Remarks on Denominal *-Ed* Adjectives

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Abstract

This paper discusses denominal adjectives derived by affixation of *-ed* in English in light of recent advances in linguistic theory and makes the following three claims. First, unlike recent proposals arguing against their denominal status, the paper defends the widely held view that these adjectives are derived from nominals and goes on to argue that the nominal bases involved are structurally reduced: *n*P. Second, the paper argues that the suffix *-ed* in denominal adjectives shows no contextual allomorphy, which is a natural consequence that follows from the workings of the mechanism of exponent insertion in Distributed Morphology (Halle and Marantz, 1993). Third, the meaning associated with denominal *-ed* adjectives stems from the suffix's denotation requiring a relation, which effectively restricts base nominals to relational nouns, derived or underived. It is also argued that the suffix is crucially different from possessive determiners in English (e.g., *'s*) in that, while the former imposes type shifting on non-relational nouns, the latter undergo type shifting to accommodate them.

1. Introduction

Denominal adjectives derived by the adjectivizing suffix *-ed*, as in (1) below, are quite common in English and seem to have received the attention they deserve from grammarians and linguists. [1,2]

(1) a. blue-eyed
     b. bearded
     c. red-roofed
     d. black-jacketed

The syntactic and semantic properties of these adjectives are intuitively clear; they are adjectives derived from suffixation of *-ed* to the nominal base N, either a nominal compound or a noun phrase, and they have the meaning related to possession such as 'possessing N' or 'provided with N', etc.

The aim of this paper is to discuss denominal *-ed* adjectives in light of recent advances in linguistic theory and make the following claims about their structure, morphology and semantics. Specifically, on the fundamental assumption in the framework of Distributed Morphology (Halle and Marantz, 1993; Marantz, 1997, 2001) that there is no component dedicated to word formation, this paper defends the view that the *-ed* adjectives in question are denominal and argues that bases for *-ed* are reduced nominal structures, *n*P. It is shown that facts pertaining to number marking and interpretation support the *n*P-based analysis of denominal *-ed* adjectives. Incidentally, an analysis of the singular and plural forms of foreign nouns in English is offered along the way.

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[1] Since so many cases of denominal *-ed* adjectives can be analyzed as verb-based as well (e.g., *armed*, *knobbed*, etc.), much care is taken to present unambiguously denominal ones, i.e., ones which have no verbal counterparts or with prenominal modifiers.
[2] See, among many others, Jespersen (1942), Hirtle (1970), Hudson (1975), Ljung (1976), Gram-Andersen (1992), Bauer and Huddleston (2002) and the references cited therein. See also Miller (2006:175ff.) for discussion of the Latinate counterpart *-(a)te/-ated*.

Second, we argue that the adjectivizing suffix -*ed* has no contextually determined allomorphs in denominal adjectives. Putative counterexamples are claimed to be stative participles in the sense of Embick (2003, 2004), which are deradical, not denominal.

Third, we discuss the source of the possession meaning associated with denominal adjectives and argue that it stems from the adjectivizing suffix's denotation which takes a relation as input. This effectively restricts the types of nominals which appear as bases for the suffix: intrinsically relational nouns and relational nouns derived by type shifting. We also argue that the suffix is in sharp contrast with possessive determiners in English: the former imposes type shifting on its non-relational bases, while the latter undergo type shifting to accommodate non-relational possessees.

The paper is organized as follows: in section 2, after seeing that the -*ed* adjectives in question are undeniably denominal, we will argue that their nominal bases are structurally reduced: *n*Ps. In section 3, building on the conclusion reached at in section 2, we will argue that no contextual allomorphy is possible in denominal adjectives and show that putative counterexamples can receive a different analysis. In section 4, we will consider the source of the possession meaning and propose an analysis in which the adjectivizing suffix is required to take a relation as input, which serves to restrict the types of nominal bases appearing in the adjectives. Section 5 will conclude the paper.

