

Against semantic features: the view from derivational affixes

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Abstract:

Derivational affixes are typically understood to constitute pure feature structures, unlike stems which are arguably realisations of (categorised) roots or root structures. Hence, derivational affixes by hypothesis may comprise both formal and purely semantic features; semantic features by definition having no impact on grammatical representation and not interacting with grammatical operations. The presupposition here is that semantic features are relevant only at the Conceptual-Intentional Interface, they matter for interpretation only. In this respect, semantic features would be relevant for “whatever distinguishes camels from reindeer or a joke from an insult”, as Adger and Svenonius (2011) put it.

Although doing lexical semantics in terms of decomposing denotation into semantic features was discredited and discarded around half a century ago, positing semantic features in order to capture the rich content of derivational morphemes analytically persists. For instance, the Portuguese suffix *-eiro* ‘tree’ (as in *pinheiro* ‘pine tree’) would typically be posited to bear a semantic [tree] feature. Clearly, such a feature is not formal, as it would not trigger any grammatical operation, not even agreement.

This chapter builds a systematic argument against the existence of semantic features, although these would in principle conform with the understanding of features in Chomsky (1995) as instructions to the interfaces, to the Conceptual-Intentional Interface in this case. I first lay out their superfluous character as well as their redundancy in non-lexicalist — and separationist / realisationist models of grammar, more generally — models of grammar. Given that lexical meaning in natural language is mediated by grammatical structure containing roots, (purely) semantic features would inevitably be restricted to “non-lexical” elements only, i.e. derivational affixes, that encode rich conceptual content. This makes the positing of semantic features methodologically suspect and, ultimately, redundant.

Accordingly, the rich content of derivational affixes, which can involve pretty much any nominal concept (as in Acquaviva 2009) from ‘profession’, ‘tree’ to body parts, will be argued not to be encoded in terms of semantic features. On the contrary, the chapter makes the case for derivational affixes not belonging to a unitary syntactic category, with some derivational affixes actually being roots interpreted in particular structural contexts, as has been argued already since De Belder (2011). The chapter closes by offering a taxonomy of the elements that grammar manipulates.

1 What are we to make of derivational affixes?

It is customary to understand roots as underlying the construction of *stems*, i.e. of the elements that are traditionally understood to carry the descriptive content of a word. Indeed, even in the contemporary treatment of roots in grammatical theory that begins with Marantz (1996; 1997) and comes of age in Borer (2005; 2014b; 2014a), roots are (correctly) understood to encode or enable the encoding of rich extra-grammatical concepts such as *justice*, *fry* or *pale* and are subsequently considered primarily as the elements around which stems and words are built – whatever words are. There are of course notable exceptions to casting roots solely in the role of the foundations of stems / words, notably De Belder (2011), Lowenstamm (2014), Acedo-Matellán and Real-Puigdollers (2014; 2019).

Hence, if stems are built on or around roots, *derivational affixes* are contentwise typically understood to be pure feature structures. In practice if not in theory, a division of labour regarding signification is assumed: rich descriptive (“lexical”) content is a business of stems, while ‘other’ descriptive content is handled by derivational affixes. In a further move, which vaguely assumes morphological realisation to be somehow isomorphic to content, stems are thought of as being built on or around roots, whereas derivational affixes as being understood to be made of features only. These feature structures, i.e. derivational affixes, may attach directly to root structures or to categorised structures such as *nPs* (nouns), *vPs* (verbs), or adjectives (cf. Fabb 1988). As to the kinds of features derivational affixes are made of, they are in practice assumed to comprise both *formal* features and purely *semantic* features. A distinction between formal and (purely) semantic features will be properly made in the following section, for the time being let’s look at what kind of semantic features derivational affixes could be argued to encode.¹

(1) *Examples of derivational affixes that would bear semantic features:*

– <i>eiro</i> ‘tree’	<i>pinheiro</i> ‘pine tree’	Portuguese
–(a)tz– ‘profession’	<i>pagot-atz-is</i> ‘ice cream seller’	Greek
– <i>lst</i> ‘rock’		Bella Coola
– <i>lik</i> ‘body’		Bella Coola
– <i>altwa</i> ‘sky, weather’		Bella Coola
– <i>an</i> ‘ear’		Bella Coola
– <i>uc</i> ‘mouth’		Bella Coola

Is it then the case that an affix like –*eiro* bears a semantic [tree] feature, that –(a)tz– bears a [profession] feature, that –*lst* a [rock] feature and –*uc* a [mouth] feature, and so on? In this paper it will be argued that derivational affixes are not privileged as hosts of semantic

¹ The Bella Coola examples are from Haspelmath and Sims (2010, 19–22), where there is some interesting discussion about them.

features. Moreover, the stronger argument will be made that (purely) semantic features do not exist and that only formal features exist.

