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ENGLISH AFFIXAL NOMINALIZATIONS ACROSS LANGUAGE REGISTERS

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ABSTRACT

This paper is a study of register variation as observed in the distribution and productivity of English nominalizing suffixes. Little if anything is known from previous research about whether or not morphological structure beyond the nature of the rightmost affix is a conditioning factor in register variation. As a consequence, nominalizations ending in a particular affix, or virtually all nominalizations tend to be somewhat superficially treated as collectively more characteristic of one register than another. This study fills this research gap by showing that the suffixes exhibit preferences as to their occurrence in particular registers and that, in the case of the most common suffixes (*-ness*, *-ity*, *-ion*), the internal morphological make-up of their base forms may also significantly bear on their quantitative distributions. As regards morphological productivity, the suffixes will uncontroversially exhibit varied degrees of productivity. More interestingly, however, our analysis shows that the morphological constitution of the base form may still influence the probability of a new word coming into existence, and this probability will further be conditioned by register preferences.

KEYWORDS: Register variation; nominalizations; productivity; distribution.

1. Introduction

Nominalizations are a well-researched area of English word formation (among classical works is Marchand 1969). In fact, the initial impetus for the advent of generative grammar in the 1970s came from Chomsky's (1970) criticism of the transformational account of derived nominals such as *destruction*, *transmission* and *refusal*. Chomsky noted that such nominalizations are too idiosyncratic to be generated via syntactic rule from underlying sentential structure (as in Lees 1960) and instead require lexicalist treatment. The ensuing theoretical debate inevitably expanded beyond the domain of nominalizations but they have remained in the scope of interest of linguists and have been studied from many different perspectives. Notably, much of the discussion con-

cerning deverbal nominalizations (ending in *-ion*, *-ment*, *-al*, etc.) concentrated around semantic non-compositionality (e.g. Chomsky 1970), argument structure (e.g. Anderson 1979) and morphological productivity (e.g. Plag 1999). De-adjectival nominals, on the other hand, especially *-ness* and *-ity*, have often been the object of investigations concerned with affix ordering and selectional restrictions (e.g. Selkirk 1982) and the significance of the Latinate vs. native distinction in English morphology (e.g. Aronoff 1976).

With the recent growth of interest in the study of language use, as opposed to linguistic structure, affixal nominalizations have also found their way into explorations of register variation, where *register* is a "cover term for any variety associated with a particular configuration of situational characteristics and purposes" (Biber and Conrad 2001: 175). Thus registers can be defined in terms of non-linguistic factors. And yet situational parameters of language use (such as intended audience, speaker-hearer relationship) correlate with linguistically definable properties that are traceable to particular registers. The study of register variation thus focuses on systematic patterns of variation in language use that are instantiated in certain patterning of linguistic features (i.e. grammar constructions, vocabulary items, word-formational elements, etc.).[1] In a seminal analysis of systematic differences between language varieties (i.e. the multidimensional analysis developed by Biber 1988), nominalizations are one of several dozen of linguistic features that define so-called dimensions of variation along which registers can be contrasted. In this way, linguistically defined features pertaining to formal structure, such as derived nominals, inform the study of language use, conditioned by contextual and situational factors. Biber's analysis recognizes the role of nominalizations, albeit somewhat indiscriminately: they are considered as a unified category without distinguishing between distinct types of the rightmost suffixes, let alone the varied structure of the base form.[2] For example, it would have been interesting to see whether distinct patterns such as [root]-*less*-*ness*, [root]-*ive*-*ness* and [root]-*ed*-*ness* are distributed any differently and thus offer further insight into register variation. Biber does not pursue such questions and, consequently, any potential significance of morphological make-up goes unnoticed.

Paying more attention to affixal identity, Biber et al. (1998: 63) assert that "[t]he *-ness* ending is more important in fiction than in either of the other two registers" (i.e. academic prose and speech – WG). Claims to the same effect are made by Biber et al. (1999). On closer inspection, however, investigations further into the morphological make-up of the base form may seriously question the accuracy of such statements. For example, the derivatives in *-iveness* from the BNC are found in this study to be almost nine times as common in academic prose as they are in fiction (see Results).

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[1] For example, passive voice tends to co-occur with nominalizations to characterize more formal registers. At the same time, these registers will have markedly few pronouns and contractions (Biber 1988).

[2] Biber (1988) considers nominalizations as a whole. Biber et al. (1998) and Biber et al. (1999) indicate in very general terms the varied distribution of some suffixes. No mention is made as to base-internal complexity.

Plag et al. (1999) is a study of morphologically-based differences between speech and writing and, as the authors claim, is "a first window on this aspect of register variation". This work, too, suffers from research gaps that are yet to be attended to. Firstly, the authors only cover differences between spoken and written language, the former being additionally differentiated into two domains of "spoken context-governed" and "spoken demographic". In contrast, in our research we compare a wider range of registers (see Section 3). Secondly, no distinction is made by Plag et al. (1999) as to the internal make-up of base forms and so the results given lack sufficient detail and accuracy.

The present paper sets out to fill in this research gap by looking deeper into the morphological complexity of English abstract nominalizations[3] and considering its relevance for the distribution of nominalizations across registers. With this aim in mind, both quantitative and qualitative analyses of corpus data are carried out – the former is based on frequency of occurrence and the latter draws on information pertaining to morphological status and identity. Namely, root–suffix and suffix–suffix combinations are distinguished and shown to have different effects on the productivity and distribution of the rightmost suffix. Similarly, in suffix–suffix combinations, the identity of the penultimate affix is a significant factor. To use the same example of derivatives in *-iveness* cited above, the productivity of *-ness*, when coupled with the suffix *-ive*, is found the highest in academic prose, despite what might be predicted on the basis of its total distribution or productivity. The type count of derivatives in *-iveness* in academic texts is over twice as high as it is in fiction. Similar observations have been noted in works on affix ordering (e.g. Hay 2003; Hay and Plag 2004; Plag 1999; Plag et al. 1999) and productivity (Baayen and Renouf 1996) although attention tended to be focused on global affix productivity. The present study looks at yet another variable in the equation – that of register.

Additionally, while looking at these formations in the British National Corpus, we will further refine our focus in order to retrieve and examine innovative coinages derived by means of the same nominalizing suffixes (see Methodology for an explanation of *innovative coinage* and Appendix for a complete list of these words). These innovations, again, will be given a register-sensitive and structure-oriented account.

Overall, we look at abstract nominalizations from three different perspectives: register variation, lexical innovation (productivity) and structural complexity of the base form. In simple terms, we will investigate a number of nominalizing suffixes as regards:

– their distribution across language varieties known as registers (both established and innovative forms);
– their productivity in the formation of new words;
– structural considerations: whether the suffixes show any preferences for different types of base forms.

[3] The nominalizations investigated are action-denoting *Nomina Actionis* and *Nomina Qualitatis*, which denote properties.

