

Syntactic category information and the semantics of derivational morphological rules

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Abstract

In standard generative approaches, word-formation rules contain, among other things, information on the semantics of the suffix and the syntactic category (or word-class) of possible bases. Based on the general assumption that word-class specification of the input is a crucial ingredient of derivational morphology, far-reaching claims have been made. For example, the unitary base hypothesis (Aronoff 1976) states that word-formation rules can take only bases as input that share syntactic category information. This generative position is a reflection of the well-established traditional descriptive practice of talking about affixes as being, for example, 'deverbal', 'deadjectival' or 'denominal'. Thus, across the different theoretical camps, the syntactic category of the base is, implicitly or explicitly, assumed to be central to any account of affixal behavior.

In the present paper this view is challenged and it is claimed that derivational morphology does not necessarily make reference to syntactic category information in the input. It will be shown that the word-class specification of the input of word-formation rules creates numerous empirical and theoretical problems that have been largely ignored in the literature. It is argued that there are productive affixes where the syntactic category of potential base words is only a by-product of the semantics of the process. The data even strongly suggest that input word-class specification should be generally abandoned.

Based on the analysis of a large number of English affixes and an in-depth analysis of a subset of these affixes it will be shown that the inclusion of syntactic category information in the word-formation rules under investigation makes wrong predictions for significant portions of the data and fails to account for the phonological and semantic patterns observable in these morphological categories. In contrast, a semantic, output-oriented approach is much more successful in coping with these problems.

The radical position put forward in this paper has serious implications for morphological theory. Theories of syntax crucially make use of word-class information to specify the input of syntactic rules. If there are morphological rules that do not make reference to syntactic category in specifying their input, we are forced to acknowledge a vital difference between (derivational)

morphology and syntax. Thus, the present paper also provides a new kind of argument against the view that morphology is the syntax of words.

1. Introduction*

It is generally assumed that word-formation rules contain, among other things, information on the semantics of the suffix and the syntactic category (or word-class)¹ of possible bases. This is true for both generative approaches to word-formation (à la Aronoff 1976) and traditional work (such as Marchand 1969), and finds a reflex in the standard practice to categorize and describe word-formation processes or affixes as being, for example, 'deverbal', 'deadjectival' or 'denominal'. Based on the general assumption that word-class specification of the input is a crucial ingredient of derivational morphology, far-reaching claims have been made. For example, the Unitary Base Hypothesis (Aronoff 1976) states that word-formation rules can take only bases as input that share syntactic category information. In sum, and across all theoretical camps, the syntactic category of the base is, implicitly or explicitly, assumed to be central to any account of affixal behavior.

In this paper I will challenge this view and make the rather bold claim that derivational morphology (at least in some languages) does not necessarily make reference to syntactic category information in the input. In fact, it will be shown that the word-class specification of the input of word-formation rules creates numerous empirical and theoretical problems that have been largely ignored in the literature. I will therefore argue for an alternative hypothesis: with at least some productive affix, the syntactic category of potential base words is only a by-product of the semantics of the process. One could even venture the more radical hypothesis that in general the word-class of the input does not play a role.

The hypothesis that input word-class information is not crucial to word-formation rules has - in some form or another - been put forward earlier (for example by Plank 1981, Plag 1998, 1999, Ryder 1999, Montermini 2001), but has never been systematically investigated in more detail or across larger sets of affixes. This will be

done in the present paper using large amounts of English data from the OED (neologisms) and the BNC (hapax legomena).²

It will be shown that the Unitary Base Hypothesis is untenable in view of both the massive counter-evidence in the data and the theoretical problems involved in establishing an adequate system of category features. Furthermore, the inclusion of syntactic category information in the word-formation rules under investigation makes wrong predictions for significant portions of the data and fails to account for the phonological and semantic patterns observable in these morphological categories. In contrast, a semantic, output-oriented approach is much more successful in coping with these problems. The position put forward in this paper has serious theoretical implications because it can be interpreted as evidence for a principled distinction between morphology and syntax and against traditional concepts of word-formation rules.

The paper is structured as follows. In section 2, I will briefly review the status of syntactic category information in word-formation theory. Section 3 presents an analysis of 75 affixes of English and their behavior with regard to the word-class of their bases. This is followed in section 4 by an in-depth analysis of a subset of these affixes, the productive affixes *-er*, *-ee*, *-able*, *-ize/-ify* and *un-*. Section 5 will discuss the theoretical implications of the proposed account.

2. Background: Word-class information in derivational morphology

In studies of morphology, be it inflection, derivation or compounding, crucial reference is made to the syntactic category of the input. This paper does not make any claims about the role of word-class in inflection or compounding but focuses on derivational morphology. In this area, one can easily find statements such as “affixes are sensitive to the word-class of the stem to which they attach” (Berg 2003:286) in both specialized articles and in textbooks (cf. Bauer 1988, Carstairs-McCarthy 1992, Plag 2003:31). Even the title of articles suggests that the input word-class is a distinguishing property of derived words, as in Stiebel’s (1998) “Complex denominal verbs in German”, or Gussmann’s (1987) “The Lexicon of English De-adjectival

Verbs”, to mention only two of very many similar examples. What is important to note here is the implicit claim made by these authors that verbs derived on the basis of other base categories would behave decisively different and would form an entirely distinct morphological category. These claims are sometimes made explicit, as in a recent book by Heyvaert, who states that “[a]n account of *-er* nominalizations ... will have to distinguish deverbal *-er* nominals from *-er* nominals with non-verbal bases” (Heyvaert 2003: 105). Such claims are, as we will shortly see, often ill-founded.

Other authors have structured their monographs by making reference to input word-classes. For example, Adams (2001) has a chapter entitled “Chapter 2: Transposition” in which “we shall look at the various patterns in which a member of one word-class can serve as base for a member of another” (Adams 2001:19).

Generative formalizations of word-formation rules also specify the syntactic category of the input, no matter whether these formalizations are framed in terms of word-formation rules, templates, or affix entries. Examples are given in (1) and (2):

- (1) a. $[x]_V \rightarrow [[x]_V er]_N$,someone who Vs’, word-formation rule
 b. $[[x]_V er]_N$,someone who Vs’, template
 c. *-er*: [V ___] ,someone who Vs’, affix entry

- (2) Word formation rule for the prefix *un-*
 phonology: /ʌn/-X
 semantics: ‘not X’
 base: X = adjective (Plag 2003:31)

The commonly shared idea of the significance of word-class specifications in derivation culminated in Aronoff’s unitary base hypothesis, formulated as follows:

(3) **Unitary Base Hypothesis**

“The syntacticosemantic specification of the base ... is always unique. A WFR [Word Formation Rule, I. P.] will never operate on this or that.”

(Aronoff 1976:48)

In sum, there seems to be a consensus among students of word-formation that the specification of the syntactic category of the base is crucial to derivational processes.

Although the unitary base hypothesis has been found to be problematic on both empirical and theoretical grounds (e.g. Plank 1981: 43-65, Plag 1999: 47-48, Gaeta 2000, Montermini 2001), no systematic analysis of a broad range of affixes in one language has been entertained to check the significance of syntactic input specification or the validity of the unitary base hypothesis. This will be done in the next section.

3. The facts: A survey of suffixes

In the following, I present two tables with 41 suffixes and 34 prefixes, respectively, with some of their properties listed in different columns, including examples, the syntactic category of the base, the syntactic category of the derived word, and the semantic category of the derived word. The data for this survey (as well as for the in-depth analysis of some selected affixes in section 4) come from a variety of secondary sources (e.g. Marchand 1969, Bauer 1983, Adams 2001, Plag 2003, and numerous articles on individual affixes), complemented by data from the BNC, the OED, and the internet.