But some definitions are in order first.

2 Formal vs. semantic features

Distinctive features constitute an important analytical concept in linguistic theory. Although approaches to them can be extracted from work on a number of disparate topics, the statement that “[t]he Minimalist Program doesn’t have currently a theory of features” made by Marcel den Dikken during the Abralin ‘The Minimalist Program: Achievements and Challenges’ online event on 6 July 2020 remains true. Sadly, it is hardly the case that Minimalism is unique in having no theory of features: similar observations on the lack of a *principled* theory on features are made in Adger and Harbour (2008) regarding the whole generative enterprise. More specifically, Adger and Harbour cite Muysken and van Riemsdijk (1986) on what the fundamental desiderata of a proper Theory of Features would be, desiderata that remain unfulfilled:

- (2) “[H]ow many are there?”, “what are they?”, “how do they distribute over syntactic structures?”

True, frameworks like HPSG, which championed the importance of features back when most theoretical linguists were happy to use features as mere shorthands for all sorts of grammatical categories, come equipped with working definitions of features and feature systems. Having said that, a (remotely) minimalist theory of features will have to both answer the questions in (2) and rest upon certain (bio)linguistic assumptions on what features are.

Still, there is considerable vagueness in how different linguistic frameworks, accounts, or even linguists understand features. Approaches range from features as specs, as simple or complex *properties*, in the way they are e.g. pedagogically presented in Adger (2003, sec. 2.3) for instance, to the actual *atoms* morphemes and/or lexical items are made of. In our attempt to lay *some* minimalist foundation of what features are we can gloss over this hindering vagueness for the time being, and we can agree that features *in general* may be conceived as “instructions to the interfaces” (Chomsky 1995). Such a postulate is already very restrictive: if features are instructions to the interfaces, the Conceptual-Intentional and the Articulatory-Perceptual ones, there exist whole classes of proposed features we will have to reject as genuine features.

Thus, if feature are instructions to the interfaces, then there is no place in minimalist theorising for features as pure diacritics (‘flags’) of either structural relations (e.g. an A' dependency) or of the externalisation of structural relations (e.g. ‘movement’). This entails that a number of posited features must be thoroughly re-examined, such as the likes of SLASH, which marks long-distance dependencies, and Chomsky’s (1995) Strong, which triggers movement. Similarly, Brody’s (1995) *, a Spell-Out feature, or Merchant’s (2001) E

for ellipsis features would also be out in principle. The only way to cast features relevant for externalisation (e.g. for ellipsis or ‘movement’) as instructions to the interfaces would be to include features interpretable at the interface with the Articulatory-Perceptual (A-P) systems in the class of formal features. In other words, SLASH, Strong, *, E etc. would constitute formal features interpretable at the interface with the A-P systems, but without them being phonological features such as [rounded] or [plosive]. If anything, this move would complicate the distinction between formal and phonological features, one that was apparently settled in Zeijlstra (2008).

The above considerations notwithstanding, we should otherwise understand formal features as *both* encoding some sort of concept (in the broadest sense) relevant to the C-I interface *and* playing a role in grammatical computation (in the narrow sense). In other words, they must be motivated as involved in grammatical operations and representations. In order to have this definition of a formal feature somehow clarified, we can conduct a simple thought experiment. Suppose that by observing the data in a given language we come to the conclusion that there are three candidates for formal features in this language’s grammar, [X], [Y], and [Z]. We examine each candidate feature in turn and here is what we find:

- a feature [X] is both an instruction to the C-I interface (e.g. animacy) and it plays a role in grammatical computation (e.g. triggers agreement or differential object marking): [X] is a *good candidate* for a formal feature;
- a feature [Y] plays a role in grammatical computation (e.g. it motivates various scrambling operations) but cannot be construed as an instruction to the C-I interface: [Y] is *not a good candidate* for a formal feature;
- a feature [Z] can be understood as encoding instructions for the C-I systems (e.g. deference) but at the same time it is inert grammatically; should such a *purely semantic* feature exist, [Z] is nevertheless not a good candidate for a formal feature.

