DIRECTIONALITY AND PRODUCTIVITY OF BACK-DERIVATION AS A SYNCHRONIC AND DIACHRONIC PROCESS: DICTIONARY AND CORPUS ANALYSIS

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Abstract: Back-derivation is an example of a non-affixative word-forming process in which an affix is removed to create a semantically corresponding verb [Bauer, Lieber, Plague 2013, 280]. This common phenomenon in English mostly occurs in the area of lexis borrowed from classical languages. The author focuses on directionality as a diachronic problem, and productivity of the process in a synchronic perspective. In order to trace the phenomenon of directionality, material from the source languages is collected chronologically. As for the phenomenon of productivity, quantitative analysis is based on attestations in text corpora and dictionaries. The author examines occurrences of this mechanism and its influence with respect to the creation of similar forms in scientific and specialist language.

1. Preliminary remarks

Backward derivation is an example of a non-concatenative word-formation process, in which the affix is removed from a complex lexeme in order to create a semantically corresponding derivative [Bauer, Lieber, Plag 2013, 280]. This is quite a common phenomenon in English, especially in the domain of words borrowed from classical languages, Latin or Greek. Therefore, it appears most often in complex formations that are typical of the register in specialized languages. Huddlestone and Pullum [2002] do not see a fundamental difference

between the regular process of affixation and backderivation, since this is essentially a problem of historical vocabulary, rather than the structure of the word itself. From the point of view of cognitive linguistics, backderivation is located within the five basic morphological techniques where, next to addition, substitution, modification and conversion, it represents a typical example of subtractive operation [Langacker 1987]. Within the framework of Natural Morphology [Mayerthaler 1981; Dressler 2005; Dressler, Mayerthaler, Panagl, Wurzel 1987], this is a most counter-natural process, because the principle of constructional iconicity requires that a new meaningful unit should possess a related form. In backderivation, the form is reduced rather than extended, and no particular element can be assigned to this role. These restrictions also account for the limited productivity of this process in the world's languages. Moreover, it has been observed in the contemporary morphological research that backformation is a more or less European phenomenon, which occurs in Germanic, Romance and Slavic languages [Štekauer, Valera, Körtvélyessy 2012; Dixon 2014].

This paper will focus on two aspects of this phenomenon, i.e. directionality and contemporary productivity through comparative analysis in English. Many of these formations penetrated the English language through the medium of French in the early stages of development of both languages. In order to trace the phenomenon of directionality in this process, it will be necessary to gather research material from the above-mentioned languages chronologically, and rank it according to the types they represent, i.e. which ones are the effect of the morphological process, and which ones are just borrowings. In order to trace the phenomenon of productivity, on the other hand, a synchronic approach will be necessary by means of quantitative research based on contemporary text corpora and dictionaries. The author intends to study the impact of this dictionary mechanism in English on the scientific language register, which is characterized by a large number of neologisms and words of non-native origin to arrive at the conclusion that backderivation is not solely a diachronic process as stated by some authors, such as Marchand [1960]. The process is still productive in Present Day English with the noticeable dynamics of *nomina actionis* at the expense of the agent nouns.

2. Backderivation in the literature

In the traditional definition of backderivation in Hans Marchand's seminal work *Categories and Types of Present-Day English Wordformation* [1960], the author claims that the phenomenon of backderivation is typically historical in nature and should be treated only in terms of diachronic analysis. Marchand admits that historical knowledge and knowledge of the problem