(4) English suffixes and their base categories (N = 41)

	suffix	examples	majority base category/-ies	minority base category/-ies	derived category	semantic category of derivative
1.	-able ₁	<i>readable</i> <i>jeepable</i>	V	N, root	A	qualitative adjective
2.	-able ₂	<i>knowledgeable</i>	N		A	'characterized by X'
3.	-age	<i>leakage</i> <i>yardage</i>	N, V		N	activity, quantity
4.	-al ₁	<i>refusal</i>	V		N	nomen actionis
5.	-al ₂	<i>colonial</i>	N	root	A	relational adjective
6.	-ance	<i>acceptance</i>	V		N	nomen actionis
7.	-ant	<i>defendant</i> <i>attractant</i>	V		N	person/substance
8.	-ary	<i>revolutionary</i>	N		A	relational adjective
9.	-ate	<i>fluorinate</i> <i>regulate</i>	N	A, root	V	ornative verb

	suffix	examples	majority base category/-ies	minority base category/-ies	derived category	semantic category of derivative
10.	-cy/-ce	<i>convergence</i>	A (in -ant/-ent)		N	state, property, quality or fact
11.	-dom	<i>freedom</i> <i>stardom</i>	N	A	N	'status, realm, collectivity'
12.	-ed	<i>wooded</i> <i>pig-headed</i>	N, phrases		A	'provided with X'
13.	-ee	<i>employee</i> <i>festschriftee</i>	V	N, root	N	sentient being (non-agent)
14.	-eer	<i>mountaineer</i>	N	root	N	person noun
15.	-en	<i>deepen</i> <i>strengthen</i>	A	N	V	change-of-state etc. verb
16.	-er	<i>baker</i> <i>Londoner</i>	N, V	numerals, phrases, root	N	person/instrument/etc.
17.	-(e)ry	<i>brewery</i> <i>rabbitry</i>	N, V		N	place noun
18.	-esque	<i>Chaplinesque</i>	N		A	qualitative adjective
19.	-ess	<i>princess</i>	N		N	female animal or person
20.	-ful ₁	<i>careful</i> , <i>forgetful</i>	N	V	A	qualitative adjective
21.	-ful ₂	<i>cupful</i>	N		N	partitive noun
22.	-hood	<i>childhood</i> <i>falsehood</i>	N	A	N	'state of being X'
23.	-(i)an	<i>historian</i> <i>Chomskyan</i>	N	root	N	person noun
24.	-ic/ical	<i>heroic</i> <i>historical</i>	N	root	A	relational adjective
25.	-ion	<i>starvation</i> <i>sedimentation</i>	V	N, root	N	nomen actionis
26.	-ify	<i>personify</i> <i>solidify</i>	A	N, root	V	change-of-state etc. verb
27.	-ish	<i>Jewish</i> <i>schoolboyish</i> <i>greenish</i> <i>soonish</i> <i>fortyish</i> <i>stick-in-the-muddish</i>	N, A, adverb, numeral	phrase	A, adverb, numeral	simulative adjective
28.	-ism	<i>Parkinsonism</i> <i>blondism</i>	N	A, root	N	abstract noun
29.	-ist	<i>fantasist</i> <i>minimalist</i>	N	A, root	N	person noun
30.	-ity	<i>profundity</i>	A	root	N	abstract noun
31.	-ive	<i>connective</i>	V	root	A	relational adjective
32.	-ize	<i>normalize</i> <i>hospitalize</i>	N, A	root	V	change-of-state etc. verb
33.	-less	<i>careless</i>	N		A	'without X'
34.	-ling	<i>duckling</i>	N		N	young animal, (young) human being
35.	-ly	<i>fatherly</i> <i>deadly</i>	N	A	A	simulative
36.	-ment	<i>enjoyment</i>	V	root	N	nomen actionis

	suffix	examples	majority base category/-ies	minority base category/-ies	derived category	semantic category of derivative
37.	-ness	<i>kindness</i> <i>over-the-top-ness</i>	A	N, Phrases	N	quality noun
38.	-ous	<i>famous</i>	N	root	A	relational/qualitative adjective
39.	-ship	<i>friendship</i>	N		N	status, collectivity
40.	-th	<i>depth</i> <i>growth</i>	A, V	root	N	quality noun/nomen actionis
41.	-wise	<i>food-wise</i> <i>cross-wise</i>	N		Adverb	manner/ dimension adverbs and viewpoint adverbs

The table in (4) shows that many suffixes take more than one base category. It also makes the implicit claim that different input word-classes are quantitatively not evenly distributed, i.e. there are minority and majority patterns. For example, *-ion* (and its variants *-ation* and *-ication*) mostly take verbs as their bases, but a minority of forms are derived from nouns (see Plag 1999:207, for discussion).

A survey such as the one in (4) raises also some methodological questions. The first is the treatment of roots as a base category. Some prefixes take bound roots as their bases (as, for example, *-al* and *-ize*, cf. *feder-al* or *bapt-ize*), which are commonly taken to have no word-class specification (cf. e.g. Giegerich 1999 for English). Including 'root' as a kind of input category increases the number of apparent violations of the unitary base hypothesis.

Another methodological problem concerns the question of affix homophony versus polysemy. For example, I have assumed that there are two *-able* suffixes, one with the meaning 'characterized by X', the other creating qualitative adjectives with what is often referred to as a 'passive' meaning, usually paraphrased as 'can be VERBed' (e.g. Aronoff 1976). Thus one could immunize the unitary base hypothesis by proposing two different homophonous affixes whenever one encounters an affix taking two different kinds of input word-classes. The decision for or against affix homophony in table (4) was therefore made on an output-oriented basis. This means that, at least for category-determining affixes, the derivatives of a certain morphological category can be characterized uniquely in terms of their phonological, semantic, and syntactic properties (cf. Aronoff 1976:22, Scalise 1984:137, 1988:232, Szymanek 1985:95, see Plag 1999:49 for discussion). According to this so-called

unitary output hypothesis we have to state that, for example, adjectival *-al* is a different suffix from nominal *-al*, irrespective of their input categories.

Let us turn to the prefixes, where the situation is slightly different. Consider (5):

(5) English prefixes and their base categories (N = 34)

	prefix	examples	majority base category/-ies	minority base category/-ies	derived category	semantic category of derivative
1.	<i>a(n)-</i>	<i>ahistorical</i>	A		A	negation
2.	<i>ante-</i>	<i>antegarden</i> <i>antedate</i>	N, V		N, V	locative/temporal
3.	<i>anti-</i>	<i>anti-capitalistic</i> <i>anti-abortion</i> <i>anti-freeze</i>	A, N, V		A, N, V	adversative
4.	<i>bi-</i>	<i>bilateral</i> <i>bifurcation</i>	A, N		A, N	quantification
5.	<i>co-</i>	<i>co-harmonious</i> <i>co-author</i> <i>co-operate</i>	A, N, V		A, N, V	manner
6.	<i>counter-</i>	<i>counterexample</i> <i>counteract</i> <i>counterclockwise</i>	N, V	Adverb	N, V, Adverb	adversative
7.	<i>de-</i>	<i>dethrone</i> <i>decolonize</i>	N, V		V	negation
8.	<i>di-</i>	<i>disyllabic</i>	A		A	quantification
9.	<i>dis-</i>	<i>dishonest</i> <i>disfluency</i> <i>disobey</i>	A, N, V		A, N, V	negation
10.	<i>endo-</i>	<i>endocentric</i> <i>endocrinology</i>	A, N		A, N	locative
11.	<i>fore-</i>	<i>forefather</i> <i>foresee</i>	N, V		N, V	temporal
12.	<i>hyper-</i>	<i>hyper-active</i> <i>hyper-market</i>	A, N		A, N	quantification
13.	<i>in-</i>	<i>inactive</i>	A		A	negation
14.	<i>inter-</i>	<i>interbreed</i> <i>intergalactic</i>	N, V		N, V	locative
15.	<i>intra-</i>	<i>intramuscular</i> <i>intrasusception</i>	A, N		A, N	locative
16.	<i>macro-</i>	<i>macro-biotic</i> <i>macro-economics</i>	A, N		A, N	quantification
17.	<i>mal-</i>	<i>malnutrition</i> <i>malfunction</i>	N, V		N, V	judgmental
18.	<i>micro-</i>	<i>micro-surgical</i> <i>microwave</i>	A, N		A, N	quantification
19.	<i>mis-</i>	<i>misinterpret</i> <i>mistrial</i>	N, V		N, V	judgmental
20.	<i>multi-</i>	<i>multi-lateral</i> <i>multi-purpose</i>	A, N		A, N	quantification
21.	<i>neo-</i>	<i>neoclassical</i> <i>Neo-Latin</i>	A, N		A, N	temporal

	prefix	examples	majority base category/-ies	minority base category/-ies	derived category	semantic category of derivative
22.	<i>non-</i>	<i>non-commercial</i> <i>non-member</i>	A, N		A, N	negation
23.	<i>omni-</i>	<i>omni-present</i>	A		A	quantification
24.	<i>para-</i>	<i>para-psychic</i> <i>para-crystal</i>	A, N		A, N	locative
25.	<i>poly-</i>	<i>poly-centric</i> <i>polyclinic</i>	A, N		A, N	quantification
26.	<i>post-</i>	<i>postmodern</i> <i>postmodify</i> <i>postwar</i>	A, N, V		A, N, V	temporal
27.	<i>pre-</i>	<i>predetermine</i> <i>preconcert</i> <i>premedical</i>	A, N, V		A, N, V	temporal
28.	<i>pseudo-</i>	<i>pseudo-elegant</i> <i>pseudo-socialism</i>	A, N		A, N	judgmental
29.	<i>retro-</i>	<i>retropresbyteral</i> <i>retrocognition</i> <i>retroform</i>	A, N, V		A, N, V	temporal
30.	<i>semi-</i>	<i>semi-conscious</i> <i>semi-desert</i>	A, N		A, N	quantification
31.	<i>trans-</i>	<i>transcontinental</i> <i>transmigrate</i>	A, V		A, V	locative
32.	<i>un-</i>	<i>unkind</i> <i>un-Hollywood</i> <i>unwrap</i>	A, N, V		A, N, V	negation
33.	<i>uni-</i>	<i>unilateral,</i> <i>unicode</i>	A, N		A, N	quantification
34.	<i>vice-</i>	<i>vice-president</i>	N		N	manner

Although the prefixes, similar to suffixes, often attach to more than one input category, their output is also often diverse. The reason for this is that the pertinent prefixes are not acting as heads, i.e. they do not have a specific word-class of their own but are transparent for the word-class specification of the base.

