularly clear. Again, the aim of this paper is not to argue for or against particular analyses of the phenomenon.

[7]This s is not to be confused with Montague's use of s as the non-basic/lexicalized intensional type s.

With these in hand, let us re-examine the meaning constructors for *-er* and *more* from (5a) and (5c) above, which are respectively repeated in (15a) and (15b). In this paper, we show only the meaning language side of the meaning constructors, but they are assumed to have a Glue/linear logic side of the usual kind as well.

(15) a. $\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

b. $\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$
($\lambda P_{et}.[\mathbf{grade}_{\langle et,es\rangle}(P)]_{es}$)

The function **cmpr** is the following function from Wellwood's (2019: 26, (63)) approach:[8]

(16) $\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle} := \lambda g_{es}\lambda d_s\lambda x_e.g(x) > d$

The function **cmpr** takes three arguments: a gradable predicate (type es), a degree scale (type s), and an individual. The function applies the predicate of degrees to its entity argument and returns true if the entity's degree on the scale is greater than the degree taken as an argument.

The function **grade** maps from predicates of entities (type $\langle e, t\rangle$) to the denotation of a gradable adjective, which is type $\langle e, s\rangle$, i.e. a function that maps entities to degrees.[9]

(17) $\mathbf{grade}_{\langle et,es\rangle} := \lambda P_{et}\lambda x_e.P(x) = \top|[\exists d_s.P_\delta(x)]_s$

The Glue proofs for two basic examples are shown in Figure 1; we continue to suppress the linear logic part of meaning constructors and show only the meaning language. Note that **intelligent** is already gradeable, so the **grade** function does not play a role here. We return to **grade** in §6.4.

6 Resolve competitions

6.1 Containment via f-structure features

The competition between *-er* (5a) and *-est* (5b) is located in the f-structures (and is thus codified in the exponenda, which are the left-hand side of the VIs). In (5a), *-er* is specified as exponing the contents of the template/macro @CMPR. In (5b), *-est* is specified as exponing the contents of the template @SUPR, which in turn calls the template @CMPR. Thus, superlative f-structures contain (are subsumed by) comparative f-structures.

(18) $\begin{bmatrix}\text{COMPARATIVE} & +\end{bmatrix}$

(19) $\begin{bmatrix}\text{COMPARATIVE} & + \\ \text{SUPERLATIVE} & +\end{bmatrix}$

[8]Wellwood (2019: 31, (84)) subsequently generalizes this function so that its type e arguments are of a type that is ambiguous between entities and events, such that all instances are either entities or events, but we do not need this extra refinement for our purposes.

[9]The δ notation on P_δ is meant to evoke degrees and is just meant to serve as a reminder that this is not a variable P of type et but is rather a variable P of type es, a predicate of degrees.

taller

$$\dfrac{\dfrac{\dfrac{\overset{\textit{tall}}{\lambda y_e.[\mathbf{tall}(y)]_s} \qquad \overset{\textit{-er}}{\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}}}{[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\lambda y_e.[\mathbf{tall}(y)]_s)]_{\langle s,et\rangle}}\multimap_{\mathcal{E}} \qquad [(\lambda g_{es}\lambda d_s\lambda x_e.g(x) > d)_{\langle es,\langle s,et\rangle\rangle}(\lambda y_e.[\mathbf{tall}(y)])_s]_{\langle s,et\rangle}}{[\lambda d_s\lambda x_e.(\lambda y_e.[\mathbf{tall}(y)])_s(x) > d]_{\langle s,et\rangle}}\,\text{def}_{\mathbf{cmpr}}}{\lambda d_s.\mathbf{tall}(x) > d}\Rightarrow_\beta$$

more intelligent

$$\dfrac{\dfrac{\dfrac{\overset{\textit{intelligent}}{\lambda y_e.[\mathbf{intelligent}(y)]_s} \qquad \overset{\textit{more}_1}{\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}}}{[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\lambda y_e.[\mathbf{intelligent}(y)]_s)]_{\langle s,et\rangle}}\multimap_{\mathcal{E}} \qquad [(\lambda g_{es}\lambda d_s\lambda x_e.g(x) > d)_{\langle es,\langle s,et\rangle\rangle}(\lambda y_e.[\mathbf{intelligent}(y)])_s]_{\langle s,et\rangle}}{[\lambda d_s\lambda x_e.(\lambda y_e.[\mathbf{intelligent}(y)])_s(x) > d]_{\langle s,et\rangle}}\,\text{def}_{\mathbf{cmpr}}}{\lambda d_s.\mathbf{intelligent}(x) > d}\Rightarrow_\beta$$

