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Roots, their structure and consequences for derivational timing

Abstract: Recent work in Distributed Morphology, most prominently Harley (2014), argues for roots being able to take syntactic complements, which opens the door for the possibility of having syntactic features within a root's representation - something most DM literature rejects (Embick 2015). Upon a closer inspection of the arguments presented in the literature, it is not clear whether the disagreement has an empirical underpinning, or whether it stems from the lack of methodological clarity as far as the identification of the precise nature of what constitutes a syntactic feature. This paper takes this methodological question seriously and investigates a type of derivational behavior that, in our view, provides a decisive argument for the presence of syntactic features on roots. We argue that the presence of a syntactic feature on the root can be conclusively established based on a feature's impact on specific properties within a larger syntactic structure. Based on empirical evidence from gender agreement phenomena, we introduce a model of grammar that distinguishes roots with syntactic features from those which do not have them. We propose that such a distinction between roots will manifest itself in the timing of root insertion - roots without syntactic features are late inserted, while roots with syntactic features must be early inserted.

Keywords: Gender agreement, late insertion, roots, syntactic features

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* This research would not have been possible without funding from the Social Sciences and Humanities Research Council Insight Grants #435-2016-1034 (PI: I. Kučerová). We thank to anonymous reviewers and the audiences in the DP60 workshop at MIT, WCCFL 35 at University of Calgary, and Roots V at QMUL for their helpful comments and suggestions and Dorota Wojtaś for her Polish judgments

1. Introduction

Some recent work in Distributed Morphology, most prominently Harley (2014), argues for roots being able to take syntactic complements and in turn having to include syntactic features in the root's representation. This view goes against most work in the Distributed Morphology framework that argues that roots have no syntactic features (Arad 2003, Marantz 2007, among others). The immediate reactions to Harley (2014), included in the same volume (Alexiadou 2014, Borer 2014, Svenonius 2014, among others), pointed out empirical, theory-internal and methodological problems with such a view. The debate has an implicit counterpart in a recent debate on the nature of intrinsically nominal features, such as gender. According to some authors, gender and number may be features stored with the nominal representation in the lexicon (Steriopolo and Wiltschko 2010, Kramer 2009, Kučerová to appear, among others). While other authors (Ritter 1993, 1995; Kramer 2015, among others) argue that gender and number are features introduced by a higher functional head. That is, they are not part of the root representation.

Upon a closer inspection of the arguments presented in the literature, it is not clear whether the disagreement has an empirical underpinning or whether it stems from the lack of methodological clarity as far as the identification of syntactic features is concerned. This paper takes this methodological question seriously and investigates a type of derivational behavior that, in our view, provides a decisive argument for the presence of syntactic features on roots. In our opinion, an argument from complementation, as in Harley (2014), although compatible with the hypothesis that roots have syntactic features, is not conclusive because requirements on adjacency can be imposed in various points of the derivation (see Borer 2014). Our position is that a conclusive argument for presence of a syntactic feature on the root comes from establishing this feature's impact on specific properties of a larger syntactic structure. The logic being that features as indices associated with morphological (late) insertion of roots are distinguished from genuine syntactic features in that syntactic features, but not indices, project within a larger syntactic structure.

This paper is programmatic. We introduce a model of grammar that in principle allows syntactic features on roots since nothing in the current syntactic theory prevents the existence of roots with and without syntactic features. We use this observation as our starting point and argue that if there is such a distinction between roots, then it should manifest itself in the timing of root insertion. According to our proposal, roots *without* syntactic features are *late inserted*, while roots *with* syntactic features must be *early inserted*, where in both instances *insertion* is understood as the introduction of root identity. The rationale for our proposal is that syntactic features present on roots must be immediately available to the syntactic computation. In contrast, roots lacking syntactic features are forced by computational economy to undergo late insertion.

The critical question is how do we empirically distinguish between a feature of a root acting as a filter for late insertion, i.e., mapping morphological material onto syntactic structure (as in Embick 2015), from a feature that is present in the narrow-syntax derivation. We argue that this question can be decided only for syntactic features that give rise to idiosyncratic functional projections, i.e., structures that cannot be built from default feature information associated with functional heads in the extended projection of a category-defining head.

In sections 3 and 4, we investigate the predictions of our model utilizing a case study of specific gender-agreement phenomena in Polish.

2. Theoretical framework

Within the Distributed Morphology framework, roots are argued to be devoid of syntactic features (Arad 2003, Marantz 2007, Embick 2015, among others). The primary composition of roots involves semantic/referential and possibly morphological features ($\sqrt{R}, (M)$). As a consequence, roots may be late inserted. Late insertion within broadly understood DM is motivated by *derivational economy*

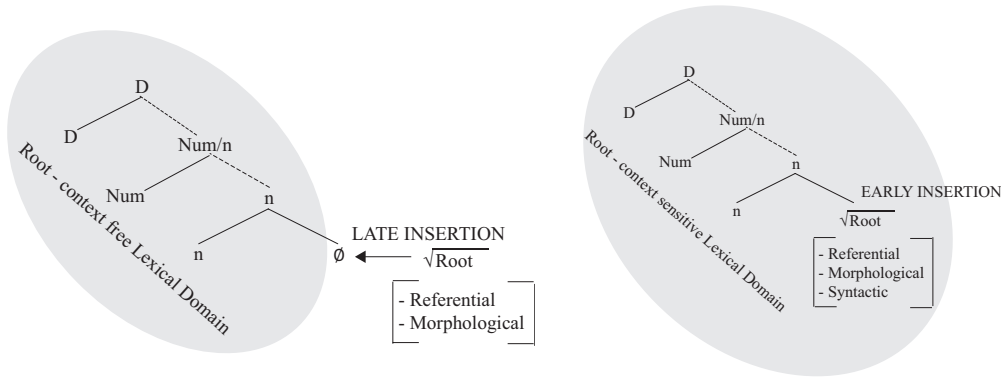
constraints, which, among other things, prevent postponing the manipulation of syntactic features. On the assumption that elements endowed with syntactic features get priority in syntactic computation, a root $\sqrt{R}_i(M)$ devoid of any syntactic features has no need to be present in the structure prior to functional head assembly. Economy dictates we only introduce elements that are needed for syntactic computation, hence late insertion of roots with no syntactic features. The tacit assumption behind late insertion is that roots impact overt syntax only indirectly via their referential, or morphological features ($R/M^{\sqrt{}}$), but never directly via root syntactic features ($S^{\sqrt{}}$).

From the syntax point of view, however, there is no a priori reason for syntactic features being absent from the representation of roots. If, however, all or certain types of roots were endowed with syntactic features $S^{\sqrt{}}$, such syntactically endowed roots \sqrt{S} should directly impact how phrase structure is built. In turn, such roots would have to be early inserted because otherwise the syntactic feature(s) wouldn't be available to narrow-syntax derivation.