The conclusion is drawn that claims about an affix's distribution must necessarily be revised to accommodate finer distinctions concerning the combinations of that affix with distinct types of base forms. The study is based on the text samples of the British National Corpus (henceforth, BNC) and its internal division into language registers.

2. The data

The following groups of complex words were the subject of this study: de-adjectival nominalizations in *-ness* (*creepiness*), *-ity* (*deniability*), *-ance/-ence* (*reluctance*), *-(c)y* (*delicacy*), *-ery* (*bravery*), *-dom* (*wrinklydom*); deverbal nominalizations in *-ion/-ition/ -ation* (*realization*), *-ment* (*improvement*), *-age* (*drainage*), *-al* (*refusal*), *-ance/-ence* (*assistance*), *-ery* (*forgery*); and denominal nominalizations in *-(c)y* (*celibacy*), *-dom* (*stardom*), *-hood* (*widowhood*), *-ship* (*directorship*), *-ery* (*peacockery*). This excluded items departing formally from the above criteria (for example through affix generalization) such as denominal *-ness* derivatives (*owlness*, *godness*, *Guinessness*) and *-ion* words that are best treated as simplex (*function*, *fiction*). The suffix *-ing* was also excluded on the grounds that, given the size of BNC, it would have been nearly impossible to isolate genuine nominalizations and ignore non-nominalizing uses.

An additional criterion of selection that was adopted here was that the words qualifying for inclusion had to be clearly first-cycle derivatives of the suffixes in question and not any instantiations of the suffixes, such as prefixed formations whose base forms end in one of the twelve suffixes. For example, *semi-baldness* and *reunification* were excluded, even though the suffixes *-ness* and *-ion* appear at the end of the words, because they are best seen as derivatives of *semi-* and *un-* prefixation. To count *reunification* as another word type of *-ion* would have been to artificially inflate the productivity of this suffix and distort the accuracy of our findings. That is why most prefixed words ending in the four suffixes were excluded. However, exceptions to this rule were made in the following cases:

- when prefixation (or compounding) clearly precedes suffixation in the derivation of a word, e.g. *outrageous#ness* (not *out#rageousness*) and *wide-awake#ness* (not *wide#awakeness*), and therefore the result of the rule that applies last is a *-ness* nominalization; such items were retained as illustrating the productivity of the suffixes in question;
- when postulating prefixation would have implied the existence of unattested forms that cannot stand on their own, e.g. *unruli#ness* (**ruliness*) and *law-abiding#ness* (**abidingness*);
- when a prefixed word departs semantically from the corresponding non-prefixed form, e.g. *excommunication* is retained as it is not clearly derivable from *communication*;

– when a prefixed form is an attested form, but neither the root morpheme nor the corresponding non-prefixed nominalization is, e.g. *transmogrification* (**mogrify*, **mogrification*).

Compound nouns were included only when they were eligible candidates meeting the above criteria, i.e. when they were clear cases of last-cycle nominalization (*topsy-turviness, soft-spokenness*) and when the second constituent of the compound could not stand on its own (**turviness*, **spokenness*).[4] Items with two free-standing constituents are best viewed as nominalizations-turned-compounds and thus were excluded, e.g. *paper-thinness*, *sword-sharpness*. All in all, the overriding principle in the selection of data was to include only those items that clearly illustrated the productivity of the nominalizing suffixes. For this same reason, blends were excluded altogether. Any unclear items that could not be traced to any possible base forms were also deleted (e.g. *ennubelation*, *chasifness*, *rogation*).

3. Methodology and procedure

The results of our study are based on the 100 million word BNC corpus (World Edition) of contemporary British English. All the texts in the BNC are classified into distinct registers (or genres) according to criteria established by the corpus compilers and this corpus-internal division has been used in this study. The range and sample sizes of distinct varieties of English investigated here are as follows:[5]

Spoken (taken as a whole) – approximately 10.33 million word tokens
Fiction – approximately 16.19 million word tokens
Academic – approximately 15.43 million word tokens
Newspapers – approximately 10.64 million word tokens
Non-Academic (Non-Fiction)[6] – approximately 16.63 million word tokens
Popular Magazines – approximately 7.38 million word tokens

In order to retrieve all eligible nominalizations, the entire BNC was searched and the word lists thus obtained were hand-edited, deleting irrelevant items, consulting the *Oxford English Dictionary* and analyzing the words in their context in the BNC when necessary. This yielded 1752 different word types in *-ion*, 1700 word types in *-ness*, 1007 in *-ity*, 312 in *-ance/-ence*, 302 in *-ment*, 194 in *-ship*, 190 in *-(c)y,* 73 in *-hood*, 65 in *-age*, 62 in *-dom*, 58 in *-ery*, and 50 in *-al*.

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[4] These happened to be mostly de-adjectival compound nouns in *-ness* (see Appendix).

[5] The discrepancies in sample sizes are largely irrelevant. Frequency counts of word tokens are normalized to a common basis of 1 million words of text.

[6] In the BNC, the non-academic genre consists of texts that essentially academic in content but have been popularized for a general audience.

Afterwards, all the items were grouped together in their respective customized word lists and further queries were run to investigate the distribution and frequency of the suffixes across the six sub-corpora. Plural nouns were collapsed under their respective singular forms for the purpose of token frequency measurements. The results of this phase of research are given below in Sections 4.1 and 4.2.

At the same time, another goal of the study was pursued. Morphological productivity of the suffixes was measured as a function of the numbers of word types overall as well as the number of innovative word types (Section 4.3). In order to identify lexical innovations in the BNC, the word lists obtained in the first part of the research were confronted with the *OED* to confirm or disprove the novelty of each word.[7] Any item found absent in the *OED* was enlisted as an innovation. Establishing the newness of a word on the basis of its absence from the *OED* seems the most reasonable solution.[8] Unlike most dictionaries, the very aim of the *OED* is comprehensiveness and full coverage of the English lexicon.

4. Results

In what follows, our findings have been divided into two parts. Sections 4.1 and 4.2 cover observations of register variation which are based on frequency of occurrence, customarily measured by means of token frequencies. Section 4.3 concentrates on investigations of register variation as determined by varied morphological productivity. The latter factor, that of morphological productivity, falls into two different kinds: productivity in the broader sense understood as the range of different word types, established and innovative, produced by an affix (Baayen's 1992 *vocabulary size*), and productivity at its most essential – understood as the capacity of a morphological rule, here an affix, to form new lexemes.

4.1. Varied distribution of suffixes

Naturally, some suffixes have been found more common that others. The order of their decreasing token frequency (per one million word tokens) is: *-ion* (8365), *-ment* (3241), *-ity* (1848), deverbal *-ance/-ence* (1052), de-adjectival *-ance/-ence* (873), *-ness* (618), *-(c)y* (437), *-al* (414), *-ship* (315), *-age* (285), *-dom* (148), deverbal *-ery* (147), *-hood*

[7] The revised Second Edition available online along with the three Additions Series volumes and new material released quarterly.