2.   An *n*P-Based Analysis

2.1   Denominal -*Ed* Adjectives Are Denominal

The fact that -*ed* adjectives, as in (1) above, are based on nominals can be demonstratively shown by the following examples where -*ed* attaches to bases with nominalizing suffixes such as -*age*, -*ance/-ence*, -*ing*, -*ion*, -*ment*, -*th/-t*, and the like. The relevant suffixes are underlined in the examples in (2) below:

(2) a.   sour-vis<u>age</u>d
     b.   good-appear<u>ance</u>d, average-intelli<u>gence</u>d
     c.   low-ceil<u>ing</u>ed
     d.   fair-comple<u>xion</u>ed
     e.   battle<u>ment</u>ed
     f.   average-leng<u>th</u>ed, gif<u>t</u>ed

The suffixes in (2) are indeed nominalizers, as can be confirmed by the following.[3]

(3) a. -*age*
         cover<u>age</u>, leak<u>age</u>, volt<u>age</u>, yard<u>age</u>, etc.
     b. -*ance/-ence*
         arrog<u>ance</u>, ridd<u>ance</u>, abs<u>ence</u>, depend<u>ence</u>, etc.
     c. -*ing*
         build<u>ing</u>, danc<u>ing</u>, meet<u>ing</u>, paint<u>ing</u>, etc.
     d. -*ion*
         fash<u>ion</u>, miss<u>ion</u>, reg<u>ion</u>, un<u>ion</u>, etc.
     e. -*ment*
         apart<u>ment</u>, base<u>ment</u>, move<u>ment</u>, pay<u>ment</u>, etc.
     f. -*th/-t*
         grow<u>th</u>, tru<u>th</u>, heigh<u>t</u>, sigh<u>t</u>, etc.

Recently, Nevins and Myler (2014) have proposed an analysis of -*ed* adjectives of the type discussed here, where -*ed* adjectivizes category-neutral √P, citing examples like **beautiful-singinged* as an argument against the involvement of nominalizers. However, their analysis has no way to account for the examples in (2) unless it is modified in such a way that -*ed* can also adjectivize *n*P, or alternatively, it is shown that the nominal bases in (2) are in fact √P, which is highly unlikely in face of the examples in (3). Note, however, that there are -*ed* adjectives based on √P, as Nevins and Myler (2014) conjecture. I will argue in section 3 that they are stative participles in the sense of Embick (2003, 2004).

Moreover, Bruening (2016), while admitting that -*ed* adjectives as in (1) and (2) are formed from nouns, suggests an analysis whereby their derivation involves an intermediate, non-existent verb form derived from an N and meaning 'possessing N', with the verbalizer being a null affix corresponding to the English prefix *be-*, as in *bejeweled*, *beringed*, *beribboned*, etc. Thus, this analysis treats the -*ed* adjectives in question as deverbal rather than denominal.

This view receives initial support from the fact that some -*ed* adjectives (used to) have forms with and without *be-*: *booted/bebooted*, *ringed/beringed*, *gartered/begartered*, etc. However, this null *be-*prefixation analysis seems to be limited in its empirical coverage and work only for cases involving bare nouns, i.e., when the nominal base

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[3] See, for instance, Plag (2003:86ff.) for an overview of nominal suffixes in English.

is simple in form, and it is not at all clear how this analysis could handle *fair complexion* and other modified nominal bases, as given in (2). In fact, a cursory search of the Oxford English Dictionary found no examples of *be*-prefixed *-ed* adjectives based on modified nominal bases, suggesting that *be-* could not form verbs with modified nominals even when it was most productive in its history. Thus, I conclude that, even though the phonologically null version of the verbalizing prefix *be-* might attach to a bare nominal base and feed the formation of *-ed* adjectives as adjectival passives, this analysis cannot be extended into covering cases involving modified nominal bases. In section 4, I will propose an alternative approach to derive the possession meaning, whereby there is no need to invoke null *be*-prefixation in the formation of denominal *-ed* adjectives.

2.2 Number Marking

It is clear now that denominal *-ed* adjectives are undeniably denominal. Next, considerations of number marking and interpretation in the adjectives further reveal that they are based on reduced nominal structures, *n*Ps.

No regular plural morpheme appears inside denominal *-ed* adjectives, as in the case of most compounds and suffixed words in English.[4] The absence of plural marking leaves the nominal base of an *-ed* adjective unspecified for number. As a result, the nominal base is compatible with both singular and plural interpretations, as shown in (4).