Summarising the above, we can conclude that:

- (3) Formal features will have to be motivated *both* as C-I interface instructions *and* as playing a role in grammatical relations and operations.

This is hardly news, of course. Besides Zeijlstra (2008), Biberauer and Roberts (2015, 3) define formal features precisely thus and contrast them with (purely) semantic features, the likes of [Z] in our thought experiment above:

The formal features are [...] interpretable or uninterpretable and, as such, are visible for syntactic operations such as Agree and Merge. The semantic features, on the other hand, are invisible to the core computational system (Narrow Syntax), but presumably visible at the semantic interface.

Cowper and Hall (2014, 146) are even more detailed in their contrasting the encyclopaedic character of a semantic feature to a formal feature, which “to be considered active it must be involved in inflectional paradigms, or trigger syntactic movement or agreement, or play some

other demonstrably formal role”. The purely encyclopaedic character of semantic features is of course already outlined in Adger and Svenonius (2011, 18), who describe them as involved in “meanings such as whatever distinguishes camels from reindeer or a joke from an insult”.

According to this outlook, what distinguishes formal from (purely) semantic features is that the former are by definition grammatically active; on the other hand, semantic features are understood as instructions of a purely encyclopedic nature, instructions about ‘other’ descriptive content that hardly affect the grammatical derivation. Essentially, the formal-semantic distinction regarding features is homologous to the distinction between grammar, or even the Faculty of Language in the Narrow Sense, and lexical semantics (Adger and Svenonius 2011, 17–18).

As we will see below, Turkish is a case in point. Although gender distinctions can of course be made in the Turkish language, do we really wish to claim that *formal* gender features such as [±feminine] exist in the grammar of Turkish? The answer is definitely negative, as we will see below, given that a purported gender feature would not play any formal role: it would not be grammatically active in any way. Interestingly, this is a conclusion one will independently reach by following the analytical methods of either Corbett (1991) or Kramer (2015).

3 From features to functional heads

Before scrutinising semantic features and how we can conceive derivational affixes without them, we have to make a brief and necessary excursus regarding a basic difference between derivational affixes and functional heads.

Functional heads are feature bundles or, perhaps, feature structures (Harley and Ritter 2002). A first issue is whether there can be more than one (interpretable) feature per functional head.² Kayne’s (2005, 212) *Principle of Decompositionability* would refute that, as according to it “UG imposes a maximum of one interpretable syntactic feature per lexical item”.

Nanosyntactic and cartographic approaches embrace Kayne’s Principle, the former explicitly, the latter in practice. Supposing functional heads can be bundles of more than one feature (cf. Bobaljik and Thráinsson 1998), these heads could be either somehow pre-assembled (which is where nanosyntactic objections come in) or assembled online from formal features available in the numeration (Hegarty 2005). I will here remain agnostic regarding which of the above three scenarios (mono-featural functional heads, pre-assembled poly-featural functional heads, or poly-featural functional heads assembled online) is the correct one. What matters for the discussion here is the *kind* of features that make functional heads up, and I believe one would have to exclude semantics features in principle (as they are encyclopaedic) and posit that

² The “interpretable” caveat is due to Fábregas (2024, pt. 2.1.1)

- (4) Functional heads are made exclusively of *formal* features (Panagiotidis 2015, 117–20, 122–24).

The above leaves us with a fundamental difference between functional heads and derivational affixes hinted at above: while functional heads are made exclusively of formal features (possibly just the one each), derivational affixes seem at first glance to (also) contain semantic features, as illustrated in (1). In the next section however we will see that semantic features have no place in contemporary generative approaches, let alone minimalist ones: semantic features do not exist. We will therefore have to rethink the distinction between functional heads and derivational affixes, and the *content* of derivational affixes more generally.

4 Formal features *only*: semantic features are superfluous

It was established in (3), and pretty uncontroversially so, that formal features must both be readable at the C-I interface and play a role in grammatical relations and operations: formal features must be both interface *instructions* and grammatically *active*.³ The question is whether there exist purely semantic features, i.e. features that are readable at the C-I interface but are grammatically inert – just like the ones we would have to posit for the affixes in (1). The answer I wish to argue for here is in the negative: (purely) *semantic features do not exist*, especially in a grammatical framework where formal structures are matched with conceptual content late.

