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The Distribution of the English Comparative: A PF Legibility Condition[1]

Abstract

The English adjectival comparative has a synthetic form, realized with the suffix *-er*, and a periphrastic form, realized with the word *more*. In Minimalist Syntax (Chomsky 2001), coupled with Distributed Morphology (Halle & Marantz 1993), the synthetic form is derived by word-forming operations such as *Head Movement* or *Head-Merger* at the PF (Phonological Form)-interface (Embick & Marantz 2008; Bobaljik 2012). The periphrastic form in turn results from the *lexically specified* absence of these operations. The underlying issue with these approaches is that they fail to derive the common observation that adjectives *longer than two syllables* cannot form synthetic comparatives. This paper gives a formal analysis of the comparative 'alternation' by positing Head Movement. Crucially, the *absence* of Head Movement with stems longer than two syllables is derived by positing a *PF Legibility Condition*, according to which all syntactic heads must be mappable to some phonological feature at the PF-interface. More specifically, if Head Movement does form a synthetic comparative with an adjective longer than two syllables, the 'comparative head' will not be able to map to any phonological feature in the context of such adjectives, which will induce derivation-crashing.

Distribucija primernika v angleščini: načelo interpretacije vmesnika PF

Primernik v angleščini ima sintentično obliko, ki je izražena s pripono *-er*, in perifrastično obliko, ki je pa izražena z besedo *more*. V okviru skladenjskega minimalizma (Chomsky

1 I would like to thank Lisa Travis for the insightful comments she has given me on the analysis presented in this paper. Any errors are of course my own.

2001), skupaj z okvirom razpršene morfologije (Halle & Marantz 1993), se sintentična oblika izpelje z besedotvorno operacijo kot npr. *premik glav* (ang. "Head Movement") ali *združitev glav* (ang. "Head Merger") v vmesniku PF (Phonological Form) (Embick & Marantz 2008; Bobaljik 2012). Perifrastična oblika primernika pa nastopi, kadar omenjene operacijo niso na voljo. Takšne analize ne morejo potrditi dobro znane posplošitve, po kateri pridevniki, *daljši od dveh zlogov*, ne morejo tvoriti perifrastičnega primernika. Pričujoči članek poda formalno analizo opisane primerniške »premene«. Pokazali bomo, da perifrastična oblika nastopi kot posledica premika glav ter da je odsotnost takšnega premika z osnovami, ki so daljše od dveh zlogov, pogojena z načelom *interpretacije vmesnika PF*. Slednje veleva, da mora vsaka skladenjska glava biti v asociaciji z vsaj neko fonološko lastnostjo na vmesniku PF. Natančneje, če pride do premika glav tudi s pridevniškimi osnovami, ki so daljše od dveh zlogov, potem primerniška glava ne bo v asociaciji z nobeno fonološko lastnostjo, kar bo zaustavilo izpeljavo takšne oblike.

1 Introduction

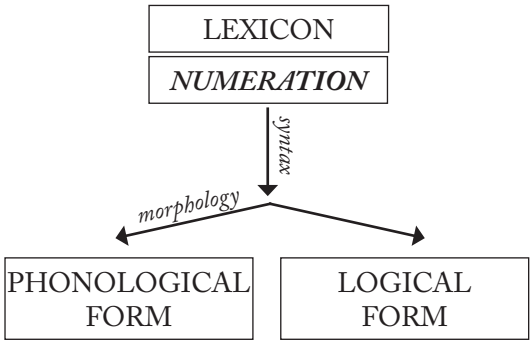
The English adjectival comparative can be formed either by suffixation of the comparative suffix *-er* (*smart ~ smart-er*) or by periphrasis (*intelligent ~ more intelligent*). A well-established fact (Graziano-King 1999) is that some reference to phonology is needed when determining whether a synthetic or periphrastic comparative is formed: adjectival roots that are monosyllabic or disyllabic (*short* adjectives) permit the suffixation with *-er*, whereas roots that are longer than two syllables (*long* adjectives) only permit periphrasis. In Minimalist Syntax (Chomsky 2000), paired with Distributed Morphology (Halle & Marantz 1993), synthetic comparatives result from the application of some word-forming operation: this can either be syntactic *head-movement*, or *morphological head-merger* that applies at the level of the Phonological Form (Embick & Marantz 2008; Bobaljik 2012).