[8] Similarly, Plag (1999: 117) uses both corpus data and the *OED* as the basis for his investigations of productivity. The author concludes that "both the *OED*-based and corpus-based productivity measures are useful analytical tools". He also discusses some of the weaknesses of Baayen and Lieber's (1991) method that relies on hapax legomena as indicators of productivity. Similar criticism can be found in Bauer (2001) and Van Marle (1992).

(82), denominal/de-adjectival *-ery* (7). More interestingly, nominalizations are indeed distributed disproportionately across registers. When considered jointly in token frequencies, they are distributed in the following sequence of increasing frequencies: Spoken < Fiction < Pop < News < Non-Acad < Acad (Figure 1).

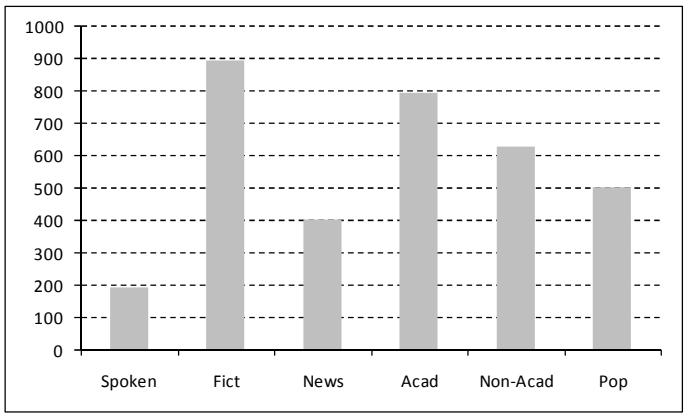

Figure 1. Normalized joint token frequencies of the twelve suffixes across registers.

Individual suffixes tend to follow the same pattern although some exceptions are to be noted (*-ness*, *-ment*, *-ery*, *-ship*), notably the suffix *-ness*, which is the most frequent in fiction (Figure 2).

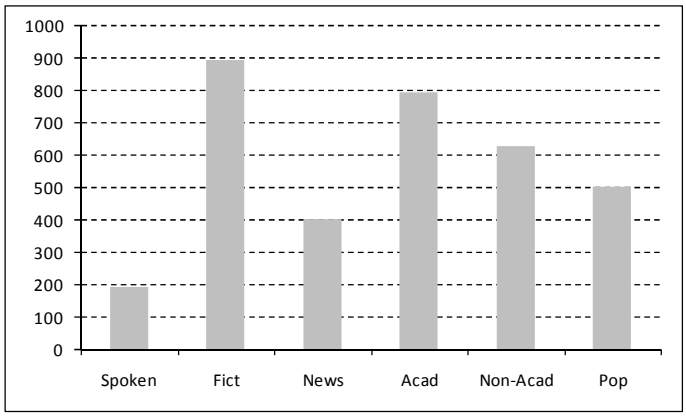

Figure 2. Normalized token frequencies of *-ness* across registers.

Clearly, *-ness* is indeed marked by its preference for fiction texts (see also Figure 3 below). A functional interpretation of these findings might be that *-ness* words – in comparison with words derived with *-ity*, the functional rival of *-ness* – do seem more informal and less technical (e.g. *tenaciousness* vs. *tenacity*). There may be several reasons for this. Firstly, the suffix *-ness* may be preferred by speakers because it is a "safer" option when little editing time is available in online production: it is easily parsed out, i.e. it is straightforwardly attached to its base with a clearly observable morpheme boundary with no adjustment or truncation operations (again, *tenacious-ness* vs. *tenac(ious)-ity*); it has no phonological effect on the base form, either (cf. the change in vowel quality in *tenacious – tenacity*) hence, *-ness* derivatives are easily decomposed and interpreted by the hearer (cf. Hay 2003; Hay and Baayen 2003). Derivatives in *-ity*, on the other hand, may be both formally and semantically opaque. This, in turn, may be because *-ity* is Latinate and the exact ways in which it combines with (usually non-native) bases may be obscure to speakers of English. The suffix *-ness*, on the other hand, is native, although it is questionable whether etymological considerations of native or non-native origin in themselves influence the choice of one suffix over another. Rather, decomposability and full predictability of usage will be a more likely explanation.[9] Secondly, another reason why *-ness* words are more informal and particularly common in fiction is the very meaning of many of its bases. Many of high frequency *-ness* derivatives denote personal qualities or feelings that rarely surface in technical/scientific texts but often do in fiction, such as *happiness*, *kindness*, *sadness*, *tenderness*, etc.

Within a single register and across registers, suffixes are unevenly distributed and highly diversified. For the purpose of overall comparison, Figure 3 plots the frequency ranges of the five most common suffixes from – among all the twelve formatives. The least frequent ones are left out in the chart for reasons of space.

The chart clearly illustrates the immense gap in terms of frequency of occurrence that is found between the suffix *-ion* and the less widely used suffixes. It is rather interesting to note that the suffix *-ance/-ence* (both deverbal and de-adjectival) is, with the exception of fiction, quite consistently more frequent than *-ness*, although the latter can safely be assumed to be more productive (see 4.3 for evidence of productivity). This indicates that the frequency figures of an affix are not to be equated with its productive potential.

The increasing numbers of nominalizations occurring in the pattern above are only to be expected. Academic prose seeks to condense as much information, often abstract notions, as possible into the minimum of form. Nominalizations offer such efficiency and condensation of ideas as longer phrases, even clauses, can be effectively replaced by a single complex word (cf. *text categorization* vs. *the manner in which text is categorized*,

[9] See Hay (2003), Hay and Baayen (2003) for a detailed treatment of decomposability as affecting productivity. In a nutshell, "any factor which facilitates decomposition of complex forms should also facilitate the emergence of productivity" (Hay 2003: 151).