In separationist-realisational frameworks of grammar (Ralli 1988; Beard 1995; Halle and Marantz 1993; Harley and Noyer 1999 and elsewhere), all semantic interpretation takes place at the interface between the combinatorial system, the grammar, and C-I systems. More specifically, all matching of meaning with form is mediated via syntactic structures built around roots (Borer 2013a; 2013b; Panagiotidis 2020): not even a simplex noun *cat* is an unstructured Saussurean sign (Marantz 1996; 1997). Of course, structures built around roots typically encode the kind of rich conceptual meaning that e.g. “distinguishes camels from

³ What makes formal features active, the exact kind or role they play in grammatical derivation, is open to slightly different interpretations. Cowper and Hall (2014, 146) simply list the environments in which formal features demonstrate their activity: when they “[are] involved in inflectional paradigms, or trigger syntactic movement or agreement, or play some other demonstrably formal role”. Biberauer and Roberts (2015, 3) foreground the hypothesis that formal features come in both interpretable or uninterpretable versions, which makes them “visible for syntactic operations such as Agree and Merge”. Zeijlstra (2008) similarly claims that “[c]hecking of uninterpretable features [...] forms a diagnostic test to distinguish interpretable formal features from purely semantic features [...]” and goes on to lay out “three properties that could be harnessed to test for the presence of a feature [*uF*]: its semantic uninterpretable, the triggering of an operation Move and the triggering of an operation Agree”.

reindeer or a joke from an insult” (Adger and Svenonius 2011, 18), what can perhaps still be loosely called ‘lexical meaning’, even after Bruening (2018).⁴

Historically speaking, semantic features that are nevertheless grammatically inert, i.e. purely semantic features, were posited in older frameworks as primitives into which said lexical meaning would be decomposed: originating in Katz and Fodor (1963), such features were invoked upon in order to do compositional lexical semantics. Accordingly, a noun like *bachelor* would be decomposed into the [+male] [-married] semantic features, and so on. This way of doing lexical semantics has long been superseded (famously after Fodor, Fodor, and Garrett 1975), but the idea that particular concepts are expressible in terms of grammatically inert features, i.e. semantic features, has persisted until today. As we will see below, those purely semantic features are nothing but a notational variant of meaning postulates; methodologically they are a remnant of a classic but obsolete way of doing lexical semantics.

Summarising, (purely) semantic features, in contrast to what was claimed about formal features in (3), would

- a. play *no* role in the construction of functional categories (unlike e.g. English gender on pronouns);
- b. trigger no Agree relations (unlike e.g. Number or Q(uestion) in English);
- c. generally play no “demonstrably formal role”;
- d. ultimately be “encyclopaedic”.

In brief, purely semantic features are not referred to by the combinatorial system in any way.

Let us again turn to the state of gender in Turkish: clearly there are female and male concepts expressed on lexical nouns, a state of affairs that is brought about by the existence in the language of stems encoding female and male concepts. Given that these stems are overwhelmingly nominal, the existence of such stems encoding gendered concepts can be readily captured as involving *nP* structures built around roots – a matter to which we return below. Crucially, there is no evidence in Turkish of a (grammatically) active gender feature. There is definitely no grammatical gender whatsoever: neither chairs are feminine, as in Italian, nor pain is masculine, as in Greek. Furthermore, semantic gender is not manifested on any functional element, with all Turkish pronouns being gender-neutral, including *o(n)* (‘she /

⁴ Roots can be understood as contentful but polysemous (Levinson 2007; Marantz 2013) or as radically empty differential indices, i.e. as the only grammar-internal criteria of lexical identity (Acquaviva 2009; Borer 2014a; 2014b; Harley 2014; Panagiotidis 2014; 2020). Here I subscribe to the second thesis, taking roots to be completely contentless: different roots enable the same simplex syntactic structure – say an idealised *nP* consisting of nothing but a root and a categoriser *n* – to be associated with different rich concepts, from *ball* to *cat* to *hell* and so on. Hence, by inserting different roots in otherwise identical structures, these structures become distinguishable at the interface with the Conceptual-Intentional systems and thus can be matched with different concepts (Acquaviva and Panagiotidis 2012; Panagiotidis and Nóbrega to appear).

he') and *kendi* (a version of a *se*-anaphor). By the definition in (3) there are no formal gender features in Turkish.