This paper makes two arguments. Firstly, Svenonius (2016) notes that the application of syntactic *head movement* cannot be used to give a principled analysis of the synthetic-periphrastic comparative "alternation". We argue that this is not the case, showing that two *categorizing* adjectival heads need to be posited for English syntax, which allows for a principled analysis of the comparative alternation through head movement. Secondly, we demonstrate that existing accounts of the comparative alternation (Embick & Marantz 2008; Bobaljik 2012) fail to capture the role of phonological syllable-counting in the determination of whether a synthetic form is possible with a given root. We amend this by proposing a universal principle of the Phonological Form (PF) interface, the *PF-Legibility Condition*, which states that all syntactic heads must be mappable to some phonological feature at PF.

1.1 *Basic Assumptions*

This paper assumes the basic Minimalist framework (Chomsky 2000, 2001) in the shape of a *Y-model* of grammar, shown in (1) below.

(1) Y-model of grammar



Under the Y-model of grammar, the lexical primitives feed syntactic computation, which then undergoes *spell-out* to the phonological (PF) and semantic (LF) interfaces. In Distributed Morphology (Halle & Marantz 1993), morphological operations occur at the PF-interface. This view of morphology argues that syntactic heads, when computed in the syntax, are merely bundles of abstract syntactic features and are devoid of any *phonological features* at that point. Their phonological features are assigned to them at the PF-interface, by the operation termed *Vocabulary Insertion*. For instance, the comparative head, formally CMP^0, is assigned the Vocabulary Item /-er/.

2 Empirical Landscape

Descriptively, English has two classes of adjectives; the *long* adjectives, such as *intelligent*, and the *short* adjectives, such as *smart*:

(2) CLASS I: *smart* ~ *smart-er* / **more smart*
(3) CLASS II: *intelligent* ~ **intelligent-er* / *more intelligent*

Class I represents synthetic adjectives and Class II periphrastic adjectives. However, as Bobaljik (2012: 164–165) and also Graziano-King (1999) note, there are further two sub-classes of adjectives:

(4) CLASS Ia: *polite* ~ *politer* / *more polite*
(5) CLASS Ib: *ill* ~ **ill-er* / *more ill*

Both these sub-classes consist of short adjectives: Class (Ia) optionally allows the formation of either a synthetic or periphrastic form, while Class (Ib) disallows synthetic formations. This slightly undermines the classical observation that the synthetic-periphrastic divide is conditioned by the syllable-length of the root, since both *polite* and *ill* are *not* longer than two syllables, and yet they show divergent behaviour when forming the comparative.

As discussed in Bobaljik (2012: 164), who draws on the study performed by Graziano-King (1999), syllable-length is actually not an accurate predictor of synthetic comparative formation. Rather, it is extra-grammatical factors, such as frequency of use, that dictate whether a mono- or disyllabic root will form a synthetic comparative. However, the syllabic phonological criterion *does* delimit the "cut-off" point that licenses *potential* synthetic-comparative formation: once the *two-syllable threshold* is crossed, only periphrastic comparatives are formed. Let us term this the *Phono-Syntactic Generalization*:

(6) Phono-Syntactic Generalization:
The metrical shape of the root determines the "cut-off" point for *-er* suffixation: roots longer than /σσ/ cannot form synthetic comparatives.

According to Bobaljik (2012) and Graziano-King (1999), this seems to be a "robust" generalization.[2] Put differently, there seems to be much more variation in the set of mono- and disyllabic roots than in the set of roots with a higher syllable count.