The table in (6) quantifies over the tables in (4) and (5):

(6) a. Distribution of multiple word-class input: suffixes and prefixes

	suffixes	prefixes	affixes
number of affixes, total	41	34	75
more than one base category (without 'root')	20	29	49
three or more base categories (without 'root')	3	8	11
average number of different word- classes as bases (with 'root')	2.1	2.1	2.1

b. Combinations of different input word-classes across affixes

	suffixes	prefixes	affixes
A, N	11	14	25
N, V	7	7	14
A, V	1	1	2
A, N, V	-	7	7
other	1	-	1

(6a) shows that, overall, we end up with an average of 2.1 word-classes for prefixes and 2.1 for suffixes if we include ‘root’ in our inventory of word-class specifications. This is broadly in line with Berg’s (2003:300) finding that “both prefixes and suffixes combine with an average of 1.4 word-classes”, which was based on a much smaller data-base (only CELEX, Baayen et al. 1995) and which did not include roots as a base category.

In (6b) we see that many different word-class combinations are attested. Some affixes attach to nouns and verbs, others to nouns and adjectives and some to adjectives and verbs. Seven affixes, all of them prefixes, attach to all three major categories. Further combinations involving other categories (such as numerals, adverbs or phrases) are also attested.

The state of affairs revealed by the survey of a wide range of affixes has important implications for the role of word-class information in derivational morphology. First, even if we disregard roots as a base category, which is a conservative decision rather in favor of the unitary base hypothesis, we still find a violation of the hypothesis in 49 out of 75 cases, as shown in the table in (6). Second, it seems that no current feature system can capture the distribution of input word-classes. Traditional feature systems like the often employed $[\pm N, \pm V]$ system cannot cope meaningfully with the many different combinations of word-classes that we find, for example $[N, V, \text{Adverb}]$ for *counter-*, or $[N, V, \text{numerals, phrases}]$ for *-er*. And even if it could, we would still have no explanation for the quantitative differences in terms majority and minority choices with regard to input word-class. Third, in spite of the different kinds of input categories, the output is semantically and phonologically uniform, which can in no way be derived from the unitary base

hypothesis. The latter fact does not come out in the above tables, which do not make reference to morpho-phonological patterns, but it is clear from many pertinent studies that even in cases of strong stem allomorphy, the output patterns are phonologically quite uniform (see, for example, Plag 2003, for an overview and further references). Such output uniformity would come as a surprise in an input-oriented model of derivational morphology.

A fourth, and perhaps more principled, problem for the unitary base hypothesis (and in fact for any other input-oriented approach) is the question of why we should find different word-classes as inputs in the first place? Which ones would be expected for a given affix? Which ones would not?

In the following section I will address these problems by venturing the hypothesis that it is the semantics that is responsible for the observed patterns of base selection, and that input word-class information is superfluous or epiphenomenal.

4. Some case studies: *-er, -ee, -able, -ize/-ify, un-*

In this section we will look more closely at some morphological categories that are particularly annoying for proponents of the idea that word-class specification of the input is a crucial ingredient of any word-formation process. The in-depth analysis will show that the four problems mentioned in the preceding section can be solved by a closer inspection of the semantics of the morphological category in question. The argument will roughly run as follows. Discarding the word-class specification from our word-formation rules and thus the unitary base hypothesis from our morphological theory immediately solves the first problem. The second problem, the one concerning a possible feature system to potentially unify the different word-classes, is also avoided if we do not posit a word-class specification for the input in the first place. An output-oriented approach solves the third problem, and we are left with the rather serious problem why we do find certain bases with a given affix and not others. In other words, how can our theory of word-formation be constrained if we get rid of the unitary base hypothesis, which has been proven to be empirically

and theoretically inadequate? My answer to this question is that the semantics does the job.

In the following we will look at the six affixes *-er*, *-ee*, *-able*, *-ize/-ify*, *un-* and their combinatorial properties (with regard to syntax and semantics) in order to see how the problem of word-class specification can be solved. For reasons of space, not all potentially problematic points can be adequately dealt with and the discussion of each suffix must be comparatively brief. For more detailed discussion the reader is referred to the pertinent literature cited below. The general point I want to make is that we find a non-negligible number of affixes for which a semantically-based, output-oriented analysis is much more preferable than any conceivable word-class-based one.

4.1. The suffix *-er*

Let us start our investigation with the noun-forming suffix *-er*. This suffix is extremely flexible with regard to what it accepts as its base. Consider the derivatives in (7):

(7) The versatility of *-er*

deverbal	<i>writer, singer</i>
de-adjectival	<i>loner, foreigner</i>
denominal	<i>banker, Londoner, pinstriper, weekender</i>
dephrasal	<i>four-wheeler, five-leafer, left-hander</i>

Traditionally, accounts of the behavior of *-er* derivatives have focused on deverbal forms, devising analyses largely based on argument structure. Examples of this type of approach are Levin & Rappaport (1988) and Rappaport Hovav & Levin (1992), who claim that *-er* nominals refer to the external argument (usually the surface subject) of the base verb and hence are derived only from verbs which have external arguments. In a more recent study, Heyvaert (1997) takes into account the much more diverse data and provides an alternative analysis based on a revised and more liberal

notion of subjecthood. Other treatments, such as Baeskow (2002:121ff), acknowledge at least the fact that there are denominal derivatives but simply posit a two-part subcategorization frame, one nominal, one verbal, without addressing the problem of multiple base selection, or without acknowledging the additional facts that de-adjectival and dephrasal forms are also not uncommon. For example, Heyvaert (2003), working in a cognitive-linguistic framework, states that “[a]n account of *-er* nominalizations ... will have to distinguish deverbal *-er* nominals from *-er* nominals with non-verbal bases” (2003: 105). The problem of why both kinds of bases (and, in fact, even some more) can be used with that suffix, remains to be answered.

A completely different approach is taken by Ryder (1999), who argues that *-er* nominals are interpreted on the basis of the most plausible event schemas associated with the base, similar to noun-noun compounds.³ No matter what kind of base is chosen (be it verbal, nominal, adjectival or phrasal), the resulting form must evoke an event schema in which the resulting nominal can be meaningfully interpreted as a participant.⁴ Thus words like *3-incher* and *birthdayer*, similar to compounds, receive different interpretations, depending on the context in which they occur (see Ryder 1999:292, 284, respectively):

(8) a. *3-incher*

3-inch-wide moulding (interpretation preferred by carpenters)

3-inch-diameter pipe (interpretation preferred by plumbers)

3-inch-deep seam (interpretation preferred by tailors)

b. *birthdayer*

person having a birthday

person giving the party

person attending the party

present given

birthday cake

In sum, we can conclude that it is the semantics that is responsible for the combinatorial possibilities of *-er*, with word-class restrictions being best regarded as

an epiphenomenon. The closely-related suffix *-ee* is another case in point, as we will shortly see.

4.2. The suffix *-ee*

In the analysis of derivatives in *-ee* three basic patterns can be distinguished. The suffix attaches to transitive verbs, with the derivatives referring to the object of the verb, as in (9a). The suffix also attaches to verbs of different transitivity to form nouns that refer to the subject of these verbs, as in (9b), and to nouns, adjectives and phrases to refer to entities participating in some event which is connected to the denotation of the base (9c).

- (9)
- a. *employee, addressee, nominee*
 - b. *attende, escapee, standee*
 - c. *asylee, festschriftee, blind datee, redundantee*

Recent accounts of *-ee* (Barker 1998, Muñoz 2003, Lieber 2004) have argued against syntactically-based analyses and have proposed semantically-based solutions to the problem of which kinds of bases can combine with *-ee*. My account will be largely based on the work by Barker (1998).⁵ He presents authentic data from various sources which show that the third class of derivatives, i.e. those in (9c), cannot be explained away as aberrant or morphologically ill-formed, since it is moderately productive and new forms can easily be found in larger corpora or dictionaries. This point is illustrated here by giving only one such attestation:

- (10) “It is so very important to understand the difference between an immigrant, an asylee, a refugee and an illegal immigrant.” (from Barker 1998: 700)

How do syntactically-oriented approaches deal with this apparent diversity of *-ee* derivatives? Two approaches can be observed. Most accounts either ignore the problem and only analyze one type of derivative, or the problem is treated in a

purely technical manner, ignoring the question of why there should be this diversity with regard to input categories in the first place. Baeskow (2002:121ff) is a recent example of the latter type of approach, simply proposing a two-part subcategorization frame, one nominal, one verbal.

