

Linearization of complex modifiers: Ways of (dis)obeying the Head-Final Filter

January 1, 2025

Abstract

In this paper, we argue that the Head-Final Filter (HFF) in its current formulation is not only left theoretically unexplained, but is also empirically incorrect. For one, languages like Greek or Russian are not subject to it and can have material intervene between prenominal adjectives and modified nouns. In addition, a number of languages, such as Basque and Chácobo, display mirror-HFF effects. These languages bar material intervening between postnominal adjectives and modified nouns, something that is not captured by the HFF.

In place of the HFF, we propose a novel descriptive generalization that captures all the facts above: the Modifier-Noun Adjacency Generalization (MAG). We show that all MAG-related facts follow once it is assumed that direct modification of N by A is only possible if the adjective is specified for all nominal case and φ -features. Otherwise, adjectival modification of a noun must be mediated by means of a functional head (an attributivizer) that is part of the extended NP or AP and that carries these features. The way this head is realized morpho-phonologically (as an affix or a clitic) determines whether it must be adjacent to both the noun and the adjective, or only to the noun. In the former case, no material may intervene between A and N; in the latter case, it may. This, we argue, derives MAG.

Key words: Head-Final Filter, adjectives, (nominal) modification, linearization, adjacency, case/ φ -features, rich agreement, affixes vs. clitics

1 Introduction

This paper aims to provide a novel approach to a long-standing puzzle in the domain of linearization that concerns complex nominal modifiers. Concretely, we focus on the well-known fact that, in some languages, adjectives that can take dependents to their right when used predicatively cannot do so when used attributively in the prenominal position. This is illustrated in (1) for English.

- (1) a. She is proud of her daughter.
b. *a proud of her daughter mother

At the descriptive level, this fact has usually been attributed to the so-called *Head-Final Filter* (HFF) from Williams (1982), which states that post-head material in prenominal modifiers is not allowed. Accordingly, a variety of different types of theoretical analyses have been developed to derive this descriptive statement.

Against this background, one important contribution of the present paper is to show that the HFF is in fact descriptively inadequate, as it both over- and undergenerates. On the one hand, there is a number of languages, in which the linear order as in (1b) is grammatical, i.e. the HFF overgenerates in this case. This is shown below for Modern Greek.

- (2) **Modern Greek** (Vasiliki Koukoulioti, native speaker, p.c.)

- a. Ine perifanos yia to yio tu.
is proud.M.SG for the son.ACC his
'He is proud of his son.'

- b. o perifanos yia to yio tu pateras
 the proud.M.SG for the son.ACC his father
 ‘the father proud of his son’

On the other hand, we introduce a novel empirical observation that also the mirror image of the HFF is attested across languages, i.e. cases in which postnominal adjectives cannot take dependents to their left, even though their predicative counterparts can do so. This configuration, illustrated below for Basque, shows that the HFF undergenerates.

(3) **Basque** (Hualde & Ortiz de Urbina, 2003, 138)

- a. Bere lanaz harro-a dago.
 her work.INS proud-DET is
 ‘She is proud of her work.’
- b. *emakume bere lanaz harro-a
 woman her work.INS proud-DET
 Intended: ‘a woman proud of her work’

At the same time, it is not a general property of languages with postnominal adjectives that no material may intervene between the noun and the adjective. In Farsi, for instance, this linear order is possible, which thus mirrors the situation in Greek depicted in (2).

(4) **Farsi** (Zahra Mirrazi, native speaker, p.c.)

- a. Anha be farzand-an=e xod moftaxar-Ø-and.
 they in child-PL=LNK own proud-COP.PRS-3PL
 ‘They are proud of their children.’

- b. madar-an=e be farzand-an=e xod moftaxar
 mother-PL=LNK in child-PL=LNK own proud
 ‘mothers proud of their children’

This suggests that the data in (1) should be captured by a different descriptive generalization than the HFF, one that is also able to capture the data in (2), (3), and (4). Based on a sample of more than 30 languages, this paper offers such a novel generalization in replacement of the HFF, dubbed the *Modifier-Noun Adjacency Generalization* (MAG). MAG relates the requirement (or lack thereof) for attributive adjectives to be linearly adjacent to the nouns they modify to the following grammatical properties: the richness of agreement morphology on adjectives and the morpho-phonological status of the attributivizer, if present in the language.

(5) **Modifier-Noun Adjacency Generalization (MAG)**

Linear XP-intervention between a noun N and its modifying adjective A can occur only if A exhibits:

- a. an overt agreement marker that is specified for all features available in the DP, which is also present on the predicative form of A, or
 b. an overt attributive marker that is morpho-phonologically independent of A, i.e. is an adjectival clitic or a free word form, or forms a morpho-phonological unit with N.

In a next step, we develop a morpho-syntactic analysis that derives this generalization. In particular, we argue that, unless adjectives are fully equipped with all features available in the DP of the language already in their predicative form, they must take an attributivizer whose role is to carry these features when adjectives are used attributively. Within the theory of projection based on feature percolation that we propose, the reason for this is that featurally incomplete attributive adjectives would otherwise disrupt the Agree relation between the

noun and the highest head in the extended nominal projection, thus leaving the DP featurally incomplete as a whole, which is problematic from the perspective of DP-external agreement. Now, if this attributivizer has, in addition, morpho-phonological properties that require it to be adjacent to the adjective, i.e. if it is an adjectival affix, it follows that no material can intervene between the two. All together, this derives MAG.

The paper is structured as follows. Section 2 introduces the HFF in more detail, discussing HFF-effects in English and in a broader cross-linguistic perspective. In Section 3, we present two challenges to the HFF mentioned above: by languages that violate the HFF and languages that display ‘mirror-HFF effects’. Section 4 introduces and motivates the novel generalization MAG, which we propose in replacement of the HFF. Subsequently, Section 5 provides a formal analysis of MAG: we show that all MAG-related facts follow once it is assumed that direct modification of N by A is only possible if adjectives are specified for all nominal features; otherwise, adjectival modification of nouns must be mediated by an attributivizer, which may impose linear adjacency restrictions on both the noun and the adjective. Finally, in Section 6, we discuss earlier approaches to the HFF and show that, especially in the light of the observations made above, they do not adequately capture the relevant facts. Section 7 concludes.

2 The Head-Final Filter: An overview

2.1 The HFF in English

The earliest formulation, known to us, of the constraint that will later become widely known as the Head-Final Filter is Greenberg (1963)’s Universal 21. This descriptive universal points out the following asymmetry in the linearization of nouns, attributive adjectives, and their modifiers:¹

¹For a discussion of Universal 21 including a list of counterexamples to it, see also the Rara and Universals Archive (<https://typo.uni-konstanz.de/rara/universals-archive/60>). Thanks to an anonymous reviewer for pointing out this resource to us.

(6) **Universal 21**

(Greenberg, 1963)

If some or all adverbs follow the adjective they modify, then the language is one in which the qualifying adjective follows the noun and the verb precedes the object as its dominant order.

In this universal, the asymmetry with respect to the prenominal/postnominal placement of attributive APs is described as a function of their structural complexity (i.e. whether they are adverbially modified or not) and the position of their head. While postnominal APs can be structurally complex independently of the position of their head, prenominal APs can only be structurally complex if their head is adjacent to the modified noun, i.e. if no further adverbial modifiers intervene.² The latter point is illustrated for English in (7). The distribution of the patterns in Greenberg’s sample of 30 languages that gave rise to this generalization is shown in Table 1 (the data for four languages was not available).³

- (7) a. a [smoothly running] meeting (Sadler & Arnold, 1994)
 b. *a [running smoothly] meeting

	A–N	N–A
Adv–A	11	5
A–Adv	0	8
both possible	0	2

Table 1: Distribution of languages with respect to Universal 21 (Greenberg, 1963).

The domain of Greenberg’s Universal 21 is relatively narrow: it includes only nouns as modifiees, only adjectives as modifiers, and only adverbs as dependents of modifiers. However, the relevant generalization does not have to be restricted to these categories. As far as the type of the dependents is concerned, not only adjuncts, like adverbs, but also complements appear to be banned from intervening between prenominal adjectives and their

²Greenberg does not mention whether or not the generalization described in Universal 21 is based on some specific semantic class of adverbs.

³Throughout the paper, we use ‘–’ to indicate linear precedence, i.e. ‘X–Y’ reads as ‘X precedes Y’.

head nouns. Williams (1982), for instance, provides the example with the PP *of his children*, which is a complement of *proud* and not an adjunct.⁴

(8) *the [AP proud [PP of his children]] man (Williams, 1982)

Also other categorial types of dependents, including e.g. complement clauses (CPs), are restricted in the same way, see the example below.

(9) *the [AP proud [CP that her daughter is a student]] woman

Moreover, the syntactic category of the modifier appears to be irrelevant as well. Not only complex head-initial APs, but also adnominal PPs and CPs (i.e., relative clauses) cannot appear prenominally, as the examples below show.

(10) *the [PP to Bill] letter (Williams, 1982)

(11) *a [CP which I published in 1991] book (Escribano, 2004)

Unlike adjectives, P and C heads always take a complement. Being head-initial in English, there will therefore always be some phrase intervening between them and the nouns they modify when they appear prenominally. The impossibility for PPs and CPs to occur prenominally in a language like English is thus even more categorical compared to APs.

In view of these facts, Williams (1982) offers the following formulation of the constraint that applies in the examples above, the *Head-Final Filter* (HFF): an adjacency requirement between the head of a prenominal modifier and the head of the noun phrase that it modifies phrased in terms of the modifier's head-finality.⁵

⁴Note that Williams (1982) does not cite or discuss Greenberg's Universal 21. The connection between the HFF and Universal 21 has been first made by Sheehan (2017a,b).

⁵The same constraint, but formulated in different terms, has also been discussed under the names of the Surface Recursion Restriction (Emonds, 1976), the Consistency Principle (Giorgi & Longobardi, 1991), the No Complement Restriction (Bouchard, 2002), the Left Elbow Constraint (Osborne, 2003), and the No Prosodic Boundary condition (Tokizaki & Inaba, 2020). For other related constraints, see also the Same Side Filter (Ross, 1973) and the Final-over-Final Condition (Biberauer et al., 2014; Sheehan et al., 2017).

(12) **Head-Final Filter**

(Williams, 1982)

English (and German) have a constraint barring post-head material in prenominal modifiers.

Unlike Universal 21, Williams (1982)'s HFF is not intended as a typological generalization. It makes a claim about English and German only, but the claim that it makes for these two languages is actually stronger than that of Universal 21. Subsequent work has argued that the HFF is possibly even more general than the way it is formulated in Williams (1982), insofar as it has been taken to hold not only for nominal modifiers, but also for modifiers of verbs and adjectives (Escribano, 2004) as well as for degree constructions (Grosu & Horvath, 2006), and has even been assumed to be responsible for the restrictions with respect to the linearization of complex verb clusters and complement clauses (Hinterhölzl, 2016). However, within the scope of this paper, we will stick to a more conservative conception of the HFF as applying to nominal modifiers, remaining agnostic with respect to the possibility that it might also apply to modifiers of VPs/APs, degree constructions, complement clauses, or other phenomena (one of the reasons for this is the fact that we will argue that the HFF is actually empirically inadequate even in the case of nominal modification and the constraint in question needs to be reformulated in different terms). At the same time, we will follow the commonly shared view that the HFF is not restricted to English and German, but is a linguistic (near-)universal (see e.g. Sheehan, 2017a,b). Hence, for the purposes of this paper, we will adopt the following operational definition of the HFF:

(13) **Head-Final Filter**

(operational definition)

Prenominal modifiers must not contain any post-head material.

In the next section, we will show that the HFF indeed applies to many languages, and we will also discuss various alternative word orders that HFF-obeying languages employ when speakers convey something that would otherwise have to be expressed by means of a non-head-final prenominal modifier. However, before addressing these issues, it should be pointed

out that even in an HFF-obeying language like English, the HFF does not apply without exceptions, at least at first sight. Three types of apparent HFF-violating constructions can be identified in English.

The first type of construction concerns right-branching modifiers of the kind exemplified in (14). Such modifiers are, however, constructed within the lexicon, as is evidenced by the absence of agreement morphology (cf. **a two-syllables word*), and as such do not constitute real violations of the HFF. Being lexical constructs, they are treated in syntax as single heads.

- (14) a. a [_{QP} two-syllable] (phonological) word
b. a [_{AP} higher-than-average] (basic) salary
c. an [_{PP} up-to-date] (linguistic) bibliography (Escribano, 2004)

The same holds for another set of apparent counterexamples to the HFF, namely complex modifiers headed by *tough*-adjectives. Such modifiers can indeed appear in HFF-violating configurations (see (15)), but, as Nanni (1980) points out, they should be considered atomic lexical formations since they cannot contain adverbial modifiers (see (16)), overt experiencers, parasitic gaps or multiple embeddings.

- (15) a. an easy to clean room
b. a hard to find manuscript (Nanni, 1980)

- (16) a. *an easy to *quickly* clean room
b. *a hard to find *in the attic* manuscript (Nanni, 1980)

The final class of counterexamples concerns the degree modifier *enough*, which, unlike other degree modifiers in English (like *very* or *too*) occurs after and not before the adjective:

- (17) John is a tall enough guy to play basketball. (Sheehan, 2017a,b)

Note, however, that here *enough* must immediately precede the modified noun in such cases. This is evidenced by the fact that a *to*-infinitive cannot intervene and must be placed postnominally instead:

(18) *John is a [tall enough to play basketball] guy. (Sheehan, 2017a,b)

Unlike the cases with other, preadjectival degree modifiers, the combination of an adjective and *enough* should thus not be considered a matter of lexical formation. This type of construction thus presents a genuine violation of the HFF in English. This means that (13) should be amended such that degree modifiers can be exempt from the HFF if they immediately precede the modified noun. This *enough*-construction will be subject to our analysis later on.

2.2 The HFF cross-linguistically

We conclude this overview of the domain of application of the HFF with a discussion of its cross-linguistic status. According to the current state of knowledge based on reports in the literature (for an overview, see Cinque, 2010; Sheehan, 2017a,b) and our own data collection (which will be described in more detail in Section 4), the HFF applies in a variety of other languages besides English. Below, we provide representative examples from Georgian, Hungarian, Icelandic, Modern Eastern Armenian, and Serbo-Croatian, which come from our own data collection; the full list of HFF-obeying languages known to us can be found in Section 4.