from the diachronic point of view helps to understand the contemporary situation of this process and its functional effects, because it is not easy to grant the status of backderivation to single forms such as this *to enthuse* 1859[1] < *enthusiasm* 1608, provided that they occur in more words similarly created. Such analogous forms can be found in English most often in derivatives from agentive nouns ending in *-er/or*, e.g. *to edit* < *editor*, and expressing the performer of actions; and in the group of verbs ending in *-ate*, which are in a strong semantic relationship with nouns of foreign origin ending in *-ion*, e.g. *to negate* < *negation*. Thus, according to Marchand, their main distinctive feature is the semantic correlation and formal analogy, e.g. removal of a fixed segment, which leads to the creation of a morphological rule. This is visible in pairs of correlated lexemes e.g. *revise/revision*, *provide/provision*, *televise/television* and *to enthuse* mentioned above. However, the use of such verbs is limited by users' acceptance, without limiting the productivity of the process [1960, 310]. In the same place, Marchand classifies the types of backderivation into two groups, i.e. the type *to burgle* 1870 < *burglar* 1541, where a noun of a pseudo-agent character gives a word-forming base for a verb that did not exist before, but became necessary for reasons of language pragmatics. The whole operation of creating a new derivative in such a case is to remove the pseudo-suffix of an agent character /ə(r)/, and noticeably most of the resulting verbs belong to this type. The second type of backderivation in Marchand is the *swindler*[2] 1774 > *to swindle* 1782 type, in which the noun is seen as a natural derivation of the verb from the point of view of the average user, even though the etymology of the word requires a different analysis of its morphological status. Moreover, Marchand explains the meaning of this process in the creation of a compound type, such as *to stagemanage* 1879 < *stagemanager* 1805, but this is material for separate deliberations.

In general, we use several criteria to identify if a given derivative is the result of backderivation. The already mentioned Bauer, Lieber, Plag [2013, 281] first propose the criterion of attestation with a given creation, where the noun is oftentimes earlier than the verb[3], for example *to edit* 1791 <*editor* 1712 ('release' < 'publisher'), *hawk* 1546 < *hawker* 1510 ('hawk' < 'hawk'), *burgle* 1870 < *burglar* 1541 ('break in' < 'burglar'). As can be seen, the transformation through backderivation does not concern only words of foreign origin, but also the native ones, with a predictable syntactic role. Another criterion is the visible semantic correlation, where the meaning of the noun is contained

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[1] Dates of first attestation, according to the OED 2nd edition; the arrows indicate the directionality of a borrowing.

[2] In the OED, 'swindler' is a word of German origin (from *schwindle*) describing a person with an unstable mind, unpredictable, especially in financial and business matters.

[3] Attestations of words with noun-forming suffixes such as *-ment*, *-ion*, *-ancy/-ency* exceed chronologically derivatives of adjectives or verbs formed on these bases [Adams 2001; Durkin 2014; Dixon 2014].

in the meaning of the derived verb, e.g. < *breathalyzer* 1960 ('analyze breath' from the device used for this purpose). The other criterion is the frequency of occurrence of a given form, where the longer form of the lexeme is usually more frequent than the shorter one that is the result of backderivation.

Szymanek (1989) analyses the function of this process in the morphological system of language in relation to English and Polish, relying on the aforementioned linguists. Following Bauer [1983, 64], he states that backderivation consists in the formation of a new lexeme by removing a suffix, or such an element of the morphology of the word, which is considered to be a suffix. This element is removed from a formation which is complex as a result of analogy with the existing instances, and is in effect, a newly derived form, a lexeme both with and without a suffix. As an example of a complex formation that has been analyzed as a form with what is considered a suffix, he gives the English word 'to laser' derived from the lexeme *laser*, which is itself an acronym in English (= light amplification by stimulated emission of radiation). For English language users, the last element of this word resembles the classic suffix *–er* that is used to create agent and instrumental nouns. Given the contemporary status of this lexeme, the whole operation should be treated in terms of a synchronic process. This type of backderivation, i.e. by removing the suffix *-er*, is common in English, as evidenced in the previously discussed examples from Marchand. Szymanek [1989, 93-94], however, mentions another type of such derivation noticeable in pairs like these:

(1) *transcription* 1598 > *to transcript* 1592
    contraception 1886 > *to contracept* (no date of attestation)