(4) a.   one-eyed, one-armed
    b.   two-faced, two-bedroomed
    c.   three-toed, three-cornered

When the nominal base has no numeral in it, the unspecified cardinality of the nominal referent is inferred on the basis of the encyclopedic knowledge, as exemplified in (5)a and (5)b. (5)c shows that the same holds for non-count nouns, which suggests that the nominal base is unspecified for mass/count as well as number.[5]

(5) a. Singular interpretation
    a *big-bellied* man has a big belly
    a *strong-minded* woman has a strong mind
    a *rubber-tipped* stick has a rubber tip
   b. Plural interpretation
    a *hard-featured* actor has hard features
    a *fine-boned* head has fine bones
    a *low-spirited* Alice is in low spirits
   c. Non-count interpretation
    a *grey-haired* poet has grey hair
    a *middle-aged* person is of middle age
    a *cold-blooded* animal has cold blood
               (Gram-Andersen, 1992:22)

Moreover, pluralia tantum nouns can form *-ed* adjectives, as in (6) below, without losing their interpretations.[6] This shows that what is necessary for their interpretation is not lost when they appear in *-ed* adjectives and that overt plural marking per se is not essential in obtaining the interpretation of a pluralia tantum noun.[7]

(6) a. good-mannered
    b. long-trousered
    c. sharp-scissored
    d. spectacled
    e. sunglassed