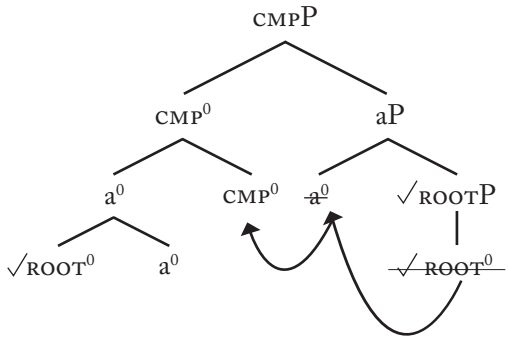
3 Comparatives and Head Movement

In this section, we discuss the standard analysis of synthetic comparative formation with syntactic head movement. We also discuss Svenonius' (2016) claim that *head movement* cannot be used to construct a principled account of the comparative "alternation", and show that this is in fact not the case.

A standard analysis of comparatives involves the head of the comparative phrase, CMP^0, attaching to the adjectivizer, a^0, which in turn is attached to an acategorial root, as discussed in Embick & Marantz (2008) and Bobaljik (2012). These syntactic heads are the abstract representation of the morphemes involved in the comparative construction, shown below:

2 A possible counter-example to this are forms such as *un-happi-er*, where the semantic scope of the comparative dictates the following bracketing [[un-happy]-er]. However, such cases can be analyzed through *late adjunction* (see Newell 2005), and as such do not represent a counter-example to (6).

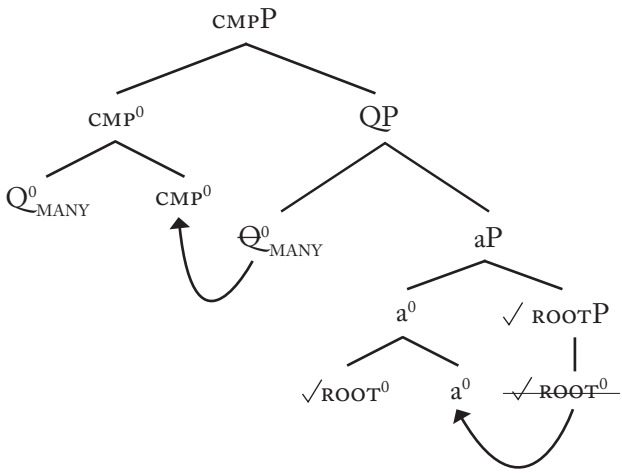
(7) Synthetic comparative



According to Embick & Marantz (2008) and Bobaljik (2012), some word-forming operation "concatenates" the discussed syntactic heads into a single word. One option is standard syntactic *head movement* (Travis 1984), which involves moving √ROOT up to a^0 and attaching itself to it; subsequently, [√ROOT+a^0] move and attach to CMP^0, yielding [[√ROOT+a^0]+CMP^0]. The other option is that *morphological head-merger* at PF (Marantz 1989) is what derives the synthetic comparative, by concatenating the relevant heads in a similar fashion. In this paper, we will posit syntactic head movement, though it could in principle be PF merger.

As shown in (7), the root undergoes movement in a successive-cyclic fashion, first to a^0, and then to CMP^0. The reasoning in the cited literature is that periphrasis arises when such head movement *does not apply*, resulting in the structure in (8), where two words are derived, viz. [$Q_{many}{}^0$+CMP^0] and [√ROOT+a^0]:

(8) Periphrastic comparative



Before we discuss (8) in detail, we must mention that the periphrastic comparative in English seems to host an additional phrase, viz. a quantifier. Bobaljik (2012, 134) notes that *more*, used in periphrastic comparatives, is itself the comparative degree of the quantifier *many*, since it has positive, comparative and superlative forms (e.g. *many* ~ *more* ~ *most*). As Bobaljik notes, *more* and *most* must be morphologically complex, since they are formed by the standard comparative and superlative suffixes, viz. *-er* and *-(e)st*, implying the morphemic divisions *mo-re* and *mo-st*. According to this, we must then say that Q_{MANY}, which represents *mo-*, immediately precedes *a*P, and that CMP^0, representing *-er*, in turn immediately precedes QP, as shown in (8) above.[3]

In terms of head movement, periphrasis is achieved by the *absence* of a^0's movement to CMP^0. The root still moves to a^0, yielding $[\sqrt{ROOT}+a^0]$, and Q_{MANY} also has to move to CMP^0, yielding $[Q_{many}{}^0+CMP^0]$. This derives the periphrastic comparative, e.g. *mo-re* (=$[Q_{many}{}^0+CMP^0]$) *intelligent* (=$[\sqrt{ROOT}+a^0]$). These steps are shown in (8) above.