(19) **Georgian** (Diana Kakashvili, native speaker, p.c.)

a. es bič'i aris damok'ideb-ul-i tavis deda-ze.
 this boy-NOM is depend-PTCP-NOM his.DAT mother-on

‘This boy is dependent on his mother.’

b. *damok'ideb-ul-i tavis deda-ze bič'-i
depend-PTCP-NOM his.DAT mother-on boy-NOM

Intended: 'a boy (who is) dependent on his mother'

(20) **Hungarian** (Dóra Kata Takács, native speaker, p.c.)

a. János független a szüle-i-től.
J. independent the parents-POSS.3SG-from

'János is independent of his parents.'

b. *egy független a szüle-i-től fiú
a independent the parents-POSS.3SG-from boy

Intended: 'a boy independent of his parents'

(21) **Icelandic** (Gísli Rúnar Harðarson, native speaker, p.c.)

a. Jón er stolt-ur af syni sínum.
J. is proud-M.SG.NOM.STRONG on son.DAT his.DAT

'Jón is proud of his son.'

b. *stolt-ur af syni sínum faðir
proud-M.SG.NOM.STRONG on son.DAT his.DAT father

Intended: 'a father proud of his son'

(22) **Modern Eastern Armenian** (Hasmik Sargsian, native speaker, p.c.)

a. (Na) hpart ē ir tlay-ov.
3SG proud COP.3SG REFL.3SG.GEN boy-INS

'S/he is proud of her/his son.'

- b. *hpart ir tlay-ov hayr
 proud REFL.3SG.GEN boy-INS father

Intended: ‘a father proud of his son’

(23) **Serbo-Croatian**

(Anja Šarić, native speaker, p.c.)

- a. On je ponosan na svog sina.
 he is proud.SHORT on his son

‘He is proud of his son.’

- b. *ponosan na svog sina otac
 proud.SHORT on his son father

Intended: ‘a father proud of his son’

Note that the languages listed above all obey the HFF in a non-trivial manner: in all of them, adjectives precede the nouns they modify and the linear order A–XP is available in the predicative position at least in addition to XP–A, yet the HFF-violating linear order A–XP–N is not possible when adjectives are used attributively. By contrast, languages with strictly head-final APs preceding their modified nouns (such as, for instance, Japanese and Turkish, cf. Sheehan, 2017a,b) trivially obey the HFF: the A–XP–N order is simply ruled out because adjectives in such languages cannot take their dependents to their right in the first place. Throughout the paper, we will use the term ‘HFF-obeying languages’ for languages that obey the HFF non-trivially.

In order to linearize modifiers with complex APs containing a dependent of the adjective, non-trivially HFF-obeying languages either change the construction altogether (e.g., to a relative clause structure, some examples of which we will see in Section 3.2) or use another word order instead, which restores the A–N adjacency, as shown schematically below.

- (24) a. XP–A–N (left-branching prenominal AP)
 b. N–A–XP (right-branching postnominal AP)
 c. A–N–XP (discontinuous AP)

These alternative word orders are illustrated in the examples below. The left-branching prenominal XP–A–N order is exemplified by (25) from Hungarian; in fact, this linearization possibility is available in all the other languages from (19)–(23) as well (but not in English, presumably because English does not permit the XP–A order across the board). The example in (26) from Serbo-Croatian illustrates the possibility of the postnominal placement of complex APs in a language in which the regular placement of simplex APs is the prenominal one (this possibility is also available in English). Finally, the examples in (27) from English show discontinuous attributive APs, in which the adjectives are prenominal, while their dependents are extraposed postnominally (note that this is possible with complements only of certain specific classes of adjectives (27a–b), but across the board with adjuncts of adjectives (27c)).⁶

- (25) **Hungarian** (Dóra Kata Takács, native speaker, p.c.)

egy a szüle-i-től független fiú
 a the parents-POSS.3SG-from independent boy
 ‘a boy independent of his parents’

- (26) **Serbo-Croatian** (Anja Šarić, native speaker, p.c.)

a. otac ponosan na svog sina
 father proud.SHORT on his son
 ‘a father proud of his son’
 b. ponosan otac

⁶Some languages allow for more than one of the word orders in (24). Thus, for instance, Serbo-Croatian permits XP–A–N, N–A–XP, and, for some speakers, also A–N–XP.

c. *otac ponosan

- (27) a. a hard man (for me) to talk to (Berman, 1974)
b. a similar car to mine (Escribano, 2005)
c. a smart kid for her age (Bernstein, 1995)

These alternative word orders may in principle be base-generated or derived.⁷ They are, however, not in the focus of this paper, so we will remain agnostic with respect to this. What is crucial in this connection, though, is the fact that all of these linear orders used instead of the HFF-violating A–XP–N order imply the adjacency of A and N. This point will be important for the analysis developed in Section 5.

3 Challenges for the HFF

In the previous section, we have reviewed data from various languages that suggests that the linearization of prenominal modifiers is subject to the HFF. This, thus, requires these modifiers to be head-final. At the same time, the HFF defined as in (13) itself cannot be taken as a principle that bans XP-intervention between nouns and their attributive adjectives throughout. The reasons for this are twofold. First, there are languages in which the HFF-violating A–XP–N order is in fact allowed, which means that the HFF overgenerates. Second, there are languages where postnominal modifiers, which fall outside the domain of application of the HFF, are subject to an analogous restriction that requires them to be head-initial and disallows the mirrored N–XP–A order. In this respect, the HFF undergenerates. We will discuss each of these types of languages in turn.

⁷Cinque (2010), for instance, analyzes complex postnominal APs in English in terms of reduced relative clauses. For other analyses that derive (some of) the orders in (24), see also Bošković (2013) and Sheehan (2017a,b), which will be discussed in Section 6. For analyses of discontinuous APs, see Escribano (2005) and Maezawa (2008).

3.1 HFF-violating languages

It is well known in the literature that, despite the cross-linguistic tendency for languages to obey the HFF, some languages do in fact permit HFF-violations. On the one hand, this is the case for a number of languages that have affixal agreement marking on adjectives, such as Bulgarian, Polish, Russian, Ukrainian (Slavic); Latin (Italic); Lithuanian (Baltic); Modern Greek (Hellenic). In these languages, where APs are generally prenominal and head-initial, the A-XP-N order is actually grammatical and well-attested, as demonstrated by the following corpus examples for Greek and Russian.

(28) **Modern Greek** (Corpus of Modern Greek⁸)

- a. [A]lla afto to [simantiko yia tis arxes] zitima tha paramini ipo
but this the important for the authorities issue FUT remain under
sizitisi [...].
discussion

‘But this important issue for the authorities will remain under discussion.’

- b. I [filikes pros tin Turkia] xores apariθmunte os eksis [...].
the friendly towards the Turkey countries are.listed as following

‘The countries (that are) friendly towards Turkey are listed as follows.’

- c. To PASOK ofli [...] na pisi tus [apoyoitvmenus apo ti lituryia
the PASOK must SBJV convince the disappointed from the function
tu politiku sistimatos] polites na epistrepsun stin kalpi [...].
the political system citizens SBJV return to.the ballot.box

‘The PASOK (a political party) must convince the citizens disappointed by the functioning of the political system to return to the ballot box.’

⁸The corpus can be found at <http://web-corpora.net/GreekCorpus>. Its size is around 35.7 million tokens, and it mostly contains texts from contemporary newspapers, though other types of texts (fiction, scientific texts, etc.) are represented as well.

(29) **Russian**

(Russian National Corpus⁹)

- a. [Zavisimyje ot eksporta nefteproduktov i gaza] strany [...]
dependent from export oil.products and gas countries
razrabatyvajut samyje različnyje programmy dejstvij.
develop SPRL various programs actions

‘Countries (that are) dependent on oil and gas exports develop various programs of actions.’

- b. V zakl’učeniye kosnus’ ješčë odnogo [interesnogo dl’a tekuščeje rossijskoj
in conclusion touch.1SG still one interesting for current Russian
politiki] momenta.
politics moment

‘In conclusion, I will touch upon yet another point (which is) interesting for the present-day Russian politics.’

- c. Inogda on zažmurival [ustavšyje ot plohogo osveščeniya] glaza [...].
sometimes he closed.tightly tired from bad lighting eyes

‘From time to time, he would squeeze shut his eyes that were tired of bad lighting.’

The examples above demonstrate that the HFF-violating A–XP–N order is grammatical in Greek and Russian, being attested in corpora. Nevertheless, it has been claimed in the literature that the possibility of this word order is only marginal in these languages (see, e.g., Sheehan, 2017a,b). However, the results of our consultations with native speakers of these languages do not support this conclusion. Moreover, specifically for Russian, we have conducted a quantitative corpus study in order to check the frequency of the A–XP–N word order in comparison to N–A–XP for a number of common adjectives and participles that can

⁹The corpus can be found at <https://ruscorpora.ru/en>. The source of the examples reported here and of the corpus study reported below is the ‘Main Corpus’ of the Russian National Corpus. Its size is around 374 million tokens, and it mostly contains modern written texts, including fiction, journalistic, academic, and day-to-day life texts.

take dependents, using the Russian National Corpus. The query templates that were used are given below.

- (30) a. A.NOM (P) N.CASE N.NOM (e.g. `ustat'.PARTCP.NOM ot N.GEN|GEN2 N.NOM`)
 b. N.NOM A.NOM (P) N.CASE (e.g. `N.NOM ustat'.PARTCP.NOM ot N.GEN|GEN2`)

Note that these queries are very restrictive, first, because of the nominative case of the head noun and the adjective and, second, because of the one-step distance between all of the elements of the query. This was done in order to reduce the number of spurious matches in the output of the queries¹⁰, though it also means that many occurrences of the relevant patterns (e.g. with non-nominative NPs or NPs containing a more complex dependent of the adjective) are not represented in the resulting numbers. The results of the corpus study are presented in the table below; note that for comparison we have also included the numbers of occurrences of the adjectives in question when they are used prenominally or postnominally without dependents, i.e. simple A–N and N–A.¹¹

	A–XP–N	N–A–XP	A–N	N–A
<i>dovol'nyj</i> INS 'satisfied with'	108	100	321	159
<i>interesnyj dl'a</i> 'interesting for'	90	19	1749	107
<i>pohožyj na</i> 'similar to'	1492	3719	322	35
<i>ustavšyj ot</i> 'tired of'	66	72	119	48
<i>važnyj dl'a</i> 'important for'	387	67	2629	149
<i>vernij</i> DAT 'loyal to'	135	143	1323	159
<i>zavisimyj ot</i> 'dependent on'	33	23	21	6

Table 2: Number of hits in the Russian National Corpus (queried on June 25, 2024).

The results of this corpus study show that, despite a very restrictive nature of the queries that have been used, the A–XP–N order is robustly attested in naturally occurring corpus

¹⁰The potential remaining spurious matches have not been subtracted from the number of hits under the assumption that the amount of noise should be roughly the same across the conditions.

¹¹In order to make the resulting numbers comparable, also the A–N and N–A queries were restricted to nominative NPs. Moreover, they were delimited by a verb on the right side to ensure that the matches of N–A do not also include those of N–A–XP, i.e. the query templates used were `A.NOM N.NOM V` and `N.NOM A.NOM V`. Notice that, although the postnominal placement of adjectives in Russian is rather marginal compared to the prenominal one (and may in fact be something different than true attributive modification, e.g. a non-restrictive/parenthetical structure), it is available not only in the presence of dependents of adjectives. We would like to thank an anonymous reviewer for raising this issue.

examples. Moreover, for the predominant majority of the adjectives used in the study, this word order is as frequent as (*dovol'nyj* ‘satisfied’, *ustavšyj* ‘tired’, *vernij* ‘loyal’, *zavisimyj* ‘dependent’) or even more frequent than (*interesnyj* ‘interesting’, *važnyj* ‘important’) the HFF-obeying N–A–XP word order, with the only exception of *pohožyj* ‘similar’. To conclude, the results of our corpus study allow us to reject the claim that the A–XP–N order is a marginal phenomenon in Russian.

On the other hand, HFF-violations are also attested in languages with non-affixal adjectival markers, i.e. free word forms or clitics. This is the case, for instance, in Mandarin Chinese and Tagalog, as the examples below demonstrate.¹² Note that both Mandarin *de* and Tagalog *-ng* are not markers of agreement with the head noun, but rather markers of attributive modification as such, often referred to as *attributivizers* or *linkers* (see, e.g., den Dikken, 2006; Haspelmath, 2023). The distinction between attributivizers and agreement markers, but also the distinction between affixal and non-affixal markers will play an important role in our analysis in Sections 4 and 5.¹³

(31) **Mandarin Chinese**

yi-ge [duli yu fumu] **de** qingshaonian

one-CL independent from parents LNK teenager

‘a teenager who is independent of his parents’

¹²Although APs are typically left-branching in Mandarin, some are right-branching, as in the example below.

¹³We use the following diagnostic to distinguish between attributivizers and agreement markers: while attributivizers only occur with attributive adjectives, agreement markers occur with both attributive and predicative adjectives. Note that not exhibiting concord with the modified noun is not crucial for being an attributivizer: although this is the case in many languages (e.g., Mandarin and Tagalog), some languages have agreeing attributivizers (e.g., German).

As far as the distinction between affixes and clitics is concerned, we take it to be central that, unlike affixes, clitics are always phrasal and can attach to non-head material inside the phrase they select (cf. Zwicky, 1977; Zwicky & Pullum, 1983).

(32) **Tagalog** (Schachter & Otones, 1972, 246; gloss ours)

Naghahanap ako ng [bagay (para) sa bata]=ng damit.

AV.PROG.search 1.SG.NOM GEN suitable for DAT child=LNK dress

‘I am looking for a dress (that is) suitable for the child.’

The examples presented in this section thus show that the HFF as defined in (13) clearly faces various counterexamples.

3.2 Mirrored languages

As already mentioned above, it is generally well-known in the literature that a number of languages do not obey the HFF. What, to the best of our knowledge, has however not been yet discussed in connection with the HFF is the fact that some languages seem to display the mirror image of it in the postnominal position. A representative example of this type of languages is Basque (language isolate). Adjective phrases in Basque are strictly head-final (33a) and strictly postnominal when used attributively (33b). However, although predicative adjectives can take leftward dependents, attributive adjectives cannot. Thus, complex attributive APs containing a complement of the adjective are ungrammatical (33c); the only way to express this kind of meaning is to resort to (prenominal and strictly head-final) relative clauses containing a complex predicative AP instead (33d). In other words, the order N–XP–A, which is the mirror image of the order disallowed by the HFF, is systematically ruled out in Basque.

(33) **Basque** (Hualde & Ortiz de Urbina, 2003, 138)¹⁴

¹⁴The example in (33b) is not provided in Hualde & Ortiz de Urbina (2003), it was given to us by a native speaker of Basque (Sergio Monforte, p.c.).

- a. Bere lanaz harro-a dago.
her work.INS proud-DET is
‘She is proud of her work.’
- b. emakume harro-a
woman proud-DET
‘a proud woman’
- c. *emakume bere lanaz harro-a
woman her work.INS proud-DET
Intended: ‘a woman proud of her work’
- d. [bere lanaz harro-a dagoen] emakume-a
her work.INS proud-DET is.COMP woman-DET
‘a woman who is proud of her work’

A similar situation obtains in Chácobo (Panoan). In particular, predicative adjectives in this language can take dependents both to their right and to their left, the former option being the more natural/neutral one (34a). However, attributively used APs, which are strictly postnominal in Chácobo, can only be head-initial, i.e. the N–XP–A order is disallowed, while the N–A–XP order is possible (34b). On the other hand, the N–XP–A order becomes possible again if the AP receives the linking element =*ka(to)*, which Tallman (2018) analyzes as a relative clause marker (34c).