(7)
```
            DP
           /  \
          D    NumP
              /    \
           Num      nP
                   /  \
                  n    √P
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Given the full-fledged DP structure in English in (7), the absence of determiners suggests that nominal bases for *-ed* are not DPs, which is
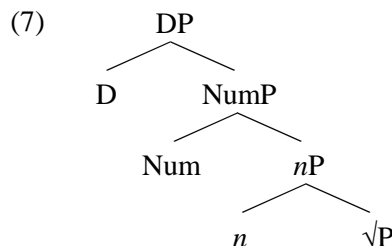
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[4] As is well known, there are cases where irregular plural forms or pluralia tantum nouns appear inside compounds. See Sproat (1985) for discussion.
[5] See Borer (2005) for an approach which derives these distinctions structurally.

[6] When it serves as a modifier, a plural tantum noun like *scissors* can appear in singular form and receives the singular interpretation, e.g., *a scissor blade*.
[7] Gram-Andersen (1992) reports *queer-looksed* and *baggypantsed* as the only cases he found where the regular plural morpheme *-s* appears. Notice that both are plural tantum nouns. The former and its like example *more pleasanter-looksed*, which is unacceptable in PDE, can be found in Jespersen (1942), whose source was the 19th-century writer George Elliot's novel, *Silas Marner*. For the latter, *pants* can appear as it is in other compounds as well (e.g., *pants dress*, *pants pocket*, *pant(s) skirt*, etc.). One possible interpretation is that, for those who allow these compounds, *pants* is registered as a group noun. See also footnote 11 below.

supported by the fact that they are not referential and do not introduce a discourse referent. See (8).

(8) When a four-wheeled vehicle goes through a turn, each of {the (four) wheels/*them} turns at a different speed.

(Google search, with minor changes)

The absence of plural marking further suggests that the Num head and its projection are entirely missing from the structure as well, with *n*P being the base for *-ed*, as we have tacitly assumed.[8]

The same analysis holds in the case of nouns with irregular plural inflection as in (9), with ancillary assumptions concerning irregular plural marking. In this case as well, the absence of Num is crucial in deriving *-ed* adjectives based on them.

(9) a. sheep-Ø, m<u>e</u>n-Ø, m<u>ice</u>-Ø, f<u>ee</u>t-Ø
  b. ox-en, child-(r)en
  c. curricul-a, foc-i, larv-ae, ax-es, criteri-a, temp-i, ind-ices

In the framework of Distributed Morphology, where all words are created in syntax, both regular and irregular plural forms have the same structure: [*n*P Num]. After the syntactic computation, the morphosyntactic features in the terminal nodes in the structure are realized as exponents by the Vocabulary Insertion rules, as in (10):

(10) VI rules for English plural inflection
  a. [−singular] ↔ -s
  b. [−singular] ↔ Ø / X___
    X = {√SHEEP, √MAN, √MOUSE, √FOOT, …}
  c. [−singular] ↔ en / {√OX, √CHILD…}___

In some cases, readjustment rules apply after VI, which bring about stem changes, as in *man~men-Ø*, *mouse~mice-Ø*, *foot~feet-Ø*, and *ox~ox-en*.[9]

Moreover, consider nouns with distinct suffixes for singular and plural forms like *curricul-um~curricul-a*, *foc-us~foc-i*, *larv-a~larv-ae*, *criteri-on~criteri-a*, *ax-is~ax-es*, *temp-o~temp-i*, *ind-ex~ind-ices*, and *matr-ix~matr-ices*.[10] In these nouns, the suffix in the singular form is an exponent of *n*, and the suffix in the plural form is more specified and is an exponent of *n* and the plural feature fused together.

Thus, in the case of singular *curricul-um*, whose structure is represented in (11)a, *-um* is the exponent of *n*, and Ø is the exponent of [+singular], as in (12)a and (12)c. respectively. In the case of plural *curricul-a* in (11)b, *n* and [−singular] undergoes the rule of fusion in (12)d under linear adjacency before VI, and the feature complex [n, −singular] is realized as *-a*, according to (12)b.

(11) a. *curriculum*   b. *curricula*
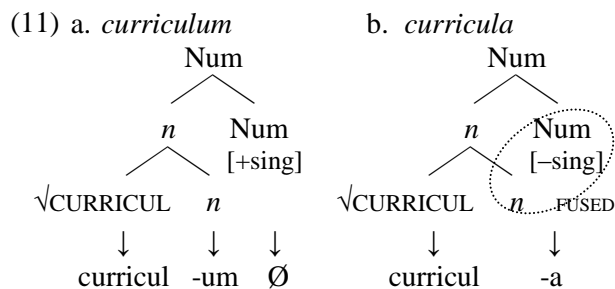
(12) a. *n* ↔ -um / {√CURRICUL, …}___
  b. [*n*, −singular] ↔ -a / {√CURRICUL, …}___
  c. [+singular] ↔ Ø
  d. *n* ⌢ [−singular] → [n, −singular]

In this analysis, what appears to be the singular and plural suffixes in the above foreign nouns are the exponents of *n* and the feature complex of *n* and [−singular], respectively. This treatment is justified by the fact that some of these nouns can have the regular plural suffix *-s,* and, when they do so, they always have the surface form, *Root + n + -s*, and the irregular plural endings never show up with the regular plural suffix, as shown in (13) below:

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[8] Alternatively, the absence of plural marking might suggest that Num is present in syntax but its morphosyntactic feature undergoes deletion before phonological realization, thereby never appearing on the surface. In DM terms, the feature undergoes an impoverishment rule before Vocabulary Insertion. It is technically possible to implement such an analysis, but the trigger of the impoverishment rule is unclear. Thus, I do not pursue this possibility, though it is hard to distinguish between the *n*P analysis in the text and the NumP-cum-impoverishment analysis empirically.

[9] The necessity of readjustment rules in DM has been called into question. See Haugen (2016) for a recent discussion. In

this paper, I follow Halle and Marantz (1993) and assume readjustment rules changing nominal stems for expository purposes. Their effects can be restated without making recourse to readjustment rules.

[10] Note that many of these nouns involve bound roots, which can be categorized by a differemt category-determining head: e.g., *curricul-ar*, *foc-al*, *larv-al*, *criteri-al*, *ax-ial*, etc.

(13) a. curricul-um-s   *curricul-a-s
      b. foc-us-es   *foc-i-s
      c. criteri-on-s   *criteri-a-s
      d. temp-o-s   *temp-i-s
      e. ind-ex-es   *ind-ices-es

This fact can be straightforwardly explained if we assume the VI rules for the *n* head such as (12)a and for the regular plural morpheme in (10)a apply, as a result of the rule of fusion in (12)c not having applied in the structure (11)b.

Turning back to denominal *-ed* adjectives, they can be formed from nouns with irregular plural marking. Crucially, the nominal bases involved are singular (or non-plural) forms, as in (14). Given the discussion so far, this strongly suggests that *n*P, not NumP, is the base for the suffix *-ed*.[11]

(14) a. beautiful-kimonoed
      b. three-footed
      c. raidused
      d. antennaed
      e. two-axised
      f. slow-tempoed

Furthermore, the *n*P-based analysis works well with pluraria tantum nouns, with ancillary assumptions. Specifically, I follow Arregi and Nevins's (2014) analysis of pluralia tantum nouns, where these nouns are assumed to have their *n* head specified for [−group], and, if Num is present in structure, they must appear with the Num head specified as [−singular].[12] The latter requirement is satisfied vacuously in the absence of Num, e.g., in denominal *-ed* adjectives. The relevant structure is represented in (15) below:

(15)

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              a
             / \
            /   \
          n       a
         / \     -ed
        /   \
  √SPECTACLE  n
          [−group]
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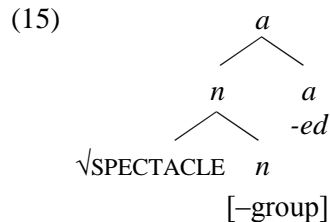
[11] Some speakers accept *-ed* adjectives based on irregular plural forms like *many-peopled*, *buck-teethed*, and the like. I treat their nominal bases as having [+group] specified in the *n* head, together with assumptions of the VI rules deriving their surface forms.

[12] Arregi and Nevins's analysis is based on Harbour's (2011) analysis of Kiowa collective nouns and pluralia tantum nouns.

This way, the plural tantum interpretation, as in (6), can be guaranteed without having overt plural marking, which requires the presence of Num.

All in all, we can safely conclude that denominal *-ed* adjectives involve reduced nominal structures, and they are *n*Ps.

3. No Contextual Allomorphy

Another claim that I would like to put forth is that denominal adjectives show no contextual allomorphy, which will be explicated step-by-step.

First, the *-ed* suffix of denominal adjectives behaves in the same way as that of adjectival and verbal passives in displaying phonologically conditioned allomorphy, as shown in (16).

(16) Phonologically Conditioned Allomorphy
      [əd, ɪd]: red-headed, talented
      [d]: thick-skinned, winged[13]
      [t]: smooth-faced, forked
                          (Gram-Andersen, 1992:18)

Moreover, as has long been noted in the literature (e.g., Quirk *et al.* (1985) and Bauer and Huddleston (2002), among many others), a handful of *-ed* adjectives which do not end with [t] or [d] deviate from the above pattern, having syllabic *-èd* ([əd, ɪd]), either instead of or as well as non-syllabic *-ed* ([d, t]).

(17) a. with *-èd* only
         crooked, dogged, ragged
     b. with *-èd* or *-ed* [14]
         aged, forked, hooked, jagged, legged

Consider the adjectives with syllabic *-èd* in (17). Bauer and Huddleston (2002) treat them as "lexicalized" cases, along with other adjectives like *naked*, *wicked*, and *wretched*. This treatment is compatible with the fact that the regular form of the suffix in question was syllabic *-èd* in Middle English (Harley, 2006). Building on Bauer and Huddleston's insight, I argue that the lexicalized adjectives above are amenable to a different analysis. Specifically, I argue that they are stative participles in the sense of Embick (2003, 2004)