Paradoxically, the initial nouns in the above example already possess verbs analogous to them, *to transcribe* 1552 and *to contra(con)ceive* (no date of attestation) respectively, which entered the English lexicon during the period of borrowings, ca. 16th till 18th centuries, or were created in stages. In both cases, the suffix of foreign origin *-ion,* typical of abstract nouns, is removed e.g. *electrocution* < *to electrocute*, *negation* < *to negate* etc. If we rely on the dates of dictionary attestations for these particular lexemes, following Szymanek [1989, 94], as a criterion for identifying forms created by backderivation, several examples meet such principles. The other items have appeared as spontaneous formations, not attested in the OED (1989/2009) and other sources. Many linguists propose to reverse the understanding of this particular process, at least for the words with the agent suffix *-er*. The motivation of this operation for the users is clear, as they recognise it as a natural process of suffixing, even in the case of the acronym *laser*, which represents the synchronically motivated process [Marchand 1960, 391; Beard 1981, 29]. Similar tendencies start to occur in the scientific vocabulary as regards the specialist terminology, with regular patterns of derivation by analogy (e.g. *analysis* > *to analyse*, *osmosis* > *to osmose*).

In Polish, the notion of backderivation appears in the context of the phenomenon of negative derivation and truncations, which are aimed at the creation of nominal abbreviated forms, often augmentative and pejorative (*dyr < dyrektor*, *ogór < ogórek*), and not to create an expression of a different syntactic category, correlated semantically with the word-formation base. This phenomenon accompanies other word-forming techniques as a fully grammatical method of creating new words, however, it appears to be relatively marginal. More precisely, just after prefixation, suffixation and paradigmatic derivation, backderivation is predominantly coupled with the negative alteration of the word-forming base, where in effect we are talking about alterative derivatives [Waszakowa 1994]. The process of this type of derivation has its limitations that are etymological, phonological, etc. Presumably, that is the reason why it is located on the borderline of fundamental morphological processes and other means of creating new lexemes, which are motivated by the creativity, analogy or originality of the users, and not only by lexical competence or the grammar of language.

To sum up, backderivation is a kind of 'reversed' derivation; while natural derivation processes seek to produce a new word from existing words by means of prefixes, suffixes and compounding. Backderivation works in the opposite direction, where the process begins with a morphologically complex form, and seeks to reconstruct the word-forming base (stem or root) that previously *de facto* never existed as free-standing forms.

3. Typological classification of backderivation: methodology and research questions

In search of a specific reference point for this research, a general classification of types of backward derivation by Pennanen [1966, 44-45] was accepted, where the ordering criterion is the syntactic category of the derivative. The author lists six types of lexemes that were created by the process under study:

Type I   – a verb derived from an agentive noun, or tool, instrument
Type II   – a verb derived from an action noun, usually of an abstract character
Type III – a verb derived from an adjective form, which is or has been deverbal or from a participle
Type IV – a noun derived from an adjective and considered to be its derivative
Type V   – an adjective derived from an abstract noun, adverb, whose basic form exists
Type VI – a 'primary' noun formed from an analogous base, which is taken as its root

As can be seen from definitions of individual categories, this classification is far from ideal, but it depicts the nature of this phenomenon. In the present investigation, we use the typology, in which Pennanen listed 768 examples of backderivation in 20th century English[4]; in particular, we focus on words that belong to the scientific register and are of foreign origin in English. These may be neologisms of the neoclassical compound type, with Greek or Latin origin. This type of classification will also serve as an instrument for data analysis in the process of subtraction of morphological material. The first objective is to establish certain regularities and rules in terms of directionality in the creation of new forms based on the dictionary attestations. The second goal is their productivity in terms of synchronic operations typical of each group. In this approach, various sources of research material are exploited, such as general dictionaries, the *Oxford English Dictionary* (OED, 2nd ed.), the *Cambridge Advanced Learner's Dictionary* (CALD, 3rd ed.) and available Internet corpora, the *British National Corpus* (BNC), and the *Corpus of Contemporary American English* (COCA) to confirm the origin of analysed lexemes, their attestations and their status in language.

4. Analysis of data material

Our analysis begins with the first group of derivatives that appears most numerous according to Pennanen, i.e. verbs based on agent and instrumental nouns. Out of approximately 160 items collected by this author, only 26 lexemes are of non-native origin and represent specialized language (scientific and technical register). Surprisingly, forms such as *edit* < *editor*, as described in the introduction, are not usually represented and, for example, only 14 examples of the total number are included in our compilation (see table 1).