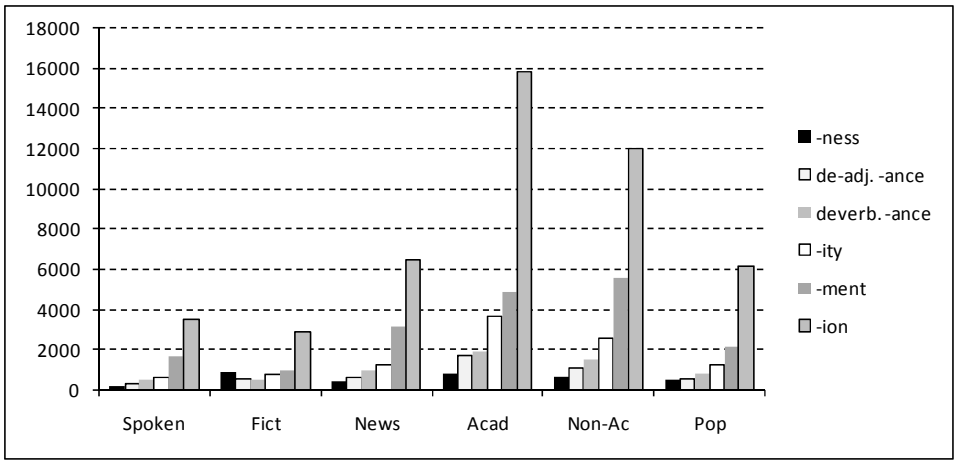

Figure 3. Normalized token frequencies of five most frequent suffixes across registers.

his clumsiness vs. *that he is always clumsy*). Typically, key words in such structures are shifted, or recategorized, to become a complex nominal. Thus abstract nominalizations are particularly useful in syntactic recategorization (transposing) rather than the labeling function of word formation (Plag 2003: 73–74, Lieber 2005: 406). Condensation of information is typically the motivating factor, especially in academic prose.[10]

4.2. Structural effects on register variation

In English and many other languages with derivational morphology, affixes are not completely free to attach to any type of bases as well as to one another. Rather, restrictions have been noted on possible base–affix and affix–affix combinations. For example, nominalizing *-al* only attaches to verbs ending in a stressed syllable (cf. *propose*, *deny*); all verbs in *-ize* can only take *-ation* to make nominalizations – other deverbal nominalizing suffixes such as *-ment* are ruled out (Plag 2003). Some such restrictions may be simple to phrase and describe in structural terms, for example on the grounds of prosodic structure in the case of *-al* derivation above and a specific morphological restriction placed on verbs in *-ize*. Other constraints may be more intricate and involve multiple requirements or limitations (see e.g. Plag 1999). However, another layer of complexity is how, within the group of attested affix pairings, some of these pairings may be significantly more frequent than others, and how certain affix pairings may preferred in certain registers. We will address these questions in this section.

[10] In this case, due to the nomenclature employed in the BNC, this is also true of the texts that are labelled "non-academic" (see footnote 6).

Because our objective here will be the study of morphological base form patterns, our discussion focuses on those suffixes which attach to several types of base forms of a particular morphologically definable kind. For example, the suffix *-(c)y* is included for analysis as it regularly attaches to three types of base forms: adjectives in *-ate* (*legitimate – legitimacy*), adjectives in *-ant/-ent* (*redundant – redundancy*) and nominal bases (*delinquent – delinquency*).[11] In contrast, the suffix *-ship* is ignored in this section as it attaches to nominal bases whose morphological make-up does not allow any clear classification into distinct word-formational types. All in all, five of the original twelve suffixes will be discussed below and these are *-ness*, *-ity*, *-ion*, *-ment*, and *-(c)y.*

Linguistic literature has long seen *-ness* nominalizations as more frequent and significant in fiction than any other register (e.g. Biber et al. 1998; Biber et al. 1999). That is also the picture emerging from the foregoing discussion (see Figure 2 above). Yet any such claims must inevitably be rectified once *-ness* nominalizations are investigated more closely. Below we present our findings of the effect of base forms' morphological structure on register distinctions. Table 1 shows normalized token frequencies across the registers with reference to the morphological structure of the base form.[12]

Table 1. Frequencies of *-ness* word tokens per 1 million tokens of text.

	Spoken	Fict	News	Acad	Non-Acad	Pop
simplex root+*ness* (*fakeness*)	148	711	298	416	393	356
simplex root+*y*+*ness* (*creepiness*)	3.7	25	11	6	11	25
-ful+*ness* (*stressfulness*)	1.8	18.8	6.4	25.4	17.7	12.4
-ish+*ness* (*quirkishness*)	0.3	3.5	1.6	0.9	1.7	2.5
-ous+*ness* (*curvaceousness*)	10	43	19	104	51	27
-ed+*ness* (*datedness*)	4	15	5	21	13	10
-ive+*ness* (*declarativeness*)	8	12	18	109	63	27
-less+*ness* (*depthlessness*)	7	29	17	32	28	13
-ing+*ness* (*reassuringness*)	3	5	10	20	19	9

[11] Adjectival base types of other kinds are occasionally also involved (e.g. *graphicacy*, *paramountcy*) but these are infrequent (14 types) and too heterogenous to form a morphologically coherent group.

[12] Word type counts are dealt with in Section 4.3.

Our findings above clearly show that further sub-division of *-ness* nominalizations accounts for even more register variation in additional detail. Although overall fiction has the highest frequency of *-ness* words, the only two groupings of morphological features for which *-ness* words are the most frequent in fiction are *simplex+ness* and *-ish+ness*. In other cases, *-ness* is as representative of fiction as it is of some other registers (root+*y*+*ness*, *-ful+ness*, *-ed+ness*, *-less+ness*). In yet other cases, fiction is outnumbered substantially by frequency counts in academic texts (*-ous+ness*, *-ive+ness* and *-ing+ness*). In view of these facts, our perception of the distribution of *-ness* across registers needs revision in order to allow for these newly-found patterns. The highest total count of *-ness* derivatives in fiction is predominantly attributable to items conforming to the morphological template *simplex adjectival root+ness* (711 items out of the total count of 896, see Table 1). The occurrence of *-ish+ness* words, although the highest in fiction (3.5 items), is here negligible. Otherwise, all other instantiations of *-ness* may be predicted to be equally or less frequent in fiction than in any other of the six registers (see Table 1).[13] On a more global scale then, claims about a universal preference of an affix for any one register may be rejected as inadequate and superficial.

Admittedly, this inconsistency of *-ness* is not entirely haphazard. It seems to be the case that register preferences of particular base form types predetermine the varied distribution of *-ness*. In particular, simplex nouns are preferred in less formal registers such as spoken language and fiction (Biber et al. 1999: 322–323) and, presumably, the same also holds true of derived nouns in the sense that, in those registers, simplex roots are the preferred bases for *-ness* suffixation. With derived adjectives acting as base forms, the adjectival suffix itself may be an important factor. The repartition of suffixes such as *-ous* and *-ive*, which represent learned vocabulary and therefore are more frequent in academic writing (Biber et al. 1999: 532), may be the very reason for the high number of words in *-ousness* and *-iveness* in academic texts. Similarly, the suffixes *-ish* and *-y* may safely be regarded as more characteristic of less formal registers and thus explain the preponderance of words in *-ishness* and *-iness* in those registers (see Table 1).