Svenonius (2016) has argued against analyses of the type presented here. He notes that using head movement to derive synthetic comparatives implies an account of periphrasis that is *unprincipled*. In particular, he says that we must assume that head movement always takes places, e.g. that a^0 always undergoes syntactic movement. This means that the *adjunction complex* (i.e. the derived word) created by head movement then needs to be *undone* at the PF-interface if the root is longer than two syllables. Svenonius basically assumes that some mechanism at PF checks whether the root is longer than two syllables; if it indeed is, then some *other* operation has to *undo* the effect of head movement in order to yield periphrasis. He rightly notes that such an account of the comparative alternation is *unprincipled*, since an *ad hoc* operation needs to be stipulated to "undo" head movement.

However, there is independent evidence that head movement need not be *undone* at all. With (2)–(5), we illustrated the different classes of comparative-formation in English, based on Bobaljik (2012) and Graziano-King (1999). Recall that, in the domain of *short* adjectives (Classes Ia–Ib), phonological information is *not* a predictor of synthetic-comparative formation. In other words, nothing about

3 The assumption here is that Q_{MANY} is only in the structure for periphrastic comparatives. We could, in principle, assume that it is always in the structure, but that with Head Movement, as in (7), it is spelt out as *zero* when occurring in the same adjunction complex as a^0. This does make the prediction that we should cross-linguistically sometimes see this Q_{MANY} being suffixed (spelt out overtly) between the root and CMP in synthetic comparatives, e.g. [Root-Q_{MANY}-CMP], but it is unclear if this is borne out. However, this is not a crucial assumption for the arguments made in this paper.

the phonology derives the presence of head movement for *smart-er* and its absence for *more ill* (**ill-er*). This implies that we are truly dealing with *two lexical classes* of adjectives: one class licenses head movement, the other does not. An analysis involving head movement must thus have more to say about the *lexical specification* of these forms, and not about "undoing" head movement at PF.

We will here argue for a simple proposal, couched in Distributed Morphology (Halle & Marantz 1993), viz. that English has two classes of adjectivizing heads – call them a^0_1 and a^0_2. These heads have different *c-selection* properties, which dictates what heads they can immediately precede in syntax (i.e. in the structures in (7)–(8)):

(9) C-selection of Adjectivizers

CMP^0	*c-selects*	a^0_1, Q^0_{many}
Q^0_{many}	*c-selects*	a^0_2

The head a^0_1 can only be c-selected by CMP^0 directly, which gives rise to a synthetic comparative. The head a^0_2, in turn, can only be c-selected by Q^0_{many}, which gives rise to the periphrastic comparative. CMP^0 must, of course, be able to select either a^0_1 or Q^0_{many}, since /-er/ is found in the synthetic as well as the periphrastic constructions. A lexical analysis along the lines of (9) is necessary to encode the basic distinction between *smart* ~ *smarter* and *ill* ~ **iller*, since phonological syllable-count plays no role in "preventing" head movement with *ill* (both roots are monosyllabic).

To make the account in (9) complete, we must further say that a^0_1 *undergoes* head movement, but that a^0_2 does not, as shown in (7)–(8) . Since these are two separate heads, nothing in Minimalist Syntax or Distributed Morphology prevents an analysis like this: some heads undergo head movement and some do not. To make this formally explicit, I will assume a basic version of Roberts (2005, 144), according to which the movement of some X^0 is always triggered by an EPP-feature[4] of an immediately higher head Y^0. For English, we must then say that CMP^0, a^0_1 and a^0_2 host an EPP-feature, while Q^0_{many} does not:[5]

4 An EPP-feature is a type of feature that triggers syntactic movement. Assume that a head X^0 is higher in the syntactic structure than a head Y^0, e.g. $[_{XP}\ X^0\ [_{YP}\ Y^0\ ]]$. If X^0 bears an EPP-feature, this feature can only be *satisfied* by moving and attaching the "closest" head to X^0. In this case, it is Y^0 that will move and attach to X^0.