The agentive forms represented in sample (2), ending both in *-or* and *-er*, do not present any logical mechanism of formation as a rule, apart from a regular subtraction of the final morph for complex hybrids (cf. *vacuum-cleaner*), and many of them appear ephemeral, slang or marginal in terms of frequency of use.

More interesting, from the point of view of our analysis, is the second group of verbs derived from so called *nomina actionis* nouns. The list of about 318 words that represent backderivation includes as many as 172 forms belonging to the register of specialized, scientific language, which covers about 54% of the whole collection. The forms derived from nouns that end in *-(a)(t)ion,* ca. 122 lexemes, come to the fore in the present sample and, in comparison with other suffixes, which are subtracted from the base or stem, this is the dominant model in this group, which is reflected in the table 2.

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[4] The analysis of backformed derivatives produced in the 21st century was conducted by Naděžda Stašková [2013].

Table 1. Sample backderived forms of nouns and verbs with the dates of attestation in OED and number of occurrences in BNC and COCA

Sample backderived forms – attestation year in OED / number in BNC, COCA	
auth 1936 / 0 < *author*	*chiropract* 1926 / 0 <*chiropractor* 1926 / 24 items
escalate 1922 < *escalator*	*helicopt* 1961 / 0 < *helicopter* 1960 / 1070 items
compand 1951 / 0 items < *compander* (in tele-communication) 1951 / 0 items	*lase* 1962 / 0 < *laser* 1960 / 999 items
*copy-edit*1950 / 0 < *copy-editor* 1 item	*teleprint* 1971 / 1 < *teleprinter* / 36 items
curate 1909 / 0 as a verb < *curator* 484	*vacuum-clean* 1900/1 item < *vacuum-cleaner*/ 164 items
rotovate 1959 / 0 < *Rotovator* 1959 / 3 items	*transduce* 1949 / 1< *transducer* / 64
turbo(super)charge 1957, 1981 / 1 in ads < *turbo(super)charger* / 3 items	*tute* / 0 < *tutor*, in slang (no attestation)
varitype 1955 / 0 < *VariTyper* / 10 items	*vive* 1928 / < *viveur* / 8 items
vocode 1981 / 0 < *vocoder* 2 items	*volumize* 1991 < *volumizer* / 0 items

Table 2. Number of denominal forms of verbs in back derivation – by the type of suffix

Suffix	Number / of bases with the suffix	Examples
- (a)(t)ion	122	*Air-evacuate* < *air-evacuation* 1951, *aviate* < *aviation* 1900
- *sis* > - *yse* / -*ose*	17	*Autolyse* < *autolysis* 1903; *phagocytose* 1912 < *phagocytosis*
-*ing*	12	*Computer-generate* 1990 < *computer-generating*
-*ment*	3	*Micromanage* 1976 < *micromanagement*
-*ance* / -*ence*	2	*Concord* 1969 < *concordance*; *reluct* 1912 < *reluctance*
-*graphy*	2	*Chromatograph* 1953 < *chromatography* *Choreograph* 1943 < *choreography*
-*er*	1	*Demerge* 1980 < *demerger*

The direction of derivation of verb forms from nouns is attested by the dates under which these lexemes appeared in dictionaries. Following Adams [2001, 137], most users assume that the creation of a noun with an element *-(a)(t)ion* implies the existence of a verb derivative. The hypothesis that the nouns were first borrowed and then other forms based on the elements of the nouns are created really needs to be supported by concrete scientific research. However, it does not detract from the fact that for some suffixes such as *-ment*, *-ion*, *-ancy/-ency*, there is a noticeable statistical tendency that the attestation of nouns with these affixes precedes chronologically other derivatives, i.e. adjectives and verbs, created on the basis of these nouns [Adams 2001, Durkin 2014; Dixon 2014]. According to the monograph by Mańczak-Wohlfeld, *Developmental tendencies of contemporary English borrowings in Polish* [1995, 54], the borrowed nouns outnumber the borrowed verbs or adjectives

in English. Mańczak-Wohlfeld also refers to a study by Haugen (1950), who drew a similar conclusion based on a survey of borrowings in other languages. Similarly, this tendency is quite common and predictable within the other groups of the backderivation typology under the present study.