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[13] Note that *winged* has an alternative pronunciation with syllabic *-èd* (Embick, 2000:220 fn.).

[14] Some *-ed* adjectives like *forked* and *hooked* may be derived from their verbal forms.

and that syllabic *-èd* in these adjectives is a case of contextual allomorphy determined by the Root involved.[15,16,17] The structure of stative participles is given in the following:

(18) a.   Asp$_S$P   b.   Asp$_S$

Asp$_S$ √P   √   Asp$_S$

√   …
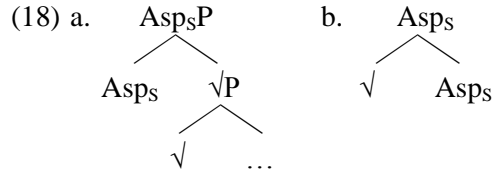
Asp$_S$ is a head which defines a simple state, and, in (18)a, it serves as a category-defining head and adjectivizes a category-neutral Root in its complement.[18] The complex head in (18)b is created in the structure in (18)a, and it undergoes VI from the Root out.

Specifically, for the lexicalized cases above, I argue that they are derived by the VI rule in (19)a below, which Embick (2003) proposes for stative participles like *allegèd*, *blessèd*, and *learnèd*. This amounts to saying that adjectives like *crooked*, *ragged*, and other adjectives with syllabic *-èd* are not denominal and on a par with *allegèd* and the like. On the other hand, those with non-syllabic *-ed* undergoes the VI rule in (19)b.

(19) a. Asp ↔ -èd/{√bless, √allege, √age, …} __
     b. Asp ↔ -ed

(Embick, 2003:158)

This analysis is corroborated by the fact that some adjectives with syllabic *-èd* have meanings unpredictable from their putative nominal bases. Specifically, as we saw at the outset, the meanings of denominal *-ed* adjectives are predictable from their nominal bases fairly easily, construed as 'having N' or 'provided with N', etc. However, the adjectives with syllabic *-èd* in (20) have meanings unpredictable from their components.[19]

(20)   a. crooked: 'bent or twisted'
                     not 'having a crook/crooks'
       b. dogged: 'having tenacity'
                     not 'having a dog/dogs'
       c. ragged: 'torn and in a bad condition'
                     not 'having rags'

This is what is expected under the theory of word formation developed by Marantz (2001).[20] According to his theory, the interpretation of a category-neutral Root is negotiated against the encyclopedic knowledge in the context of the functional head that categorizes it, as a result of which special meanings can arise. Given this, it is strongly suggested that the adjectives in (20) are Root-derived rather than denominal.[21]

The present analysis provides a simple and consistent answer to the cases we have seen so far. However, *leggèd* and related forms appear to resist an explanation along the line suggested here.[22] Specifically, on the assumption that syllabic *-èd* appears as a result of Root-determined contextual allomorphy, *leggèd* is predicted not to appear in denominal adjectives owing to the VI rule in (19)b. However, as (21) shows, *leggèd* can appear with a modifier unlike Root-derived adjectives.[23]

(21)   a. three-leggèd
       b. long-leggèd
       c. cross-leggèd

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[15] See Dubinsky and Simango (1996) for the relation between the syllabic and non-syllabic participial suffixes and adjectival and verbal passives.

[16] As an alternative to the widely held two-way distinction between adjectival and verbal passives, Embick (2003, 2004) proposes for a three-way distinction of so-called past participles: stative, resultative and eventive participles. The first two correspond to (stative) adjectival passives, and the last one to (eventive) verbal passives.

[17] Morita (2015) argues, adopting Nevins and Myler's (2014) √P-based analysis, that denominal *-ed* adjectives are stative participles. I have no objection to equating *-ed* adjectives based on √P with stative participles. However, as we saw in section 2, what we call denominal adjectives are based on *n*Ps and thus should be kept distinct from stative participles.

[18] I assume that several types of Asp in Embick (2003, 2004) and the *a* head forming denominal *-ed* adjectives belong to the same family, while differing in their "flavors," which are reflected in their semantic function. See Embick (2004) for Asp$_S$, which defines a simple state, and Asp$_R$, which takes a *v*P and defines a state out of an event subcomponent.

[19] See Kiparsky (1982) and Arad (2005) for related observations.