Figure 1: Proofs for *taller* & *more intelligent*

For f-structures containing the contents of @SUPR, **MostInformative**$_f$ selects *-est*, which has the most features (Asudeh & Siddiqi 2023).[10,11]

(20) **MostInformative**$_f(\alpha, \beta)$ returns whichever of α,β has the most specific f-structure in the set of f-structures returned by Φ applied to α/β's collected f-description.[12]

Intuition. Prefer portmanteau forms, whenever possible, on f-structural grounds. Choose the VI that defines an f-structure that contains the greater set of features.

Formalization. The proper subsumption relation on f-structures (Bresnan et al. 2016: chap. 5) is used to capture the intuition.

Given two VIs, α and β,

$$\textbf{MostInformative}_f(\alpha, \beta) = \begin{cases} \alpha \textbf{ if } \exists f.f \in \Phi(\pi_2(\pi_1(\alpha))) \wedge \forall g.g \in \Phi(\pi_2(\pi_1(\beta))) \rightarrow g \sqsubset f \\ \beta \textbf{ if } \exists f.f \in \Phi(\pi_2(\pi_1(\beta))) \wedge \forall g.g \in \Phi(\pi_2(\pi_1(\alpha))) \rightarrow g \sqsubset f \\ \bot \textbf{ otherwise} \end{cases}$$

Given an f-structure that contains SUPERLATIVE, as in (19), the competition proceeds as follows.

(21)
$$\textbf{MostInformative}_f \left(\begin{array}{l} \underline{\textit{-er}} \\ \langle [\text{G}], @\text{CMPR} \quad\quad \rangle \\ \quad \lambda\mathcal{P}_{\langle s,et\rangle}.[\textbf{cmpr}(\mathcal{P})]_{\langle s,et\rangle} \end{array}, \begin{array}{l} \underline{\textit{-est}} \\ \langle [\text{G}], @\text{SUPR} \quad\quad \rangle \\ \quad \lambda\mathcal{P}_{\langle s,et\rangle}.[\textbf{supr}(\mathcal{P})]_{\langle s,et\rangle} \end{array} \right)$$

$$= \textbf{MostInformative}_f \left(\begin{array}{l} \underline{\textit{-er}} \\ \begin{bmatrix} \text{COMPARATIVE} & + \end{bmatrix} \end{array}, \begin{array}{l} \underline{\textit{-est}} \\ \begin{bmatrix} \text{COMPARATIVE} & + \\ \text{SUPERLATIVE} & + \end{bmatrix} \end{array} \right)$$

$$= \textit{-est}$$

The f-structure competition between *more* and *most* is identical. Given an f-structure that contains COMPARATIVE, but not SUPERLATIVE, as in (18), there is no competition, because the conditions for *-est* are not satisfied and *-er* is the only viable candidate.

6.2 Suppletion in comparatives and superlatives

We now turn our attention to suppletive comparatives, such as *worse*. The simplex suppletive form blocks both complex regular forms: *worse/*badder/*more bad*. Exceptionally, irregulars fail to block regulars. In this case, the forms *badder* and *baddest* appear

[10] Recall that the right-hand side of a vocabulary item is itself a pair. Therefore, in a set-based representation, given a VI α, $\pi_1(\alpha)$ returns the left-hand side of the VI, while $\pi_2(\alpha)$ returns the right-hand side of the VI. The left-hand side is itself a pair; therefore $\pi_1(\pi_1(\alpha))$ returns the first member of the left-hand side pair, which is the list of categories, and $\pi_2(\pi_1(\alpha))$ returns the second member of the left-hand side pair, which is the information about f-structure, semantics, and information structure that constitutes the; we refer to this joint information as a *fugui* (Asudeh, Bögel & Siddiqi 2023). In short, $\pi_1(\pi_1(\alpha))$ returns the categories that the VI maps to its exponent v-structure, while $\pi_2(\pi_1(\alpha))$ returns the features, semantics and i-structural distinctions that determine its exponent.