Table 3. Verbs derived from nouns on the pattern of Greek origin suffixes

Sample backderived forms – attestation year in OED / number in BNC, COCA	
-ysis > -yse	-osis > ose
autolysis 1902 / 0 > *autolyse* 1903 / 0 items	*phagocytosis* 1876 / 9 items / > *phagocytose* 1912
psychoanalysis 1898 / 445 items > *psycho-analyse* 1911 / 6	*diagnosis* 1681 / 1701 items > *diagnose* 1861 / 172
haemolysis 1890 / 16 items > *haemolyse* 1902 / 0 items	*symbiosis* 1622 / 54 items > *symbiose* 1960 / 1 item
sonolysis 1960 / 0 > *sonolyse* 1964 / 0 items	*endocytosis* 1963 / 16 items > *endocytose* 1970 / 0
*electrophoresis 1911 / 129 items > *electro-phorese* 1965 / 0	*exocytosis*1963 / 3 items > *exocytose* 1970 / 0 items

The above examples show a relative predictability in the regularity of verb derivation by this morphological mechanism in two columns: with regular change of Greek nominal suffix *-ysis* into verbal *-yse* with one exception for *-esis* into *-ese*. In the second column we have a very common mechanism of deriving denominal verbs in a regular pattern *-osis > ose*. In all cases, the type of the extender i.e. a linking vowel is determined in nouns, and then spread to the verbal derivatives. As for the directionality in creating derivative forms of the verb, the dates of first attestations confirm in a regular way that the noun form was the first, which is confirmed by the higher number of noun occurrences in corpora; all verbs appear to be denominal formations with a close semantic relation to the base. The average users will analyse this pattern as a regular rule of the language, particularly the specialist register.

The third group of collected examples demonstrates the creation of denominal verbs in the group of lexemes from the scientific-specialist register that represents as much as 43% of the sample. Many of these appear to be deverbal formations on the participal bases, such as *prefabricate* 1932 < *prefabricated* 1933, *phase-modulate* 1968 < *phase-modulated* 1961, *superconduct* 1964 < *superconducting* 1913. Here we also find examples of adjectives with suffixes *-ive*, *-able* and *-ent*, which served as derivation bases, for example: *auto-destruct* 1980 < *autodestructive* 1959, *biodegrade* 1970 < *biodegradable* 1960, *decongest* 1950 < *decongestant* 1903. There are observable irregularities in this group, for instance, according to the OED, the noun form *decongestive* occurred in 1903, and the adjective *decongestant* appears only in 1950, apparently to replace the earlier adjective *decongestive* 1903 (i.e., chronologically speaking, equivalent to the original noun, probably as a result of blocking or other terminological coincidence). The verb, according

to the chronology of attestation, originates from either the noun or the adjective. It is difficult to trace in greater detail the ways in which some forms of words are coined, especially in specialist registers, because many of them were created in a spontaneous way, being recorded only in scientific sources. In this way, these forms could not be found in commonly available dictionaries, and one should only rely on corpus sources.

A separate group is made up of nouns created in the scientific-specialist language by means of backderivation from other syntactic categories. They are found in group IV, i.e. deadjectival nouns, and in group VI, which contains nouns formed on the basis of other nouns by means of truncation, reduction of some morphological material from alexeme that is considered to be related. As far as group IV is concerned, it is easy to distinguish here three groups of typical suffixes, which are reduced to create a related term. These are *-ic(al)*, *-al*, *-ous*, *-ed*, and less frequently *-ar* or *-ory*, for example, the largest group of derivatives of the type *adiabat < adiabatic* 1945 shows a number of unique forms. Thus, we have coinages created by subtraction of a considerable amount of morphological material, as it was the case with the word *aerodyne < aerodynamic* 1940, or the creation of a lexeme by analogy, e.g. *epistasis < epistatic* 1917, *hypostasis < hypostatic* 1917 in genetics, *polychromasis < polychromatic* 1909 in medicine. Other forms from the adjectives that end in *-ic* are created regularly by cutting off the suffix from the base of non-native origin.