(34) **Chácobo** (Adam Tallman, p.c.)¹⁵

- a. naa motó tsi ʂo [yói karetera ka=tí].
DEM motorcycle P5 DECL bad highway go=NMLZ:PURP

¹⁵The data reported here were collected for us by Adam Tallman from his consultants Paë Yaquë Roca and Maro (Mario) Chavez Ortiz, all of whom we would like to thank for their help.

naa motó tsi ʒo [karetera ka=tí yói].
 DEM motorcycle P5 DECL highway go=NMLZ:PURP bad

‘This motorcycle is bad for driving on the highway.’

b. motó [yói karetera ka=tí] kopi=ki paï.
 motorcycle bad highway go=NMLZ:PURP buy=DECL.NPST Paë

*motó [karetera ka=tí yói] kopi=ki paï.
 motorcycle highway go=NMLZ:PURP bad buy=DECL.NPST Paë

‘Paë buys/will buy a motorcycle (which is) bad for driving on the highway.’

c. motó [karetera ka=tí yói=**ka**] kopi=ki paï.
 motorcycle highway go=NMLZ:PURP bad=REL buy=DECL.NPST Paë

‘Paë buys/will buy a motorcycle which is bad for driving on the highway.’

Finally, the same pattern can also be found in Eastern Oromo (Afro-Asiatic). Also this language exhibits head-final APs in the predicative position (35a) and a postnominal placement of adjectives when they are used attributively (35b). However, complex attributive APs with a dependent of the adjective placed between the adjective and the head noun are ungrammatical (35c); instead, a relativization structure must be used in this case (35d), whose status of an embedded clause structure is evidenced by the presence of the dependent clause marker.

(35) **Eastern Oromo**

(Shimelis Mazengia, native speaker, p.c.)

a. nam-i-cc-∅-i kun dureys-umma=tti boon-aa-ǰa.
 person-EP-SGV-NOM-EP this rich-NMLZ=LOC proud-M-COP

‘This man is proud of being rich.’

- b. Muussa nama boon-aa-dā.
M. person proud-M-COP
‘Muussa is a proud person.’
- c. *Muussa nama dureys-umma=tti boon-aa-dā.
M. person rich-NMLZ=LOC proud-M-COP
Intended: ‘Muussa is a person proud of being rich.’
- d. Muussa nama dureys-umma=tti boon-∅-u.
M. person rich-NMLZ=LOC proud-3SG.M-DPT
‘Muussa is a person proud of being rich.’

The facts presented above cannot be captured by the HFF. Yet, structurally, languages like Basque, Chácobo, and Eastern Oromo exhibit exactly the same pattern as HFF-obeying languages, i.e. dependents of adjectives are not allowed to linearly intervene between attributive adjectives and their head nouns, which calls for a unified account. In addition to the HFF, one would therefore also need to formulate its mirror image for postnominal modifiers in terms of head-initiality (i.e. the “Head-Initial Filter”), or a combination of the two constraints (i.e. something that could be called the “Head-Adjacency Filter”), in order to account for the data discussed above.

Note, however, that also the ban on the N–XP–A order can be lifted in some languages, as the examples below from Atong (Sino-Tibetan) and Farsi (Indo-Iranian), which have clitical attributivizers, illustrate.¹⁶ This means that just postulating an additional mirror-image constraint for postnominal modifiers would not be enough: one would also need to explain

¹⁶Interestingly, unlike the positive forms of adjectives in Farsi, which must be postnominal, the superlative forms can only be placed in the prenominal position, where they display HFF-obedience (cf. Sheehan, 2017a,b). Crucially, however, prenominal superlatives cannot have the clitical attributivizer that must occur with postnominal adjectives (‘ezafe’), which supports the descriptive generalization and the formal analysis proposed in this paper. We do not include this isolated fact in our data sample though, since we do not conduct a systematic study of the HFF effects with comparatives and superlatives in this work (as mentioned in Section 2.1). We are grateful to an anonymous reviewer for bringing up this issue.

under which conditions this constraint can be violated, as it must be explained why the HFF-violating A–XP–N order is allowed in some languages, as we have seen before.

(36) **Atong** (van Breugel, 2010, 518)

[naŋʔ=məŋ gore [jal=na rak-khal] =gaba] =aw
 2SG=GEN horse run=DAT strong-COMP/SUP =ATTR =REF

‘your horse that is strongest in running’ (i.e. ‘your fastest running horse’)

(37) **Farsi** (Zahra Mirrazi, native speaker, p.c.)

madar-an=e [be farzand-an=e xod moftaxar]
 mother-PL=LNK in child-PL=LNK own proud

‘mothers proud of their children’

Let us sum up. The two sets of data discussed in Sections 3.1 and 3.2 above, namely the data from languages that violate the HFF and from languages that display mirror-HFF effects, show that the HFF is descriptively inadequate, as it both overgenerates and undergenerates. Hence, an alternative descriptive generalization that is able to capture all the relevant facts is needed in place of the HFF. This generalization will be proposed in the next section.

4 A novel generalization

Section 3 has shown that the HFF defined in (13) turns out to be descriptively inadequate to capture all the relevant adjacency effects between the heads of modifier phrases and the nouns they modify. The goal of this section is to provide an alternative descriptive generalization that is able to capture both the HFF facts and the facts introduced in Section 3, which the HFF fails to capture. Section 4.1 will introduce this alternative generalization and will support it empirically by providing the relevant data from various languages. Some potential

counterexamples will be addressed in Section 4.2 and explained away. Subsequently, Section 4.3 will discuss the proposed new generalization in more general terms comparing it with the HFF.

Furthermore, the HFF is also analytically inadequate, since it is merely a descriptive statement, which does not explain *why* head-finality should be a requirement for modifier phrases. This raises the question of which component of the grammar imposes the adjacency requirement on modifying adjectives with respect to their head nouns or lifts it allowing for some material to intervene between them. This question will be addressed in Section 5, based on the new descriptive generalization introduced in Section 4.

4.1 The Modifier-Noun Adjacency Generalization

In order to be able to formulate a descriptively adequate generalization that would replace the HFF, we have conducted a survey of languages to see whether they obey/violate the HFF or what can be called the “reverse HFF” or the “Head-Initial Filter”, i.e. the mirror image of the HFF in the postnominal position.

Since descriptive grammars often lack a discussion about possible word orders in complex modifying APs, for many languages we had to collect the data from native speakers or language experts through a questionnaire. We were able to obtain the relevant data for more than 30 languages from 17 (sub)families; they are listed in the table below, grouped by family and with reference to their sources.¹⁷ It should be pointed out that the data sample reported here exhibits certain asymmetries, in the sense that (i) it contains data from a relatively small number of language families and may therefore be not balanced, and (ii)

¹⁷Czech requires a separate mentioning here. It is usually assumed to be an HFF-obeying language (see, e.g., Sheehan, 2017a,b). However, our own data collection has brought mixed results in this respect: while some speakers do indeed find the A-XP-N order ungrammatical, some other speakers find it acceptable, even if high style. We do not know at this point what is behind this variation; for this reason, we do not list Czech in either of the columns in the table below and abstain from making any specific claims about it.

It should also be pointed out that, in the case of Abkhaz, Kalaallisut, and St’át’imcets, the complex modifiers we report about are likely to be relative clauses rather than APs, either because the distinction between relative clauses and adjectives is difficult to make or because adjectives have to be converted into transitive verbs in order to be able to take dependents. This should not make a difference for the claims made here, however.

the data originate from different sources, which range from descriptive grammars in some cases to in-depth data elicitations from native speakers in other cases. We believe that this is virtually inevitable in typological generative syntax, as it is impossible to create a fully representative sample with linguistic data of the same high quality. It is also for this reason that the cells in the N–A block of the table are less populated than those in the A–N block: we were simply not able to obtain the relevant data from as many languages with postnominal adjectives as was the case with languages with prenominal adjectives. Note, however, that this asymmetry between A–N and N–A gets significantly reduced if one counts as data points language families rather than individual languages. What is also important is that the cells within the N–A block (i.e., N–XP–A vs. *N–XP–A) are quantitatively balanced, because the observation concerning the “mirror” HFF-effects is crucial for the approach argued for in this paper.

	XP-intervention possible		XP-intervention impossible	
A–N	Abkhaz (Abkhaz-Adyge)	Hewitt (1979, 109–110)	Armenian (IE isolate)	(22)
	Bulgarian	Sheehan (2017a,b)	Dutch	(72)-(73)
	Polish	Sheehan (2017a,b)	English	Section 2.1
	Russian	(29)	German	(68)-(69)
	Latin (Italic)	(39)	Icelandic	(44)-(45)
	Lithuanian (Baltic)	Ambrasas (1997, 704)	Estonian	native speakers
	Mandarin (Sino-Tibetan)	(31)	Finnish	native speakers
	Modern Greek (Hellenic)	(2), (28)	Hungarian	(20), (25)
	St’át’imcets (Salish)	Davis (2011, 9–12)	French	Sheehan (2017a,b)
	Tagalog (Austronesian)	(32)	Italian	(40)
			Portuguese	Sheehan (2017a,b)
			Romanian	Sheehan (2017a,b)
			Spanish	Cinque (2010, 45)
			Georgian (Kartvelian)	(19)
			Serbo-Croatian (Slavic)	(23), (26)
N–A	Atong (Sino-Tibetan)	(36)	Basque (language isolate)	(33)
	Farsi (Indo-Iranian)	(4)	Chácobo (Panoan)	(34)
	Kalaallisut (Eskimo-Aleut)	Fortescue (1984, 49)	Eastern Oromo (Afro-Asiatic)	(35)

Table 3: The sample of languages investigated for the (reverse) HFF effects.

On the basis of this survey, we can observe that three relevant factors determine the behavior of languages with respect to the adjacency requirement between attributive adjectives

and their head nouns: (i) the presence or absence of an overt attributive marker, (ii) the affixal or non-affixal nature of this attributive marker, and (iii) in the affixal case, the types of nominal features encoded in it. More concretely, the conditions under which intervening material is permitted between an attributive adjective and its head noun can be stated in terms of the following descriptive generalization that we call the *Modifier-Noun Adjacency Generalization* (MAG). Note that even though MAG in (38) is formulated specifically for modifying adjectives, we assume that it is likely to hold for nominal modifiers of any category.

(38) **Modifier-Noun Adjacency Generalization (MAG)**

Linear XP-intervention between a noun N and its modifying adjective A can occur only if A exhibits:

- a. an overt agreement marker that is specified for all features available in the DP¹⁸, which is also present on the predicative form of A, or
- b. an overt attributive marker that is morpho-phonologically independent of A, i.e. is an adjectival clitic or a free word form, or forms a morpho-phonological unit with N.

Note that MAG only tells us when XP intervention *can* in principle be possible, not when it *will* be available. Intervention can only take place if the trivial prerequisite for the A-XP-N/N-XP-A order is met, namely that right-branching/left-branching APs respectively are allowed in the language at hand to begin with, otherwise not. If A-XP is not a possible word order in a language with prenominal adjectives to begin with, the HFF is obeyed trivially (as, e.g., in Japanese or Turkish, see the discussion in Section 2.2). Similarly, languages with postnominal adjectives where the XP-A order is not available trivially obey the reverse HFF (*N-XP-A).

Let us now discuss in more detail the empirical motivation for MAG. We have already seen in Sections 3.1 and 3.2 that the affixal vs. non-affixal nature of the attributive/agreement

¹⁸These features include at least φ and case (κ , henceforth) and, to the extent that they do not count as φ -features, also definiteness, specificity, animacy, etc.

marker plays a role with respect to whether the language allows for the non-adjacency of attributive adjectives and modified nouns. In particular, we have seen that languages with morpho-phonologically independent attributive markers, i.e. with clitics or free word forms, systematically violate the HFF (for instance, Mandarin) and the reverse HFF (for instance, Farsi). The effects originally attributed to the HFF, thus, reduce to properties of morpho-phonologically dependent, i.e. affixal, attributive markers. This motivates (38b).

Moreover, we have seen that also some languages with affixal attributive markers can violate the (reverse) HFF, but the conditions under which this is possible have not been clear yet. Based on our sample of languages, we argue that two conditions must be met in this case, as stated in (38a). First, the attributive adjective must be specified for the φ/κ -features that are present on the DP.

An illustrative example in this connection is Latin, whose adjectives (as well as nouns) are marked not only for φ -, but also for κ -features. In this respect, Latin differs from modern Romance languages, which lack overt case marking on adjectives (and nouns), as shown below for Italian.¹⁹ In accordance with MAG, it is this difference that underlies the distinction between these languages with respect to the possibility for attributive adjectives not to be noun-adjacent.²⁰

(39) **Latin** (Cic. Fam. 1.9; Chiara Gianollo, p.c.)

in [praestantibus in re publica gubernanda] viris
in excellent.ABL.M.PL in thing public to.be.governed man.ABL.M.PL

‘in men who excel in the government of the republic’

¹⁹Note that the point made here concern prenominal adjectives in Italian, which are a restricted lexical class in this language; the majority of adjectives in Italian appear postnominally.

²⁰One might wonder whether the fact that Italian has articles, while Latin does not, might play a role in this respect. However, the presence or absence of articles in a language does not seem to correlate with whether it obeys or violates the HFF. On the one hand, for instance, Bulgarian has articles, but nevertheless violates the HFF. On the other hand, Serbo-Croatian lacks articles, but obeys the HFF.

(40) a. **Italian**

*nei [bravi in matematica] studenti
in.the.M.PL good.M.PL in maths student.M.PL

Intended: ‘in the students (who are) good in maths’

b. negli studenti bravi in matematica

c. nei bravi studenti

d. *negli studenti bravi

Second, adjectives must be fully marked for all nominal φ/κ -features not only when they are used as attributive modifiers, but also when they act as independent predicates. This part of MAG is motivated by the contrast between languages like Greek (HFF-violating) and German (HFF-obeying). In Greek, attributive and predicative adjectives are fully marked for all nominal features, and the HFF does not apply. German, by contrast, has fully marked attributive adjectives, but this is not sufficient to violate the HFF, as predicative adjectives in German are bare forms. The examples below illustrate this.