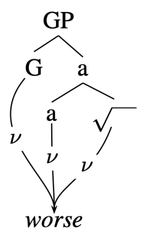
[11] We thank Adam Przepiórkowski and Sebastian Zawada for extensive discussion of this formalization, which supersedes prior versions we have proposed elsewhere.

[12] The function Φ is similar to the familiar ϕ from LFG, which L$_\text{R}$FG also adopts. The difference is that ϕ maps c-structure nodes to the minimal f-structure that satisfies the mapping, whereas Φ maps f-descriptions to the minimal f-structures that satisfy them.

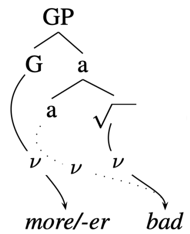
under restricted conditions in English,[13] but not with the same meaning as *worse*. *Worse* contributes a meaning constructor that is not present in the environments that give rise to the realization *badder* (also *worst/baddest*). See Asudeh & Siddiqi (2022) for details about regular forms appearing instead of irregulars, as in *divineness/divinity*.

Given the typical blocking behaviour of irregulars, we can conclude that the irregular is a vocabulary item that spans multiple c-structure terminals, (22a), and outcompetes two vocabulary items that express equivalent information, (22b).

(22) a.



b.



In this competition, **MostInformative**$_c$ chooses the portmanteau form over the complex form. Therefore, *worse* is preferred over *badder* and *more bad*.

(23) **MostInformative**$_c(\alpha, \beta)$ takes two sets of vocabulary items α,β and returns whichever set is smaller.

Intuition. Prefer portmanteau forms, whenever possible, on c-structural grounds. Choose the set of VIs that realizes the greater span of c-structure nodes.

Formalization. We define the functions in (24) to aid the presentation, where c is a c-structure, f is an f-structure, and v is a vocabulary item.

Given a c-structure c and two sets of vocabulary items, α and β,
MostInformative$_c(\alpha, \beta) =$
$\alpha = \{x \mid x \text{ is a VI } \wedge \textbf{features}(x) \subseteq \textbf{targets}(c) \wedge \forall y \exists z.[y \in \textbf{categories}(x) \wedge z \in \textbf{labels}(c) \wedge \pi_2(z) = y]\}$
$\beta = \{x \mid x \text{ is a VI } \wedge \textbf{features}(x) \subseteq \textbf{targets}(c) \wedge \forall y \exists z.[y \in \textbf{categories}(x) \wedge z \in \textbf{labels}(c) \wedge \pi_2(z) = y]\}$

$$\begin{cases} \alpha \textbf{ if } |\alpha| < |\beta| \\ \beta \textbf{ if } |\beta| < |\alpha| \\ \bot \textbf{ otherwise} \end{cases}$$

(24)
- **features**$(v) := \Phi(\pi_2(\pi_1(v)))$
  the set of f-structures that VI v defines per the f-description in its left-hand side[14]
- **categories**$(v) := \pi_1(\pi_1(v))$
  the category list of VI v

[13]As in the famous Jim Croce song.

[14]We now want the second coordinate of the first coordinate of the VI represented as an input/output pair; see footnote 10.

- **targets**(c) :=
  $\{f \mid \phi(c) = f \wedge \pi_1(\textbf{labels}(c)) \subseteq \textbf{extendedProj}(f)\}$
  the set of f-structures that c-structure c defines, such that the nodes in the first-coordinate of the **labels** *of c are a subset of the* **extendedProj** *of f*
  - **labels**$(c) := \{\langle x, y\rangle \mid x \in \textbf{yield}(c) \wedge y = \lambda(x)\}$
    a set of pairs where the first member is a node in c-structure c and the second member is the node's label/category
    - **yield**$(c) := \{n \mid n \text{ is a terminal node in } c\}$
      the set of terminal nodes in c
  - **extendedProj**$(f) := \phi^{-1}(f)$
    the set of c-structure nodes that map to f-structure f; the extended projection of f in c-structure

We now explain the workings of the helper functions in (24) some more. The function **features** takes a VI as an argument and returns a set of f-structures. The f-structures that are returned are those defined by the second coordinate (π_2) of the first coordinate (π_1) of the vocabulary item. The first coordinate of the vocabulary item is its left-hand side and the second coordinate of that left-hand side includes any f-descriptions that are part of the VI's exponenda. The function Φ returns the set of f-structures defined by the f-description in the VI. Thus, **features**(v) returns a set of f-structures. The function **categories** takes a VI as an argument and returns its category list. Again, the first coordinate (π_1) of the VI is its left-hand side. The first coordinate (π_1) of the left-hand side is the VI's category list.