Barker makes the crucial observation that an account in terms of argument structure must fail because “the argument structure for a deverbal noun does not necessarily depend on the syntactic argument structure of its verbal stem at all, but can refer directly to the meaning of the stem” (Barker 1998: 696, see Muñoz 2003:157 for a similar approach, though framed in terms of qualia structure, Pustejovsky 1991, 1995). As an alternative, he posits three crucial semantic restrictions on *-ee* nouns:

(11) Semantic restrictions on *-ee* nouns (Barker 1998)

a. Episodic linking

“the denotation of an *-ee* noun must be episodically linked to the denotation of its stem. The intuition behind episodic linking is very simple: the referent of a noun phrase headed by an *-ee* noun must have participated in an event of the type corresponding to the stem verb. For example, in order to qualify as a *gazee* it is necessary to participate in a certain role in a gazing event.” (p. 711)

b. Non-volitional participation⁶ (cf. e.g. *standee*, *asylee*)

c. Sentience (cf. e.g. *amputee* *‘amputated limb’)

In his informal explanation of his notion of episodic linking Barker refers to the ‘stem verb’, but the notion can be easily extended to nouns that evoke salient events. Compare the formal definition of episodic linking in (12), which does not make reference to word-classes, but to a set of events that can be associated with the stem:

(12) “A derived noun N is EPISODICALLY LINKED to its stem S iff for every stage $\langle x, e \rangle$ in the stage set of N, e is a member of the set of events that characterizes S.”

(Barker 1998: 712)

Concerning the non-deverbal *-ee* nouns Barker states that

these *-ee* nouns are just as strongly episodic as deverbal *-ee* nouns. A giftee is necessarily a participant in a gift-giving event, a blind datee is a participant in a blind date event, and a festschriftee is a participant in a festschrift dedication event. All that is required to satisfy the definition of episodic linking ... is that the stem be associated with a set of eventualities that can serve as qualifying events, and the attested uses of nominal stem *-ee* nouns satisfy this requirement. (Barker 1998: 717)

In (13) I have listed a set of non-deverbal forms that illustrate Barker's point further.

(13) Non-deverbal *-ee* derivatives (Barker 1998: 716)

<i>aggressee</i>	<i>asylee</i>	<i>benefactee</i>	<i>biographee</i>
<i>blind datee</i>	<i>chargee</i>	<i>cognizee</i>	<i>custodee</i>
<i>debtee</i>	<i>donee</i>	<i>executionee</i>	<i>festschriftee</i>
<i>galee</i>	<i>giftee</i>	<i>handshakee</i>	<i>inquisitee</i>
<i>letteree</i>	<i>malefactee</i>	<i>mentee</i>	<i>missionee</i>
<i>moneylende</i>	<i>optionee</i>	<i>patentee</i>	<i>philanthropee</i>
<i>pickpocketee</i>	<i>politicee</i>	<i>preceptee</i>	<i>redundantee</i>
<i>refugee</i>	<i>return adreesee</i>	<i>sharkee</i>	<i>tutee</i>
<i>venerealee</i>	<i>wardee</i>	<i>warrantee</i>	

We can now not only explain why certain word-classes enter the process, but we can even account for the quantitative patterning. In general, every base is a possible base that can be meaningfully interpreted in terms of the semantic restrictions given in (11). Given the right context (for example, a discourse on business plans and redundancies) the adjective *redundant* may well serve as the basis of *-ee*. The flexibility of this mechanism is responsible for the fact that we find more than one word-class. But why do we find so many verbs and so few nouns or adjectives? Again, the semantics is responsible. Nouns in *-ee* refer to participants of events, and these events are designated by the base word. Events are typically signified by verbs, hence we find many more verbs as bases of *-ee* than exponents of other word-classes.⁷

4.3. The suffix *-able*

This suffix behaves in a similar fashion as *-ee*, and similar arguments follow from its analysis. Traditionally, two kinds of *-able* have been distinguished, deverbal and denominal. Consider the following formalizations, taken from the pertinent literature:

- (14) Deverbal *-able* (Aronoff 1976, Akmajian et al. 1979:118-125, Anderson 1992:186)

WFR: [X]_V → [Xbl]_{Adj}

Condition: [X]_V is transitive (i.e. [+__ NP])

Syntax: 'Object' argument of [X]_V corresponds to 'Subject' of [Xbl]_{Adj}

Semantics: '(VERB)' → 'capable of being VERBED'

- (15) Denominal *-able* (Aronoff 1976, Anderson 1992)

WFR: [X]_N → [Xbl]_{Adj}

Semantics: '(NOUN)' → 'characterized by NOUN'

Such an analysis raises a number of questions. Are we really dealing with two homophonous affixes, one deverbal, one denominal? Why do we find nominal and verbal bases? Why do we find (at least some) intransitive verbal bases (e.g. *changeable* as in *changeable weather*), although the rule in (14) predicts that these should not occur? Why are transitive bases so frequent, intransitive bases so rare? And, most importantly, why do we find denominal *-able* derivatives which semantically conform to the deverbal pattern (e.g. *marriageable*), and which the rules in (14) and (15) would predict to be impossible?

In order to investigate these questions we will concentrate on those forms that most clearly call into question the two rules in (14) and (15), i.e. denominal *-able* formations. These forms come in two flavors. One set of denominal forms has the meaning given in (15) above, 'characterized by X', which I will refer to as the 'property meaning'. The other set of forms are denominal forms that, despite their being denominal, have the kind of passive interpretation common to deverbal *-able*

derivatives which I will refer to as the ‘event reading’. In (16) I have listed all pertinent forms from the *OED* and their years of first attestation. This allows us to also address the question of productivity.⁸ (16a) lists the well-behaved denominal forms, (16b) lists the forms that are not in accordance with the rules in (14) and (15).

(16) **Denominal *-able* coinages with their first attestations, exhaustive list from *OED* (up to 1985)**

a. denominal forms with property meaning

reasonable 1300	peaceable 1330	favorable 1340
proportionable 1374	treasonable 1375	seasonable 1380
medicinal 1398	meritable 1415	forcible 1422
personable 1430	sensible 1524	pleasurable 1579
leisurable 1581	valuable 1589	fashionable 1606
sizeable 1613	extortionable 1632	knowledgeable 1829

b. denominal forms with event meaning⁹

serviceable 1330	sensible 1374	pitiable 1456
merchantable 1480	customable 1529	saleable 1530
tenantable 1542	bailable 1554	marriageable 1555
pasturable 1577	actionable 1591	heriotable 1598
marketable 1600	remarkable 1604	accessible 1610
razorable 1610	oathable 1617	statutable 1636
reversionable 1681	exceptionable 1691	carriageable 1702
clergyable 1762	comfortable 1769	dutiable 1774
objectionable 1781	clubable 1783	bankable 1818
tributable 1830	perditionable 1827	impressionable 1836
motionable 1840	conversationable 1843	frictionable 1847
chickenable 1852	communionable 1861	illusionable 1879
ferryable 1888	christianable 1889	emotionable 1889
suggestionable 1892	cabinetable 1896	petitionable 1898

fluidible 1908	ultrafilterable 1908	motorable 1920
ministrable 1921	roadable 1929	jeepable 1944
fissionable 1945	trailerable 1971	zeroable 1965, 1974

The data in (16) show that the forms exhibiting the property meaning are in a clear minority. In fact, this pattern has seized to be productive as early as the 17th century (with one isolated new coinage in 1829). In contrast, denominal forms with an event meaning have been moderately productive over the centuries and up to the present time. This impression based on the *OED* can be substantiated by looking at data from the British National Corpus and the internet. The examples in (17) illustrate this.