However, this correlation does not work without exceptions. Despite the fact that the suffixes *-less* and *-ful* are by a narrow margin the most common in fiction, as shown by Biber et al. (1999), derivatives in *-lessness* and *-fulness* are found in this study to be somewhat more frequent in academic texts (see Table 1). Both stem-final suffixes (*-less* and *-ful*) and the suffix *-ness* are more characteristic of fiction and thus, theoretically speaking, their combination would be expected to be an even stronger force driving words in *-lessness* and *-fulness* towards fiction. This, however, is not the case. Similarly, the affix combinations *-edness* and *-ingness* are more common in academic discourse. One plausible explanation here is that these are cases of several interacting patterns: in

[13] Nominalizations in *-ari+ness*, *-al+ness* and *-ate+ness* have not been considered here as separate suffix combinations although they are included in the total *-ness* counts. The reason is that they are very rare in the BNC, both as types (around a dozen each) and tokens. Still, we have noted that all three types are the most frequent in academic prose.

the first, the nature of the base form imposes a certain patterning on the part of the derivative (e.g. bases in *-less* and *-ful* push *-ness* words towards fiction); in another, *-ness* is more common in fiction; in yet another, nominalizations on the whole tend to gravitate towards more formal registers.

It is now vital to investigate further in order to establish whether similar claims hold for the other three suffixes. Below a similar sub-division of *-ity* nominalizations is presented along with token frequencies per register (Table 2). Figure 4 plots token frequencies for the suffix *-ity* as a whole, with no regard to internal structure.[14]

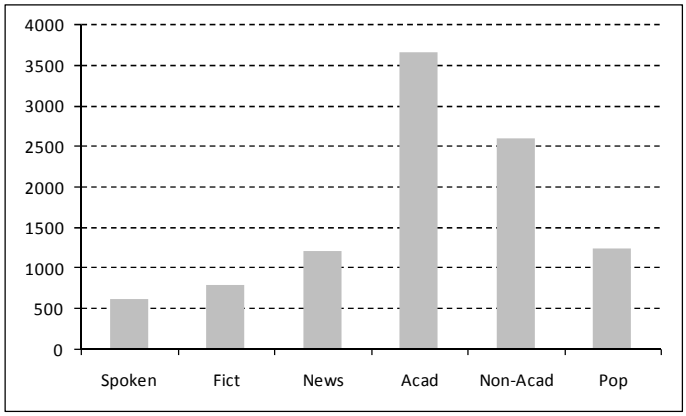

Figure 4. Normalized token frequencies of *-ity* across registers.

We note the preponderance of *-ity* over *-ness* in the academic register (and the reverse distribution in fiction – cf. Figure 2). This indicates that the processing factors such as parsability and transparency, which we cited in reference to *-ness*, may not be of paramount importance in academic texts. This is not surprising, given the lack of online production limitations and virtually unlimited editing time. This is also due to the lexical preference of academic discourse for the Latinate word stock.

[14] Note that frequencies observed for combinations of suffixes, when added together for a particular register, do not equal their respective total counts from Figure 4. This is because some of the items considered in the total counts did not fit any of the suffix combination templates. For example, *sanctity* and *humility* did not qualify for the [simplex (independent) root+*ity*] template) on the grounds of their opacity. However, items exhibiting typical allomorphic alternations such as in *toxic - toxicity* were included in the [simplex root+*ity*] type. The same applies to our analysis of *-ness*, *-ion* and *-ment*. For example, while examining *-ness*, we have ignored certain derivational types, namely *-al+ness*, *-ary+ness*, *-ate+ness*.

Table 2. Frequencies of *-ity* word tokens per 1 million tokens of text.

	Spoken	Fict	News	Acad	Non-Acad	Pop
simplex root+*ity* (*frailty*)	243	350	563	1,306	1,079	598
-able+ity (*deniability*)	109	60	144	453	340	176
-al+ity (*annuality*)	60	97	117	549	260	150
-ous+ity[15] (fibrosity)	20	81	54	166	112	64
-ile+ity (*virility*)	7	23	27	130	77	43
-ic+ity (*crypticity*)	58	34	89	100	115	64
-ive+ity (*tentativity*)	53	34	60	442	286	105

The internal division of *-ity* nominalizations does not reveal quite as many further register distinctions as in the case of *-ness*. Rather, our results in Table 2 largely coincide with those observed for total frequency counts of *-ity* in Figure 4. However, there are several differences to point out.

Firstly, although fiction scores more *-ity* words than spoken language overall, some pairings of affixes are preferred in speech, i.e. *-able+ity*, *-ic+ity*, and *-ive+ity* (Table 2). Secondly, although newspapers employ twice as many total nominalizations as fiction and consistently generate more *-ity* nominalizations than fiction, the *-ous+ity* combination is considerably more frequent in fiction. This is also confirmed by our findings of word type counts (Section 4.3), which indicates a general type-and-token preference on the part of this affix pairing.

Let us now focus on a similar sub-division of *-ion* nominalizations, presented along with token frequencies per register (Table 3, overleaf). Figure 5 (overleaf) plots total frequencies to allow comparison of findings.

We have noted earlier that newspapers are in general more prolific in nominalizations than popular magazines (Figure 1). It has also been established that *-ion* derivatives overall are slightly more frequent in newspapers (Figure 3). And yet further subdivision of *-ion* reveals a scheme according to which it is only due to *-ate+ion* derivatives that newspaper language has more *-ion* nominalizations (Table 3). All other suffix combinations with *-ion* have higher frequencies in popular magazines. As the difference in the number of *-ate+ion* words between newspapers and popular magazines is substantial, it in itself is responsible for the overall higher frequency count of all *-ion* words

[15] The suffix *-ous* in the derived nominalizations may either surface as an allomorphic alternation (*numerosity*) or sometimes it is truncated (*ambiguity*). Both types are included in this category.

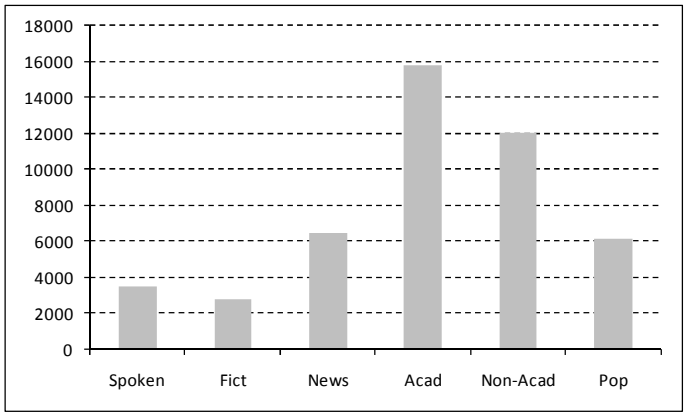

Figure 5. Normalized token frequencies of *-ion* across registers.

Table 3. Frequencies of *-ion* word tokens per 1 million tokens of text.

	Spoken	Fict	News	Acad	Non-Acad	Pop
unsuffixed root *+ation* (preventation)	743	763	1,148	3,251	2,401	1,473
-ate+ion (*fundoplication*)	1,026	734	2,055	4,816	3,783	1,645
-ize+ation (*autonomization*)	91	25	3	383	325	21
-ify+cation (*extensification*)	52	23	58	377	223	79
unsuffixed root+(*it*)*ion* (*spendition*)	1,269	1,111	2,886	5,833	4,751	3,187

in newspapers. The uneven qualitative distribution of suffix combinations is thus a noteworthy observation.