The function **targets** takes the given c-structure c as its argument. The function returns a set of f-structures. In other words, **targets**(c) returns the f-structures expressed by the terminal nodes in c. The f-structures that are returned must meet further conditions. In particular, each f-structure in the set must be such that the set of c-structure nodes that map to the f-structure (obtained from **extendedProj**) are a superset of the nodes in the c-structure c that is the argument to **targets**. These nodes are obtained by taking the first coordinate of the value of the **labels** function applied to c. The function **labels** returns a set of pairs, such that each pair consists of a node from the **yield** of c and its category, obtained through the standard LFG labelling function, λ (Kaplan 1989, 1995). The function **yield** returns the set of terminal nodes in c. Lastly, as alluded to before, the function **extendedProj** takes an f-structure as an argument and returns the set c-structure nodes that map to the f-structure in question; thus, this function captures all of the c-structure nodes that map to a given f-structure. In other words, it returns all of the nodes on any given $\uparrow = \downarrow$ path, such as a verbal spine or a nominal spine.

Thus, the arguments of **MostInformative**$_c$ are sets of vocabulary items. Each set is defined such that 1) its members' f-structures are subsets of the target f-structure for the given c-structure, 2) its members' category lists are such that for each category in the list there is an identical category in the set of categories that label the nodes of the given c-structure.

Turning back to our example, take α to be *worse* and β to be *badder*. In this case, α, β are expressing the same f-structural information and the same c-structural spans. α is a set containing a single vocabulary item (the one for *worse*) and β is a set containing two vocabulary items (the ones for *bad* and *-er*). Therefore, **MostInformative**$_c$ selects

α/*worse*, since $|\{[worse]\}| < |\{[bad], [\text{-}er]\}|$. The same reasoning explains why *worse* is preferred by **MostInformative**$_c$ to *more bad*. Note that this version of **MostInformative**$_c$ essentially captures the *Minimize Exponence* principle of Siddiqi (2006, 2009).

6.3 Periphrasis versus affixation

The phonological competition between *more* and *-er* is triggered by information in the v-structures, which are repeated in (25) and (26) respectively.

(25) $\begin{bmatrix} \text{PHONREP} & /\text{mo\textturnr}/ \\ \text{PFRAME} & (\cdot)_\omega \end{bmatrix}$

(26) $\begin{bmatrix} \text{PHONREP} & /\text{ə\textturnr}/ \\ \text{PFRAME} & ((\ )_\sigma(\cdot)_\sigma)_{ft} \\ \text{PDOMAIN} & (\ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{PFRAME} & (\ )_\sigma((\ )_{\sigma=\mu}) \end{bmatrix} \end{bmatrix}$

When two VIs have equivalent exponenda and are both phonologically licit, **MostSpecific** selects the VI with the most restricted distribution (Asudeh, Bögel & Siddiqi 2023).

(27) **MostSpecific**(α, β) returns whichever vocabulary item has the most restrictions on its phonological context.

Intuition. Prefer affixes whenever possible.

Formalization. The proper subsumption relation on feature structures (i.e., v-structures) is used to capture the intuition.

Given two exponents (v-structures), α and β,

$$\textbf{MostSpecific}(\alpha,\beta) = \begin{cases} \alpha \textbf{ if } \beta\backslash\text{PHONREP} \sqsubset \alpha\backslash\text{PHONREP} \\ \beta \textbf{ if } \alpha\backslash\text{PHONREP} \sqsubset \beta\backslash\text{PHONREP} \\ \bot \textbf{ otherwise} \end{cases}$$

As an affix, *-er* has a more restricted phonological environment than *more*, where the latter is the elsewhere case in this competition. Therefore, according to **MostSpecific**, *bigger* is preferred to *more big*, for example.

6.3.1 The prosodic domain of *er* and bracketing paradoxes

A classic puzzle in morphology concerns the comparative suffix *-er* and its appearance in, e.g., *unhappier*; see Pesetsky (1985) and Sproat (1988, 1992) and afterwards. The puzzle is that *unhappy* is trisyllabic, yet *-er* affixes to it (happily) despite its normal injunction against attaching to a domain greater than two syllables. Here we adopt what is a standard analysis of this puzzle (Sproat 1992), which is that *un-* is outside the prosodic domain of *-er* (i.e., PDOMAIN here). This sort of analysis shows that there is no bracketing paradox at all, but rather that there is a locality condition on the PDOMAIN of *-er*. In other words, the prosodic structure is [*un*[*happier*]].