- (17) On retirement MacLauchlan returned to Cornwall with the **assessionable** manors commission, surveying hill forts and linear earthworks. (BNC-GTB 737)

All coroners hold inquests on people who died aboard, if their deaths would have been **inquestable** in this country. (BNC-K1M 428)

From the first album on The Smiths matured from semi-suicidal to sensitive, with their much needed plausible **pop-marketable** yet meaningful approach, which is rare enough these days. (BNC-ART 826)

Not many years ago, it was a favorite exercise of the reviewer ... to term the work "**magazinable**," or the poet a "magazine poet." Even poets who detested being called "minor" poets preferred that rather vague and indiscriminate distinction, rather than the unrespectable "**magazinable**." (http://www.theotherpages.org/poems/amv13_intro.html)

Commanders don't need to be flooded with all available information -- we must get the right information, with the right degree of detail, delivered to the right decisionmaker at the right time. Warfighters need "**decisionable** information." Information must be available "inside the enemy's decision cycle." This means that information must be obtained, processed and disseminated fast enough so that our own forces can act before the enemy can react. (<http://www.pentagon.gov/speeches/1996/s19960604-paige.html>)

By providing methods of determining which problems are **solutionable**, Kleene's work led to the study of which functions are computable. (from *Wikipedia: The Free Encyclopedia*, http://en.wikipedia.org/wiki/Stephen_Cole_Kleene)

Such data do not only show that the reference to syntactic category as in (14), which would be the semantically pertinent rule, is problematic, they also reveal that reference to argument structure fails to account for data with non-verbal bases.¹⁰ The rule in (14) must therefore be thoroughly revised. The alternative approach that I advocate here discards reference to the word-class of the input and makes crucial reference to the semantics of the derivatives instead. I propose the following semantic restriction on *-able* derivatives:

(18) **Semantic restriction on *-able* derivatives**

Xable assigns a potentiality property to an entity Y, such that Y is a potential non-volitional participant in an event E. E is either directly denoted by the base X, or is conceptually associated with Y and the denotation of X.

This restriction is of course reminiscent of Barker's 'episodic linking' and shows the semantic relatedness of the two suffixes. Among other things, both restrictions crucially refer to events, which is also the reason for the preponderance of verbal bases (in which case the event is 'directly denoted by the base') as against nominal bases (in which case the event is 'conceptually associated'). Verbs are the kinds of words that typically denote events and are therefore much more likely to be chosen as bases.

One crucial difference between *-able* and *-ee* is what I labeled 'potentiality property'. This is an underspecified property whose specific interpretation is highly context-dependent, as shown in the following example, where *showable* can have different interpretations:

(19) *This film is not showable in schools*

showable: 'can be shown', 'worthy of being shown', 'permitted to be shown'

The restriction in (18) relies on the notion of 'non-volitional participation' instead of argument structure.¹¹ This shift from syntax to semantics is not only theoretically necessary because of the lack of any argument structure if the base is a noun. It is also

empirically advantageous, since it predicts that, contrary to the prediction of (14), also non-arguments of potential base words can be assigned the potentiality property expressed by *-able* words. The word *ferryable* is a case in point. The *OED* states that *ferryable* can refer to the path of the ferrying event and paraphrases the meaning of *ferryable* as 'Of a water: That may be crossed in a ferry-boat'. The verb *ferry* however, does not take a path argument, but only allows a patient as its internal argument. Consider (20a) versus (20b):

- (20) a. **We ferried the river last night.*
 b. *We ferried the goods last night.*

This means that non-arguments of the base word may become the subject of *-able* predicates, which explains why both expressions in (21) are well-formed:

- (21) *ferryable river* 'a river that can be crossed by a ferry'
ferryable goods 'goods that can be transported by ferry'.

Alternatively, one could analyze *ferryable* as a denominal form, with the noun *ferry* being conceptually associated with a ferrying event, and the appropriate interpretation following from (18). In (22) I have listed a number of denominal forms to illustrate the connection between the noun and the event that is conceptually closely associated with it.

- (22) Some base nouns and conceptually associated events
action - (in a judicial context:) take legal action against
assession - a sitting beside or together (*OED*)
bail - set free on bail
exception - take exception to
fission - split nuclear atoms
impression - impress someone, also 'leave an impression'
marriage - marry someone
objection - raise an objection

To summarize, we have seen that a semantic, output-oriented approach to *-able* can cope much better with the empirical and theoretical problems posed by the data. Denominal forms with a passive meaning need no longer be ignored or explained away as quirky in spite of their being both moderately productive and regular in shape and meaning, but can be accounted for in a unitary fashion together with the more canonical, i.e. deverbial, forms.

4.4. The suffixes *-ize* and *-ify*

The suffixes *-ize* and *-ify* can be considered suppletive allomorphs (Plag 1999), so that I will focus here on only one of the two, *-ize*, with analogous arguments applying to *-ify*. The two suffixes can take nouns as well as adjectives as their bases and form derivatives whose traditionally recognized meanings can be categorized as in (23):

(23) The polysemy of *-ize* derivatives

LOCATIVE	'put (in)to X'	<i>hospitalize</i>	denominal
ORNATIVE	'provide with X'	<i>patinize</i>	denominal
CAUSATIVE	'make (more) X'	<i>randomize</i>	de-adjectival
RESULTATIVE	'make into X'	<i>peasantize</i>	denominal
INCHOATIVE	'become X'	<i>aerosolize</i>	denominal
PERFORMATIVE	'perform X'	<i>anthropologize</i>	denominal
SIMILATIVE	'act like X'	<i>powellize</i>	denominal

Plag (1998) and (1999) provide a detailed semantic analysis of *-ize* in terms of Jackendoff's (1983, 1990) theory of lexical conceptual structure. In a more recent account, Lieber (2004) refines this analysis further, but reaches the same overall conclusion, namely that *-ize* is a polysemous suffix, with the meaning of a given derivative emerging as the result of the interaction of the semantics of the base with the semantics of the suffix. The crucial point with regard to the issue in the focus of this paper is that the "the syntactic category of the base can be disregarded because

the only restriction necessary is that the base can successfully be interpreted as an appropriate argument in the LCS'' (Plag 1998:227). Let us see how this works.

In Plag (1998, 1999) I have argued in detail that the versatile semantics of *-ize* derivatives can be represented by the underspecified lexical-conceptual structure (henceforth LCS) given in (24):

(24) LCS of *-ize* verbs (generalized)

$$\begin{aligned} &[[\quad]_{\text{BASE}} \text{-ize}]_{\text{V}} \\ &\{ \text{NP}_i \quad \text{NP}_{\text{Theme}}, \text{NP}_{\text{Theme}} \quad , \text{NP}_i \quad \} \\ &\text{CAUSE}([\quad]_i, [\text{GO}([\text{Property, Thing} \quad]_{\text{Theme / Base}}; [\text{TO}[\text{Property, Thing} \quad]_{\text{Base / Theme}}]]) \end{aligned}$$

For the purpose of this paper we need not go into the details of this rather complex representation, but will only look at the LCSs of locative, ornative and causative derivatives, because they suffice to illustrate (and solve) the problem of multiple base categories. Consider first the LCS of locative derivatives, illustrated with the verb *containerize* in (25):

(25) LCS of locative *-ize* verbs ('denominal')

$$\begin{aligned} &[[\quad]_{\text{BASE}} \text{-ize}]_{\text{V}} \\ &\text{NP}_i \quad \text{NP}_{\text{Theme}} \\ &\text{CAUSE}([\quad]_i, [\text{GO}([\quad]_{\text{Theme}}; [\text{TO}[\quad]_{\text{Base}}]]) \\ &\textit{The men containerized the cargo} \\ &\text{CAUSE}([\textit{The men}]_i, [\text{GO}([\textit{the cargo}]_{\text{Theme}}; [\text{TO}[\textit{container}]_{\text{Base}}]]) \end{aligned}$$

According to the LCS of *-ize*, the sentence *The men containerized the cargo* must be interpreted in such a way that *the men* caused *the cargo* to go to some *container*. In technical terms, locative derivatives can be described in terms of the three functions CAUSE, GO and TO, with the base word being the argument of the TO function and the theme being the argument of the GO function.

If we compare the locative case with the ornative case, we find that the content of the two argument positions is simply swapped. Now the base occupies the

argument slot of the GO function, while the theme acts as an argument of the TO function. This is illustrated in (26) with the verb *patinize*:

(26) LCS of ornative *-ize* verbs ('denominal')

$[[\quad]_{\text{BASE}} \text{-ize}]_V$

$\text{NP}_i \text{ --- } \text{NP}_{\text{Theme}}$

$\text{CAUSE} ([\quad]_i, [\text{GO} ([\quad]_{\text{Base}}; [\text{TO} [\quad]_{\text{Theme}}])])$

They patinized the zinc articles

$\text{CAUSE} ([\text{They}]_i, [\text{GO} ([\text{patina}]_{\text{Base}}; [\text{TO} [\text{zinc articles}]_{\text{Theme}}])])$

The fact that the argument slots of both the GO and TO function are available for both base and theme is expressed by the subscript notation in (27):

(27) LCS of locative/ornative *-ize* verbs

$[[\quad]_{\text{BASE}} \text{-ize}]_V$

$\text{NP}_i \text{ --- } \text{NP}_{\text{Theme}}$

$\text{CAUSE} ([\quad]_i, [\text{GO} ([\quad]_{\text{Theme / Base}}; [\text{TO} [\quad]_{\text{Base / Theme}}])])$

Turning now to causative formations, we see that the only thing that is additionally needed is to specify the semantic nature of the arguments of the TO and GO arguments. In the case of causatives, it is a Property, not a Thing. The verb *randomize* is used for illustration in (28):