Nominalizations in *-ize+ation* appear highly biased towards academic and, to a lesser extent, non-academic prose. They are sparse virtually anywhere else and particularly so in fiction, newspapers and popular magazines. Interestingly, in this respect, spoken language substantially outnumbers the above-mentioned three registers (Table 3).

Below, the suffix *-ment* is analyzed in a similar fashion. This time, two types of base forms are considered. Figure 6 and Table 4 plot relevant data for comparison of frequencies.

The first template, X-*ment*, accounts for the great majority of word types sampled, thus the results for X-*ment* in Table 4 correlate closely with those in Figure 6. The frequency proportions for *en*-X-*ment*, however, are quite different. Apparently the reason

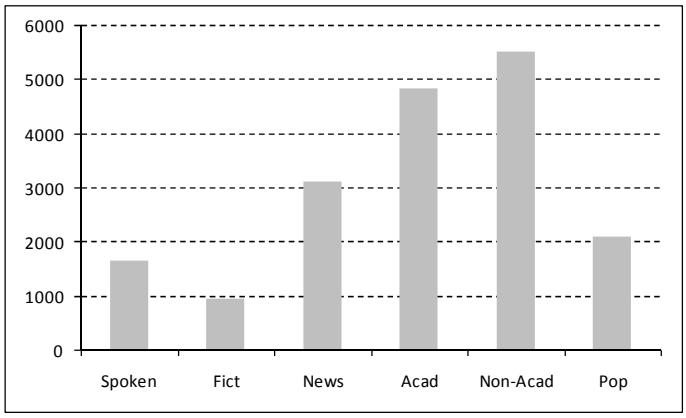

Figure 6. Normalized token frequencies of *-ment* across registers.

Table 4. Frequencies of *-ment* word tokens per 1 million tokens of text.

	Spoken	Fict	News	Acad	Non-Acad	Pop
X-*ment* (*configurement*)	1,629	895	3,060	4,637	5,376	2,023
en-X-*ment* (*ensheathment*)	35	63	81	206	150	81

for this divergence is that many of X-*ment* words are high frequency items,[16] whose frequency matches, indeed determines, the overall patterning and high token frequency of total *-ment* derivatives across all registers. On the other hand, *en*-X-*ment* nominalizations are but a minor type alongside the dominant one, which happens to follow a different distributional pattern.

Firstly, unlike in the X-*ment* type, fiction scores twice the number of *en*-X-*ment* items found in spoken language. Secondly, newspapers and popular magazines are on the same level, as opposed to the 30 per cent contrast between the two in Table 4 top row. Thirdly, academic and non-academic texts pattern alternately as the leader in the distribution of one or the other type of base form. This observation is further supported by analogous findings of word type counts, which indicates an inclination of the X-*ment* type towards non-academic texts and of the *en*-X-*ment* type towards academic prose, thus implying a functional divergence.

[16] Altogether, there are 39 items matching this template with a frequency of over 1,000 occurrences in the BNC, e.g. *government*, *development*, *management*, etc.

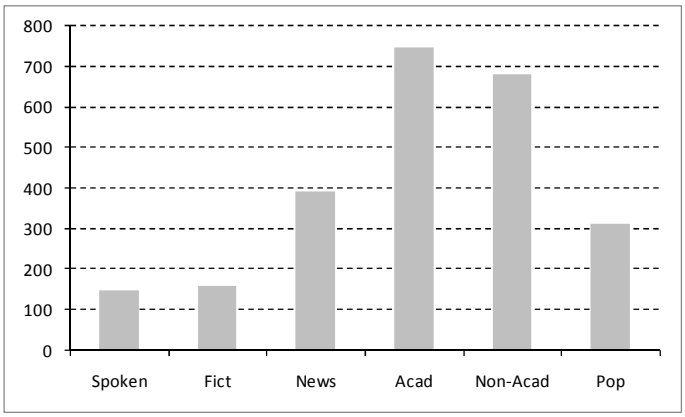

Figure 7. Normalized token frequencies of *-(c)y* across registers.

Table 5. Frequencies of -(*c)y* word tokens per 1 million tokens of text.

	Spoken	Fict	News	Acad	Non-Acad	Pop
-ant+(*c*)*y* (*reflectancy*)	70	70	152	381	324	153
-ate+(*c*)*y* (*appropriacy*)	21	49	43	151	94	54
noun+(*c*)*y* (*infancy*)	55	33	177	152	233	83

The suffix *-(c)y* is taken under consideration below. Figure 7 plots total frequencies of the suffix across the registers while Table 5 breaks down the total into respective base forms.

Perhaps the only points where the data from the table depart significantly from those in Figure 7 is the relatively low count of *-ate+(c)y* items and the high frequency of noun-based items in newspapers. The abundance of nominalizations of the latter type may be due to the fact that most of them, and especially the most popular and frequent, are associated with journalism, politics and current affairs (*presidency*, *candidacy*, *delinquency*, *constituency*, *accountancy*).

In summary, this section has analyzed the internal composition of nominalizations and showed explicitly that, assuming the same rightmost suffix, various suffix combinations and types of base forms pattern differently with regard to register preferences. This is especially evident in the case of the suffix *-ness*, where, depending on particular affix pairings, the highest values of frequency fluctuate across the registers, including the two polarized extremes of fiction and academic prose. It has also been noted that the varied distribution of *-ness* in most cases overlaps with the distributional preferences of

the stem-final suffix (or lack thereof). We have concluded that previous claims about affix distribution need to be revised so as to accommodate the newly-found patterns.

4.3. Structural effects on morphological productivity across registers

In this section, we discuss the same twelve suffixes with respect to their potential to form distinct word types. In our discussion above, observations of register variation were all based on frequency of occurrence and this in turn is customarily measured by means of the number of word tokens. In contrast, investigations of morphological productivity will be more likely to benefit from counts of different word types rather than the number of times one and the same form occurs in a corpus. Below we briefly discuss results pertaining to total word type counts (established and innovative) and then proceed to investigate novel lexemes.

Overall, type counts indicate a more balanced spread of relevant affixes across the registers[17] and we observe similar patterns of distribution to those we noted in token counts. It is interesting, however, to focus more closely on the affix that displayed perhaps the most variation of all: the suffix *-ness*. Overall, compared to considerations of token frequency, the counts of word types in *-ness* bring more evidence for the alleged preference of the suffix to be used in fiction. In 6 out of 9 different types of base forms, *-ness* lexemes are the most numerous in fiction, although sometimes by a narrow margin. This contrasts with the ratio of 2 out of 9 by the criterion of token frequencies. The two combinations root+*ness* and *-ish+ness* once again confirm their preference towards fiction. Still, in three cases of affix combinations academic prose persists as the most productive genre (*-ed+ness*, *-ing+ness* and *-ive+ness*). Of the two affix combinations we have concluded before, on the basis of token statistics, to be typically academic, only *-ive+ness* remains unequivocally so by the criterion of type count, with lexemes in *-ous+ness* being outnumbered minimally in fictional texts. Morphological productivity and token frequency distributions alike are thus shown to be subject to register variation, although the patterns may not always overlap completely.