[20] See Marantz (2013) and Anagnostopoulou and Samioti (2013) for more recent developments.

[21] Nevins and Myler (2014) argue for the same point, citing adjectives like *blue-blooded* 'noble'. However, their examples are all based on A-N compounds, which can be idiomatic on their own (e.g., *blue blood* 'membership in a noble family').

[22] The alternative with non-syllabic *-ed* poses no problems.

[23] There is considerable variation in the pronunciation of *legged* among speakers, reflecting differences, at least, in region and age. The source of variation is reducible to whether √leg is in the list of the VI rule (19)a and whether the adjective is based on √P or *n*P, to which we will turn shortly.

Thus, we have the situation that the modification relation suggests the structure of the complex head in (22)a, while the contextually determined allomorph suggests that in (22)b. As is clear by now, the adjectives in (21) are cases of bracketing paradox.

(22) a. [$_{Asp}$ [$_n$ [$_\sqrt{}$ [$_a$ $\sqrt{}$three a] $\sqrt{}$leg] n] -ed]
    b. [$_{Asp}$ [$_a$ $\sqrt{}$three a] [$_{Asp}$ $\sqrt{}$leg -ed]]

To resolve the situation, I tentatively propose that complex forms like *three-legged* with syllabic *-èd* are adjectives derived from complex Roots.[24] The relevant structure is represented in (23):

(23) [$_{Asp}$ [$_\sqrt{}$ [$_a$ $\sqrt{}$three a] $\sqrt{}$leg] -ed]
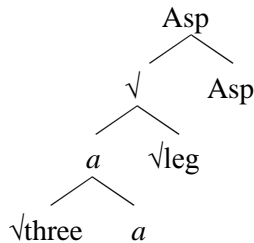
Recall that we have rejected the structure as in (23) as an analysis of denominal *-ed* adjectives in favor of an *n*P-based analysis. What I argue here then is that, although it is not tenable as an analysis of denominal *-ed* adjectives, the $\sqrt{}$P-based analysis is particularly suitable for complex adjectives involving *leggèd* and thus should be adopted as an ad hoc measure to account for the peculiar aspect of $\sqrt{}$*leg*. This treatment seems justified considering the variation in the distribution of *leggèd* among native speakers.[25]

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[24] This is the structure proposed by Nevins and Myler (2014) for denominal *-ed* adjectives in general. See Harley (2009) for a DM analysis of compounds, where complex Roots as in (23) are formed.

[25] One might wonder at this point why denominal adjectives show no contextual allomorphy unlike English past participles. For reasons of space, I cannot discuss this issue in detail, but a brief answer is that, given that contextual allomorphy is restricted to cases where a node can see another node when it is concatenated with it, the Asp head deriving participles can see the Root involved despite the intervening heads, i.e., *v* and Voice, while the adjectivizing head *-ed* cannot due to the *n* head, as we saw in the text. See Embick (2010) for a proposal that can derive the distinction between these heads.

Alternatively, the distinction can be captured by the notion of span and the Span Adjacency Hypothesis (Merchant, 2015),

To sum up this section, it can be concluded that denominal *-ed* adjectives show no contextual allomorphy and that the putative allomorph, syllabic *-èd*, is in fact the exponent of Asp$_S$ which can be realized only in the context of a limited number of Roots.

4. The Source of Possession Meaning

As we saw at the outset, the meaning of a denominal *-ed* adjective is fairly predictable and construed as 'possessing N' or 'provided with N'. Pretheoretically, it might appear that the meaning of possession arises as a result of affixation of *-ed*.

To account for this semantic property of denominal *-ed* adjectives, I follow Nevins and Myler (2014) and propose that the adjectivizing suffix *-ed* has the following denotation:

(24) ⟦ *a(-ed)* ⟧ = $\lambda R \lambda x \exists y [R(x,y)]$

Here *R* is a variable for a 2-place relation, and this ensures that *n*P is restricted to relational nouns like nouns of inalienable possession.

The denotation in (24) is quite reminiscent of that of possessive determiners in English (e.g., the Saxon genitive, *'s*), and one might suspect that *-ed* is the adjectival version of the possessive determiner. However, the two cannot be equated even if the categorial difference is taken into consideration. Specifically, the adjectivizing suffix and the possessive D are crucially different in that the latter, which is semantically transparent as in (25)a below, can undergo type-shifting so that it can accommodate non-relational possessees, while the former cannot. Thus, when a possessee is a non-relational noun, the type-shifting operator in (25)b kicks in, thereby allowing the possessee to be in a free, pragmatically controlled relation with the possessor (Barker, 1995; 2011).[26]