5 The alternative account that uses *morphological head-merger* at PF, assumed by Bobajik (2012), must also resort to similar specification, just that it involves *diacritics* that do or do not license morphological head-merger of different syntactic heads – see Bobaljik (2012, 165) for details.

(10) EPP-specification

$a^0_{1[EPP]}, a^0_{2[EPP]}$	—	will trigger Head Movement of Root to a^0
$CMP^0_{[EPP]}$	—	will trigger Head Movement of a^0/ Q^0_{many} to CMP^0
Q^0_{many}	—	will **not** trigger Head Movement of a^0 to Q^0_{many}

In sum, all heads carry an EPP-feature that triggers head movement of an immediately lower head, except for Q^0_{many}. This means that head movement, and hence a synthetic comparative, will always be licensed, *unless* Q^0_{many} is in the structure. If Q^0_{many} does occur, as in (8), it will *not* attract the lower a^0, but it will itself undergo movement to CMP^0. This will give rise to periphrasis, as shown in (8).

To make the present account complete, we must also specify the c-selection properties of the two adjectivizers, as (9) only specifies which heads they are selected by:

(11) *C-selection of Roots*

a^0_1	*c-selects*	$\sqrt{}$ROOT:{smart, …, polite}
a^0_2	*c-selects*	$\sqrt{}$ROOT:{intelligent, ill, …, polite}

While a^0_1 needs to select roots such as *smart*, it also selects roots like *polite*. a^0_2, in turn, selects all long adjectives, but also roots such as *ill*, and also *polite*. Recall from (4) that roots such as *polite* can either form synthetic or periphrastic comparatives. By allowing both adjectivizers to select roots like *polite*, we derive the *seeming* optionality of head movement with such roots. At this higher theoretical level, the four classes of adjectives, stated descriptively in (2)–(5), are derived by the different interaction of the two adjectivizers with different syntactic heads.

In sum, an account of the comparative alternation involving head movement is completely principled, involving the standard mechanisms of EPP-specification and c-selection. *Contra* Svenonius (2016), Head movement does not need to be "undone" at all at PF in order to derive periphrasis.[6]

4 The Need for a PF-Legibility Constraint

This section warns that the account given in section 3 does not as such derive the Phono-Syntactic Generalization (6). To do so, we propose a principle of the PF-interface – a *PF Legibility Constraint*, which rules out long adjectives forming synthetic comparatives.

6 One might wonder whether the fact that we posited two adjectivizers for English is not itself a stipulation. However, any account of the distinction between *smart~smarter* and *ill~*iller* needs to posit two lexical classes of adjectives in some way.

In the previous section, we argued, *contra* Svenonius (2016), that a head movement account of the comparative alternation need not involve any stipulative theoretical machinery. However, there is still a problem with accounts of the sort given in the previous section: they fail to derive the *Phono-Syntactic Generalization* stated in (6). This generalization states that *long* adjectives systematically fail to undergo head movement, which is a "robust" effect, according to Bobaljik (2012, 164) and Graziano-King (1999). The analysis given in the previous section fails to capture this generalization because a^0_1, used in forming synthetic comparatives, could very well select for a root that is longer than two syllables, such as *intelligent*. Such roots could simply be added to the lexically specified c-selection list for a^0_1 in (11), since nothing in the grammar prevents this. The selection lists in (11) encode the Phono-Syntactic Generalization as a mere *lexical* and *historical accident*, and yet the robustness of it implies that it is *not* the result of mere lexical specification. This means that there must be a grammatical principle that upholds this generalization.

To uncover this principle, we shall first discuss some basic facts about assigning phonological content to syntactic heads. As discussed in section 1.1, phonological contents are assigned to abstract syntactic heads at PF by the operation of *Vocabulary Insertion* (VI) (cf. Halle & Marantz 1993). A typical VI-entry consists of a pair of lexical items: the *elsewhere* item and its *contextual* version.