We expand this discussion here to includes words like *shadowier*. With respect to forms like this, we hypothesize that the only VI within the PDOMAIN of *-er* is in fact the adjectivizer *-y*. Thus, *shadowier* is licit, because *shadow* is in fact outside the prosodic domain of *-er*. Some speakers reject *shadowier* in favour of *more shadowy*. This would be explained if, for these speakers, *shadow* in fact *does* occur in the domain of *-er*, resulting in an *-er* form that prosodically unsuitable. For these speakers, *shadowier* is not a possible prosodic word per *-er*'s requirements. In other words, for some speakers, the bracketing is the licit [*shadow*[*ier*]], whereas for others it is the illicit [[*shadowy*]*er*].

6.4 Semantic restrictions on competition

We return now to another question, which was initially raised in §5:

Q Why is **clutcher* ungrammatical but *more clutch* is not?

In particular, **MostSpecific** prefers *clutcher*, while **MostInformative**$_c$ and **MostInformative**$_f$ have no preference (they both *bork*, delivering $\bot$ as their output).[15] Foreshadowing a little, our answer is that **clutcher* simply fails semantically: there's nothing wrong with it morphosyntactically or morphophonologically.

Recall from §5 that we take a distinction between the semantics of *-er* vs *more* (and *-est* vs *most*) to account for *more/most*'s greater freedom of distribution:

(28) De'Aaron Fox was more clutch/*clutcher than any other player last year.

(29) Kudrow's performance was more wooden/*woodener than Sorvino's.

Gradable adjectives, like *tall* or *intelligent*, and non-gradable adjectives, like *clutch* or *wooden*, thus have different types:[16]

(30) a. $[\![\textit{tall}]\!] = \lambda x_e.[\textbf{tall}(x)]_s$
b. $[\![\textit{intelligent}]\!] = \lambda x_e.[\textbf{intelligent}(x)]_s$

(31) a. $[\![\textit{clutch}]\!] = \lambda x_e.[\textbf{clutch}(x)]_t$
b. $[\![\textit{wooden}]\!] = \lambda x_e.[\textbf{wooden}(x)]_t$

In other words, *tall/intelligent*, map their entity arguments to the entity's degree of tallness/intelligence, whereas *clutch/wooden* map their entity arguments to true/false, i.e. denote whether the entity *is* clutch/wooden.

Recall the vocabulary items from (5) above, focusing on the comparative ones to reduce clutter (the superlatives make the same point):

---

[15]It is up to the theory to determine how borking should be interpreted; for example, we could interpret as a tie, such that relative to the constraint in question, either VI can be chose.

[16]We assume a generally available, pragmatically motivated late existential closure of type $\langle es, et\rangle$ for these adjectives, such that, e.g., *tall* ends up meaning $\lambda x \exists d.\textbf{tall}(x) \geq d$. This same existential closure can be used in elliptical contexts such as *Alex is taller* or *Alex is tallest*, where no *than*-phrase is present.

(5) a. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu}$

$\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$$\begin{bmatrix} \text{PHONREP} & /\text{ə}\text{ɹ}/ \\ \text{PFRAME} & ((\ \ )_\sigma(\ \cdot\ )_\sigma)_{ft} \\ \text{PDOMAIN} & (\ \ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{PFRAME} & (\ \ )_\sigma((\ \ )_{\sigma=\mu}) \end{bmatrix} \end{bmatrix}$$

c. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu}$ $\begin{bmatrix} \text{PHONREP} & /\text{mo}\text{ɹ}/ \\ \text{PFRAME} & (\ \cdot\ )_\omega \end{bmatrix}$

$\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$(\ \lambda P_{et}.[\mathbf{grade}_{\langle et,es\rangle}(P)]_{es}\ )$

The **grade** function, which only *more* and *most* can contribute, maps a predicate of entities to a function from entities to degrees.