We argue for a model of grammar where both types of roots exist. While roots without syntactic features are late inserted, roots with syntactic features must be early inserted. We identify early insertion as *initial merge* of a root in the *extended lexical domain* (L^D) (Grimshaw 1991). Late insertion involves root-context free assembly of L^D via the merger of appropriate functional heads, and, once that functional domain is constructed, subsequent late insertion of the root. Our prediction is that early insertion results in a syntactic structure that exhibits sensitivity to idiosyncratic root properties. We show that there are constructions whose idiosyncratic properties cannot be solely attributed to root features, be they morphological or referential/semantic, indirectly impacting syntactic structure after late insertion. In order to account for such cases, we argue that a root is early inserted and present at initial merge of a given extended lexical domain L^D (reasons for having a null set as placeholder for late insertion (DeBelder and Van Craenenbroeck 2015) are discussed in section 4.2).

(1) a. Late insertion

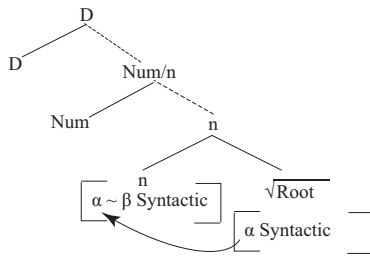
b. Early insertion



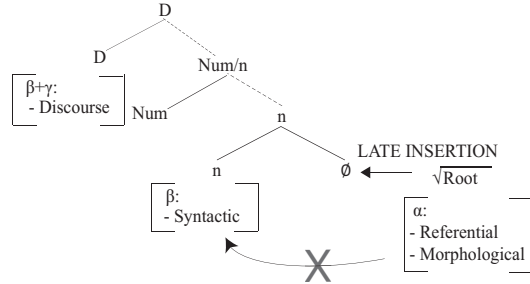
Having two timing options for root insertion is a natural outcome of the assumption that timing of root insertion is governed by principles of derivational economy. Note that under the T-model, both *Late* and *Early Insertion* introduce referential features prior to LF interpretation. *Late Insertion* is timed to occur after syntactic computation is completed but prior to PF and LF computation. Thus, Late and Early insertion predict differences in behavior of roots at the syntactic level, but not at later points of the derivation. We adopt the prevailing view within the Minimalist Program (Chomsky 1995) that variation in syntactic structure should be reduced to lexical variation. In this specific case, we assume that lexical variation allows a subgroup of roots to be endowed with syntactic features, even whilst most lexical roots remain syntactically inert. Roots with syntactic features $\sqrt{R}_i(M), S$ are forced by derivational economy to be inserted early. Hence, there is no other option but for a syntactically active root $\sqrt{R}_i(M), S$ to directly impact structure building operations, just as derivational economy dictates that there is no other option for syntactically inert roots $\sqrt{R}_i(M), S$ but late insertion, which makes their impact on syntactic operations indirect.

We adopt the null hypothesis that syntactic computation, narrowly understood as building up a phase complement, is only sensitive to syntactic features. As such, that means that up to the phase head a lexical domain is insensitive to morphological or semantic features but is solely based on default features associated with functional heads within the extended projection. At spell-out, a root devoid of syntactic features is mapped onto the default extended domain, as long as its referential/morphological properties are compatible with the features of the extended functional head. Crucially, when roots are devoid of syntactic features, we should never observe direct impact of root properties on the properties of higher functional heads, but only observe syntactic features introduced by higher functional heads, as shown in (2)

(2) Roots with syntactic features



Roots without syntactic features



The observation that we examine is that there are cases where syntactic features on the root impact syntactic features on a higher functional head. We reject the notion that variation in structure is always the domain of functional heads that are assembled independently of the root.

We thus fundamentally differ from proposals such as that of Embick (2015), where he argues that features on roots are never syntactic, but can be morphological in addition to being referential. For example, a root can have a [+fem] gender feature but that feature is not syntactic but morphological. Because morphological features on roots are exempt from syntactic economy conditions, late insertion of morphologically endowed roots with referential features $\sqrt{R},(M)$ is not blocked by economy. We agree with the logic of the proposal but we disagree with the assumption that roots cannot have syntactic features. A gender feature on a root that can be computed by syntax is for us by definition a syntactic feature, for the simple reason that syntax does not compute morphological properties. If it did, late insertion of morphologically endowed roots would be blocked by derivational economy. The question then is whether there are empirical reasons to argue for some features on roots to be syntactic. The next two sections explore a hybrid gender-agreement system within a well-defined semantically homogenous group of nouns that denote professions. We show that this group of nouns exhibits variation in syntactic gender agreement that must have its source at the root. Furthermore, we show that this variation cannot be attributed to purely semantic, or morphological/diacritic properties of the root. In other words, we will argue that the only way to account for the data is to have the root directly interact with syntactic structure during structure building operations. As a consequence, we adopt the logical conclusion that this behavior must be triggered by syntactic properties of the root, with all that such an approach entails as far as early insertion goes.

Our approach does not negate that the majority of syntactic derivations are carried independently of the root. In most cases, an extended lexical domain L^D follows a standard functional head template that is compatible with a syntactically inert root. The coexistence of late insertion and early insertion predicts that syntactic structure of L^D is either root-context free, or root-context sensitive depending on the nature of the root. Availability of both options eases the burden of acquisition by allowing a child to generalize a regular root-context free functional architecture that accommodates the majority of roots. Roots that are not associated with a generalized functional architecture are deemed by an elsewhere condition to be endowed with syntactic features – acquisition is made easier since idiosyncratic syntactic behavior is reduced to the lexicon. From our perspective, early insertion is a result of the fact that during acquisition there are roots that have to be labeled as syntactically active

because there is resistance to mapping their lexical/root idiosyncrasy onto functional architecture. This resistance is a reflex of the desire to keep syntactic operations as simple as possible. As such, early insertion is a highly marked and a fairly infrequent case.

3. The (ir)regular gender system of Polish

Polish *common nouns* exhibit a three-way gender system (masculine, feminine, neuter; for example, *książka* ‘book.F.SG’, *stół* ‘table.M.SG’ *krzesło* ‘chair.N.SG’), with the gender being idiosyncratically associated with each lexical entry.¹ The domain of *Polish profession attributive nouns* (PPANs) is different in that it exhibits a two-way system, i.e., PPANs are only masculine or feminine. PPANs form a semantically homogenous group but exhibit significant *derivational and agreement variation* that allows us to group them into three distinct categories. The majority of PPANs belong to the first group, which we will call *type I*, (3a). Type I PPANs appear either in a masculine or a morphologically-derived feminine form.² The second group, which we call *type II*, (3b), does *not* allow any morphologically derived feminine form. Finally, *type III* PPANs, (3c), only consists of feminine forms, morphologically derived by the nominal feminizing morpheme *-ka*.³

(3) Types of Polish profession attributive nouns:

- | | | |
|--|------|-----|
| a. Type I: <i>kurier</i> +Ø ‘courier.M’ vs <i>kurier</i> + <i>ka</i> ‘courier.F’ | ✓M, | ✓F |
| b. Type II: <i>premier</i> ‘PM.M’ vs * <i>premier</i> + <i>ka</i> ‘PM.M’ | ✓M, | * F |
| c. Type III: * <i>nianie</i> ‘nanny.M’ vs <i>nań</i> + <i>ka</i> ‘nanny.F’ | * M, | ✓F |

We are not aware of any phonotactic or morpho-syntactic restrictions that would underlie the derivational restrictions on type II and III. The derivational morphology restriction cannot be attributed to semantic properties of the roots either because there is no obvious semantic division between type I and type II/III. For example, a typically female-denoting noun *pielęgniarka* – *pielęgniarka* ‘nurse’ belongs to type I, instead of the expected type III. Similarly, some names of traditionally male dominated professions, such as *poseł* – *posłanka* ‘member of parliament,’ belong to type I as well.