Is it then the case that we need to posit purely semantic (i.e. non-formal) gender features in Turkish? Such features would be borne by nominals encoding gendered concepts. I think that informal descriptions of Turkish might acknowledge that a noun like *erkek* ('man') bears a masculine gender feature, whereas a noun like *kadın* ('woman') bears a feminine gender feature. Crucially the features [masculine] and [feminine] informally posited here only describe a particular *aspect* of the lexical meaning encoded by the nouns (i.e. *nPs*) *erkek* ('man') and *kadın* ('woman').

Still, other aspects of the lexical meaning for words like *erkek* ('man') and *kadın* ('woman') could be [+adult] or [-familiar], if we choose to have them *notated* as features. However, what we are dealing with when we are isolating particular aspects of the denotation of *erkek* ('man') and *kadın* ('woman') is simply meaning postulates. Unless we would subscribe to semantic decomposition, expressing meaning postulates as features is unnecessary and ultimately fallacious. In any case, regarding *erkek* ('man'), at least the following meaning postulates can be claimed to hold:

- (5) $\Box \forall x, \text{ERKEK}(x) \rightarrow \text{MALE}(x)$
 $\Box \forall x, \text{ERKEK}(x) \rightarrow \text{ADULT}(x)$
 $\Box \forall x, \text{ERKEK}(x) \rightarrow \neg \text{FAMILIAR}(x)$

The fact that sixty years after Katz and Fodor (1963) we are still inclined to think of the first meaning postulate in (5) as the interpretation of a 'semantic' feature, although this is not what we would customarily think of the other two, is simply a notational preference. In the context of (5), and of Turkish grammar more generally, positing a [\pm feminine] or [\pm masculine] feature would make as much as sense as positing a [\pm adult] or a [\pm familiar] feature: all three would simply notate meaning postulates *qua* semantic features, translating particular but arguably prominent aspects of *erkek*'s lexical ('encyclopaedic') meaning. Of course, for someone coming from the study of languages with formal gender features – semantic, grammatical, or both – the gender category is easier to pass as encoded by a feature than are adulthood or familiarity. Nevertheless, such preference does not necessarily reflect the realities of Turkish grammar.

Picking particular meaning postulates to notate as semantic features, just because formal features with the same interpretation exist in other grammars, is therefore methodologically flawed or simply superfluous: in the case of (5) for instance, all that has to do with masculinity etc. is retrieved in the Encyclopaedia once a nominal structure built around an ERKEK root reaches the C-I interface.

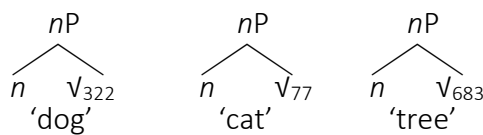
Generalising, purely semantic features should not exist, especially in frameworks where structures are matched with conceptual content late, as in the separationist-realisational frameworks mentioned at the beginning of this section (Ralli 1988; Beard 1995; Halle and Marantz 1993; Harley and Noyer 1999 and elsewhere). More specifically, matching of meaning with form is mediated via syntactic structures built around roots (Marantz 1996; 1997; Borer 2005; 2013a; Panagiotidis 2015, chap. 3; Panagiotidis and Nóbrega to appear). Signification, the pairing of meaning and form is mediated via syntactic structures built around roots (Borer 2013a; 2013b; Panagiotidis 2020) and not even a simplex noun like *cat* is an unstructured Saussurean sign (Marantz 1996; 1997).

- (6) Lexical meaning in natural language is mediated by grammatical structure containing roots.

Given that once visible to grammar (i.e. the combinatorial system) a feature is by definition formal (Cowper and Hall 2014, 146), semantic features would only be detectable by inspecting the *proposition* instead of the *sentence* (cf. Biberauer and Roberts 2015, 3 above). Therefore, a semantic feature would actually be used in order to encode a concept like masculinity in (5) or tree, profession etc. in (1) whatever the grammatical structure in which they would appear and generally in a fashion orthogonal to the combinatorics of natural language.

At the same time, the encoding of concepts relevant to the proposition only seems to be the job of structures built around roots as per (6) and footnote 4, and for reasons explored in Panagiotidis and Nóbrega (to appear). Hence, the same simplex *nP* can be associated with different concepts because it is built around different roots: different roots enable the same simplex syntactic structure — an idealised *nP* consisting of nothing but a root and a categoriser *n* in this basic case — to be associated with different concepts.