The least productive group of derivatives in scientific language based on the scheme of backderivation are adjectives, mainly denominal, created by the reduction of the noun sufix *-ics*, meaning a type of science e.g. *cybernetic < cybernetics* 1951, or *acrobatic < acrobatics* 1918. This group represents a great variety of operations, for example, by cutting off such suffixes as *-ity*: *biodiverse < biodiversity* 2011, *intertextual < intertextuality* 1973, or complex suffixes as in the example of *autoimmune < autoimmunization* 1952, *desertified < desertification* 1980. Another intriguing point is the lack of attestations of the derived form in current dictionaries; many of these examples come from a variety of sources, including corpora. This demonstrates the ephemeral nature of such formations and poses a significant problem for the researcher in terms of the directionality of such derivatives in further analysis.

Conclusions

Backderivation as a process of cutting off the morphological elements of a word is a natural way of preventing the formation of long chains of morphological material that result from subsequent word-forming operations. Consequently, this operation allows, in further stages of derivation, for the existence of a newly created words to attach other affixes, thus enriching further derivation possibilities of the same base. The process of suffixation itself

forces a truncation on the stem of foreign origin in order to prevent atypical formations in terms of morphology, and to avoid an excessive departure from the semantics of the base. This highly specialized vocabulary needs various forms and applications in the register of scientific language, which must be clear and semantically transparent.

There is a clear directional trend in the formation of new lexemes from elements of foreign origin in the process of backderivation, if one analyses examples from the register of the scientific language of recent years, in particular from the Internet, where different dynamics of derivation of new *nomina actionis* can be observed, at the expense of agent nouns. This trend shows that it is necessary to trace the processes of creating neologisms in modern science, where, as our analysis illustrates, the role of backderivation is growing and is on a par with the process of affixation in terms of productivity. The fact that this process should no longer be included in the literature of the subject matter as one of the so-called minor word-forming processes of a diachronic character has been raised many times, however, subsequent studies on analogous and predictable formations as a result of back derivation only confirm the need to verify the previous classifications. This process, as highlighted above, is still typical and most common, as well as productive in terms of creating scientific terms and neologisms on the basis of vocabulary of foreign origin. Therefore, it is difficult to examine all the manifestations of language in common use, as they are less well established, which reduces its productivity parameters compared to other processes. For example, the semantic relationship of the category NOUN with the suffix *-ation*>VERB with the suffix *-ate* in English has been established by a long process of backderivation; similarly, the relationship of foreign nouns in the scientific register is established, ending in N *-ysis* > V *-yse*, and N *-osis* > V *-ose*, creating lexical-semantic correlates.

The creation of new lexemes through backderivation not only involves cutting off elements that perform certain categorical and semantic functions, but also reduces a large amount of lexical material of the base, or stem, in the case of foreign words. Even in popular and still productive affixes (*-ic*, *-ity*), the reduction process and its scale are still unpredictable in the English language system, which is determined by the phonological context, preventing the creation of unusual segments that may be difficult to articulate. Another element is the mutual motivation of the resulting forms, semantic and syntactic, since we are dealing with material of foreign origin, mostly Latinate and Romance, which in English constitutes a separate system, hence the need for a diachronic approach to the problem of backderivation. The diachronic approach, as many contemporary authors believe [Kastovsky 2009; Rainer 2004; Dietz 2012], shows more clearly the development of such non-native vocabulary, and its elements, through processes that have led to its consolidation. Such a phenomenon is the recreation of a non-routine morph based on borrowed

lexical units in the system through mass absorption of material of Latin-Greek origin [Koshiishi 2002; Görlach 2001] or the role of analogy. Some relations between complex words are re-analysed by users, because the old, historical/ diachronic ones have lost their semantic transparency and the new ones are more convincing and useful for their application in new contexts.

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