(32) $\mathbf{grade}([\![clutch]\!]) = \lambda x_e.\mathbf{clutch}(x) = \top | [\exists d_s.\mathbf{clutch}_\delta(x)]_s$

In short, the optional **grade** meaning constructor in the VI for *more* (and *most*) allows composition with a non-gradable adjective, whereas *-er* (and *-est*) does not have this capacity. Figure 2 shows the computations.

In sum, the competition between, e.g., **clutcher* and *more clutch* as well as the putative optionality of *more red/redder* is a function of the gradability of the adjective, as resolved by the Glue Semantics. In particular, the base semantics of *more* and *-er* is the same, as indicated by the single, obligatory meaning constructor which occurs in each of their VIs in (5a) and (5c); but *more* also optionally contributes a meaning constructor that maps an ordinary property to a gradable property. Therefore, *more* is correctly predicted to be able to compose with non-gradables such as *clutch*, while *-er* is correctly predicted to not occur with such adjectives. Note that *more clutch* is not winning one of our competitions: *clutcher* is simply illicit semantically, while *more clutch* is not.[17]

6.5 Putative optionality

Lastly, let us turn to how overt comparative phrases interact with gradability.

(33) a. Max is more proud than happy.

b. *Max is prouder than happy.

(34) a. Max is more proud than he is happy.

b. Max is prouder than he is happy.

[17] A reviewer points out that there is still some work to be done here, since **MostSpecific** still prefers *clutcher* over *more clutch*. We leave the details of this for future work, but it seems that the system needs to be able to 'back off' to a candidate that expresses the right semantics, even if it is not the morphophonologically preferred candidate. This case seems to show that the **MostInformative** principles should take priority over **MostSpecific**. Concepts tend to find a way to be expressed.

clutcher

$$\dfrac{\overset{\textit{clutch}}{[\lambda y_e.[\mathbf{clutch}(y)]_t]_{et}} \qquad \overset{\textit{-er}}{\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}}}{} \;\nvdash$$

more clutch

$$\dfrac{\overset{\textit{clutch}}{[\lambda z_e.[\mathbf{clutch}(z)]_t]_{et}} \qquad \overset{\textit{more}_2}{\lambda P_{et}[\lambda y_e.[\mathbf{grade}_{\langle et,es\rangle}(P)(y)]_s]_{es}}}{[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\lambda z_e.[\mathbf{clutch}(z)]_t)(y)]_{es}} \multimap_{\mathcal{E}}$$

$$\dfrac{[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\lambda z_e.[\mathbf{clutch}(z)]_t)(y)]_{es}}{[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y))]_{es}} \Rightarrow_\beta$$

$$\dfrac{[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y))]_{es} \qquad \overset{\textit{more}_1}{\lambda \mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}}}{\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y))]_{es})]_{\langle s,et\rangle}} \multimap_{\mathcal{E}}$$

$$\dfrac{\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}[\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y))]_{es})]_{\langle s,et\rangle} \qquad [(\lambda g_{es}\lambda d_s\lambda x_e.g(x) > d)_{\langle es,\langle s,et\rangle\rangle}([\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y))]_{es})]_{\langle s,et\rangle}}{[\lambda d_s\lambda x_e.(\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y)))(x) > d]_{\langle s,et\rangle}} \,\mathrm{def}_{\mathbf{cmpr}}$$

$$\dfrac{[\lambda d_s\lambda x_e.(\lambda y_e.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(y)))(x) > d]_{\langle s,et\rangle}}{[\lambda d_s.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(x)) > d]_{\langle s,et\rangle}} \Rightarrow_\beta$$

$$\dfrac{[\lambda d_s.\mathbf{grade}_{\langle et,es\rangle}(\mathbf{clutch}(x)) > d]_{\langle s,et\rangle}}{[[\lambda d_s.[\lambda P_{et}\lambda x_e.P(x) = \top|\exists d_s.P_\delta(x)]_{\langle et,es\rangle}(\mathbf{clutch}(x))]_{es} > d]_{\langle s,et\rangle}} \,\mathrm{def}_{\mathbf{grade}}$$

$$\dfrac{[[\lambda d_s.[\lambda P_{et}\lambda x_e.P(x) = \top|\exists d_s.P_\delta(x)]_{\langle et,es\rangle}(\mathbf{clutch}(x))]_{es} > d]_{\langle s,et\rangle}}{\lambda d_s.[\lambda x_e.\mathbf{clutch}(x) = \top|\exists d_s.\mathbf{clutch}_\delta(x)] > d} \Rightarrow_\beta$$