(41) **Greek**

a. (Aftos) ine perifan*(-os).
he is proud-M.SG.NOM

b. o perifan*(-os) pateras
the proud-M.SG.NOM father

c. (Afti) ine perifan*(-i).
they are proud-M.PL.NOM

d. i perifan*(-i) yonis
the proud-M.PL.NOM parents

(42) **German**

a. Er ist stolz(*-er).
he is proud-M.SG.NOM.STRONG

b. stolz*(-er) Vater
proud-M.SG.NOM.STRONG father

- | | | | | |
|----|------------------------------------------------------|----|-----------------------------------|-------------------|
| c. | Sie sind stolz(*-e).
they are proud-PL.NOM.STRONG | d. | stolz*(-e)
proud-PL.NOM.STRONG | Eltern
parents |
|----|------------------------------------------------------|----|-----------------------------------|-------------------|

Now that we have shown language configurations that serve as clear cases for MAG, the next section will discuss several patterns that seem to speak against this empirical generalization. In particular, we will discuss the patterns of Russian and North Germanic/Serbo-Croatian, and it will be shown that they are only apparent counterexamples to the proposed generalization.

4.2 Potential counterexamples

There appears to be a number of potential counterexamples to MAG that need to be addressed. We will show that they are only apparent counterexamples, however: under closer scrutiny, they do not speak against the proposed generalization.

The first case that could be taken to work against MAG is Russian. More specifically, one may question the validity of the first condition of MAG stated in (38a) in light of the distinction between so-called long forms and short forms of adjectives in Russian. Russian predicative adjectives can have morphologically shorter forms, which are equipped with the same (full) set of φ -features as long forms, but are not marked for κ -features: they are only able to occur in nominative/caseless environments. Yet at the same time Russian is an HFF-violating language.

However, the short forms cannot be used attributively in Russian. They are only able to occur in the predicative position, while the long forms can be used both predicatively and attributively, as the examples below show and table 4 summarizes.

(43) **Russian**

- | | |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| a. Ona umn-aja/umn-a.
she smart-LONG.F.SG.NOM/SHORT.F.SG
‘She is smart.’ | b. umn-aja/*umn-a
smart-LONG.F.SG.NOM/SHORT.F.SG
d’evočka
girl
‘a/the smart girl’ |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|

	attributive use	predicative use
long forms	✓	✓
short forms	–	✓

Table 4: Syntactic distribution of long and short forms of adjectives in Russian.

In other words, there is only one type of forms of Russian adjectives that can occur in the attributive position to begin with (which is where the HFF can potentially apply), namely the long forms, and these are fully marked for all nominal φ/κ -features and have identical predicative counterparts, which is in line with (38a). Hence, Russian is predicted to violate the HFF. The fact that there are also other forms of predicative adjectives in the language is irrelevant in this context.

The second potential counterexample for MAG comes from North Germanic languages and Serbo-Croatian. Let us start with North Germanic; we will show afterwards that the situation in Serbo-Croatian is in fact similar. We will illustrate the North Germanic pattern on the basis of Icelandic, but the pattern is analogous also in Danish, Swedish, and Norwegian, modulo the fact that their adnominal agreement morphology is less rich.

In particular, predicative adjectives in Icelandic can take their dependents to their right or to their left (44), the latter being a more marked option, which is similar to the situation in West Germanic languages like Dutch and German.

(44) **Icelandic** (Gísli Rúnar Harðarson, native speaker, p.c.)

- a. Jón er stolt-ur af syni sínum.
J. is proud-M.SG.NOM.STRONG on son.DAT his.DAT
- b. Jón er af syni sínum stolt-ur.
J. is on son.DAT his.DAT proud-M.SG.NOM.STRONG
- ‘Jón is proud of his son.’

However, differently from Dutch and German, whose predicative adjectives are bare forms (see (42) above and the discussion in Sections 5.2.2 and 5.2.3), Icelandic predicative adjectives are fully marked for all nominal φ/κ -features, and the same also holds for its attributive adjectives (as we will see in (46)). Despite these facts, Icelandic is an HFF-obeying language, as only the XP–A–N order is allowed in the attributive position (45), which, again, seems to speak against the generalization in (38a).

(45) **Icelandic** (Gísli Rúnar Harðarson, native speaker, p.c.)

- a. *stolt-ur af syni sínum faðir
proud-M.SG.NOM.STRONG on son.DAT his.DAT father
- b. af syni sínum stolt-ur faðir
on son.DAT his.DAT proud-M.SG.NOM.STRONG father
- ‘a father proud of his son’

Yet the situation in Icelandic is not as simple as, e.g., in Greek, where there is only one form of adjectives, which appears both predicatively and attributively and is fully marked for all nominal φ/κ -features. Icelandic, by contrast, has two forms of adjectives, namely so-called strong and weak forms, both of which are marked for gender, number, and case. This may look reminiscent of the situation with Russian long and short forms of adjectives discussed above, but the distribution of Icelandic strong and weak forms is crucially different from

that of Russian long and short forms. In particular, the predicative position only allows for strong forms of adjectives in Icelandic, and the same holds for the attributive position inside indefinite DPs (there is no overt indefinite article in the language). By contrast, definite DPs (headed by a suffixal definite article) allow for both strong and weak forms of adjectives to be used attributively. However, the two forms give rise to different interpretations in this case: unlike weak forms, strong forms must obligatorily be interpreted non-restrictively inside definite DPs. Importantly, no such requirement holds for strong forms used predicatively or inside indefinite DPs (as weak forms may not be used there). Below, these facts are exemplified in (46) and summarized in table 5.

- (46) **Icelandic** (Gísli Rúnar Harðarson, native speaker, p.c.)
- a. Jón er { stolt-ur / *stolt-i }.
 J. is proud-M.SG.NOM.STRONG proud-M.SG.NOM.WEAK
 ‘Jón is proud.’
- b. { stolt-ur / *stolt-i } faðir
 proud-M.SG.NOM.STRONG proud-M.SG.NOM.WEAK father
 ‘a proud father’
- c. stolt-i faðir-inn
 proud-M.SG.NOM.WEAK father-DEF.M.SG
 ‘the proud father’
- d. stolt-ur faðir-inn
 proud-M.SG.NOM.STRONG father-DEF.M.SG
 ‘the father, who, by the way, is proud’

What this shows is that it is not the case that predicatively used adjectives can simply be inserted into the attributive position in Icelandic. If that was the case, strong forms would

	attributive use, definite DPs	attributive use, indefinite DPs	predicative use
strong forms	✓ (non-restr.)	✓	✓
weak forms	✓	–	–

Table 5: Syntactic distribution of strong and weak forms of adjectives in Icelandic.

be able to be used in both definite and indefinite DPs without further semantic effects, contrary to fact. Rather, the pattern observed above shows that the morpho-syntax of Icelandic attributive and predicative adjectives must be different: attributively used adjectives must carry some formal features that are sensitive to the (in)definiteness of the DP, while predicatively used adjectives must lack them, otherwise the same (in)definiteness effects would be observed in the predicative use as well. This is consistent with the condition of MAG stated in (38a), which requires that attributively and predicatively used adjectives are featurally identical for a language to be able to violate the HFF. In other words, MAG correctly predicts that the HFF must be obeyed in Icelandic.

The situation in Serbo-Croatian is very similar. Serbo-Croatian distinguishes between short and long forms of adjectives, whose distribution is however different from that of short and long forms of adjectives in Russian. In particular, only short forms can occur in the predicative position, while both forms can occur attributively. However, short forms used attributively give rise to an indefinite/non-specific reading of the noun phrase, whereas long forms trigger a definite/specific interpretation, as shown by the examples in (47) from Aljović (2002). Thus, similarly to the situation in Icelandic, attributively used adjectives in Serbo-Croatian must be featurally different from predicatively used adjectives, because, differently from the latter, they are sensitive to definiteness/specificity. This, again, is consistent with MAG, which correctly predicts Serbo-Croatian to be an HFF-obeying language.

a. Goran je { lijep / *lijepi }.

G. is nice.SHORT nice.LONG

‘Goran is nice.’

b. lijep momak

nice.SHORT young.man

‘a nice young man’

c. lijepi momak

nice.LONG young.man

‘the nice young man’

Summing up, we have introduced MAG as the new descriptive generalization that comes in place of the HFF, provided empirical evidence for it, and explained away potential counterexamples. To conclude, let us now discuss MAG from a more general perspective and compare its key components with those of the HFF. This will be done in the next section.

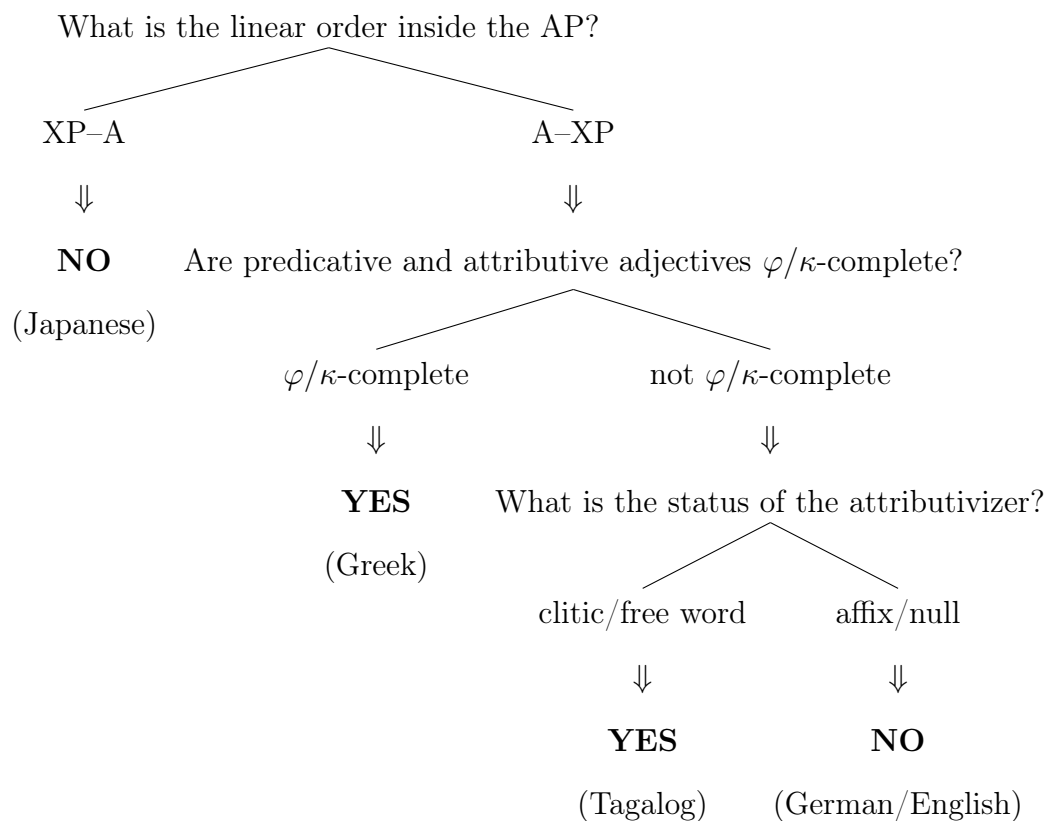
4.3 Comparing MAG with the HFF

Given the formulation of the HFF in (13), it is clear that it operates in terms of a single factor in constraining the word order in complex prenominal APs: their head-finality. The same will hold for the “reverse” HFF, which will need to be assumed for postnominal APs: it will operate in terms of head-initiality. Since this requirement is inviolable, the (reverse) HFF fails to capture the violating cases introduced in Section 3. By contrast, MAG states that the heads of modifying APs must be noun-adjacent, but there are two cases in which this requirement can be lifted, allowing for (reverse) HFF violations: either APs have an attributive marker that is morpho-phonologically independent of adjectives, or they exhibit

an affixal agreement marker that is specified for all nominal features and occurs on both predicative and attributive adjectives (i.e., is a general adjectival agreement marker). In other words, MAG operates in terms of two factors with respect to the possibility of the non-adjacency between attributive adjectives and their head nouns, which are independent of each other and come from two different domains of grammar: morpho-syntax (the richness of φ/κ -marking on adjectives) and morpho-phonology (the status of attributivizers as affixes or null morphemes vs. clitics or free word forms).

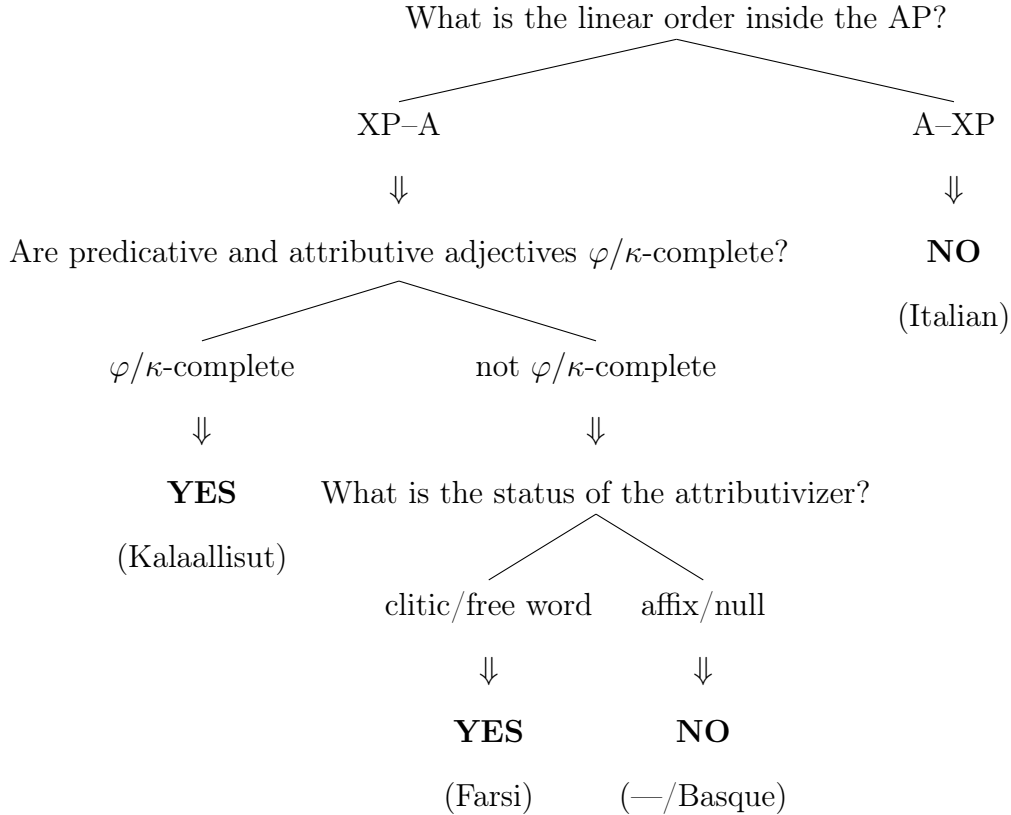
In order to demonstrate the relation between MAG and the (reverse) HFF in a more visual way, we will represent it in the form of decision trees that give an answer to the question of whether the (reverse) HFF may be violated, but do so in terms of the two key factors of MAG discussed above. The decision tree in (48) is concerned with the question of whether the A–XP–N order is possible with prenominal adjectives, i.e. whether the HFF may be violated, while the decision tree in (49) is concerned with the question of whether the N–XP–A order is possible with postnominal adjectives, i.e. whether the reverse HFF may be violated. Note that both decision trees start off with the question concerning the linear order inside the AP, which is the trivial prerequisite for the violability of the (reverse) HFF. Also note that the questions concerning the possibility of the A–XP–N/N–XP–A order with prenominal/postnominal adjectives, which the decision trees below answer, are formulated for a specific AP, rather than for APs in general. The reason for this has to do with the fact that languages are often flexible in allowing for both prenominal and postnominal adjectives (e.g. Italian), hence some of their APs are subject to the decision tree in (48), while others to that in (49). The same holds for the question concerning the linear order inside the AP, since some languages allow for both A–XP and XP–A (e.g. German), and hence the decision trees below will output two answers for such languages.

