The productivity of deverbal categories and suffixal models within shared-root deverbal paradigms as reflected in the *Oxford English Dictionary*

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The textual prototypes which stand for the earliest recorded uses of words are conducive to the recovery of the diachronic routes of the categorical patterning in vocabulary. Studied in the paper are single/multiple category-divergent/ (optionally) suffix-variant derivatives sharing a common root with the parent verbs. Both primary and secondary deverbal categories were included into the electronic framework. Their mutual succession/precedence could be the basis for conducting retrospective/prospective ultimate/intermediate set reconstruction.

Keywords*: verbs, deverbal derivatives, OED textual prototypes, types frequency, onomasiology, electronic modelling*

1. Introductory remarks

The *Oxford English Dictionary* contains documented dated evidence of the earliest and subsequent, in cases of more than one quotation, uses of words in the written medium. They testify to the appearance and occurrence of elements of the lexicon over time. This unprecedented as to its textual richness lexicographic resource has been available in the electronic format for quite a while. However, in line with Algeo's remark made some twenty-five years ago about the *Emperor's new clothes* (Algeo 1990), we argue that these continue to have a need for ever newer designs.

The earliest quotations of words from the *OED* constitute a database. In our study we used version 3.0 of the Second CD-ROM edition of *OED 2*. The database was drawn from the entire body of the *OED* quotations which make up a textual corpus (Hoffmann 2004). In a corpus, the earliest registered use of a word is known as its textual prototype.

Discussed in this paper is the heuristic potential of the earliest quotations of all the *OED* registered verbs and their shared-root suffixal coinages for the reconstruction of the diachronic peculiarities of deverbal productivity.

2. The *OED* earliest quotations in the study of derivational families

Traditionally, the notion of diachronic productivity of derivation types has stayed within the framework of a pair of the 'motivating' and 'motivated' lexemes with a specified (in terms of the onomasiological base, feature and relator) word-building relationship between them (cf. Bauer 2003, Baaen 2009).We suggest putting this notion into a more paradigmatic context by juxtaposing the productivity of a derivational category in question with other types of shared-root derivatives and their respective productivities. Sets of dated motivating verbs and their derivatives constitute a historical dictionary of deverbal families. No software tools for such a compilation were available in the existing applications to the electronic *OED*. They had to be developed especially for this study.

The deverbal derivatives are divergent by the category and could be variant by the suffix within some of the categories.

The earliest quotations of a parent verb and its same-root derivative(s) constitute the historical word-forming family. The corpus of verbs contains *17,771 bases* for derivation. The prerequisite for a verb being drawn into the present study was at least one attested shared-root derivative. Some of the verbs and/or their derivatives are registered in the *OED* as archaic. They are marked by the asterisk following the lexeme.

The notion of diachronic productivity applies only to those examples where the derivative is attested after the base. This puts aside all cases of the back-derived base being antedated by one or several shared-root derivatives discussed in (Bilynsky 2013; cf. a ref. to it in Miller 2014:14).

The database is to be rebuilt, if we elevate the age differential between the dated attestations that we perceive as time homogeneous. All the queries to the framework may be run on the etymological partitions of the verbal bases and individual variant suffixes.

3. Data

The classes of deverbatives were attributed ordinal positions within the initial word forming family lattice and all other electronic grids in the range of $d_{1\text{-}17}$.

The ordinal progression of categories arbitrary from the point of view of the developed software application nonetheless took into account the linguistic principles of *natural morphology* (the more common category precedes the less common one), diathetical derivation (passivization transform follows its reverse counterpart), part-of-speech succession (the noun proceeds the adjective and the adjective proceeds the lexicalized participle), derivational complexity (secondary derivatives attain larger ordinal labels than their primary deverbal motivators) or epidigmatic (sense building) complexity (factitive lexicalizations are a subclass of their same-word action counterparts).

Substantive deverbatives fall under action, agent, patient and factitive nouns. Action nouns are of two kinds: those that are not lexicalized into factitive nouns (tagged d_1) and action nouns (d_2) that admit lexicalization into the same-word factitive nouns that will denote the state or condition of the subject achieved as a result of the accomplishment of the action and/or a concretized result of the accomplished action. Factitive lexicalizations (cf. Aronoff, Lindsay 2014) are tagged as $d_{2'}$ since most, but, interestingly, not all factitive nouns are in lexicalization relationships with the same-word action (d_2) nouns.