The three types are further distinguished by the properties of agreement within its extended nominal domain. While type I and III exhibit *regular agreement* based on the features of the noun, type II exhibits a *mixed agreement* pattern. As shown in (4), if a noun of type I is masculine, all agreeing elements in the extended domain agree in masculine. If such a noun is feminine, all agreeing elements agree in feminine. Similarly, feminine nouns of type III only trigger feminine agreement, (5). In contrast, nouns of type II display a heterogeneous agreement pattern, shown in (6). While the noun in and of itself appears to be masculine, the agreeing elements in the extended domain seem to depend on the *natural gender* of the referent. If the referent is a male, the agreement is masculine. If the referent is a female, the agreement is feminine.⁴

¹ We ignore animacy. This might turn out to be a problem as we deal with a variation in the domain of animate nouns. The reason we think this is a fairly safe move is that in Polish animacy is grammatically encoded only in masculine nouns but the issue we investigate concerns both feminine and masculine nouns.

² Type I PPANs thus differ from common nouns that can be feminine without a derivational feminine morpheme, as in *kobieta* ‘woman’.

³ To our knowledge, *-ka* is the only nominal feminine endings in Polish. Other feminine endings, such as *-owa* in *krawiec* – *krawcowa* ‘tailor’, *-ini* in *maszałek* – *marzałk-ini* ‘marshal’, *-ina* in *wojewoda* – *wojewodz-ina* ‘governor’ and *-na* in *rad-ny* – *rad-na* ‘council member’, are morphologically adjectival – their paradigm does not come from nominal declension.

⁴ We do not discuss agreement on predicates because it is regular. If the agreement pattern is heterogeneous, predicates agree with the gender on D. As for anaphoric pronouns, as everywhere else in the system, they can refer to the gender on D or – if there is a dissociation – to the natural of the intended referent.

(4) Homogeneous agreement in type I (N and agreeing modifiers reflect natural gender of referent):

- | | | | | | |
|----|-------------|--------------|--------------|------------------|------|
| a. | <i>Ten</i> | <i>nasz</i> | <i>młody</i> | <i>kurier</i> | |
| | that.M | our.M | young.M | courier.M | ✓MMM |
| b. | <i>*Ta</i> | <i>nasza</i> | <i>młoda</i> | <i>kurier</i> | |
| | that.F | our.F | young.F | courier.M | *FFM |
| c. | <i>Ta</i> | <i>nasza</i> | <i>młoda</i> | <i>kurierka</i> | |
| | that.F | our.F | young.F | female courier.F | ✓FFF |
| d. | <i>*Ten</i> | <i>nasz</i> | <i>młody</i> | <i>kurierka</i> | |
| | that.M | our.M | young.M | female courier.F | *MMF |

(5) Homogeneous agreement in type III (N and modifiers always exhibit feminine agreement):

- | | | | | | |
|----|-------------|--------------|--------------|---------------|------|
| a. | <i>Ta</i> | <i>nasza</i> | <i>młoda</i> | <i>niańka</i> | |
| | that.F | our.F | young.F | nanny.F | ✓FFF |
| b. | <i>*Ten</i> | <i>nasz</i> | <i>młody</i> | <i>niańka</i> | |
| | that.M | our.M | young.M | nanny.F | *MMF |
| c. | <i>*Ten</i> | <i>nasz</i> | <i>młody</i> | <i>naniek</i> | |
| | that.M | our.M | young.M | male nanny.M | *MMM |

(6) Heterogeneous agreement in type II (N does not reflect gender of referent but modifiers do):⁵

- | | | | | | |
|----|------------|--------------|--------------|----------------|------------------------|
| a. | <i>Ten</i> | <i>nasz</i> | <i>młody</i> | <i>Premier</i> | |
| | that.M | our.M | young.M | PM.M | ✓MMM (male referent) |
| b. | <i>Ta</i> | <i>nasza</i> | <i>młoda</i> | <i>Premier</i> | |
| | that.F | our.F | young.F | PM.M | ✓FFM (female referent) |

To our knowledge, no current account of gender correctly predicts the correlation between derivational restrictions and agreement.

4. Gender-indexed vs. gender-featured roots

We argue that the pattern introduced in section 3 follows from the theoretical distinction between roots with and without syntactic features. For concreteness, we adopt the terminology of Acquaviva (2008) and will use the term *indexed roots* (\sqrt{i}) for roots without syntactic features but with referential and possibly morphological features. Instead of a feature matrix, their representation contains a structured index (Acquaviva 2008) that provides a reference to a gender value.⁶

For reasons outlined in section 2, indexed roots are late inserted. Since they are not present in the derivation when the extended nominal domain is built, they associate with a default functional architecture. That is, idiosyncratic properties of the root \sqrt{i} (\sim gender) are irrelevant for the functional structure of the DP.

We use the term *featured roots* (\sqrt{F}) for roots endowed with syntactic (and referential) features. Featured roots are early inserted and force the functional architecture of their extended lexical domain L^D to be dependent on the root's syntactic features.

Based on the model outlined in Section 2, we propose that the attested pattern is a result of the duality of roots combined with an independent property of syntactic features, namely, the fact that

⁵ It has to be noted that we use the term heterogeneous because bare nominal type II expressions can trigger masculine agreement with the predicate even when referring to a female: *premier przemówił* (m) 'The PM spoke'. However it has to be noted that when modified, DP's headed by type II nouns always trigger agreement on a predicate that is homogeneous with the modifiers. We thank an anonymous reviewer for pointing this out.