(48) **Is the A–XP–N order possible in the prenominal AP?**



The decision tree above shows that the HFF is violated in two types of languages (with φ/κ -complete predicative and attributive adjectives and with morpho-phonologically unbound attributivizers) and is obeyed in two cases (trivially when the A–XP order is not available and non-trivially when predicative and attributive adjectives are not φ/κ -complete and a clitical attributivizer is not employed), and gives an example language for each of these cases. The decision tree below does the same for the reverse HFF.

(49) **Is the N–XP–A order possible in the postnominal AP?**



Now that we have discussed in more detail the key elements of MAG and compared them to the HFF, we can proceed to developing a formal analysis that derives MAG. This is the goal of the next section.

5 Analysis

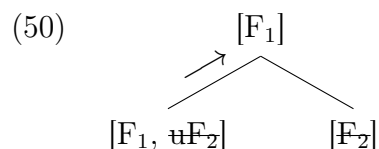
The discussion above makes it clear that the rationale behind MAG has to do with two independent phenomena, which allow for non-adjacency in adnominal modification. One of them, which comes from the domain of morpho-syntax, is the fact that richness of morphological marking can have an effect on word order. The other one comes from the domain of morpho-phonology and has to do with the difference between affixes and clitics with respect to the freedom of choice of their hosts: the latter are less restricted in what they may attach to, thus leaving more room for non-adjacency effects. In what follows, Sections 5.1 and 5.2 will spell out an analysis that derives both of these aspects of MAG in turn, starting with

the richness of feature marking and its effect on linear order.

5.1 The feature composition involved in nominal modification

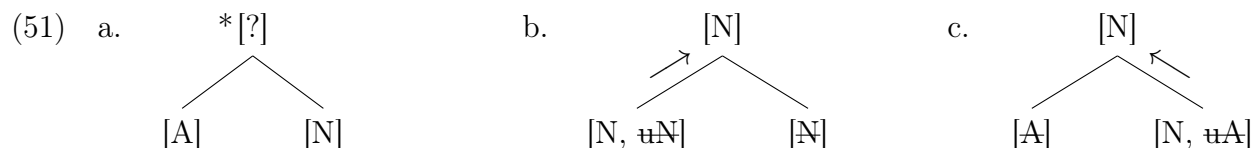
We start our analysis by laying out our assumptions about the nature of predicatively and attributively used adjectives and the relation between them. In particular, we assume that when attributively and predicatively used adjectives are different in form, predicative use of the adjectives is the basic one, since this is where they appear as independent predicates. The morpho-syntactic form and the featural specification of predicatively used adjectives thus corresponds to the way adjectives enter the syntactic derivation.

By contrast, we consider the attributive use of adjectives to be a secondary one, which is reflected through a greater complexity of the feature composition involved in our system. To see this, let us outline the mechanics of feature composition adopted in this paper, which rests on two assumptions. First, we assume that c-selection is feature-driven in that selecting heads are equipped with an uninterpretable categorial $[uF]$ feature that must be checked off under sisterhood by a matching interpretable $[F]$ feature of the selectee (Adger, 2003; Heck & Müller, 2007; Zeijlstra, 2020). Second, we assume that feature bundles that contain interpretable categorial features that are not involved in c-selectional feature checking get percolated up, i.e. project. These assumptions are schematically shown below.

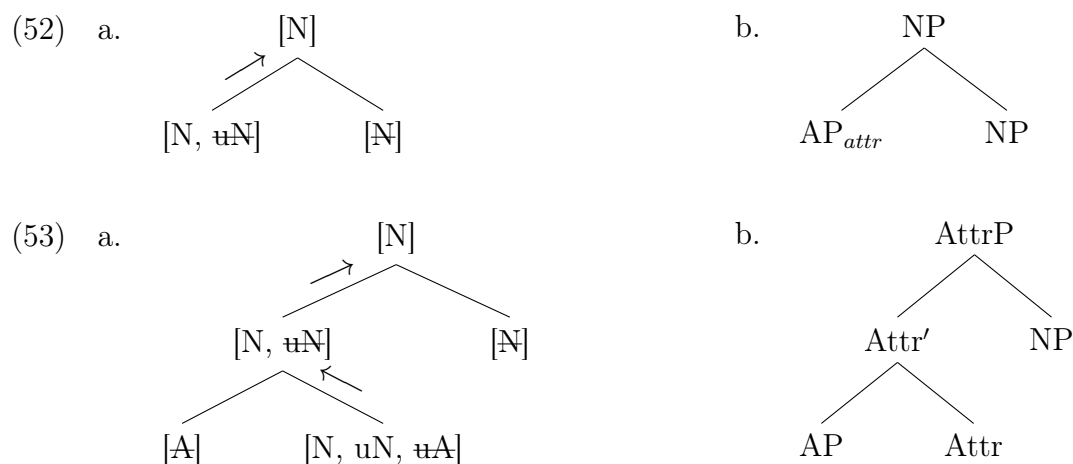


Now, crucially, we take modification to be governed by the same featural mechanisms as well, i.e. we assume that underlyingly it is a kind of complementation (Escribano, 2005; Georgi & Müller, 2010; Zeijlstra, 2020). Accordingly, a direct merger of a noun, which bears an $[N]$ feature, and an adjective, which bears an $[A]$ feature, is not possible, as neither of them subcategorizes for the other and the resulting object cannot be labeled, as shown in

(51a). Analytically speaking, this situation can be resolved in two ways. On the one hand, the adjectival projection that combines with the noun can have a [uN] feature and, at the same time, an [N] feature, which percolates up instead of the [N] feature of the noun, as in (51b). On the other hand, the nominal projection that merges with the adjective can have a [uA] feature in addition to its [N] feature, with the latter percolating up, as in (51c).



The next question is how the features [N, uN] end up being present within the extended adjectival projection in the scenario depicted in (51b) and how the features [N, uA] end up being present within the extended nominal projection in the scenario depicted in (51c). With respect to the former question, we assume that two possibilities are available. On the one hand, adjectives may come equipped with [N, uN] already from the lexicon, as shown in (52). On the other hand, there may be some element in the syntax that converts [A] into [N, uN], as shown in (53). Note that the structures below are also represented in terms of more familiar X-bar-theoretic labels for convenience, the featural representations should be seen as primary however.²¹



²¹It is not straightforward to map the featural structure in (52) to its X-bar-theoretic counterpart because selection and projection are dissociated in this case.

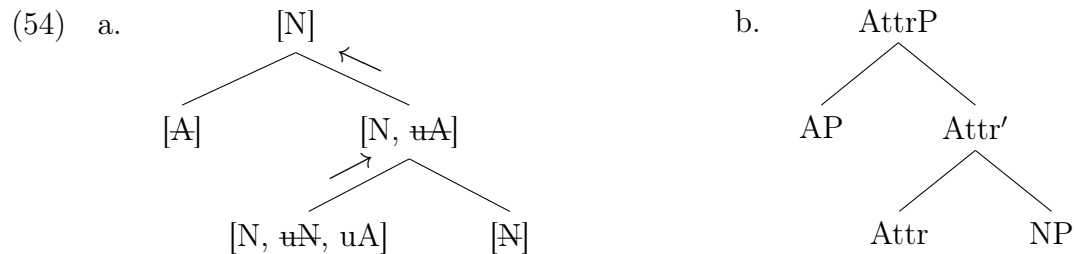
Given that the syntactic element responsible for the conversion of [A] into [N, uN] in (53) effectively enables the adjective to serve as an attributive modifier, we will refer to it as an attributivizer and represent it as the Attr head. This also provides a way of detecting whether adjectives in a language follow the strategy in (52) or that in (53). If adjectives have different predicative and attributive forms, this implies that they employ an attributivizer. If adjectives have identical predicative and attributive forms, they either follow the strategy in (52) or employ a null attributivizer, whose presence should, however, be still detectable through its contribution to the derivation, e.g. in featural terms, as will be discussed below.

At this point, a question arises concerning the featural specification of predicatively used adjectives in connection with the feature composition of attributive adjectives depicted in (52) above. In particular, if adjectives enter the syntactic derivation carrying the features [N, uN] rather than [A], it is not immediately clear how the derivation can converge when adjectives are used in the predicative position. We see several possible ways out of this problem. On the one hand, predicatively and attributively used adjectives may be lexically ambiguous between items carrying the feature [A] and items carrying the features [N, uN], despite having the same form. Alternatively, the feature change from [A] to [N, uN] may be accomplished by a lexical type-shifting operation. Finally, predicative adjectives in such languages may carry the features [N, uN] being always accompanied by a null noun, i.e. the predicative use of adjectives may be a concealed attributive one due to noun ellipsis. For the purposes of this paper, we remain open with respect to this question.²²

Let us now return to the question of how the features [N, uA] can end up being present within the extended nominal projection in the scenario depicted in (51c). Differently from what has been discussed above with respect to the adjectival projection, the nominal projec-

²²Note that this question is a corollary to the question in semantics concerning how to analyze predicative adjectives if attributive adjectives are assumed to be of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$. This is unsurprising because the treatment of adjectives as elements carrying the features [N, uN] mirrors in syntax the approach to them as elements of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ in semantics. In particular, adjectives select for nouns through their selecting uninterpretable [uN] feature, which renders them effectively the heads of the resulting phrases, and the resulting phrases are nominal as desired because they inherit the interpretable categorial [N] feature from the adjectives.

tion cannot come equipped with these features already from the lexicon, as this would imply that nouns always select for an attributive adjective and, in the absence of an overt adjective, they take an unpronounced, semantically vacuous one, which does not seem to be plausible. For this reason, we assume that there is only one possibility in this case: there is an element in the syntax that turns $[N]$ into $[N, \text{uA}]$, as shown below. Given that this can only happen in the presence of an attributive adjective, this element must be an attributivizer like before.



In what follows, we will argue that all the analytical possibilities discussed above are in fact attested in the languages of the world. Concretely, either adjectives already enter the derivation carrying the features $[N, \text{uN}]$ as depicted in (52), or nominal modification involves an attributivizer, which can be part of the extended adjectival projection (xAP , henceforth) or the extended nominal projection (xNP , henceforth), as in (53) and (54).²³ Moreover, we will show that only languages in which both predicative and attributive adjectives are marked for all φ/κ -features available in the DP can enter the derivation carrying the features $[N, \text{uN}]$, all other types of languages must employ an attributivizer for the purposes of nominal modification. Below, we will discuss both of these types of languages in turn.

²³See also Bošković (2005) who argues that languages vary with respect to whether adjectives can directly adjoin to NP or whether NPs have to be selected by some adjectival head.

As far as the possibility for Attr to be part of the xAP or the xNP is concerned, it is argued in Philip (2012) that attributivizers always form a constituent with the modifier and not with the modified noun. If correct, the structure in (54) must be ruled out on independent grounds in this case. However, this would not make a difference for our analysis because all HFF-relevant properties of Attr are independent of whether it is part of the xAP or the xNP , as will be discussed below.

5.1.1 Languages without attributivizers

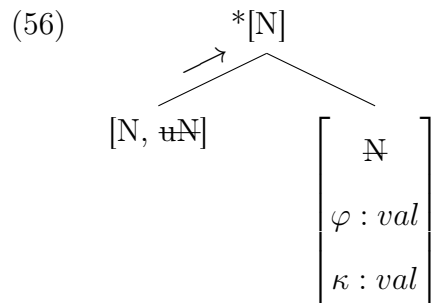
Let us start our discussion with the feature composition of attributive modifiers with their head nouns depicted in (52) and repeated in (55) below for convenience, where attributively used adjectives are equipped with the pair of categorial features $[N, uN]$ and select for nouns, which have an $[N]$ feature. Note that this feature composition at the syntactic level mirrors the approach to adjectives in categorial grammar (where attributive adjectives have the type N/N) and formal semantics more generally (where attributive adjectives are commonly assumed to be of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$), and it has been implemented previously in the syntactic literature as well (Escribano, 2004; Zeijlstra, 2020).



We argue that the feature composition in (55) is only available in languages in which both predicative and attributive adjectives are equally marked for all features active in the DP, which involves at least all φ - and κ -features. In what follows, we will first show why this must be the case for attributive forms and will return to the same question for predicative forms after. The reason for why attributive adjectives must be fully feature-marked in order for the language to be able to follow the feature composition in (55) has to do with the fact that nouns and other nominal elements are equipped not only with categorial features, but also with a set of φ -features active in the language, as well as with κ -features.²⁴ Accordingly, it is the φ/κ -features of the attributively used adjective that percolate up together with its projecting categorial $[N]$ feature in (55), and not the φ/κ -features of the actual head noun. Hence, if attributive adjectives of a language are not marked for some or all of the φ/κ -features active in the DP of that language, the lack of these features and their values in the feature matrix of an attributive adjective will be passed over to the next nominal projection,

²⁴We assume that Case is present as a feature on DPs in all languages independently of whether it is morphologically realized or not.

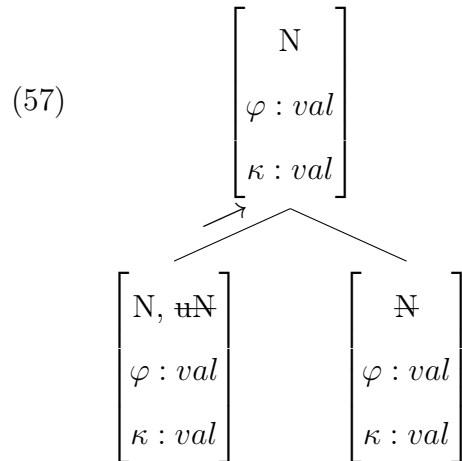
which will be lacking them as well. In other words, the features specified on the head noun will not be able to percolate up in the presence of a modifying adjective in this language.²⁵



Thus, the NP that results from the merger of a noun and an attributive adjective that is not marked for some or all φ/κ -features, as in (56) above, ends up lacking these φ/κ -features itself. This outcome is, however, problematic: a D head must be able to agree with its noun and any other functional head in the extended NP with respect to all features that are available in the DP. Following Adger & Svenonius (2011), we take φ and κ to be sub-features of the categorial [N] feature. Consequently, if the D head probes for [N] and not specifically for φ and κ when it searches for φ/κ -values, D will not be able to probe beyond the higher NP projected by the adjective, given relativized minimality. Thus, it will not be able to target any φ/κ -features below this NP, and the φ/κ -features of the noun will become inaccessible outside the DP. Note that the situation is equally problematic if attributive adjectives are unmarked only for some rather than all φ/κ -features: in this case, the DP will end up being φ/κ -incomplete with respect to this subset of features.