(28) LCS of locative/ornative/causative *-ize* verbs

$[[\quad]_{\text{BASE}} \text{-ize}]_V$

$\text{NP}_i \text{ --- } \text{NP}_{\text{Theme}}$

$\text{CAUSE} ([\quad]_i, [\text{GO} ([\text{Thing, Property} \quad]_{\text{Theme / Base}}; [\text{TO} [\text{Thing, Property} \quad]_{\text{Base / Theme}}])])$

She randomized the order of the pronouns

$\text{CAUSE} ([\text{She}]_i, [\text{GO} ([\text{Thing the order of the pronouns}]_{\text{Theme}}; [\text{TO} [\text{Property random}]_{\text{Base}}])])$

This analysis makes interesting predictions about the potential polysemy of individual formations. Thus, we should expect derivatives that can be interpreted

both in the locative/ornative and in the causative sense, which is indeed the case. The verb *nuclearize*, for example, is attested with the two meanings ‘To supply or equip (a nation) with nuclear weapons’ (*OED*) and ‘To render (a family, etc.) nuclear in character’ (*OED*). In the first case the base word is interpreted as a Property: ‘Of, pertaining to, possessing, or employing nuclear weapons’ (one of the meanings of *nuclear* in the *OED*). With the second meaning of *nuclearize* the base is interpreted as the Property ‘Having the character or position of a nucleus; like a nucleus; constituting or forming a nucleus’, which is another meaning of *nuclear* given by the *OED*. Spelling out the semantic categories of the relevant arguments of GO, the LCS looks as follows:

- (29) a. CAUSE ([]_i, [GO ([]_{Theme}; [TO [_{Property} *nuclear*]_{Base}]])
 b. CAUSE ([]_i, [GO ([_{Property} *nuclear*]_{Base}; [TO []_{Theme}]])

Or consider the verb *publicize*, which can either be interpreted as locative (*OED*: ‘[t]o bring to the notice of the public’) or as causative (*OED*: ‘to make generally known’), depending on whether we interpret the base as denoting a Thing or a Property. In a traditional analysis, one would say that the former derivative is denominal, the latter de-adjectival. In the present analysis, reference to syntactic category is superfluous. The observations concerning the pairing of locative/ornative meanings with nominal bases and causative meanings with adjectival bases are not entirely wrong, but given the identical semantic structure that unites all three kinds of derivatives, i.e. locative, ornative and causative, reference to input word-class is an unnecessary complication.

To summarize, the only restriction necessary is one that refers to the semantic structure of the output form, such that the base can serve as an appropriate argument in the LCS. The apparent word-class restrictions are derivative of the semantic ones.

4.5. The prefix *un-*

The final case study concerns a prefix, negative *un-*. A full account of the intricacies of this prefix is beyond the scope of this paper, and I will therefore concentrate on certain facts which seem uncontroversial enough to be discussed here and which have a bearing on the issue under discussion. In general, this prefix is extremely versatile, as evidenced in (30):

- (30) a. **de-adjectival:** forming adjectives with the meaning ‘not X’
unhappy, unsuccessful, unreadable
- b. **denominal:** forming nouns with the meaning ‘absence of X, non-X’
unease, unbelief, uneducation, unrepair
- c. **denominal/deverbal:** forming nouns and verbs with the meaning ‘X, but not having the proper characteristics of X’
uncelebrate, unevent, un-Hollywood, un-Grieg
- d. **deverbal:** forming reversative verbs with the meaning ‘reverse X’
unbind, unwind, unwrap (cf. also the verbs in e. below)
- e. **denominal:** forming privative verbs with the meaning ‘remove X’
uncork, unleash, unsaddle

Note that I am working here with the assumption that *un-* is one polysemous morpheme, and not, say, five different ones. A unitary approach to *un-* seems justified on the grounds that all meanings seem closely enough related (see Horn 2002, Lieber 2004 for analyses in support of this). Alternatively, one might think that there are two *un-* prefixes. One of them, exemplified in (30a-d), acts as a non-head and (informally speaking) negatively modifies its base word. The other one, privative *un-* as exemplified in (30e), acts as a head and derives verbs from nouns.¹² A third alternative would be to separate different *un-* prefixes according to their input word-class, which would give us four *un-*’s: one deadjectival, one denominal, one deverbal and one denominal/deverbal. A fourth analysis could posit three different *un-* prefixes, depending on the output. One nominal with the two different related

readings given in (30b) and (30c), one adjectival with the interpretation given in (30a), and one verbal, with the interpretations given in (30d) and (30e).

Each of these four assumptions about the nature of *un-* has its own advantages and disadvantages. A priori, only the third alternative should be ruled out, however. It misses any generalization that apparently hold across input word classes. In one of the most detailed semantic studies of *un-*, taking into account a wide range of data, Horn (2002) argues for a unitary semantic analysis of that prefix and comes to the conclusion that *un-* “has come to function as a unitary derivational operator on adjectives, verbs, and nouns, expressing the Aristotelian concept of privation.” Lieber (2004) roughly reaches the same conclusion for *un-* in her comparative analysis of negative prefixes in English.

The important point in the context of our discussion is, however, that no matter whether we follow Horn (2002) and Lieber (2004) in their (convincing) unitary analysis or prefer one of the other two assumptions concerning the nature of *un-*, we end up with multiple word-class input and multiple related meanings for at least one of our assumed *un-* prefixes, and we end up with a rather systematic pairing of input word-class and output interpretation. This systematic pairing strongly suggests that one type of information is redundant.

We can make two observations in this regard. First, the semantics of the output is generally a function of the meaning of the prefix in combination with the meaning of the base. Second, the meaning of the derivative cannot be derived solely on the basis of the word-class information of the input. For example, a nominal input can lead to a derivative of either type (30b), (30c) or (30e), a verbal input to outputs like (30c) and (30d). Given these two observations, it is the word-class specification of the input that is empirically unnecessary, if not theoretically undesirable (as also shown by Horn (2002) and Lieber (2004)).

4.6. Summary and discussion

To summarize the discussion in the previous sub-sections, we can state that cases of affixes supporting a semantically-based, instead of a word-class based, account of

selectional restrictions are not so hard to find in English morphology. Traditional word-class based accounts face numerous problems of both empirical and theoretical nature. A purely semantic approach can solve many, if not all, of these problems. It answers the question why different word-classes may serve as input, as long as the meaning of the pertinent bases in interaction with the meaning of the suffix satisfy the semantic restrictions on the output. It also answers the question why there are majority patterns and minority patterns attested. Quantitative variation results from the readiness with which exponents of certain word-classes lend themselves to certain interpretations.

Data from other languages seem to support these results. Although work pointing in this direction is obviously scarce, some pertinent studies can be found. With regard to German, for example, Meibauer (1995) has shown that a syntactic approach to the 'agentive' nominalizer *-er* 'er' faces similar problems as syntactic approaches to its English counterpart. Ehrich and Rapp (2000) have shown that the syntax and semantics of *-ung* nominalizations (as in *Bestellung* 'order') is also best accounted in terms of semantics, and not in terms of argument structure, a result that stresses the potential prevalence of semantic over syntactic information in word-formation. For Italian, Montermini (2001) and Gaeta (2000) also arrive at the conclusion that semantic and not word-class information is crucial for explaining certain word-formation patterns.¹³

The obvious question that arises from our analysis is of course whether the semantically-based account of our relatively few affixes can be extended across the board. In other words, do *all* productive derivational processes disregard the word-class of their input forms? There is at least one fact that we have not discussed yet and which casts doubt on the generality of the more radical claim that syntactic category information plays absolutely no role for the input. This fact is that, although many derivational processes involve more than one word-class as base, there is also a substantial amount of affixes that seem to attach to base words of only one syntactic category. Whether the monogamy of these affixes can be explained in terms of semantics remains to be shown.

A cursory look at some of those affixes suggests that this might be possible, sometimes in combination with phonological or morphological factors.¹⁴ For

example, nominal *-ess* (e.g. *princess*) is subject to the restriction that the base words refer to humans and higher animals in order to form an appropriate *-ess* noun, and such base words can only be nouns. Analogous arguments hold for strictly denominal *-esque* (e.g. *Kafkaesque*), strictly denominal partitive noun-forming *-ful* (e.g. *cupful*), and the strictly denominal *-less* (e.g. *affixless*), *-ling* (as in *earthling*), and *-ship* (as in *friendship*).

In other cases we are dealing with entirely unproductive affixes (e.g. deverbals *-al*, deverbals *-ance*, deverbals *-ant*, de-adjectival nominal *-ary*), where the still surviving lexicalized forms and the resulting patterns of combination can have all kinds of accidental historical reasons.

A third set of monogamous suffixes behaves as such because they are phonologically/morphologically restricted to base words with a certain suffix. The suffix *-cy/-ce* is a case in point because it only attaches to the adjectival suffix *-ent/-ant*.