(25) a. ⟦ D$_{POSS}$ ⟧ = $\lambda R[R]$
    b. π = $\lambda P \lambda x \lambda y [P(y) \wedge R(x,y)]$

As a result, both relational and non-relational nouns can appear as a possessee in possessive DPs, as shown in (26) and (27), respectively.

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which makes reference to the notion of extended projection (Grimshaw, 2005).

[26] See also Partee and Borshev (2003).

(26) $[\![$ *John's leg* $]\!] = [\![$ D$_{POSS}$ *leg* $]\!]([\![$ *John* $]\!])$
$= ([\![$ D$_{POSS}$ $]\!]([\![$ *leg* $]\!]))(\mathbf{j})$
$= (\lambda R[R](\lambda x \lambda y[\mathbf{leg}(x,y)]))(\mathbf{j})$
$= \lambda x \lambda y[\mathbf{leg}(x,y)](\mathbf{j})$
$= \lambda y[\mathbf{leg}(\mathbf{j},y)]$

(27) $[\![$ *John's log* $]\!] = (\pi ([\![$ D$_{POSS}$ *log* $]\!]))([\![$ *John* $]\!])$
$= (\pi ([\![$ D$_{POSS}$ $]\!]([\![$ *log* $]\!])))(\mathbf{j})$
$= (\pi (\lambda R[R](\lambda y[\mathbf{log}(y)])))(\mathbf{j})$
$= (\pi (\lambda y[\mathbf{log}(y)]))(\mathbf{j})$
$= (\lambda x \lambda y[\mathbf{log}(y) \wedge R(x,y)])(\mathbf{j})$
$= \lambda y[\mathbf{log}(y) \wedge R(\mathbf{j},y)]$

In the case of the adjectivizing suffix, since the suffix does not undergo type-shifting, the nominal bases are restricted, as (28) shows:

(28) a. relational
white-haired, hot-blooded, strong-willed, thick-voiced, simple-minded, good-natured, beaked, hoofed, horned, tailed, petalled, barked, branched, fringed, etc.
b. non-relational: clothes and accessories
white-capped (nurse), gloved (hand), silver-sandaled (feet), gold-ringed (finger), white-aproned (landlord), etc.

What is to note is that a class of non-relational nouns denoting clothes and accessories can be nominal bases for the adjectivizing suffix, whose denotation is fixed as in (24). I argue that this is possible because this class of nouns are coerced into relational nouns. Specifically, by building on the insight of Vikner and Jensen (2002), I argue that they can undergo type-shifting on the basis of their telic function (i.e., clothes are to wear), as a result of which the concomitant meaning-shift operation derives the relational denotation in (29) from the original, non-relational one: $\lambda x[\mathbf{CLOTHES}(x)]$ (where **CLOTHES** stands for any noun denoting clothes or accessories).[27]

(29) $\lambda y[\lambda x[\mathbf{CLOTHES}(x) \wedge \mathbf{wear}(y,x)]]$

I further argue that the meaning shift is possible as a result of negotiation with the encyclopedic knowledge, in particular, what we know about clothes: In a nutshell, cloths are for wearing, and wearing necessitates physical contact with body-parts, which allows them to be treated as relational. This meaning shift basically explains why denominal *-ed* adjectives based on this class of nouns are used for situations where they are worn, not possessed.

Therefore, it seems plausible to say that, for type-shifting of non-relational nouns to relational ones to be successful, concomitant meaning-shift must be such that it supports the relational interpretation. This presumably explains why the following adjectives are unacceptable.

(30) a. *two-carred (man)
b. *big-officed (president)
c. *good-jobbed (student)

To sum up this section, the adjectivizing suffix has the denotation in (24), which serves to restrict only relational nouns, underived and derived, to appear in denominal *-ed* adjectives. This is in sharp contrast with the possessive determiners in English, which can accommodate both relational and non-relational nouns, undergoing type-shifting if necessary.

5. Conclusion and Further Issues

We have discussed denominal *-ed* adjectives in light of recent advances in linguistic theory and have shown that, once you specify the adjectivizing suffix as taking a relational *n*P as input, all the properties discussed in this paper follow as consequences of independently motivated principles of grammar and the external system. However, I have left out many interesting issues concerning denominal *-ed* adjectives such as the derivation of their nominal bases, their stress patterns, their non-literal meanings, which are derived from their primary meanings, and so on. Needless to say, more research is needed for further understanding.

Acknowledgments

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[27] Vikner and Jensen's (2002) analysis, originally proposed to account for genitive possesssives, is couched within the framework of Generative Lexicon Theory (Pusktejovsky, 1995). I remain agnostic about whether the information in the qualia structure is part of lexical knowledge or not.

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