(12) A typical VI-entry

$\sqrt{GO}^0$	⟷	gəʊ		*(elsewhere item)*
$\sqrt{GO}^0$	⟷	went	/ _____ [PAST]	*(contextual item)*

For instance, the root $\sqrt{GO}^0$ is *by default* assigned the phonological form /gəʊ/, which represents the *elsewhere item* that is the "default" item that any syntactic head usually has. However, in the context of the tense feature [PAST], the root $\sqrt{GO}^0$ is assigned the phonological form /went/, instead of the default /gəʊ/. In this way, (12) illustrates the most typical VI-entry: one VI-item is the elsewhere item and the others are contextual items.

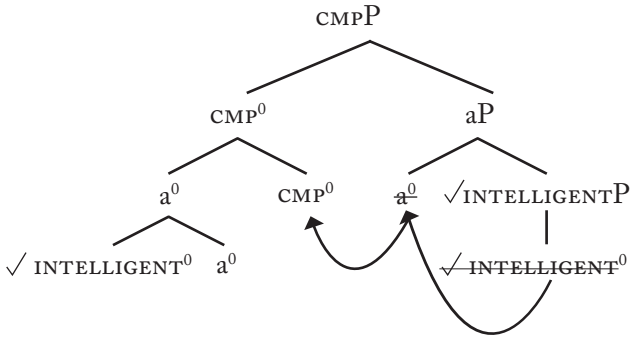
Let us now consider the VI-entry for the CMP^0-head. If we want to express the Phono-Syntactic Generalization, the standard way of achieving this in Distributed Morphology (Halle & Marantz 1993) is to add a contextual specification to the VI-item:

(13) VI-entry for CMP^0

CMP^0	⟷	-ər	/ {σ, σσ} _____

The entry for CMP^0 in (13) states that the suffix /-ər/ can only be assigned to CMP^0 if the preceding phonological exponent (the root) is mono- or disyllabic. This brings us closer to deriving the Phono-Syntactic Generalization. Let us explain in detail what the rule in (13) achieves. Above, we commented that the account in section 3 fails to explain why roots such as *intelligent* could not undergo head movement to CMP^0 in the event that they were selected by $a^0_{1.}$ Let us now observe what the VI-entry in (13) predicts for such a situation:

(14) If a^0_1 c-selected √INTELLIGENT^0



In (14) above, the root √INTELLIGENT^0 undergoes Head Movement to a^0, creating [√INTELLIGENT^0+a^0], and the latter undergoes movement to CMP^0, yielding [[√INTELLIGENT^0+a^0] + CMP^0]. If the situation in (14) arose, then the phonological form /ɪntelɪʤənt/ would be assigned to √INTELLIGENT^0. Since /ɪntelɪʤənt/ consists of four syllables, /-ər/ could not be assigned to CMP^0, according to the VI-entry in (13). What would then happen? In such cases, if the context for a given contextual VI-item is not met, the *elsewhere* item is inserted. However, notice that CMP^0, in (13), has no elsewhere item. In principle, we could entertain the idea that in such cases the elsewhere VI-rule for CMP^0 does exist and maps to a *zero exponent*. But the root √INTELLIGENT^0 can only form the comparative through periphrasis (where the /-ər/ is suffixed to Q_{many}), and not with a zero comparative-exponent. Thus, it follows that there is no elsewhere VI-rule for CMP^0.

It seems to be unclear what precisely should happen if (14) arose. What we need to say is that a derivation as in (14) *crashes*, in the standard Minimalist sense (Chomsky 2000), which entails that the derivation stops, amounting to 'ungrammaticality'. Below, I propose the principle that induces such a crash – a *PF Legibility Condition*:

(15) *PF Legibility Condition*

> Every X^0 must have a potential VI-item it can associate with. If this condition is not met, ***CRASH*** the derivation!