Let us now examine another facet of productivity understood as the potential of the suffix to allow the creation of new words. The cross-reference of the BNC and the *OED* (see Methodology and procedure) has generated a database of lexical innovations and the results are summarized below.

– The decreasing numbers of new formations across the registers are represented in the sequence: *academic prose* (181 innovations) > *non-academic prose* (103 innovations) > *popular magazines* (83 innovations) > *fiction* (59 innovations) > *newspapers* (39 innovations) > *spoken language* (28 innovations).

[17] Measured in word types, suffixes are particularly evenly spread across the registers when the suffix is attached to simplex root base forms.

- The productivity of *-ness* decreases along the scale: *-ed+ness* (42 new types) > *-y+ness* (39) > root+*ness* (21) > *-less+ness* (14) > *-ish+ness* (10) > *-ive+ness* (6) > *-ing+ness* (5) > *-ful+ness* (4) > *-ous+ness* (2) (168 new word types altogether; including other disregarded patterns and items found outside the six registers studied here).
- The decreasing potential of *-ness* to coin new words across the registers is represented by the sequence: *fiction* (41 new types) > *popular magazines* (35) > *academic prose* (31) > *non-academic prose* (28) > *newspapers* (14) > *spoken language* (9).
- The productivity of *-ity* decreases along the scale: *-able+ity* (65) > *-al+ity* (18) > *-ive+ity* (13) > *-ic+ity* (12) > root+*ity* (7) > *-ous+ity* (4) > *-ile+ity* (0) (129 new word types altogether).
- The decreasing potential of *-ity* to coin new words across the registers is represented by the sequence: *academic prose* (50) > *non-academic prose* (21) > *popular magazines* (18) > *fiction* (11) > *newspapers* (6) > *spoken language* (5).
- The productivity of *-ion* decreases along the scale: *-ize+ation* (83) > *-ate+ion* (40) > root+*ation* (10) > *-ify+cation* (9) > root+*(it)ion* (4) (146 new word types altogether).
- The decreasing potential of *-ion* to coin new words across the registers is represented by the sequence: *academic prose* (78) > *non-academic prose* (34) > *newspapers* (7) > *spoken language / popular magazines* (5) > *fiction* (2).

Compared to the three suffixes above, the remaining ones are marginally productive. With respect to each individual formative we have noted the following:

- The 10 new types in *-ment* we have identified do not seem to point to any clear structural or register-related preferences of the suffix.
- The suffix *-(c)y* is virtually unproductive with nominal base stems, and the 8 deadjectival innovations that we have identified clearly lean towards academic prose.
- The suffix *-ance/-ence* yields 14 new types (notably in the spoken and academic varieties).
- A third of the total number of word types in *-dom* and *-hood* are innovative items (21 out of 62 and 21 out of 73 respectively). Innovations in *-dom* lean strongly towards popular magazines (10 out of 21) whereas those in *-hood* are the most numerous in academic prose (7 out of 21).
- The suffix *-ery* yields 11 new types. Both new and established types exhibit a strong tendency for newspapers, popular magazines and fiction. They are uncommon in academic prose, many are stylistically expressive.
- The suffix *-ship* yields 18 new types, 9 of which are derived from complex nouns ending in *-man.* New types in *-ship* as well as those established are the most common in non-academic prose.
- The suffixes *-age* and *-al* yield no new types.

In summary, in this section we have seen that morphological productivity, too, is subject to register variation. In short, innovative formations are highly differentiated according to the variety of language in which they are more likely to appear. Furthermore, certain affix pairings are far more probable to lend themselves to word coinage than others.

5. Conclusions

The BNC data have produced results very similar to those reported by other authors when it comes to estimated total frequencies of all nominalizations per register and the increasing number of nominalizations observable in the sequence Fiction < Spoken < Pop < News < Non-academic < Academic. Academic prose has long been recognized as the most productive and this is borne out by our findings. The abundance of *-ness* words in fiction, as noted by Biber et al. (1998) and (1999), has also been confirmed.

Beyond these rather general observations, individual suffixes have received limited treatment in the study of register variation, and none whatsoever as far as base-internal complexity is concerned. To rectify this situation, we have offered a more in-depth analysis of several suffixes in several registers. More importantly, we have then adopted a more detailed qualitative approach by considering the types of affix combinations that may bear on the distributional preferences of the rightmost suffix. This has served us as another basis for considering register variation at a completely new level, one where affix pairings – not single affixes – are considered. Indeed, the morphological structure of base forms has proved a significant distributional factor. Notably, the distribution of the suffix *-ness* has been shown to depend in most cases on the morphological complexity of the stem: whether it is simplex or complex, and – if complex – whether the stem-final suffix itself is preferred in any particular register. We have concluded that claims about an affix's frequency, productivity and distribution across registers must necessarily be revised to accommodate finer distinctions concerning the combinations of that affix with distinct types of base forms.

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APPENDIX: LEXICAL INNOVATIONS IN THE BNC

1. *-ness* derivatives (168 types)

simplex root+*ness*

gaganess	eliteness	campness	feistiness
avidness	eerieness	basqueness	yumminess
creoleness	hungness	dutchness	crapness
routineness	snagginess	germanness	fakeness
zombieness	whackiness	lairiness	bronzeness
bolshieness			

simplex root+*y*+*ness*

creepiness	pressiness	fudginess	blotchiness
curviness	lardiness	fugginess	bobbliness
fizziness	hippiness	grapiness	looniness
goriness	iffiness	fiestiness	wrinkliness
battiness	chewiness	crabbiness	clumpiness
pointiness	boxiness	creakiness	trebliness
tartiness	ashiness	cleansiness	spindliness
snagginess	boominess	clubbiness	plebbiness
tickliness	bosominess	yumminess	scratchiness
scariness	snappiness	zinginess	

-ful+ness

colourfulness	stressfulness	threatfulness	skillfulness

-ish+ness

prattishness	elvishness	clubbishness	warderishness
quirkishness	groupishness	cornishness	ampishness
swedishness	flemishness		

-ous+ness

curvaceousness	impecuniousness

-ed+ness

woolly-headedness	fiery-headedness	quick-mindedness	lightfootedness
well-definedness	expectedness	rewardedness	slow-wittedness
swollen-headedness	extrovertedness	self-employedness	thick-skulledness
brainedness	emptyheadedness	self-enclosedness	flawedness
constructedness	enclosedness	serious-mindedness	grey-mindedness
community-mindedness	mild-manneredness	understatedness	group-mindedness
	loosemindedness	sustainedness	datedness
double-voicedness	many-partedness	twistedness	activatedness
dumb-mindedness	knittedness	well-craftedness	calculatedness
dumbfoundedness	knuckleheadedness	quantitative-mindedness	blue-bloodedness
disembodiedness	quick-footedness		good-humouredness