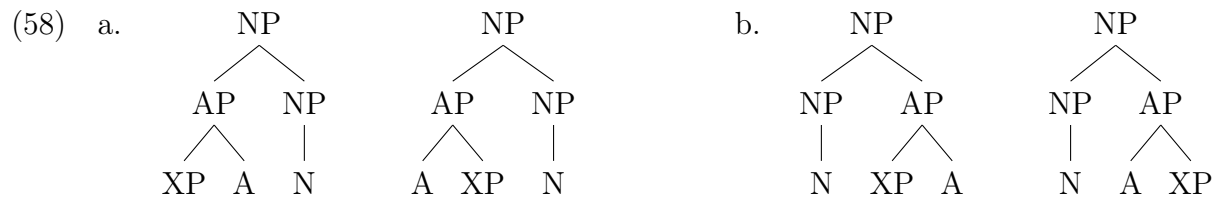
This problem does not arise if attributive adjectives carry the values of all the nominal φ/κ -features available in the language. In that case, they will be projected to the next NP level, as illustrated below, where the probing D head will be able to access them.

²⁵Here and below, the (un)interpretability of φ/κ -features is not indicated for simplicity as the question concerning the locus of interpretable φ/κ -features is not directly relevant for the issues under discussion.



We can now return to the question of why also predicative forms of adjectives must be fully feature-marked in order for a language to be able to follow the feature composition in (55). The answer to this question is straightforward: if attributive adjectives are marked for all φ/κ -features, but predicative adjectives are not, this means that some other element must introduce these features in the course of attributivization, i.e. an attributivizer must be present in the derivation, and this implies the feature composition in (53) or in (54), but not that in (55).

Now that we have discussed the mechanics of adjectival modification that follows the feature composition in (55), we are in a position to discuss what it implies for the HFF/MAG-related linearization. In particular, we assume that nothing here imposes any linearization constraints on complex APs in this case, and modifying adjectives can take their dependents to their left or to their right, as shown in (58) for prenominal and postnominal APs. In other words, languages in which predicative and attributive adjectives are fully inflected for all nominal φ/κ -features are HFF-violating if the head parameter of A gives rise to the intervening configuration A–XP–N or N–XP–A. This is the case, e.g., in Greek with prenominal APs and in Kalaallisut with postnominal APs, see the decision trees in (48) and (49).

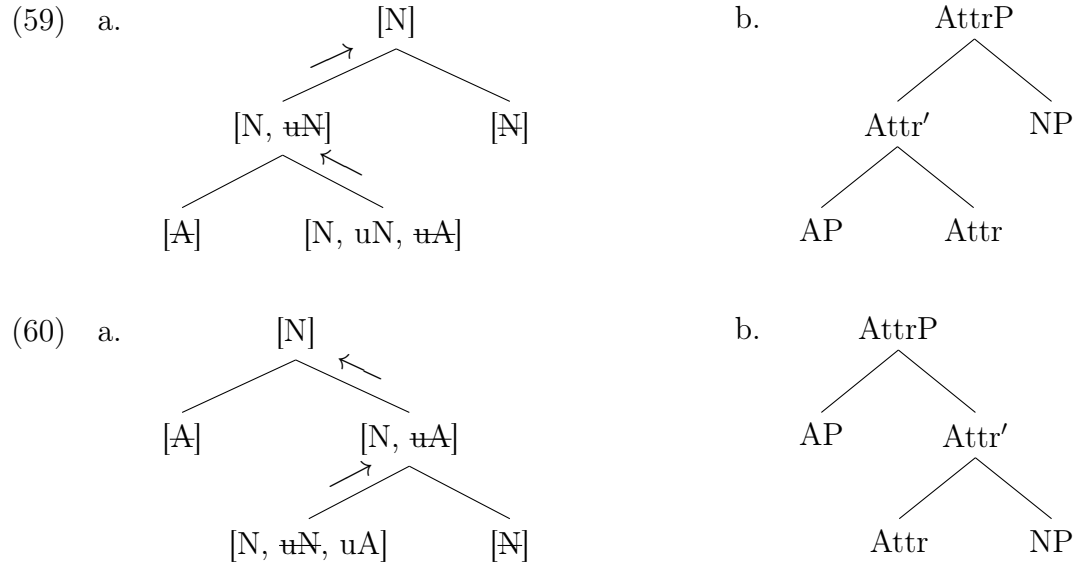


To conclude, the assumptions outlined above derive the part of MAG stated in (38a), which covers the subset of HFF-violating languages whose predicative and attributive adjectives are equally specified for all nominal φ/κ -features. Specifically, we assume that adjectival modification in such languages follows the feature composition in (55), which does not impose any constraints on the linearization of modifying APs. By contrast, languages in which adjectives are not marked for all φ/κ -features cannot follow this strategy because they would block the feature transmission of the φ/κ -features they are not marked for. In this way, attributive adjectives, despite being “adjuncts”, can act as interveners for Agree within this type of feature composition. Accordingly, HFF-obedient languages come exclusively from the set of languages that have an attributivizer and follow the feature composition in (53) or (54). This type of languages will be discussed in the next section.

5.1.2 Languages with attributivizers

In the previous section, we have argued that adnominal modification in which adjectives enter the derivation carrying the features $[N, uN]$ is only possible in languages whose attributive and predicative adjectives are fully marked for all nominal φ/κ -features. In this section, we will discuss the alternative feature composition that languages in which this is not the case must resort to. In particular, this alternative must be such that the adjective is prevented from projecting since this would lead to the φ/κ -incompleteness of the DP as shown in (56). This can be done by means of an attributivizer, i.e. a separate linking element specified for all nominal features, which is introduced for the purposes of attributive modification. As discussed above, the attributivizer can be part either of the xAP as in (53) or of the xNP as

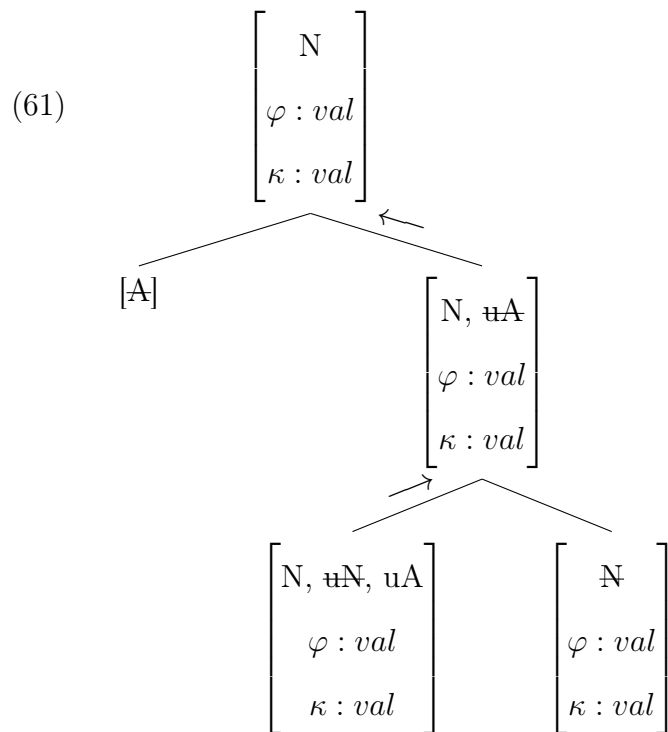
in (54), which are repeated below for convenience.²⁶



In the structures above, the attributivizer is represented as the head of the special functional projection *AttrP*, which is optional and gets introduced within the *xAP* or the *xNP* only in the context of modification. Being an element that enables nominal modification in such cases, *Attr* must therefore be specified for all nominal features. This does not mean that it necessarily needs to exhibit φ/κ -agreement with the noun (though of course it can, as is, e.g., the case with the agreeing attributive marking in German): as a functional attributive element, *Attr* itself as a whole can be the spell-out of all nominal features, without some specific φ/κ -features being morphologically distinguishable within it. For this reason, independently of whether it takes an *AP* as its first argument and an *NP* as the second one as in (59) or the other way around as in (60), *Attr* will project its categorial *[N]* feature together with all its φ/κ -features higher up, making them accessible to the *D* head and thus ensuring the φ/κ -completeness of the *DP*. In this way, the adjective, which lacks some or all φ/κ -features, is prevented from projecting and does not act as an intervener. The full feature composition taking place in this case is illustrated below for *Attr* as part of the *xNP*;

²⁶There may be the question in connection with these structures of how stacking of adjectives would work in this case. With *Attr* being part of the *xAP*, this is straightforward: every modifying adjective will bring in its own *Attr* head. In the case of *Attr* as part of the *xNP*, a separate *Attr* head will need to be introduced in the nominal spine for each additional adjective.

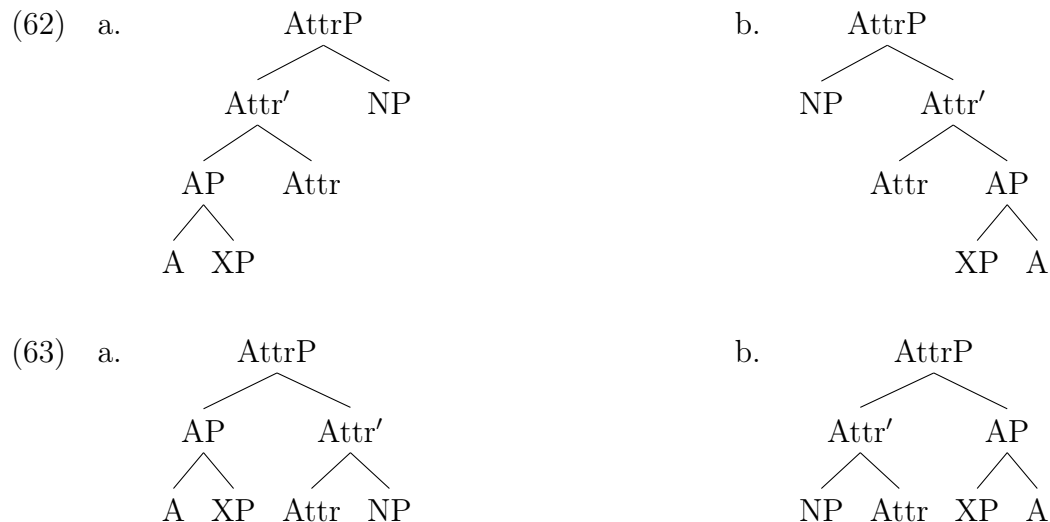
the situation is completely analogous if Attr is part of the xAP.²⁷



Now, the adjective can in principle take a dependent to its left or to its right in such derivations. However, differently from the situation depicted in (58) above, there is a constraining factor here: the dependent of the adjective can now linearly separate Attr from the A head in some cases. In particular, this is the case with right-branching prenominal APs and left-branching postnominal APs, independently of whether Attr is part of the xAP or of the xNP, as shown in the structures below.²⁸

²⁷To make the feature composition less cumbersome, the adjective is represented here as carrying the categorial [A] feature, so it would not be able to project to begin with. However, nothing crucial would change if it carries the features [N, uN] instead; Attr would just need to have a suitable different categorial type in this case.

²⁸Also when Attr is part of the xAP, the dependent of the adjective must enter the derivation below Attr, i.e. it must be introduced inside the AP and not the AttrP, otherwise one would expect that only attributive but not predicative adjectives should be able to take dependents.



This is not a problem if Attr is morpho-phonologically independent of A, i.e. it is a free word form, an adjectival clitic, or a nominal affix or clitic. In this case, no linearization constraints will be placed on the structure. However, if Attr is an adjectival affix, it must be adjacent to the host adjective it attaches to. In such cases, an intervening dependent between the adjective and Attr will make the structure ungrammatical. Moreover, also null affixes impose morpho-phonological attachment restrictions and therefore constrain linearization, as we will see below.

Hence, in order to derive the part of MAG stated in (38b), which relates the possibility of violating the (reverse) HFF to the morpho-phonological status of the attributive marker, we need to formulate constraints on attachment of different kinds of bound morphemes. This will be done in the next section.

5.2 The morpho-phonological status of attributivizers

5.2.1 Attr as a clitic or free word

As outlined above, in languages where predicatively used adjectives do not exhibit φ/κ -completeness, an additional Attr head must be present in the xNP/xAP to host all nominal φ/κ -features and prevent the adjective from projecting, as shown in (61). As such, the presence of the Attr head makes in principle possible the HFF-violating A–XP–N order

and its postnominal counterpart N–XP–A. In particular, if every terminal is spelled out as a morpho-phonologically independent element, there is no reason why it should ban such orderings. This is, in fact, in full accordance with MAG: if the modification of N by A exhibits an overt attributive marker that is a morpho-phonologically independent clitic or free word, the A–XP–N order is freely available. This is the case, for instance, in Mandarin Chinese and Tagalog, and in a mirrored fashion in Atong and Farsi. The examples from Tagalog and Atong are repeated here from above for convenience.

(64) **Tagalog** (Schachter & Otones, 1972, 246; gloss ours)

Naghahanap ako ng [bagay (para) sa bata]=ng damit.

AV.PROG.search 1.SG.NOM GEN suitable for DAT child=ATTR dress

‘I am looking for a dress (that is) suitable for the child.’

(65) **Atong** (Tibeto-Burman; van Breugel, 2010)

[naŋʔ=məŋ gore [jal=na rak-khal] =gaba] =aw

2S=GEN horse run=DAT strong-SUP =ATTR =REF

‘your fastest running horse (strongest in running)’

The fact that the A–XP–N order in languages where Attr has to be part of xNP/xAP requires Attr to be morpho-phonologically independent, suggests that the ban on XP-intervention between nouns and their modifying adjectives is due to Attr being morpho-phonologically dependent on the adjective. This amounts to two different cases: cases where Attr is realized by an affix and cases where Attr is realized by a null morpheme. We discuss both in turn.

5.2.2 Attr as an affix

The scenario when Attr is realized as an affix occurs, for instance, in German, as we have seen above. The relevant examples are repeated below for convenience.

(66) **German**

- | | | | | |
|----|-----------------------------|----|-----------------------|--------|
| a. | Er ist stolz(*-er). | b. | stolz*(-er) | Vater |
| | he is proud-M.SG.STRONG.NOM | | proud-M.SG.STRONG.NOM | father |

If the Attr marker is affixal in nature, its distribution is constrained both syntactically and morpho-phonologically. Following Ackema & Neeleman (2004), we assume that an affix can only attach to the head of the phrase it selects. The following constraint proposed by Ackema & Neeleman (2004), which they call the Input Correspondence Principle (ICP), formulates this restriction concerning possible hosts of affixes.