This condition would crash the derivation in (14) because CMP^0 would have no potential VI-item it could associate with. Recall that the VI-entry for CMP^0 (13) only has the contextual VI-item /-ər/, but *no* elsewhere item, and the phonological context for /-ər/ is not met in (14). This means that there is *no* VI-item that could be assigned to CMP^0 in (14), which violates PF Legibility and so crashes the derivation, rendering **intelligenter* ungrammatical.

It should be noted that the principle in (15) is not at all *ad hoc*, but is actually conceptually desirable and necessary. The principle is a very simple constraint on the *phonological interpretation* of syntax: it demands that every X^0 be interpretable. This is a very general constraint of the PF-interface that is grounded in the general spirit of the Minimalist Program. Since *narrow syntax* essentially hosts just structure-building operations, it must interface with the PF and LF cognitive domains: these allow syntax to be assigned phonological content (at PF) and semantic interpretation (at LF). It thus must be the case that *some principle* forces syntactic structure to be *interpretable at PF*: the crucial aspect of ensuring interpretation at PF involves endowing syntax with *phonological features*, which will be interpretable at the cognitive *sensorimotor system* (Chomsky 2000)[7], since abstract syntactic features cannot be read by that system. The constraint in (15) then merely enforces a general need to make syntax interpretable at PF. If a given structure cannot be made interpretable, i.e. an X^0 has no VI-item it could associate with, the derivation crashes.[8]

How does the PF Legibility Condition derive the Phono-Syntactic Generalization? It ensures that roots with more than two syllables cannot "survive" in a synthetic comparative. One may wonder whether we need the PF Legibility Condition at all, since the *lexical*, c-selection facts are such that no *long* adjective (like *intelligent*) is selected by the synthetic comparative-forming head a^0_1. As already noted above, the selection facts alone predict that the Phono-Syntactic

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7 The *sensorimotor* system reads phonological features, which are essentially instructions for particular motor functions, such as vocal articulation.

8 This opens the question about what should be done with *null/zero exponence*. There are two possible answers to this. If Siddiqi (2009) is correct, there is no zero exponence because all "null" syntactic heads actually get *fused* with non-null heads. However, if zero exponence really does exist, it is likely that (15) does not care about the contents of a VI-rule. In other words, it only cares that there is a potential VI-rule for every X^0, but the VI-rule may map to a zero exponent. This is a real possibility, since an *elsewhere* rule mapping to zero cannot be involved in the comparative construction, as noted above.

Generalization is a *lexical accident*, which does not seem to be the case. The grammar needs a principle that explains why the c-selection facts systematically obey the Phono-Syntactic Generalization, which is achieved by the PF Legibility Condition.

An additional argument for the PF Legibility Condition comes from diachronic considerations. Bobaljik (2012, 72) reports that a slow diachronic shift towards the periphrastic construction can be observed by roots that are monosyllabic or disyllabic, e.g. *ill ~ more ill (*iller)*, *irksome ~ more irksome (*irksomer)*. A purely lexical selection analysis cannot predict a diachronic trend in any direction, since it predicts that any root can freely be associated with any adjectivizer, without there being any systemic difference between the two. The PF Legibility Condition, on the other hand, predicts the existing diachronic trend directly, because it can be explained as a general shift to a^0_2 selecting all root types. More concretely, it predicts that we will *not* observe the rise of a trend where roots such as *intelligent* start forming synthetic comparatives, as such formations violate the PF Legibility Condition. The purely lexical/selection analysis, in turn, cannot rule out the rise of a trend in this direction, which – to reiterate – is because it predicts that no *grammatical* factor rules out forms like **intelligent-er*.

5 Conclusion

The contribution of this paper is two-fold. Firstly, it argues against the claim, advanced by Svenonius (2016), that syntactic head movement cannot be used to give a principled account of the comparative "alternation". We have shown that a combination of head movement and standard syntactic mechanisms can account for the comparative alternation in a principled way, once two lexical classes of adjectives are posited. Secondly, this paper notes that existing accounts of the comparative alternation miss the Phono-Syntactic Generalization. We have demonstrated that this can be amended by proposing a *PF Legibility Condition*, which prevents roots such as *intelligent* from forming synthetic comparatives.

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