- (7) Same structure, different roots



In other words, semantic features would *duplicate* the job of such structures without making any reference to the combinatorial system and being invisible to it. The above considerations lead us to think that in general semantic features, grammatically inert instructions to lexical semantics (or ‘the Encyclopaedia’), are generally superfluous; therefore they are inexistent:

- (8) Purely semantic features do not exist.

Clark (2020, 6) independently arrives at the same conclusion.

5 Derivational affixes without semantic features

It could be argued that we are being too hasty in the wholesale rejection of semantic features in (8). Once more recalling (1), the Portuguese affix *-eiro* does mean ‘tree’, productively deriving words such as *pinheiro* ‘pine tree’ and the like, the Greek affix *-(a)tz-* does mean ‘profession’, productively yielding professional names like *pagot-atz-is* ‘ice cream seller’) etc.; finally, Bella Coola contains affixes encoding concepts such as *-lst* (‘rock’), *-lik* (‘body’), *-altwa* (‘sky, weather’), *-an* (‘ear’), *-uc* (‘mouth’).

Maybe a compromise could be struck; as already mentioned, this would be a compromise that actually already constitutes an operating procedure for many researchers looking into morphology, although not necessarily one informed by a principle. Such a compromise would look like this: whereas (6) is true for stems and similar root-derived structures, maybe semantic features like [tree], [profession], [rock], [body], [sky], [ear], [mouth] etc. would actually encode meaning in *rootless affixes*.

It is now time to see how this compromise stands up to scrutiny. We begin with a simple observation: the interpretations of the derivational affixes in (1) look a lot like those of *nouns*; more precisely, all the listed affixes actually encode nominal concepts (Acquaviva 2014). Informally, we can think of most interpretations for purported purely semantic features as the encoding of nominal concepts. If this generalisation is a valid one, which is of course an empirical matter, it would be an eminently interesting one: why would semantic features not encode more verb-like concepts, such as dynamic concepts typically functioning as events?

Second, even setting aside whether semantic features exist, the orthogonal issue of the *syntactic* status of derivational affixes is a crucial one here, should we insist on drawing a dichotomy between root-derived stems on the one hand and derivational affixes hosting semantic features on the other. “Affix” is definitely a morphological analytical category that describes how a morpheme combines with other morphemes, whereas “derivational” describes its morphological function, i.e. ‘word making’ (see Fábregas and Krämer 2020 for the similar case of ‘prefixes’). Therefore, there can exist no *a priori* commitment about the *content* of particular morphemes just because they will end up to morphologically behave as affixes. Simply put, it is implausible to posit that a mechanism will decide that i) root-based structures will end up as stems and ii) structures composed of semantic features will end up as affixes; this sort of look-ahead would make no sense, in a realisational-separationsit models at least.

Third, there are already well-articulated accounts casting *all* derivational affixes as roots or as built around roots (e.g. De Belder 2011; Lowenstamm 2014; Acedo-Matellán and Real-Puigdollers 2014; 2019). If anything, this means that the dichotomy between root structures as *stems* and semantic feature structures as *affixes* is hardly to be taken for granted. Let us however grant the hypothesis that all derivational morphemes are root structures, which would have at least two consequences: First, all derivational affixation would be a subcase of

compounding. For instance, if *–ness*, *bird*, *–ful*, *maiden*, *–proof* and *bottle* are all root structures, then *blackness* is a compound like *blackbird*, *handful* as much of a compound as *handmaiden*, *waterproof* as *water bottle* – and so on, morphophonological minutiae notwithstanding. I am not sure this is a desirable state of affairs or even one that would be easy to explain away. Second, there do exist derivational affixes like *–ness* / *–ity* above, *–ise*, causatives and the like, which clearly have no substantive content: are these all root structures?

Similar concerns are reported by Panagiotidis (2014, 297–98), who cites Pullum (2010). Pullum claims that the root vs. “suffix” status of “the endings of the words [such as] *–like*, *–esque*, *–ward*, *–proof*, *–(a)thon*, [...] *–ism*, [...] *–(o)phile*, *–(i)licious*, and *–gasm*” must be decided on the basis of firm theoretical considerations.⁵ In other words, no pretheoretical decisions made on stress patterns or other morphophonological considerations will help us reverse-engineer the content of morphemes, be they stems or affixes.