⁶ Indexed roots are compatible with Embick's understanding of roots in general.

indexical values of gender are not restricted by feature geometry,⁷ whilst syntactic features are strictly binary.⁸

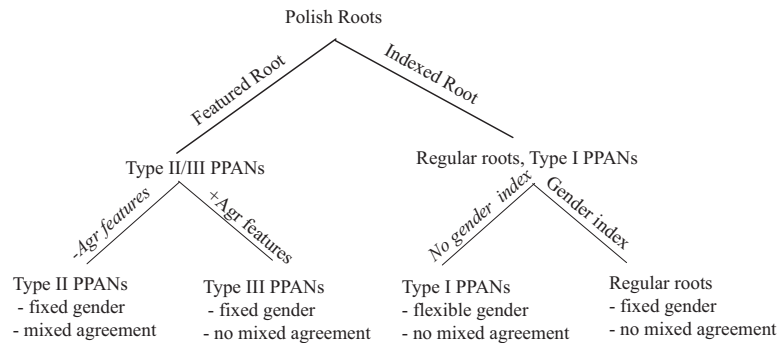
Specifically, we argue that common nouns (e.g., *kobieta* ‘woman.F.SG’, *mężczyzna* ‘man.M.SG’, *dziecko* ‘child.N.SG’; *książka* ‘book.F.SG’, *stół* ‘table.M.SG’, *krzesło* ‘chair.N.SG.’) and type I PPANs (*kurier* ‘male courier’, *kurierka* ‘female courier’. i.e., those that can be both masculine and feminine, are an instantiation of indexed roots.

In this group of nouns, agreement features are mediated by an index. That is, no syntactic agreement is carried out by functional heads of the extended nominal domain as these roots are inserted late.⁹ The difference between type I nouns and other common nouns is that of index valuation. Common (non-PPAN) nouns have an index feature value specified — making their overall gender fixed. In contrast, the value of the gender index of type I PPANs is unspecified from the lexicon. Instead, the gender value is determined from the context via a functional head (D) later in the course of the derivation, and in turn is sensitive to the natural gender of the referent (Steriopoło and Wiltchko 2010, Kučerová to appear, among others). Thus our treatment of common nouns and type I PPANs is conservative within the DM framework.

Our system differs from this mainstream reasoning because of our account of the other derivational group, i.e., nouns based on featured roots. These are exemplified by type II PPANs (masculine only; *premier* ‘PM’, **premierka* ‘female PM’) and type III PPANs (feminine only; **niańk* ‘male nanny’, *niańka* ‘nanny’). Roots of these nouns are endowed with a syntactic gender feature. This feature enters into an agree relation with higher functional projections and in turn enforces syntactic agreement on functional heads in the extended nominal domain. Since the feature on these roots is syntactic and as such it interacts with higher functional projections, these roots must be early inserted in order to be available during the course of the narrow-syntax derivation.

The difference between type II and type III lies in the value of the gender feature. We propose that the syntactic feature on the root is a binary feature which can either be marked or unmarked. The feature that underlies the formation of type II PPANs (masculine-only) is unmarked, and in turn is subject to *impoverishment* at spell-out of its smallest local domain. In contrast, the gender that underlies the formation of type III PPANs (feminine-only) is marked. As a consequence, this gender feature cannot be impoverished and its value remains fixed throughout the extended nominal projection. The tree in (7) summarizes the four-way system.

(7)



The remainder of this section spells out the technical details of the proposal and demonstrates how derivational timing interacts with spell-out and agreement domains.

⁷ Languages may have a dozen or more noun classes without any obvious geometrical restrictions on their type.

⁸ It will become clear in later section that syntactic binary features are non gender values but abstract agreement features that restrict the behavior of early inserted PPAN's.

⁹ By syntactic agreement we mean agree under c-command.

4.1 Derivational basics

To proceed with the derivations, we must first clarify *the first step of the derivation* in the light of the option that roots may be inserted late. For concreteness, we follow DeBelder and Van Craenenbroeck (2015) in assuming that *first merge* is a derivational starter merging an element with a *workspace* that is a null set $\{\emptyset\}$. The motivation is that merge is always binary. In addition, the empty set provides a placeholder for late insertion. To make the derivations explicit we assume three minimally needed functional projections: *n*, *Num* and *D* (Ritter 1995, Borer 2005).

Crucially, we assume that every instantiation of merge, be it internal or external, is based on agree (*merge as agree*). In the case of external merge, agree reflects c-selection (Adger 2003). This assumption is critical for labeling of the *merge set*. Effectively, all features of the merged set become the label.

The other two notions that need to be clearly defined are workspace and spell-out domain. We define *workspace* as the minimal extended projection that includes all defining features of the category associated with the root inserted or to be inserted. In the nominal domain of our interest, the workspace includes number and gender but excludes features introduced by *D* (person; Ritter 1993). A *spell-out domain* is then defined as the smallest workspace where all features have been checked (but not necessarily valued). Crucially, only a terminated workspace can be spelled-out. As for the *morphological realization* of a spell-out domain, we assume that the lexical insertion of the inflected noun subsumes the adjacent functional heads (*n* and *Num*). This, however, is possible only if the features of the functional heads are a subset of the inserted lexical items. In cases when they are not a subset, the features of the higher functional heads must be realized as a separate morpheme.

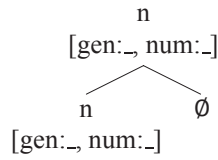
The following subsections give step-by-step derivations for the four different types of nouns attested in Polish, i.e., common nouns and the three types of PPNs. The purpose of this admittedly daunting exercise is twofold: (a) to demonstrate that the proposal can be worked out into an internally consistent system and (b) to highlight the interaction of derivational timing, morphological realization and syntactic agree.

4.2 Case (I): Common (non-PPAN) nouns (masculine/feminine/neuter; standard case)

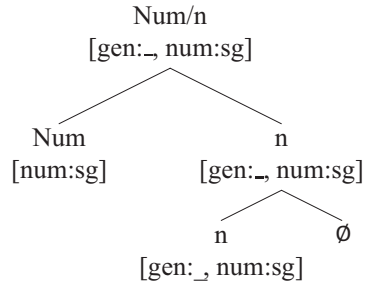
We argue that roots of common nouns are stored with an index that contains a specified gender value. Most Polish nouns characterized by a fixed gender value belong to this group. A simplified derivation of this type is given in (8). Since this is an indexed root, the root is late inserted. In turn, a first-merge workspace does not contain a root. Instead, a functional head (*n*) is merged directly with the empty workspace (\emptyset). Since only *n* contains features (here, unvalued number and gender), *n* and its features project, as seen in (8a). In the next step, (8b), the *Num* head is merged with *n*. For concreteness, we assume that there is a valued [*num*] feature on *Num*. In this step of the derivation, all unvalued instantiations of the unvalued [*num*] feature become valued by merge as agree. Since all defining features are now present, in the next step, (8c), the workspace terminates and root insertion takes place. The presence of the root material, including its indexed gender information causes post-syntactic agreement and feature adjustment within the previously built nominal domain, (8d). Finally, *D* is merged. We assume that *D* is a bundle of unvalued number and gender features and a valued person feature. As before, merge as agree takes place and all unvalued gender and number features become valued. After *D* is merged and feature valuation takes place, the complement of *D* is spelled-out, (8e).