(67) **Input Correspondence Principle (ICP)** (Ackema & Neeleman, 2004)

If an AFFIX takes a head Y or a projection of Y as its input,
the AFFIX is phonologically realized as /affix/, and
Y is phonologically realized as /y/,
then /affix/ takes /y/ as its input.

This means that Attr, when affixal, must be strictly adjacent to A, irrespective of whether Attr first selects an NP and only then an AP, or the other way round. In order to ensure that Attr also ends up in a string-adjacent position to the adjective, it must be prevented that further material intervenes between Attr and A.

This may give rise to two kinds of effects. First, in languages where APs are strictly head-initial and prenominal, or strictly head-final and postnominal, attributively used adjectives cannot take any dependents. Second, in languages in which XPs can appear both to the left and to the right of a predicatively used adjective, attributively used adjectives can still take leftward XPs if APs are prenominal or rightward XPs if APs are postnominal. This is the case in German, as the following examples show.

- (68) a. Maria ist [stolz auf ihre Tochter].
 Maria is proud on her daughter
- b. Maria ist [auf ihre Tochter stolz].
 Maria is on her daughter proud
- (69) a. *die [stolz auf ihre Tochter]-e Mutter
 the proud on her daughter-ATTR.F.SG.NOM mother
- b. die [auf ihre Tochter stolz]-e Mutter
 the on her daughter proud-ATTR.F.SG.NOM mother

The restrictions on the attachment of affixes formulated as the ICP in (67) thus naturally capture the generalization stated in (38b) and explain the fact that languages such as German obey the HFF.

5.2.3 Attr as a null morpheme

The third type of language to be discussed are languages in which an Attr head is predicted to be present, but is not realized overtly. Two sub-types of such languages can further be distinguished: languages in which *not all* instances of Attr are morpho-phonologically realized and languages in which *no* instance of Attr is morpho-phonologically realized. We discuss both varieties in turn, starting with the former one, in which the Attr head is only sometimes realized overtly.

A language that belongs to this variety is Dutch. Dutch is similar to German in that predicatively used adjectives are always bare forms, as the following examples show.

- (70) a. De man is lang.
 the.COM man is tall
- b. Het kind is lang.
 the.NEUT child is tall
- c. De mannen zijn lang.
 the.PL men are tall
- d. De kinderen zijn lang.
 the.PL children are tall

Dutch differs from German, however, in that nouns do not always trigger overt morphology on attributive adjectives: attributives take a schwa-ending, except when they modify an indefinite neuter singular noun; then the agreement marker is null (see the following table and (71)).

	COM/PL	NEUT
definite	-e	-e
indefinite	-e	-∅

Table 6: Paradigm of attributive marking on adjectives in Dutch.

- (71) a. de jong-e vrouw
the.COM young-ATTR woman.COM
- b. het jong-e kind
the.NEUT young-ATTR child.NEUT
- c. een jong-e vrouw
a young-ATTR woman.COM
- d. een jong-∅ kind
a young-ATTR child.NEUT

With *overt* attributive morphology (i.e. with the schwa), things work in the same way as in German when it comes to PPs intervening between the noun and the modifying adjective. The schwa must right-attach to the adjective that heads the AP. Therefore attributive adjectives can only take a PP on their left, but not on their right.

- (72) a. een [op haar moeder trots_A]-e vrouw
a of her mother proud-ATTR woman
- b. *een [trots op haar moeder_N]-e vrouw
a proud of her mother-ATTR woman

- c. *een [trots-e op haar moeder] vrouw
 a proud-ATTR of her mother woman

This situation is exactly the same when the agreement marker is *covertly* realized, as shown in the examples below (with a neuter noun instead of a common one). Like before, all adjacency requirements are met only in (73a). In (73b), Attr is not adjacent to the head of the AP, and in (73c) it is not adjacent to the NP.

- (73) a. een [op haar vader trots_A]-∅ kind
 a of her father proud-ATTR child
- b. *een [trots op haar vader_N]-∅ kind
 a proud of her father-ATTR child
- c. *een [trots-∅ op haar vader] kind
 a proud-ATTR of her father child

Since uninflected forms of attributive adjectives in Dutch indeed contain a syntactically present but phonologically unrealized Attr, the analogous behavior of complex APs with overt and covert attributive morphology in (72) and (73) is not surprising at all. Therefore, one might entertain the idea that also null affixes are subject to the ICP in (67), even if Ackema & Neeleman (2004)'s original conception of the ICP was not supposed to cover zero morphology.

In this light, it is important to observe, however, that Dutch uninflected attributive forms do in fact behave differently from attributive schwa-forms with respect to certain linearization phenomena. Consider the following paradigm based on observations by van Riemsdijk (1998).²⁹

²⁹According to the online resource *Taalportaal*, which offers a comprehensive grammar of Dutch and contains an in-depth discussion of complex attributive adjective phrases in this language (<https://taalportaal.org/taalportaal/topic/pid/topic-14286625184046279>), there is some speaker variation with respect to the acceptability of (74a). Also, as noted in the journal *Onze Taal* (https://www.dbnl.org/tekst/_taa014201301_01/_taa014201301_01_0191.php), *groot genoeg-e* as in

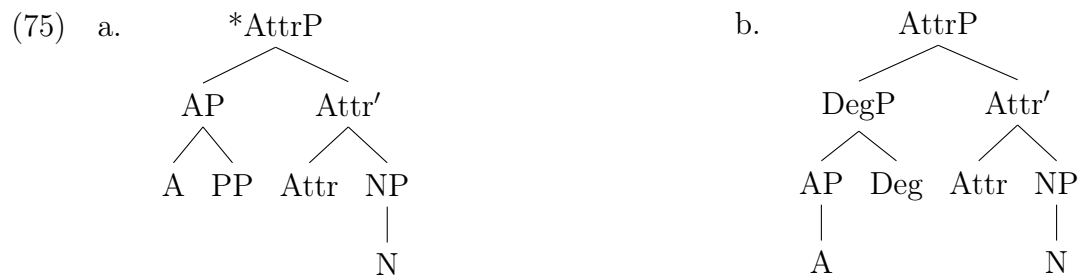
- (74) a. een [groot genoeg_{Deg}]-∅ kind
 a big enough-ATTR child
- b. *een [groot genoeg_{Deg}]-e vrouw
 a big enough-ATTR woman
- c. *een [groot-e genoeg_{Deg}] vrouw
 a big-ATTR enough woman
- d. *een [groot genoeg_{Deg}] vrouw
 a big enough woman

When the attributive agreement marker is overt, the postadjectival degree marker *genoeg* ‘enough’ interrupts the adjacency between the schwa and the adjective, triggering ungrammaticality ((74b)-(74d)). This is not the case, however, when the attributive marker is null (74a). This suggests that zero morphology imposes an adjacency requirement with respect to its host that is less strict compared to that of overt morphology.

The most straightforward way of accounting for the data above offers itself under the assumption that degree markers head a dedicated functional projection inside the xAP (cf. Abney, 1987; Grimshaw, 1990; Kennedy, 1999). In this case, no additional stipulations are necessary for the null version of Attr as in (74a): it simply follows the ICP in that its phonological realization “attaches” to the head of the phrase it selects syntactically, i.e. DegP.³⁰

(74b) is often heard in more recent language use, and web search returns quite a few hits of this phrase. We are grateful to an anonymous reviewer for bringing both of these facts to our attention. It is not clear to us at this point whether these facts are a matter of dialectal variation, language change, or something else.

³⁰Note that in order to account for cases with preadjectival degree words, the ICP will presumably need to be relativized to extended projections.



However, this implies that more needs to be said about the overt version of Attr in (74b), which cannot attach to the head of the DegP *genoeg* and, therefore, must follow additional restrictions.³¹ One obvious additional constraint on overt affixes is that they can only attach to a non-lexical head in an extended projection if this head is an affix itself, which, for instance, disallows the attachment of verbal tense/agreement morphology to sentential negation in English (cf. **Mary eat not-ed*). Thus, we propose the following constraint, which we will call the *Affix Continuity Constraint* (ACC) and which can be formulated as follows:

(76) **Affix Continuity Constraint (ACC)**

If an AFFIX Z takes as its input a head Y or a projection of Y,
 where Y is part of the extended projection of X,
 and Z is phonologically realized as non-null /z/ and Y as /y/,
 then Y must be an AFFIX as well, such that /z/ takes /y/ as its input, and /y/ takes as its input the phonological realization of the head taken by Y as its input.

Now, the question arises as to how to account for languages like English, where the Attr head never gets morpho-phonologically realized. For our analysis to work, English attributive adjectives need to be modified by a covert Attr head. However, unless the presence of such a null Attr can be evidenced, our explanation for languages like English would end up being circular. We believe that there is actually good evidence for the presence of a zero Attr in

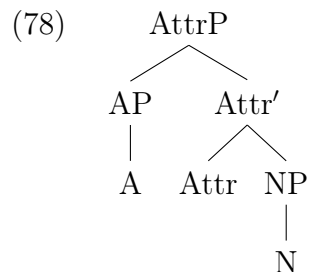
³¹This raises the more general question of whether it is covert or overt morphology that should be more restricted in its distribution. On the one hand, null morpho-syntactic material is subject to recoverability requirements, which do not affect overt material. On the other hand, however, affixation of overt morphological material is sensitive to morpho-phonological constraints that covert morphology is trivially not subject to. It is this latter type of restrictions that seems to be relevant in the present context.

English, though. The reason is that the distribution of the English null forms is virtually identical to that of the Dutch ones (whose presence is paradigmatically licensed and therefore undisputed). Like in Dutch, English attributive APs may not contain material to the right of their heads with the exception of the degree modifier *enough*, as the example below shows (see also (17)).

- (77) a. a [proud_A]-∅ child
 b. *a [proud of his mother_N]-∅ child
 c. a [proud enough_{Deg/A}]-∅ child

As the distributional pattern of English attributive adjectives is identical to that of those Dutch bare attributive adjectives that exhibit covert agreement morphology, it can be concluded that the English Attr head is also realized by a null affix, just as is the case for the Dutch bare attributively used adjectives. That English adjectives have null endings is not that surprising, given that English reflects fewer inflectional distinctions in general, a result of a higher amount of deflection emerging in the course of time.

A final note has to be made about languages in which predicatively used adjectives are inflected for some, but not all features present in the DP, as is the case, e.g., in Italian. Even though Italian predicatively used adjectives are inflected for φ -features, they are not for κ -features. This means that in such a language, the presence of φ -morphology on the adjective does not exclude the presence of a null Attr head in the xNP. In fact, this Attr head is required, since otherwise the AP would intervene for κ -Agree between D and N. This means that the structure of an NP modified by an attributive (prenominal) adjective in a language like Italian is as in (78).



Consequently, in such a configuration, an XP will not be able to be placed between Attr and A, which is precisely what needs to be derived for a language like Italian.

Thus, we can conclude the presentation of the analysis of MAG/HFF proposed in this paper. In a next step, we will compare it with a number of analyses proposed previously in the literature and discuss in which ways we believe it is superior to them. This is the goal of the next section.

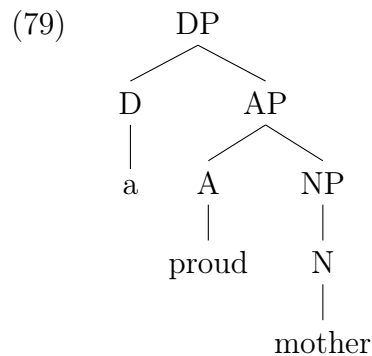
6 Previous accounts

This paper is not the first attempt to account for the ban on A–XP–N configurations. Several types of analyses have been proposed in the literature to explain these facts, although not all of them also aim to account for the cross-linguistic variation with respect to the HFF and none of them for the “mirror” HFF effects. In what follows, we will discuss Abney (1987)’s analysis in terms of adjectives occupying the head position in the extended nominal projection, Escribano (2004)’s analysis in terms of the Linear Correspondence Axiom (LCA) and labeling, Sheehan (2017a,b)’s analysis in terms of the interaction between the LCA and the head parameter, Philip (2012, 2013)’s approach to linearization in terms of the HEAD-PROXIMATE constraint in an Optimality-Theoretic framework, and Bošković (2013)’s account in terms of the NP/DP parameter. Note that these analyses differ with respect to the assumed source of the observed constraint: while Abney and Bošković locate it in narrow syntax, for Escribano, Sheehan, and Philip it results from the mechanics of (postsyntactic) linearization. We will briefly discuss each of them in turn and compare them to the account

proposed in this paper. We would like to emphasize that we focus here on analyses that apply specifically to the HFF effects in adjectival modification of nouns.³²

6.1 Abney (1987)

In his seminal work on the DP architecture, Abney (1987) argues that attributive adjectives head a position in the extended nominal projection:



Under the assumption that a head can only take one complement (the single complement hypothesis), attributive adjectives cannot select an XP complement because they already have an NP as their complement. This is different for predicative adjectives, whose complement slot is not occupied by the NP. Furthermore, since the AP contains the NP, an adjunct to an AP can never intervene between A and N. In this way, the A–XP–N pattern can be ruled out as desired, both when the XP is a complement of the adjective and when it is its adjunct. Finally, even though this is not explicitly discussed by Abney (1987), it can account for why postnominal complex APs containing an XP are allowed in English (80d). Following common assumptions (Cinque, 2010), this has to do with the fact that such postnominal APs do not modify nouns directly, but rather occupy the predicative position in a reduced relative clause structure. This together then explains the facts in (80).

³²For instance, Hinterhölzl (2016) proposes an analysis of HFF-like effects in connection with the linearization of adverbs and objects, which is formulated in terms of prosodic requirements. At the same time, he acknowledges that such an approach will not do for the original HFF effects in prenominal modification and that additional morphological factors must be involved in their case. For this reason, we will not discuss this approach here.

- (80) a. the [proud] man
 b. *the [proud of his son] man
 c. *the man [proud]
 d. the man [proud of his son] (Abney, 1987)

However, the strength of Abney’s proposal is also its weakness. The idea that adjectives are heads in the extended projection of the noun, rather than adjuncts or specifiers, has been shown to be problematic for a number of reasons (for a detailed discussion, see Svenonius, 1994; Matushansky, 2002; Escribano, 2006; Pysz, 2006). Here we point out only one major problem with this analysis, namely the fact that Abney’s DP-internal APs simply do not have the distribution of other kinds of APs. If they did, [_{AP} *proud father*] in (79) should be able to occur in other typical adjectival slots, e.g. in the predicative position, contrary to fact:³³

- (81) *John is [_{AP} proud father].