A more detailed investigation of the apparently monogamous affixes is certainly desirable to further substantiate these lines of argumentation. Judging from the brief survey of potentially offending affixes it seems however that these can be accounted for even under the most radical assumption that with all productive affixes apparent restrictions concerning the syntactic category information of the input are epiphenomenal.

5. Theoretical consequences

The claim that the word-class specification of the input does not play a crucial role, or even no role at all, in derivational morphology, has serious implications for morphological theory. The first of these implications concerns the relationship between syntax and morphology, the second concerns the nature of morphological rules. I will discuss each in turn.

On the one hand, there are many linguists who believe that there is no principled difference between syntax and morphology. On the other hand, there are many linguists who believe that there is indeed such a difference. Among the

differences commonly mentioned are the ones in (31), taken from two morphology textbooks (Katamba 1993, Plag 2003):

(31) **word structure rules**

- may change word-class
- may be sensitive to the morphological make-up of bases
- often have arbitrary exceptions and their output is often lexicalized
- are rarely recursive¹⁵

sentence structure rules

- do not change word-class
- are not sensitive to the internal structure of words
- their output is normally not lexicalized and there are usually no arbitrary exceptions
- are highly recursive

But even those linguists who believe in a principled distinction between syntactic and word structure seem to assume that there is no difference between syntax and morphology with regard to the fact that both syntactic and morphological rules specify the syntactic category of their input.

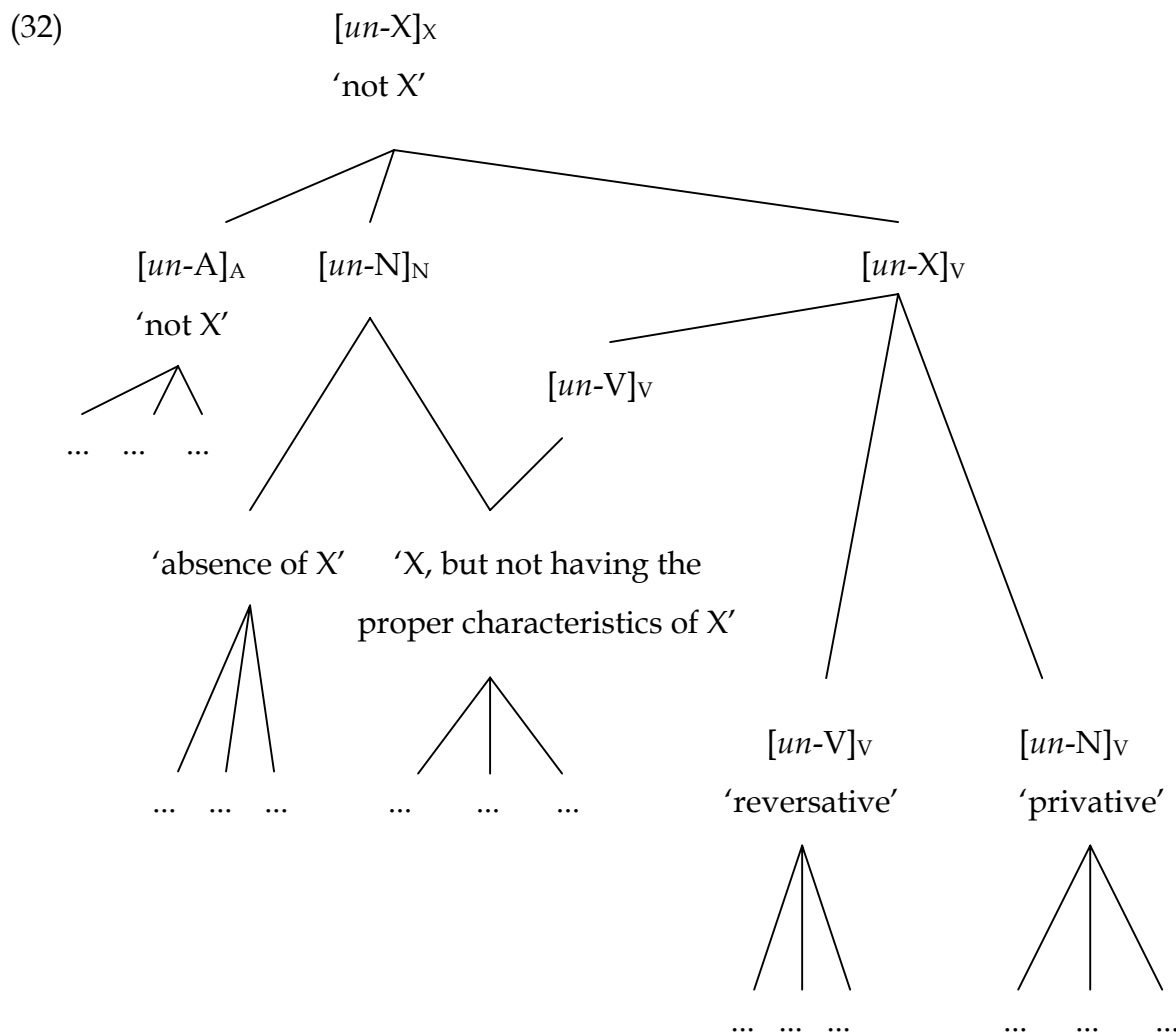
Most syntactic theories specify the syntactic category of elements that enter structure-building or structure-checking devices (e.g. phrase structure rules, agreement rules, structural constraints etc.),¹⁶ and it seems that the majority of morphologists sit on their side of the table when it comes to the role of word-class for morphological derivational rules (cf. again the pertinent examples cited in section 2 of this paper).

If, however, as shown in this paper, there are cases in derivational morphology which strongly suggest that syntactic category information is not specified for the input, this means that there is a clear and principled distinction between syntactic rules and (at least some kinds of) lexical-morphological rules. Syntactic rules necessarily make reference to input word-class, derivational rules do not. The existence of such a clear difference provides a new kind of argument against approaches that want to subsume morphology under syntax by extending syntactic principles and mechanism to word-internal structure, such as Lieber (1992).

But the question of syntactic vs. semantic information may be wrongly conceived in the first place. Why should not all sorts of lexical information play a role in word-formation, even though semantics seems to be often the strongest one? This question brings me to the second possible implication of the semantic hypothesis.

Based on the findings in this paper we could argue that our concepts of derivational morphological rules are generally in need of revision. If we abandon symbolic morphological rules such as those in (1) and (2), and replace them by some kind of associative mechanism operating on - in several ways - similar words in the mental lexicon, one could explain why all kinds of information - phonological, morphological, semantic, and syntactic - are available to the speaker and are used in variable ways. This kind of reasoning has been proposed in analogical models of derivational morphology (cf. Becker 1990, 1993, Rainer 2003) and evidence is accumulating that traditional morphological rules are too simple to capture the complexities of word-formation and the mental lexicon (e.g. Krott et al. 2001, Skousen 2002, Hay and Plag 2004).

The roles of word-class and semantics might, however, be reconciled without completely abandoning representations such as those in (1) and (2), by revising them in some way. Booij (2004) has recently proposed a new model of word-formation, called 'construction morphology', which allows for morphological templates, i.e. output forms, of varying degrees of abstractness, linked in the form of an inheritance tree. The facts concerning, for instance, the prefix *un-*, could potentially be interpreted as follows in the framework of construction morphology, where '...' stands for concrete complex words of the respective types:



In this way the different specializations of the prefix *un-* could be formalized in terms of related subtemplates. Each of the six subtemplates would be a constructional idiom, with a variable and a specified affix, and a specification of those meaning aspects that allegedly would not follow from the general meaning of the top node template.

What such templates and inheritance trees miss, however, is why and how these specific configurations - and not conceivable other ones - should arise with a given affix in the first place. Under a detailed semantic analysis à la Horn (2002) or Lieber (2004), the different combinations of bases and prefix and the meaningful interpretation of the resulting derivatives can indeed be derived on the basis of the predictable interaction of the semantics of base and prefix alone, such that templates and inheritance trees of the form in (32) appear superfluous or epiphenomenal.

To summarize our general discussion, we can state that the role of semantics in word-formation is still not very well understood,¹⁷ nor do we know how this role could be meaningfully implemented in a formal model of word structure. If nothing else, this study has shown that there is indeed a demand for this.