(8) Simplified derivation of *kobieta*.F ‘woman’

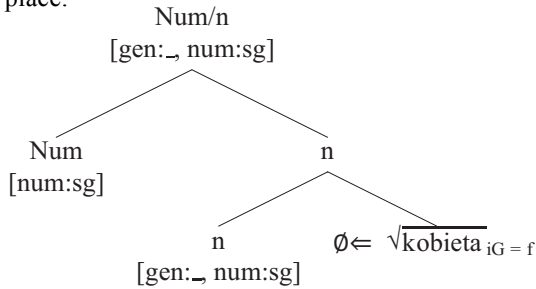
a. no root; functional head (n) merged directly with workspace; n projects:



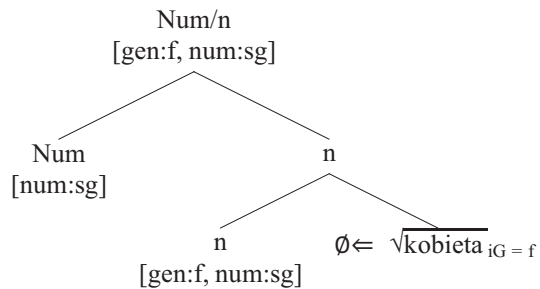
b. Num merged with n; valued [num] feature on Num; valuation of [num] by merge as agree:



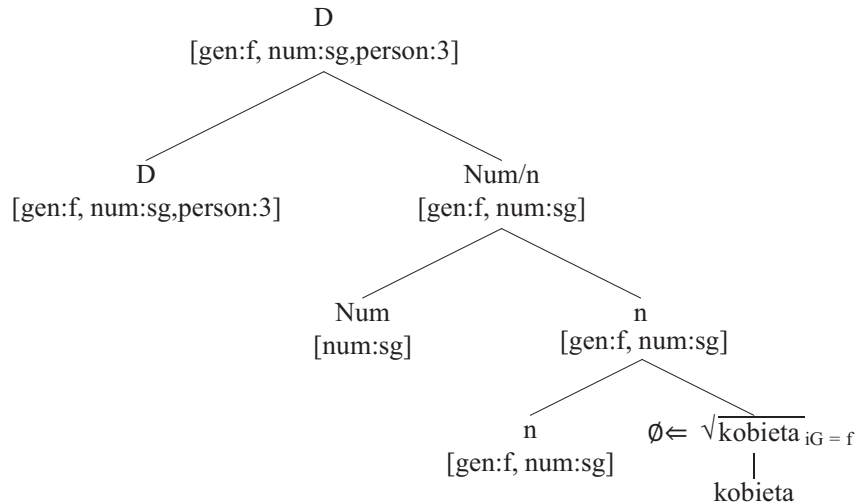
c. Workspace terminates, root insertion takes place:



d. Post-syntactic agreement/feature adjustment:



e. D merged (~ a bundle of unvalued number and gender features + valued person): merge as agree (for gender and number) and spell-out of the complement of D:



The consequence of this derivation is that everything in the D domain and above shares the features of the adjusted label of Num/nP. An important property of the proposed derivation is that an unvalued gender feature on D copies any gender value from the indexed root because the work space that triggers root insertion precedes merge of D. Another crucial feature of the proposed derivation is that at no point during the construction of the extended nominal domain features get valued by agree as a goal-seeking relation in the DP domain. Instead, all feature sharing is done by merge as agree. Such a derivation is thus reminiscent of the postulation of the theoretical distinction between concord and agree (Norris 2014) but derives it as a consequence of derivational timing of root insertion.

Before we proceed to the remaining derivations we have to clarify one more aspect of the proposed derivation. The claim is that roots can be late-inserted even when they have referential features, which raises non-trivial questions about the timing with respect to semantic interpretation.¹⁰ In our system, referentiality is tied to features on D, more precisely to person feature. We follow Kučerová (2018) who argues that person feature is mapped at spell-out onto a semantic index, i.e., a meaningless numerical pointer that gets interpreted via an assignment function (Heim and Kratzer 1998).¹¹ As for the identity of roots, we assume that DPs are phases and that late insertion takes place at spell-out.¹² As the derivation proceeds, the DP gets selected by a higher phase head. After the complement of the higher phase head is spelled-out, the DP, including the root, is sent to LF together with the surrounding material.

4.3 Case II: Type I PPAN roots (✓ masculine, ✓ feminine)

Let us now analyze the other type of nouns whose derivation involves an indexed root as far as gender is concerned. We argue that type I PPAN nouns, like non-PPAN roots, are also based on indexed roots, but they can alternate between gender values depending on the referent. This is because, unlike their common-noun counterpart, there is no specified gender value associated with the index.¹³ Furthermore, we argue that since the gender value is not specified by the index, it must be introduced by a higher functional head, concretely D, whose gender valuation reflects the contextual value of the referent (Kramer 2009, 2015; Steriopolo and Wiltschko 2010; Kučerová to appear, among others). The advantage of this approach as opposed to claiming that type I PPANs have no semantic/morphological gender feature on their root (Embick 2015) is that Polish is uniformly characterized as having a gender index on all its roots that are not syntactically specified for gender.

A simplified derivation of a masculine version of such a noun is given in (9). The first steps of the derivation proceed exactly as in (8). In both cases no root is merged at the start of the derivation. A PPAN type I derivation differs from the non-PPANs at the point when the workspace terminates and root insertion takes place, (9c). Since no gender value is associated with the index, no post-syntactic agreement can take place. Instead, the derivation continues with an unvalued gender feature. Only when D is merged, (9d), the unvalued feature on D becomes valued from the context (in this case as masculine).¹⁴ Since there is a pre-existent agree relation between the gender feature on D and the unvalued gender features in the lower part of the structure (as a result of agree by merge), all instances of the unvalued gender features within this previously established agree chain become automatically valued — in this case, as masculine because of D’s valuation. Once the complement of D is spelled-out, morphology reflects this valuation.

¹⁰ We thank an anonymous reviewer for raising this question.

¹¹ Because of the nature of the empirical problem considered here, the discussion concerns only referential DPS. An advantage of using semantic indices is that the implementation straightforwardly extends to non-referential DPs as well.

¹² Roots must be inserted at spell-out for the morphology module to be able to use the indexical material for post-syntactic agreement.