I believe that in tackling this matter we should take (6) very seriously: whatever element has substantive content, i.e. encodes concepts that are not encoded by formal features, is a structure built *around* a root or *containing* a root (see Alexiadou and Lohndal 2017 for a review of the subtle but crucial distinction between the two), no matter whether it surfaces as a stem or as an affix. I therefore agree with De Belder roots (2011), Lowenstamm (2014), and Acedo-Matellán and Real-Puigdollers (2014; 2019) that *all truly contentful* derivational affixes involve roots; incidentally, these would include all our examples from Portuguese, Greek, and Bella Coola. This stand would also contribute to answering the question of why so many derivational affixes encode nominal concepts. If these affixes are built around (categorised?) roots, they can be readily matched with simplex sortal concepts (and also states, perhaps); anything more would require a more complex syntactic structure (cf. Hale and Keyser 2002; Harley 2005; Ramchand 2008).

Summarising, the whole issue actually boils down to a choice between

- a. elements in (1) being roots (or structures containing roots) and
- b. positing that, in the absence of a root structure, semantic features may fetch a wealth of elaborate (primarily nominal) concepts, such as ‘tree’, ‘profession’, body part concepts, whatever the meaning(s) of *–ism* would be, or a complex notion of ‘loving something’ as in *franco-phile*, *biblio-phile* etc..

Given that some of these concepts (e.g. ‘profession’) actually postdate the emergence of the Language faculty in the species, I think that we can confidently go for the first option.⁶

⁵ For the record, Pullum considers *–like*, *–esque*, *–ward*, and *–ism* to be “suffixes”, and the rest to be roots.

⁶ Emonds (2011, 56–59) and Nóbrega (2018) on why a concept post-dating the emergence of the Language Faculty is not encodable as a feature.

Still, pure *formal* feature structures that surface as the ‘light’ derivational affixes should also exist. Although we still vouch for (4), namely that functional heads are made of formal features, it is not necessarily the case that formal feature structures surface exclusively as functional heads: they may also surface as ‘light’ derivational affixes.

If something along the lines of Panagiotidis (2015, chap. 5) is on the right track, formal feature structures bearing uninterpretable categorial features will surface as functional heads, otherwise they can function as derivational affixes. Two examples of such ‘light’ derivational affixes, made of formal features only, would include English *–ness* / *–ity*, along with *–th* and, perhaps, the likes of *–ment*: all these are category-changing affixes yielding nouns, they therefore look like they are exponents of the nominaliser *n*. A more complex case would be English *–ise*: this would realise a special verbaliser *v*, i.e. an element that bears a [causation] formal feature, one that is independently motivated for English, next to a categorial feature [V]. If the ‘menagerie’ in (9), adapted from Panagiotidis (2011, 381), is anything to go by, derivational affixes could either

- be complex syntactic structures containing roots or
- belong to *any* of the four elements predicted below, **except** *functional heads*.

(9) The elements of grammar

	<i>made of</i>	<i>categorial status</i>	<i>includes</i>	<i>examples</i>
<i>categorisers</i>	formal features	[N] or [V]	<i>n, v</i>	<i>–ness, –th</i>
<i>functional heads</i>	formal features	uninterpretable [N] or [V]	Voice, Asp, T, C, D, Num...	<i>–ing, to, will, if, the, –s</i>
<i>subcategorial elements / “inner morphemes”</i>	formal features	categoryless	particles, low applicatives, low causatives...	<i>–ee, de–</i> ; verbal particles <i>up, in</i>
<i>roots</i>	?	categoryless	roots	CAT, WORK, KTB, –EIRO

According to the above picture, roots and root structures, categorising elements, and subcategorial “inner morphemes” can all surface as derivational affixes. Returning to the English examples used earlier, *–ise* would be a categorising derivational affix made of formal features only, *–ness* a pure categoriser also consisting of just formal features, whereas *–ful* and *–proof* would be roots or root structures.⁷

⁷ Non-category changing derivational affixes would also be pure formal feature structures (Fábregas 2024). This entails that the ‘menagerie’ in (9) must be accordingly refined.

Taking some derivational affixes to be built around roots brings us back to the problem identified earlier: are we to say that *handful* and *waterproof* are compounds? Recall that this was a point of criticism towards the idea that all derivational suffixes are roots. A way we can address this matter is to posit that root structures surfacing as derivational affixes may encode *unvalued* categorial features, further enriching the ‘menagerie’ in (9). Accordingly each of the affixes in (1) would bear an unvalued categorial features, a claim previously made for Classless Words in Farsi (Karimi-Doostan 2008; 2011) in Panagiotidis (2015, 103–5).⁸

6 Conclusion

Even if one does not ascribe to Minimalist commitments, it is a truism that methodological parsimony should drive all scientific research. In this respect, semantic features’ only purpose is to encode concepts without them having any effect on the grammatical computation, thus duplicating the role of root structures, whose purpose is par excellence to encode concepts. Additionally, given that the semantic features posited abide by no grammar-internal principles, these must be superfluous and unnecessary: all signification in language not involving formal features such as [plural] is therefore mediated by root structures.