Moreover, also specifically with respect to the HFF, Abney’s analysis is problematic in being too restrictive in a cross-linguistic perspective, as the only order involving A, N, and an XP it can derive is the postnominal N–A–XP order, which can be treated as a reduced relative clause structure. It cannot explain why the HFF-violating A–XP–N order is in fact possible in certain languages (such as Greek or Russian) if attributive adjectives are systematically disallowed to take a complement beyond the NP. Also, it does not explain why the postnominal N–XP–A order is only banned in some languages (such as Basque or Chácobo) but not others (such as Atong or Farsi). Abney’s account works in exactly the same way for postnominal and prenominal adjectives, and would ban intervening XPs in

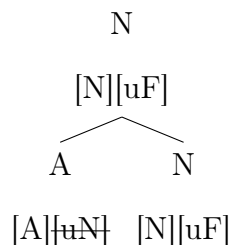
³³An anonymous reviewer points out that our analysis of languages with fully feature-marked adjectives and therefore no attributivizers (see Section 5.1) ends up looking a lot like Abney’s proposal. This is true in the sense that, feature-theoretically, modifying adjectives take the head noun as a “complement” on our analysis, and it is their nominal feature that gets projected. However, since it is a nominal feature that gets projected, the resulting phrase is categorially nominal and has the right, nominal distribution. Hence, the criticism of Abney’s proposal related to the distribution of APs and NPs does not apply to our analysis.

both types of languages. Finally, under Abney’s approach it remains an open question as to how the XP–A–N order in Dutch or Hungarian, and the A–N–XP order in English or Serbo-Croatian can be derived (unless in the former case it is assumed that the XP is a specifier of A).

6.2 Escribano (2004)

Another, very different type of approach to the HFF takes it to result from restrictions on (postsyntactic) linearization, rather than from narrow syntactic constraints. One proponent of this approach is Escribano (2004), whose analysis of the HFF relies on specific assumptions concerning the nature of modification and of the labeling and linearization algorithms. More specifically, Escribano assumes that a modifier takes the modified element as its complement, but does not project because what is supposed to project are heads that still have “unsatisfied” features. This is illustrated below for adjectival modification. Given that A is the selecting head in this construction, even though it does not project, Escribano takes it to asymmetrically c-command its complement N and therefore, by Kayne (1994)’s Linear Correspondence Axiom (LCA), to precede N.

(82) a. **syntactic structure:**

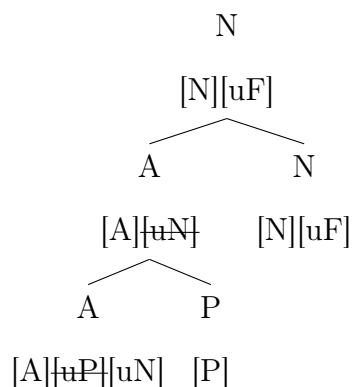


b. **linear order:**

A–N

By contrast, if an attributive adjective takes an XP complement first, for instance a PP, N serves as its second complement, which corresponds to a *specifier* in X-bar theoretic terms. Since heads asymmetrically c-command complements, but are asymmetrically c-commanded by specifiers in Kayne’s theory, this implies by LCA that the adjective precedes the PP, but follows the noun, as shown below.

(83) a. **syntactic structure:**



b. **linear order:**

N–A–PP

Even though Escribano’s approach to the HFF relies on very different assumptions from the ones that underlie Abney’s analysis, it also only derives the N–A–XP order and, hence, suffers from exactly the same cross-linguistic limitations as Abney’s. Moreover, some of his specific assumptions about labeling and linearization in modificational structures are also problematic. For instance, it is not clear why the c-command relations are computed on the basis of separate notions of *head*, *complement* and *specifier*, rather than on the basis of the structural relations in the tree (where the noun would count as a head and not as a specifier).

6.3 Sheehan (2017a,b)

A more recent proponent of the LCA-based linearization approach to the HFF has been developed by Sheehan (2017a,b), whose analysis relies on the assumptions (i) that both the head parameter and the LCA are needed for linearization, (ii) that unsuccessful linearization does not necessarily lead to a crash, but may trigger repair operations, and (iii) that attributive APs are base-generated inside postnominal reduced relative clauses.

More specifically, Sheehan assumes that the head parameter is specified for the ordering of heads and their complements, while the LCA operates in the rest of cases as a last resort. Hence, if a language has postnominal adjectives, which she takes to stay in situ inside a postnominal reduced relative clause, the LCA will linearize the AP (including the XP it

contains) as following the head noun, since this head asymmetrically *c*-commands the AP.³⁴ Given that the head parameter of the adjective can be specified as head-initial or as head-final, this yields the following two sets of ordering pairs, leading to the two linearization sequences N–A–XP and N–XP–A (where XP is a PP):

(84) **Postnominal word order patterns**

<p>a. PP–A (head parameter)</p> <p>N–A (LCA)</p> <p>N–PP (LCA)</p> <p>————</p> <p>N–PP–A</p>	<p>b. A–PP (head parameter)</p> <p>N–A (LCA)</p> <p>N–PP (LCA)</p> <p>————</p> <p>N–A–PP</p>
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The situation is different in languages with prenominal adjectives, which for Sheehan are derived by movement from their postnominal base position. Being in a derived position, prenominal adjectives, but crucially not their dependents, asymmetrically *c*-command the nouns they modify and are therefore linearized by the LCA to their left. By contrast, the adjectival dependents and the modified nouns do not *c*-command each other, nor do they stand in a *c*-selectional relation to each other. Therefore no linearization instruction is available for them. This is not a problem when the adjective’s head parameter is specified as head-final: then, the two available linearization instructions, here again PP–A and A–N, are sufficient to establish the PP–A–N order by transitivity. Yet, it becomes problematic when the AP is head-initial: in this case, the ordering between N and PP remains unspecified, the only instruction being that both of them follow A. For this case, Sheehan assumes that a repair strategy is available whereby (parts of) higher copies of moved elements can be deleted, resulting in the realization of lower copies. In particular, it is the higher copy of A, but the lower copy of the PP that gets spelled out, which leads to the discontinuous A–N–PP order.

³⁴Sheehan (2017a,b) assumes Kayne (1994)’s structure of relative clauses, according to which the head noun *c*-commands the predicative adjective contained in the relative clause.

(85) **Prenominal word order patterns**

a.	PP–A	(head parameter)	b.	A–PP	(head parameter)
	A–N	(LCA)		A–N	(LCA)
	N ↔ PP	(not specified)		N ↔ PP	(not specified)
	—————			—————	
	PP–A–N	(by transitivity)		A– PP –N–PP	(by copy deletion)

Thus, unlike the other approaches discussed above, Sheehan’s analysis successfully derives four different patterns: XP–A–N and A–N–XP for prenominal adjectives, and N–A–XP and N–XP–A for postnominal adjectives, which covers all the alternative word orders discussed in Section 2.2. However, like the other approaches, her analysis predicts the A–XP–N order to be systematically ruled out and the N–XP–A order to be available across the board, contrary to fact. Moreover, her account relies on a very specific linearization mechanism, the availability of repair strategies, and the movement analysis of prenominal adjectives, all of which may potentially be questioned.


6.4 Philip (2012, 2013)

Another approach that deals with HFF patterns, even though it was not specifically designed for that, is Philip (2012, 2013). For Philip, (base) word order restrictions are regulated by a number of violable Optimality-Theoretic constraints. The most relevant one in the context of the HFF is HEAD-PROXIMATE, which is a symmetric version of the HFF: it states that the heads of selected phrases must be adjacent to their selecting heads within an extended projection.³⁵ Another relevant constraint is HEAD UNIFORMITY, which demands structures to be harmonic, i.e. all phrases in them to be either head-initial or head-final. At the same time, category-specific constraints, such as N-FINAL, which requires nouns to be the final element in a DP, or D-INITIAL, which requires determiners to be the first element in a DP,


³⁵Note that for Philip APs are selected by the nouns they modify.

can potentially outrank HEAD-PROXIMATE. This way, both HFF-violating orders (such as D–A–XP–N in Greek and Russian) and HFF-obeying ones (such as D–N–A–XP in English) can be derived cross-linguistically, as shown in the tableaux below: whether a language is an HFF-violating or an HFF-obeying one depends for Philip on whether HEAD-PROXIMATE is ranked below N-FINAL or above it, respectively.

(86) Greek/Russian (simplified from Philip, 2013, 190)

	N-FINAL	HEAD-PROXIMATE	HEAD UNIFORMITY
a.  [D [[A XP] N]]		*	*
b. [D [N [A XP]]]	*!		

(87) English (simplified from Philip, 2013, 190)

	HEAD-PROXIMATE	N-FINAL	HEAD UNIFORMITY
a. [D [[A XP] N]]	*!		*
b.  [D [N [A XP]]]		*	

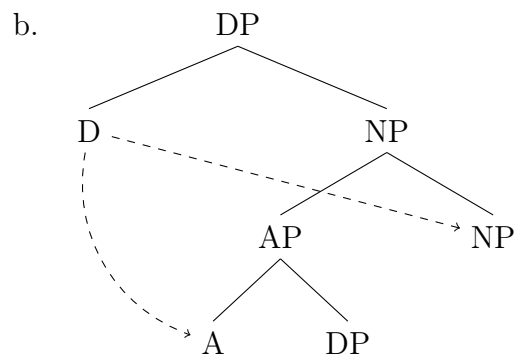
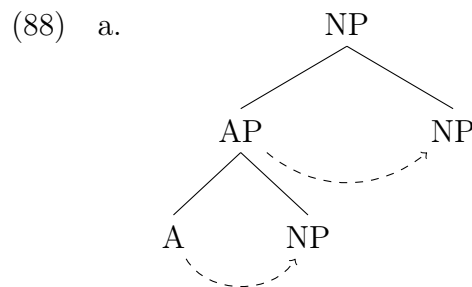
On the one hand, this is a strength of this approach, as it allows for the attested HFF-violations, but on the other hand, it leaves various facts unexplained. For one, the constraint that is assumed to be behind the HFF effects, HEAD-PROXIMATE, is just postulated and not derived from other grammatical principles. For another, the ranking of HEAD-PROXIMATE with respect to other constraints, such as N-FINAL, is not derived from anything either. In that sense, this proposal merely describes, but does not explain the HFF effects. It implies that HFF-violations do not necessarily correlate with other grammatical phenomena, which appears to be incorrect, as we saw in the previous sections.

6.5 Bošković (2013)

Finally, Bošković (2013) proposes an analysis that relates the presence or absence of the HFF effects to the NP/DP-parameter. He argues that languages differ in whether (argumental)

nominal expressions are NPs or DPs, depending on whether or not they have articles. In other words, the highest nominal projection in the xNP is the DP in some languages (e.g., in all Germanic languages), but the NP in others (e.g., in all Slavic languages with the exception of Bulgarian). Bošković takes this NP/DP-parameter to be also responsible for the presence or absence of the HFF effects: he argues that languages that lack a DP must be HFF-obeying, while DP-languages can be HFF-violating.

According to Bošković (2013), the reason for this is that, in languages without a DP, adjectives must probe for φ -features to ensure that they get valued for them. Moreover, he also argues that, if a head carries a probing feature, so does its maximal projection (which he derives from the labeling theory). If a modifying adjective has an NP-complement, this leads to a feature conflict (88a): the A head probes for φ -features and enters into an agreement relationship with its complement, while the AP enters into an agreement relationship with the NP it modifies. The only way to remedy this feature conflict is to move out the NP-complement of A to a higher position (under the assumption that traces cannot serve as goals), which derives the ungrammaticality of the A–NP–NP order. By contrast, in DP-languages, it is not the adjective that is assumed by Bošković to probe for φ -features, but the D head (88b). In this case, D enters into an agreement relationship both with the φ -feature-unvalued A and with the φ -feature-valued head NP, which results in all of them sharing the φ -features. Thus, the presence of a DP-complement of the adjective is not problematic in this scenario, and the derivation can converge.



This analysis triggers a number of questions. First, it is not clear why both A and AP need to probe for φ -features separately from each other. Further, if both the complement NP and the head NP happen to have the same φ -features in (88a), no feature conflict should arise and the structure should be grammatical, contrary to fact. Moreover, if the complement of A is a PP rather than an NP, the derivation should also converge because A would not be able to get valued for its φ -features and no feature conflict should arise again. Finally, the typology of the HFF effects that this analysis predicts is wrong. Let us see why.

For one, a language with articles like Bulgarian, which is a DP-language according to Bošković (2013), should pattern together with a DP-language like German with respect to the HFF. Yet, German does not allow for HFF-violating configurations, while Bulgarian does. Because of that, Bošković is forced to assume that some further PF-condition which enforces A-N adjacency must still be active in addition. Moreover, his account predicts that HFF-violations should not be allowed in NP-languages. However, we have seen before that languages like Polish and Russian, which are NP-languages according to Bošković, do not obey the HFF. Hence, apart from the theoretical problems that emerge under this analysis, the typology that it predicts also does not correspond to what is attested.

7 Conclusion

In this paper we have argued that the HFF in its current formulation is not only left theoretically unexplained, but is also empirically incorrect. For one, languages like Greek or Russian are not subject to it and can have material intervene between prenominal adjectives and their nominal modifiees. In addition, a number of languages, such as Basque, display mirror-HFF effects. These languages bar material intervening postnominal adjectives and their nominal modifiees, something that is not captured by the HFF.

On the basis of the language sample we have constructed, we have argued that the HFF should be replaced by a new generalization that we have dubbed the Modifier-Noun Adja-

gency Generalization (MAG). The rationale behind MAG is the fact that direct modification of N by A is only possible if all nominal features present on the DP are specified both on predicatively and attributively used adjectives. In this case, material may intervene between the adjective and the noun. Otherwise, nominal modification by adjectives must be mediated through a functional element, dubbed Attr, which is part of the xNP or the xAP and is specified for all relevant nominal features. Then, it is the morpho-phonological properties of Attr that determine whether it must be adjacent to the adjective; if so, no material may intervene between A and N. This, we have argued, derives MAG.

As a final note, we would like to emphasize that, while all the DP-internal linearizations we have encountered in our language sample are captured by MAG, there may be more types of grammatical systems than observed and described in this paper. For instance, we have not attested languages where the attributivizer is an affix on N. Also, we did not take into consideration the possibility that nouns and/or adjectives undergo movement within the DP (see Cinque, 2005). Whether the fact that we have not observed all MAG-compatible grammatical systems (yet) is the result of there being typological gaps due to independent grammatical constraints or the result of the size of our sample is a question we leave for future research.

Abbreviations

ABL	ablative	DAT	dative
ART	article	GEN	genitive
ATTR	attributivizer	INS	instrumental
AV	actor voice	LNK	linker
CL	classifier	M	masculine
COM	common (gender)	NEUT	neuter
COMP	comparative	NOM	nominative

PL	plural	SG	singular
PROG	progressive	SUP	superlative
REF	referential		

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