Figure 2: Proofs for **clutcher* (unsuccessful) & *more clutch*

In (33), the comparative complement is a simple adjectival phrase, *happy*. In (33a), the analytical comparative morpheme *more* is permitted. In contrast, (33b) shows that the synthetic comparative is ungrammatical. Cases like (33) have been discussed in the literature as *metalinguistic comparatives*.[18] It has been known for some time that the synthetic comparative is disallowed under this interpretation (see, e.g., Bresnan 1973, Embick 2007).[19] In contrast, in (34), the comparative complement is a tensed clause, *he is happy*. First, we observe that, at least on the face of it, (33a) and (34a) can mean the same thing, since (34a) is ambiguous and one of its readings is shared with (33a). Second, we observe that (33a)/(34a) do not mean the same thing as (34b).

We take this as evidence that *Max is proud* is ambiguous.[20]

1. In the metalinguistic comparative reading, *proud* is non-gradable.

2. In the other reading, *proud* is gradable.

We now present the data again sorted accordingly.

(35) Ungradable

a. Max is more *proud* than happy.
b. Max is more *proud* than he is happy.

(36) Gradable

a. *Max is prouder than happy.
b. Max is prouder than he is happy.

The ungradable structure/reading (35) has two properties:

1. The synthetic comparative morpheme *-er* is illicit. The analytic comparative morpheme *more* is licit, which we expect in ungradable environments (see above).

2. Both the simple (adjectival) and complex (clausal) complements are licit.

The gradable structure/reading (36) has the opposing properties:

1. The synthetic comparative morpheme *-er* is licit.

2. But it is only licit if the comparative complement is complex (clausal), not simple (adjectival).

We now have an account of why the following examples from the introduction are both licit.

(3) I am even madder.

[18] We thank L$_R$FG Lab member, Danil Alekseev, for discussion of this point.

[19] We note these contributions in particular because Bresnan (1973) is the natural touchstone for LFG analyses and Embick (2007) for DM analyses, and these are L$_R$FG's ancestor frameworks. However, note that both these analyses provide purely syntactic accounts of the distribution, which we don't engage here. There is considerable further literature on this topic.

[20] We have noticed that the metalinguistic comparative reading is best supported by emphasizing the comparative adjective. This is unnecessary for the other reading.

(4) I am even more mad.

It is not the case that there is true optionality here, but rather that there are two different readings in play. We leave the exact nature of the semantic distinction for future work, but one analysis option is to postulate an inverse function to **grade** — call it **degrade** — that takes a gradable adjective and returns a related ungradable predicate of entities.

7 Conclusion

In summary, we have told the story of *-er*. At a big-picture level, the distribution of *-er* and its allomorphs provides an opportunity to see all the parts of L_RFG in action: the contents of the Vocabulary (mappings from exponenda to exponents); the principal parts of vocabulary items; how to determine the phonological properties in the v-structure (exponent) of a vocabulary item; how to determine a c-structural representation in L_RFG; how to resolve complex competitions using one or more of the **MostInformative** constraints and **MostSpecific**; and how to use compositional semantics as another aspect of well-formedness. Thus, *-er* provided a great opportunity for a wide-ranging primer on L_RFG.

The overall analysis can be summarized as follows. The morpheme *-est* defeats *-er* in superlative environments, due to **MostInformative**$_f$; similarly, *most* defeats *more* in superlative environments, due to **MostInformative**$_f$. The synthetic form, *-er*, defeats the analytic form, *more*, in every environment where *-er* is permitted to surface, due to **MostSpecific**; similarly, *-est* defeats *most* in every environment where *-est* is permitted to surface, due to **MostSpecific**. Suppletive forms defeat regular forms, due to **MostInformative**$_c$. The analytic form *more* appears in some contexts where we might expect *-er* (for phonological reasons), because *-er* cannot attach to an ungradable root, due to the types in the compositional semantics and the fact that only the analytic forms can contribute the **grade** function. Thus, the phenomenon of 'metalinguistic comparatives' is not an instance of pure optionality, but rather rests on a systematic underlying ambiguity.

In sum, we have shown an L_RFG analysis of the English comparative (and superlative) as a demonstration of the theory, since it involves morphology, syntax, phonology/prosody, and semantics; L_RFG's architecture is designed to take all of this information into account.

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