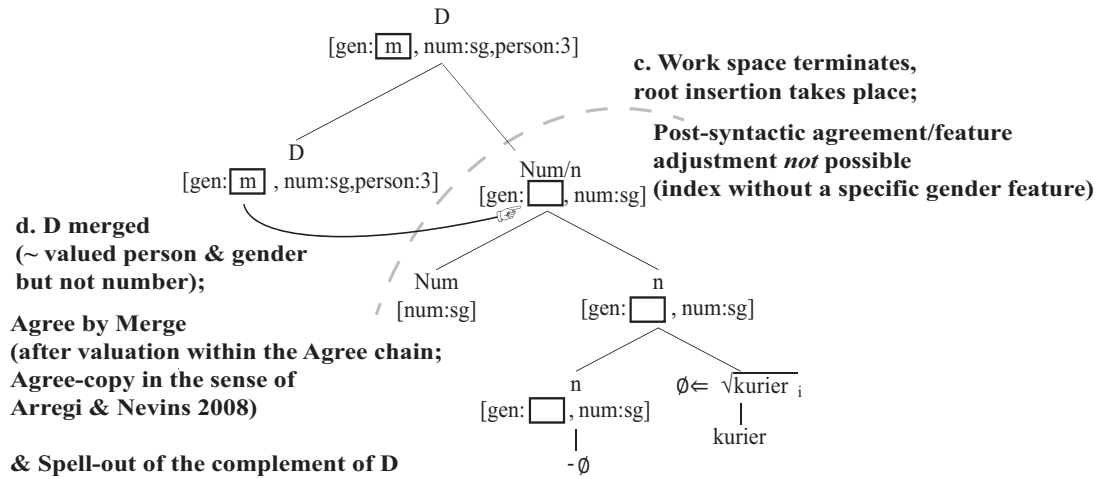
¹³ We assume that gender valuation is implied by the index having a nominal specification.

¹⁴ An anonymous reviewer correctly pointed out that the contextual valuation implicitly assumes that these DPs are always referential. They, of course, can be used predicatively as well. We use the term context here rather loosely. In the context of predicative uses of PPANs, for example, in copular clauses, the valuation reflects the natural gender of the argument the PPAN predicates over. As for generic and non-specific PPANs, we assume that the gender valuation is restricted by implicated presuppositions (Sauerland 2008).

(9) Simplified derivation of *kurier*.M ‘male courier’¹⁵

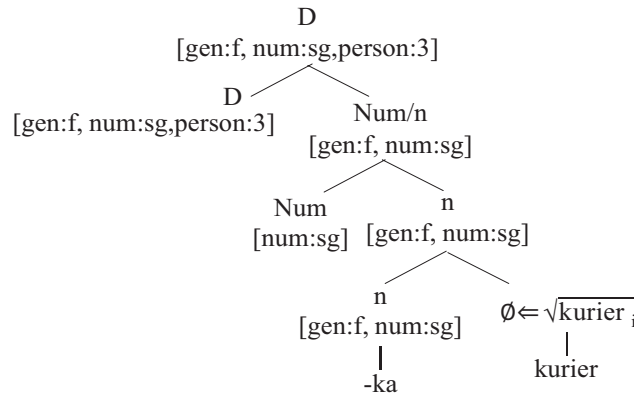
a.–b. as above,

c and d below:



Note that there is no overt morphological realization of the features on *n*, as Polish nominal morphology does not have an overt masculine morpheme that could realize *n*. Crucially, if an unvalued index combines with a feminine feature introduced by *D*, morphology realizes the feminine gender on *n* by the feminine-specific *-ka*, as seen in a simplified derivation of a feminine version of type I PPAN in (10). Since there is no feminine gender on the root, the subset principle does not apply, and the features of the functional head trigger its own morphological realization.¹⁶ Number interactions are not the focus of this paper but note that no interesting difference arises if the number feature is valued as plural. As in the singular derivation, the value gets shared by the *n* head. Both heads get morphologically realized within the same morpheme because of the subset principle.

(10) Simplified derivation of *kurierka*.F ‘female courier’



¹⁵ As far as we can see *kurier* is a root and not morphologically complex agentive noun. It is obviously a loan word, however it has been absorbed into the grammar and its behavior does not deviate from other roots of this type.

¹⁶ The prediction is that the feminine forms of such nouns must be DPs since the feminine feature is introduced by *D*. We are not convinced that this prediction is (always) correct (putting aside the non-trivial question of how we determine what constitutes the NP/DP distinction in a language like Polish). The claim that the valued gender feature is introduced specifically by *D* is not crucial for us. Any higher functional head would do. For instance, a head like Pesetsky (2013)’s *-K* would work well for this type of nouns.

4.4 Case III: Type III PPANs (* masculine, ✓ feminine)

We can now turn to the derivations based on roots with a syntactic feature, in our case gender (\sqrt{G}). We argue that gender as a syntactic feature on a root is represented as a binary feature ($\pm\text{AGR}$ feature). That is, such a feature has a marked and an unmarked value, but there is no idiosyncratic non-binary valuation of the three-way type attested in Polish (masculine/feminine/neuter).

Let us start with type III nouns, i.e., nouns that can only be feminine. We argue that this class of nouns is an instantiation of a marked gender on a root via a syntactic feature. Unlike morphological features, syntactic features on roots do not take specific morphological values such as $\pm\text{fem}$. Instead, these features reflect properties of syntactic computations. In the case of gender, that property is agreement, or lack thereof. Roots of type III nouns are endowed with a syntactic ($+\text{AGR}$) feature and they are inserted early. We further argue that this $+\text{AGR}$ feature projects a functional head, and in turn, the gender on the functional head is marked, and as such, it cannot be impoverished. The ($+\text{AGR}$) feature is not a gender valued feature, it is however valued for imposing or blocking gender agreement that results in a gender valuation. By forcing gender agreement, ($+\text{AGR}$) indirectly triggers marked $+\text{fem}$ agreement on the functional head it projects. This is because gender agreement is ‘on’ by default in Polish, hence an apparently spurious ($+\text{AGR}$) feature can only be interpreted as forcing a certain type of marked agreement, in the case of Polish this is $+\text{fem}$.

Morphology associates the marked gender on the projected functional head with the feminine affix *-ka*, as an overt morphological reflex of feminine being the marked gender in Polish. Crucially, projecting a syntactic feature from the root is distinct from having the root associated with a post-syntactic feminine gender as part of the indexed root. In turn, the subset principle does not apply and *n* is morphologically realized as a separate morpheme. The derivation thus captures the native speaker’s intuition that *-ka* is a feminine morpheme although there is no masculine counterpart.

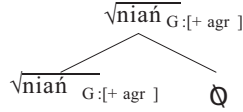
A simplified derivation of a type III PPAN is given in (11). In the first derivational step, shown in (11a), the root with the $+\text{AGR}$ feature is merged directly with the workspace. Here, the root projects because it contains a syntactic feature. In the next step, (11b), *n* merges with the root. By virtue of merge as agree, the unvalued gender feature on *n* gets valued as $+\text{AGR}$. It is this valued feature that projects further when Num is merged, (11c). When the workspace terminates, (11d), no additional insertion or agree valuation takes place. Finally, *D* is merged, (11e). By merge as agree, the unvalued feature on *D* also becomes valued as $+\text{AGR}$. After the complement of *D* is spelled out (and later the complete DP), morphology realizes the marked gender feature as feminine since feminine is the marked feature in Polish.