Related to the above is a second take-home message, namely that the syntactic structure of an element cannot and should not be expected to predict whether it will surface as a stem, a derivational affix, or other.

7 APPENDIX: Formal features as Saussurean signs

Ridding our grammatical descriptions from semantic features eminently highlights the role of formal features as elements that syntactic processes manipulate: formal features must by definition play a role in the grammatical computation, as per (3).

The dual role of formal features as reflected in (3) actually renders them as the only Saussurean signs in natural language because they *directly* connect concepts with some *abstract formal realisation*. Once (purely) semantic features as an analytical concept are out of the picture, and acknowledging that signification is a job for root structures, we can conclude that signification in the case of formal features is unique in not being mediated by grammatical *structure*.

Two relatively uncontroversial illustrations of this generalisation would be [neg] and [Q](uestion) features: a [neg] feature has a *signified*, the logical operator \neg (NOT), and an abstract *signifier*, the realisation of which is some morphological exponent; a [Q](uestion) feature has a *signified*, the illocutionary Force of question, the signifier of which is the external Merge this feature might force, or the Agree relation it will establish, or similar. Crucially, a formal feature will *have* to be realised somehow in all cases, the vagaries of

⁸ A proper treatment of the topic will be found in Nóbrega and Panagiotidis (in preparation).

morphological impoverishment, syncretism, and feature deletion notwithstanding (Halle 1997; Calabrese 2008; Harley 2008 among others): ultimately, this is what we mean by the grammatical activity or visibility to the grammar of formal features. In this vein, semantic features cannot exist precisely because a feature without an abstract signifier is simply not there. Thus, there is nothing making grammatically manifest a feature [-married] on words such as *bachelor*, *maiden* etc.; therefore there exists no feature [\pm married].

- (10) The signifier of formal features is realised i) as (part of) an exponence or ii) via a grammatical relation and/or operation.

Features have a signifier in the sense of that they must be *somehow* be expressed, indirectly most of the time. As mentioned above, this abstract signifier is combined with a signified which comes from a limited number of *featurable* concepts (Emonds 2011; Cinque 2013; Nóbrega and Miyagawa 2015; Nóbrega 2018; Golston 2018; 2019b; 2019a; Panagiotidis 2022).

If, as Sauerland (2008) argues, semantic markedness of features distinct from morphological markedness exists, such semantic markedness would be exactly a property of features as signifieds; at the same time, morphological markedness would be a characteristic of features as signifiers. Again, such a signifier should be understood in the most abstract way possible, given that it is rarely the case that features are *directly* expressed via phonological representations. In the case of formal features, a signifier must be conceived not as a form but as the *potential for form*.

- (11) A limited number of concepts can be encoded as formal features; every other concept will have to be signified via root structures.

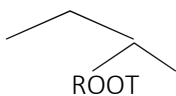
In the light of the above considerations, framing formal features as Saussurean signs does not result from methodological syncretism or, worse, from methodological sloppiness. The purpose of such framing is to highlight that *features*, not ‘words’ or similar, *are the actual symbolic atoms of language*, with all meaning not encoded as formal features being the result of matching root structures of varying complexity to Encyclopedia entries.

Summarising, the division of labour regarding signification in natural language falls out like this:

- (12) Formal features are the only unstructured Saussurean signs in natural language.⁹

The table below distils the proposed overview.

⁹ Adger and Svenonius (2011, 15) are the first (to my knowledge) to conceive features as Saussurean signs: “A given feature might consistently spell out in one way or another [...]. This simply reflects the usual Saussurean arbitrary pairing of phonological content with syntactic and/or semantic content.”

SYMBOLIC FUNCTION		COMBINATORIAL FUNCTION	
<i>formal features</i>	<i>structures with roots</i>	<i>roots</i>	<i>formal features</i>
unstructured signification	structured ('lexical') signification	N/A	driving the combinatorial function
[NEG], [Q], [N], [±state], [±plural]		N/A	Labelling, [uX] ... [X]

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