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Appendix

First dates of attestation of denominal *-able* forms

derivative	first date derivative	first date noun	first date verb	Paraphrase given by the <i>OED</i>
serviceable	1330	1320	1893	Ready to do service; prepared to minister, willing to be of service; active or diligent in service
sensible	1374	1400	1598	That can be felt or perceived
pitiable	1456	1225	1529	Deserving, worthy of, or standing in need of pity; exciting pity; lamentable
merchantable	1480	1290	1511	Suitable or prepared for purchase or sale; that may or can be bought or sold; saleable; marketable
customable	1529	1325	1494	Liable to custom or duty; dutiable.
saleable	1530	1050	-	Capable of being sold; fit for sale; commanding an easy or ready sale
tenantable	1542	1292	1634	Capable of being tenanted or inhabited; fit for occupation
bailable	1554	1259 (1466)	1548	Of persons: Entitled to be released on bail.
marriageable	1555	(1135) 1300	-	Of a person (esp. of a woman): able to be married, esp. through being of a suitable age; considered to be a desirable potential spouse (because of wealth, etc.)
pasturable	1577	1386	1533	That may be pastured; fit for pasture; affording pasture
actionable	1591	1330	1733	Subject or liable to an action at law; of such a character that an action on account of it will lie.
heriotable	1598	(888) 950	-	Subject or liable to the payment of heriots.
marketable	1600	1525	1649	Of or relating to buying and selling; concerned with trade, commercial; <i>spec.</i> designating the price that can be obtained for, or the value of, a product or service.
remarkable	1606	1654	1649	Worthy of remark, notice or observation; hence, extraordinary, unusual, singular.
accessible	1610	1382	1962	Capable of being used as an access; affording entrance; open, practicable
razorable	1610	1290	1827	Capable of, or fit for, being shaved.
oathable	1617 (1607)	1000	1141	Capable of taking an oath; fit or able to be sworn; oath-worthy.
statutable	1636	1290	1435	Prescribed, authorized, or permitted by statute.
reversionable	1681	1426		Capable of reversion.
exceptionable	1691	1385	1593	That may be excepted against; open to objection.
carriageable	1702	1560	-	Capable of being carried; portable; Practicable for wheeled carriages.
clergyable	1762	1300	-	Of an offence: Admitting benefit of clergy; in regard to which benefit of clergy may be pleaded.
comfortable	1769	1659	1297	Affording or fitted to give tranquil enjoyment and content; attended with or ministering to comfort

derivative	first date derivative	first date noun	first date verb	Paraphrase
dutiable	1774	1474	-	Liable to duty; on which a duty is levied
objectionable	1781	1380	-	Open to objection; that may be objected to; against which an adverse reason may be urged; Exciting disapproval or dislike, unacceptable, disagreeable, unpleasant.
clubable	1783	1776	-	Having such qualities as fit one to be a member of a club; sociable.
bankable	1818	1526	-	Receivable at a bank, as in 'bankable securities'.
tributable	1830	1340-70 (1585)	-	Liable to pay tribute; subject to tribute.
perditionable	1827	1340	-	Deserving perdition
impressionable	1836	1374	-	Of persons or their feelings: Liable to be easily impressed or influenced; susceptible of impressions.
motionable	1840	1420	-	Capable of motion, able to move.
conversationable	1843	1580	-	Open to conversation.
frictionable	1847	1704	-	Liable to undergo friction.
chickenable	1852	1827	-	Capable of producing chickens.
communionable	1861	1553 ?	-	Admitting of, or open to, communion.
illusionable	1879	1374	-	Liable to illusions
ferryable	1888	1590	-	Of a water: That may be crossed in a ferry-boat.
christianable	1889	1526	-	Fit to be or befitting a Christian.
emotionable	1889	1808	-	=emotional: Liable to emotion; easily affected by emotion. Also in philosophical sense, characterized by the capacity for emotion.
suggestionable	1892	1887	-	=suggestible: Capable of being influenced by (hypnotic or other) suggestion.
cabinetable	1896	1644	-	That is fit to be a member of a political cabinet.
petitionable	1898	1417	1607	That allows, justifies, or involves, the making of a petition.
fluidible	1908	1661	-	Capable of change of shape like a fluid under pressure.
ultrafilterable	1908	1908	-	Capable of passing through an ultrafilter.
motorable	1920	1849	-	Of a road, etc.: suitable for or usable by a motor vehicle; passable by motor vehicle. Also, of a distance: able to be covered efficiently or comfortably in a motor vehicle.
ministrable	1921 (1917)	1390 (1442)	-	Likely or expected to become a government minister
roadable	1929	1596	-	Suited to being driven on roads.
jeepable	1944	1941	-	Negotiable by jeep.
fissionable	1945	1865	1929	Capable of undergoing nuclear fission.
trailerable	1971	1890	1971	Of a boat: that may be transported on a trailer attached to a motor vehicle
zeroable	1965	1813	-	<i>Linguistics</i> . That may be omitted from a sentence without loss of meaning
zeroable	1974	1795	-	Capable of being set to read zero.

Notes

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¹ The discussion about the nature of what has been variably called ‘syntactic category’, ‘word-class’, ‘part of speech’, or ‘lexical category’ is legend. For the purposes of this paper I will take the existence of such categories (at least in some languages) for granted, using both ‘syntactic category’ and ‘word-class’ interchangeably, with no difference in meaning. The terms ‘part-of-speech’ and ‘lexical category’ will not be used.

² See, for example, Plag (2003, chapter 3.4) for the significance of neologisms and hapax legomena in word-formation studies.

³ Such ‘event schemas’ could be conceptualized and formalized as frames (e. g. Fillmore 1982, Fillmore et al. 2001) or scripts (as in Meyer 1993). An implementation of these formalisms is beyond the limits of this paper.

⁴ A similar, though somewhat more constrained, analysis has been proposed by Lieber (2004), who, in addition, provides an interesting account why certain types of *-er* derivatives are more productive than others. In her framework, semantic arguments of base and affix need to be coindexed, but if coindexation fails because no consistent argument exists, it is sometimes apparently possible to coindex the head argument with the least incompatible nonhead argument. A more detailed discussion of the technical details of Lieber’s theory of word-formation semantics and the notion of coindexation are beyond the limits of this paper.

⁵ Muñoz (2003) does not deal with denominal formations in sufficient detail, and Lieber’s (2004) account of *-ee* is basically a refinement of Barker’s (1998).

Although this is not the main thrust of Lieber’s (2004) book, her case studies can be read as arguments in favor of the point put forward in this paper: they show that the combinatorial properties of affixes cannot be described successfully on the basis of the input word-class or syntactic argument structure, but must be analyzed in terms of semantics. Unfortunately, Lieber’s book had not yet been published at the time of writing this article and became available to me (still in its pre-print form) only

during the final revisions stage of this article, so that the details of her analysis could not be more fully incorporated into the present paper.

⁶ The notion of non-volitional participation may in fact appear to be not restrictive enough. A more refined analysis of this notion is, however, beyond the scope of the present paper, but see Barker (1998), Muñoz (2003) and Lieber (2004: chapter 2) for possible solutions to this particular problem. The point is, in any case, that a syntactic or argument structure approach cannot solve the problems at hand (see below for illustration).

⁷ Lieber's (2004) theory may account for the preponderance of verbs in terms of coindexation failure in the case of certain nominal bases. See her chapter 2 for some discussion.

⁸ See Plag (1999) for a detailed discussion of the methodological issues involved in using the *OED* for the investigation of neologisms and morphological productivity.

⁹ Due to the high productivity of noun to verb-conversion in English, many forms are ambiguous as to the word-class of the base. (16b) therefore only shows derivatives where there is either no homophonous verb attested, or where a homophonous verb was attested later than the *-able* derivatives, or where the meaning of the derivative is clearly dependent on that of the noun. Hence, these are exclusively forms which, from the point of the speaker at the time, cannot have been based on the verb. This does not preclude that today's speakers (or linguists) may analyze some of the forms as deverbal in the modern language (e.g. *marketable*). For the convenience of the reader, the appendix contains a list of the forms with the first attestations of their base words and the *OED*'s paraphrase. The pertinent quotations can be looked up in the *OED*.

¹⁰ Even for intransitive verbs as bases the argument structure approach seems ill-founded.

¹¹ See note 6 for some discussion of the notion of non-volitional participation as taken from Barker (1998).

¹² As pointed out by Horn (2002), this type of formation seems no longer productive in present-day English, which would eliminate one of the four conceivable assumptions concerning the nature of *un-* from the scene.

¹³ Montermini (2001) analyzes *-bile* '-able' and *-oso* '-ous', and Gaeta (2000) focuses on the nominal suffix *-ata*, as in *entrata* 'entrance' (from *entrare* 'to enter') or *gomitata* 'elbow blow' (from *gomito* 'elbow').

¹⁴ See, for example, Plag (2003: chapter 4, with further references) for a summarizing discussion of the complex restrictions that often hold with English affixes.

¹⁵ Diminutive suffixes seem to be especially prone to recursivity in many languages (including English, see Schneider 2003). Some prefixes may also occur recursively in English, such as *great-* or *re-*.

¹⁶ One notable example of this general trend in syntactic theory is the radical approach in the opposite direction advocated in Borer (in press). See, for example, Baker (2003) for the opposite view.

¹⁷ Incidentally, the same holds for inflectional morphology. See Ramscar (2002) or Baayen & del Prado Martín (2004) for recent approaches to the role of semantics in regular and irregular inflection.

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