Consequently, there are no masculine forms of such a noun because the *n* head is necessarily valued as feminine from the root. Furthermore, no masculine agreement in the *D* domain is possible, as the gender feature value is fixed by the $+\text{AGR}$ feature on the root, which prevents additional gender feature valuation on *D* from context.¹⁷

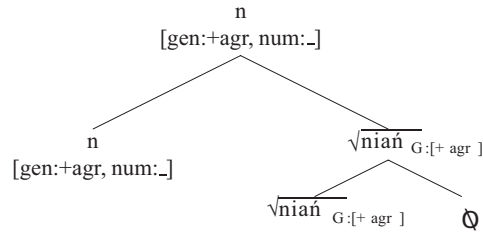
¹⁷ We concentrate on gender but the account in principle extends to other features as well. As pointed by an anonymous reviewer, it is possible that pluralia tantum nouns are stored in the lexicon with a syntactic feature for number. However, we are not aware of any derivational and agreement interactions that would provide empirical support for such an extension. It is possible, but we cannot prove it is a necessary analysis.

(11) Simplified derivation of *niania*.F ‘nanny’

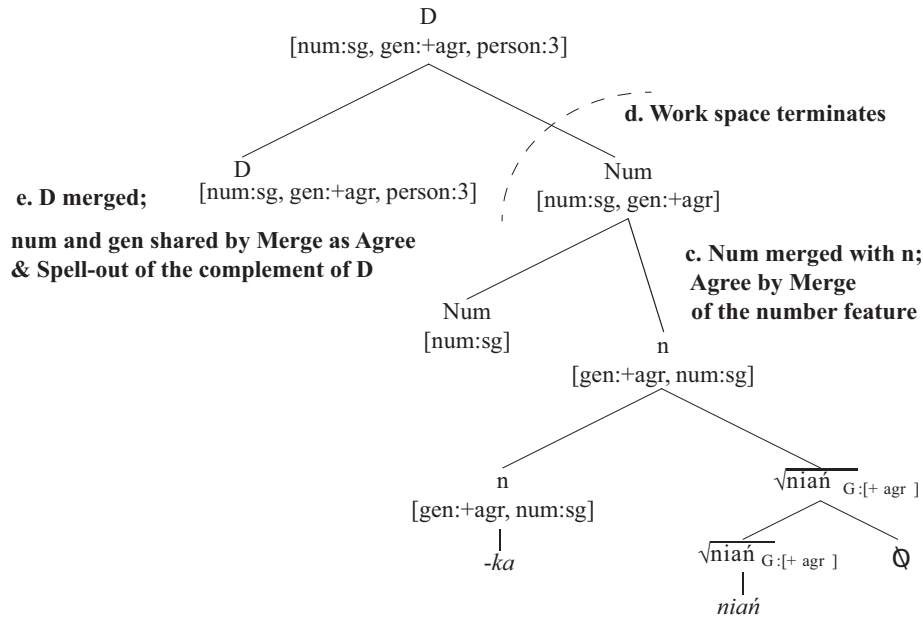
a. root with a gender feature (+AGR)
merged directly with work space (\emptyset);
the root projects:¹⁸



b. n merges with the root; gender
feature on n valued: by the root
(by merge as agree):



Steps c, d, e:



4.5 Case IV: Type II PPANs (✓masculine, *feminine; mixed agreement in DP)

We can now turn to the last class of Polish nouns: type II PPANs, i.e., those that can only be masculine. We argue that type II PPANs are derived via a root that has a $-AGR$ syntactic feature (the mirror image of type III PPANs). The presence of an AGR feature on the root (even when valued as negative) blocks masculine gender agreement on D. A $-AGR$ feature on the root prevents D's features from being valued from context. In other words, morphological markedness blocks context valuation. As in the case of type III PPANs, an agreement feature on the root, even ($-AGR$), projects a functional head. Unlike in type III PPAN's, features of a head projected by a marked ($-AGR$) feature are subject to impoverishment. We understand impoverishment as an operation that targets marked elements. An ($-AGR$) gender agreement feature is marked in Polish - by default Polish has gender agreement, thus blocking agreement is marked. Consequently, gender features on a functional head n projected by a marked ($-AGR$) root feature become subject to impoverishment regardless of the gender value they might take (Halle 2000, Bonet 1995). The idea is that impoverishment targets a marked ($-AGR$) root

¹⁸ Dan Milke (p.c.) raised the question of why the \emptyset cannot be used to insert another root. Note that if such an additional root was early inserted, it wouldn't be able to project and in turn it would fail to check its syntactic features. If such a root was late inserted it would be inserted in a structurally infelicitous context.

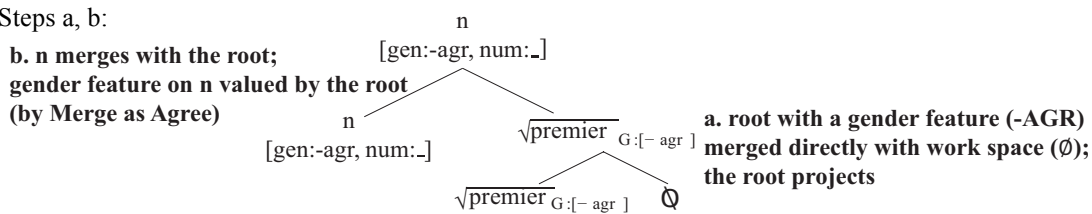
feature by deleting gender features on the functional head (–AGR) projects. Since the gender feature on *n* becomes impoverished, morphologically these nouns correspond to affixless roots.

Our analysis distinguishes two types of markedness – derived and inherent. Introducing (+AGR) on the root of type III PPANs gives rise to derived markedness manifesting itself as +fem agreement on *n*. This kind of markedness is not subject to impoverishment. However, the introduction of (–AGR) on a type II root gives rise to inherent markedness, which results in the impoverishment of gender features on *n*.

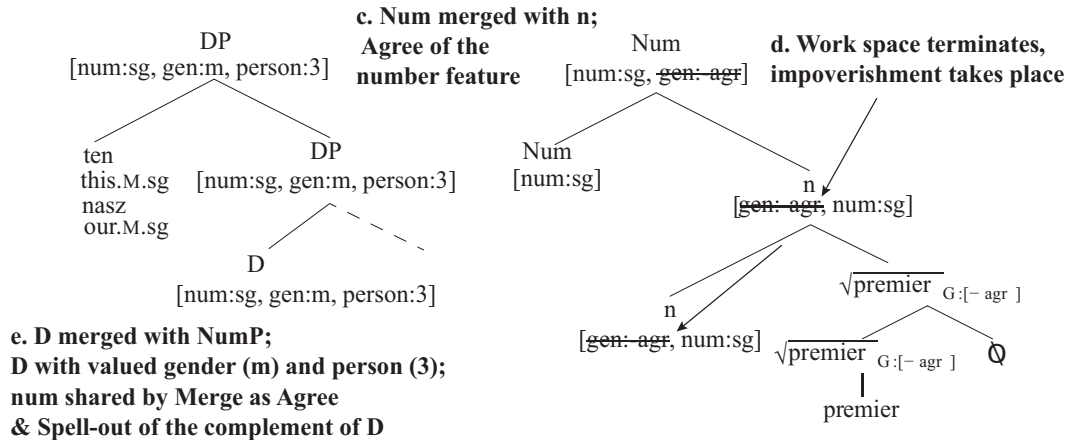
A simplified derivation of such a noun is given in (12). First, the root with an unmarked gender feature is merged directly with the empty workspace, (12a). An unvalued gender feature root merges with *n*, which also has unvalued features. Thus feature valuation between the root and *n* returns gender as unvalued, (12b). Once the workspace terminates, and after *D* is merged, impoverished gender features cannot value *D*, nor can *D* affect the lower workspace as there are no unvalued gender features below *D*. Crucially however, *D* comes with its own valued gender features, for example masculine in (12e). Thus, the derivation correctly captures the observation that the masculine version of this type of noun corresponds to a male referent, instead of being unspecified for natural gender.