-ive+ness

elitiveness	qualitativeness	declarativeness	pre-emptiveness
connectiveness	exploitativeness		

-less+ness

seamlessness	rudderlessness	hall-lessness	depthlessness
knoblessness	caringlessness	egglessness	skinlessness
vigourlessness	authorlessness	tiplessness	womanlessness
talentlessness	strokelessness		

-ing+ness

wittingness	reassuringness	throbbingness	staggeringness
never-endingness			

-ness other

fourfoldness	*down-to-earthness*	*mentalness*	*chineseness*
offhandness	over-the-topness	mexicanness	kafkaesqueness
part-timeness	statesmanliness	italianness	westwardness
creepy-crawliness	policemanliness	serbianness	mandatoriness
soft-spokenness	grandmotherliness	caribbeanness	digitalness
well-spokenness	incendiariness	drivenness	writtenness
likableness			

2. *-ion* derivatives (146 types)

root+*ation*

departmentation	forestation	whistlation	experientation
preventation	impactation	vegation	spoilation
occidentation	ingestation		

-ate+ion

fundoplication	tubeligation	phosgenation	aracylation
dessication	relitigation	boronation	arculation
inducation	fifferentiation	amination	scalation
infarcation	sediation	trypsination	physophorylation
carbocation	protentiation	sulfonation	poladenylation
acidication	carbamylation	silanation	glucuronidation
eratication	gemmulation	electroporation	tracheation
entrophication	gammascintillation	privatation	orpoagation
gasication	vasuolation	mannosylation	canullation
quantication	ethylation	platination	encapsidation

-ize+ation

autonomization	tertiarization	notorization	cancerisation
factionalization	stylolitization	ontologization	archivisation
residualization	palatization	microtization	aridisation
analogization	inferiorization	metisization	accreditisation
narratization	hysterization	politization	productionisation

textualization	judicialization	profitization	productisation
syncretization	conscientization	contractorization	spectacularisation
colocalization	rasterization	credentialization	costallisation
collateralization	aestheticization	sectoralisation	cretinisation
automization	constitutionalization	podsolisation	ironisation
anteriorization	editorialization	rectangularisation	koreanisation
cartelization	dialogization	activisation	informationisation
capillarization	grammatization	los angelesisation	historisation
historicization	lumpenization	barnardisation	holbornisation
hydridization	lupinization	calcitisation	planetisation
gallicization	vesicularization	hostelisation	eroticisation
kigerianization	vapourization	lebanonisation	encapsulisation
lebanization	weticization	columnarisation	ednaisation
informatization	swahiliization	dipthongisation	conglomeratisation
pedagogization	sociologization	epithelialisation	conisation
victorianisation	vacularisation	vacualisation	

-ify+cation

extensification	sandification	urification	hollywoodification
boogification	chelseafication	eradification	chlorification
factification			

root-*(it)io*

temption	spendition	distention	accredition

3. *-ity* derivatives (129 types)

root+*ity*

frailty	ovinity	periodity	ursinity
skimmity	simularity	dispersity	

-able+ity

deniability	conditionability	eraseability	callability
wickability	configurability	enjoyability	developability
imageability	dialability	dubitability	crashability
favourability	caterbility	drapeability	compromisability
deliverability	bangability	drillability	parkability
countability	admissability	fudgeability	shaggability
selectability	explainability	explicability	shapability
rinseability	generatability	fanciability	slurpability
severability	expendability	feelability	distinguishability
sailability	excludability	fillability	adjustability
sellability	tellability	allowability	generalisability
rinsability	trappability	appreciability	routability
licensability	hummability	assertibility	normalisability
maximisability	gropeability	avoidability	cleanability
influenceability	germinability	attributability	buyability
indictability	coolability	challengeability	permedability
interruptibility			

-al+ity

genitality	radiality	controversiality	beneficiality
metricality	hierarchicality	coventionality	clonality
anality	annuality	focality	subliminality
figurality	versality	objectuality	contextuality
cyclicality	consensuality		

-ous+ity

fibrosity	polysemity	heaviosity	coterminosity

-ic+ity

lithogenicity	technicity	crypticity	staticity
echogenicity	poeticity	urbanicity	homogenicity
nomicity	lipophilicity	homotheticity	thrombogenicity

-ive+ity

recessivity	resultativity	permissivity	adaptivity
aggressivity	tentativity	exhaustivity	intensivity
competitivity	generativity	intuitivity	transmittivity
prospectivity			

-ity other

automacity	mediterraneity	specularity	crepuscularity
exogeneity	eponymity	subversity	instaneity
diachroneity	effemininity		

4. *-hood* derivatives (21 types)

martyrhood	hackerhood	siblinghood	chaphood
grandparenthood	rainhood	dominion-hood	familihood
servanthood	pet-hood	grand-parenthood	weatherhood
riderhood	placehood	godparenthood	limbhood
disneyhood	urchinhood	faggothood	
entity-hood	marinehood		

5. *-dom* derivatives (21 types)

adventuredom	liberaldom	computerdom	serbdom
indiedom	magyardom	superpowerdom	scruffdom celebrity-dom
wrinklydom	hagdom	wimpdom	
baggydom	hackdom	orcdom	labeldom
gothdom	frockdom	slobdom	faggotdom
jazzdom			

6. *-ship* derivatives (18 types)

caretakership	craftspersonship	slave-ship	scoutmastership
nomineeship	conferencemanship	statemanship	teamsmanship

highwaymanship	contractorship	postmanship	blinkmanship
judgemanship	dreamership	settlorship	yesmanship
audienceship	backwoodsmanship		

7. *-ment* derivatives (10 types)

root-*ment*

regardment	configurement	gruntlement	dispersement

en-root-ment

enrapturement	ensheathment	emboxment	emparkment
enserfment			

-ment other

exsheathment

8. deverbal *-ence/-ance* derivatives (9 types)

exceedence	recognisance	awardance	actuance
exitance	reverberance	attainance	improvance
emittance			

9. *-cy* derivatives (8 types)

-ant+cy

reflectancy	surfactancy	confluency

-ate+cy

appropriacy	corporacy	deliberacy

-cy other

generacy	ethicacy

10. deverbal *-ery* derivatives (6 types)

advisery	debunkery	whammery	snoggery
mobbery	handcuffery		

11. denominal/de-adjectival *-ery* derivatives (5 types)

macabrery	skin-flintery	weirdery	chestnutery	show-bizzery

12. de-adjectival *-ence/-ance* derivatives (5 types)

emollience	amorance	itinerance	ductilance	afference