(12) Simplified derivation of *premier*.M ‘prime minister’

Steps a, b:

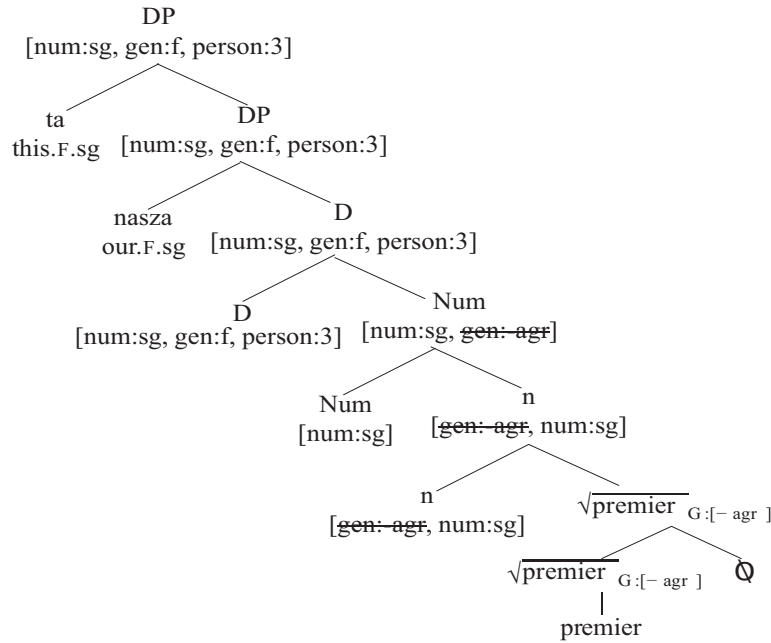


Steps c, d, e:



The derivation plays out differently when the gender feature on *D* is valued as feminine. In such a case, all unvalued gender features within the *D* part of the extended nominal projection become valued as feminine. However as before, the valuation cannot affect the lower workspace. Instead, the structure gets morphologically spelled-out as if the lower part was masculine, while the higher part is in feminine, resulting into a mixed agreement pattern, (13).

(13) Simplified derivation of *premier.F* ‘female prime minister’



The intuition that we are capturing is that a syntactically specified root will manifest itself as idiosyncratic syntactic behavior within the extended lexical domain. As far as gender agreement is concerned, syntactic specification of the root overrides higher functional heads by forcing the across-the-board marked value agreement, or it can take the form of completely inert agreement, which value is established only via lexical specification of the D head.

Our analysis of type II PPAN's provides an interesting prediction that we should observe agreement variation within the DP itself. In other words, higher level projections hosting demonstrative projections should be able to carry feminine discourse assigned agreement markers that are not consistent with the markings on the root (which does not have feminine endings), whereas lower projections, for example those hosting adjectival or possessive modification, should be able to carry default null/masculine agreement markers that are consistent with the form of the root. This is exactly what happens in examples such as (14) below where the demonstrative is feminine and the possessive is in unmarked form, which is indistinguishable from masculine.

- (14) ? *Ta nasz premier*
 that.F our.M PM.M
 ‘That our Prime minister.’

Examples such as (14) above are marginal but present on internet forums where the intention is to deride a female PM. These are not mistakes, but a consistent form of derision employed by opponents of a female PM. Crucially, examples such as (14) cannot be accounted for in a system where roots are always inserted late, and where type II differs from type I roots only as far as the spelled-out form of the derived noun (with type III being morphologically gender fixed nouns with the unusual property that they are semantically PPAN's). Thus there is a clear empirical argument for having both late and early insertion available in the grammar with all the consequences that such an idea entails.¹⁹

¹⁹ We would like to thank one of our anonymous reviewers for pointing out this prediction.

5. Conclusions

We argue that roots are not a homogeneous set as far as the lack or presence of syntactic features is concerned. Even though this paper follows mainstream DM literature in assuming that the majority of roots do not carry syntactic features from the lexicon, it also provides a methodological and empirical argument that there are roots endowed with syntactic features. Such roots are highly marked, but, based on empirical evidence presented here, they do exist. We have shown that the distinction in the structure of the roots has consequences for derivational timing and that it manifests itself in properties of the extended functional domain a given root associates with.

We also suggest that the categorical distinction between the two types of roots has consequences for our typology of features. Feature-like indices associated with indexed roots are not subject to feature-geometry considerations and may be post-syntactically copied on unvalued features.²⁰ Syntactic features on featured roots are binary, subject to markedness and always valued (the logic being that otherwise they wouldn't need to be represented in the lexicon). Crucially, these features project through the structure by merge as agree (Adger 2003).

Although we haven't explicitly elaborated on this point, the proposed system assumes a third type of features, namely, the run-out-of-mill syntactic features on functional heads which may be valued or unvalued and are subject to matching and valuation by agree. We suggest that our proposal sheds light on the stipulated distinction between concord and agree. However, a closer examination of this suggestion awaits future research.

We conclude with a brief sketch of a comparison of our proposal to previous approaches to gender. In most current work on grammatical vs. contextually-assigned gender the locus of the variation is on functional heads of different heights, with the structurally lower heads introducing a grammatical gender and the higher head introducing the contextually assigned gender (Kramer 2009, 2015, Pesetsky 2014, Landau 2015). While these systems can account for heterogeneous agreement – although they cannot explain why it is the higher head that is contextually assigned –, we do not see how they could be extended to systematically account for interactions with derivational morphology. In addition, these systems incorrectly predict that grammatical and contextually-assigned gender could co-occur within the same DP. Our approach is different in that we associate idiosyncratic gender with an idiosyncratic syntactic projection, thus providing a principled connection between properties of roots, properties of agreement and restrictions on derivational morphology.

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²⁰ The basic idea is reminiscent of Arregi and Nevins (2008) and their distinction between agree-value and agree-copy. Note that in our system the application of agree-copy is more restricted.

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