Both classes of action nouns (d_1 and d_2) as well as factitive nouns (d_2) employ identical suffixes. The suffixes contained in the electronic lattice are *-ing, -(t/s)ion, -ment, -ance, -age -ture* and *-al*. The description of the productivity of these suffixes as regards the quotas of the generated new lexemes is to take into account the fact that most of the factitive nouns are same-word variants of action nouns (either in the direct 'from action noun to factitive noun' or in the reverse 'from factitive noun back to action noun' diachronic or/and psycho-semantic sequence. Yet some, divergent from suffix to suffix, part of the productivity of the suffixal models involved in the factitive nouns reveal no same-word correspondence with action nouns.

The deverbal nouns in *-ing* number 9,636 action nouns and 1,630 lexicalizable action nouns. In accepted notation, after dividing the former quota by the latter in absolute numbers we obtain the relative [>5.9x] *OED*-types frequency for *-ing* as d_1 nouns marker. The remaining action noun suffixes, unlike the native etymology suffix *-ing*, are of borrowed etymology. They

are characterized by a much smaller number of derivatives, but a notable rise in favour of lexicalizability quotas in their respective productivities:

[>0.58x] *OED*-types frequency for *-ment* as d_1 (350 d_1 vs. 600 d_2 derivatives)
[>0.60x] *OED*-types frequency for *-age* as d_1 (56 vs. 93 d_2 derivatives)
[>0.47x] *OED*-types frequency for *-(a/e)nce* as d_1 as d_1 (80 vs. 169 d_2 derivatives)
[>0.17x] *OED*-types frequency for *-(t/s)ure* as d_1 (8 vs. 45 d_2 derivatives)
[>1.59x] *OED*-types frequency for *-(t/s)ion*, as d_1 (2,052 vs. 1,285 d_2 derivatives)

Deverbal factitive derivation ($d_{2'}$) could be lexicalizations from action nouns or 'non-epidigmatic' coinages that do not correlate with the same-word action noun reading. In the *OED* evidence such factitive nouns ($d_{2'}$*d_2), which fail to revert to the same-word action nouns, for the suffixes *-age* and *-ture* are almost as productive as factitive nouns correlating with the same-word action nouns ($d_{2'}$ d_2). For the suffixes *(-a/-e)nce* and *-ment* the non-conversed factitive nouns remain quite common too, but for the suffixes *-(t/s)ion* and *-ing* most factitive nouns are revertible to action nouns:

[>1.01x] *OED*-types frequency for *-age* as $d_{2'}$ with d_2 (93 vs. 94 ($d_{2'}$*d_2) derivatives)
[>1.06x] *OED*-types frequency for *-(t/s)ure* as $d_{2'}$ with d_2 (45 vs. 48 ($d_{2'}$*d_2) derivatives)
[>1.59x] *OED*-types frequency for *-(a/e)nce* as $d_{2'}$ with d_2 (169 vs. 106 ($d_{2'}$*d_2) derivatives)
[>2.09x] *OED*-types frequency for *-ment* as $d_{2'}$ with d_2 (600 vs. 287 d_2 ($d_{2'}$*d_2) derivatives)
[>9.96x] *OED*-types frequency for *-(t/s)ion* as $d_{2'}$ with d_2 (1285 vs. 129 ($d_{2'}$*d_2) derivatives)
[>8.27x] *OED*-types frequency for *-ing* as $d_{2'}$ with d_2 (1448 vs. 175 ($d_{2'}$*d_2) derivatives)

Agent and/or (optionally) instrument or experiencer, etc. nouns (d_3) (cf. Štekauer 2005: 90) typically end in *-er* (5,887 coinages). Sometimes, however, they can end in *-or* (872 derivatives). There are also 255 deverbal coinages in *-ant* and 72 in *-ive* bringing the total of the *OED* attested 'source of action' (d_3) nouns to 7,086 derivatives yielded by 6.658 stems. (1.06 coinages of suffix-variant 'source of action' noun productivity for one verbal stem). There is a compatible (1.07 derivatives for a verbal stem) quota for variant suffix productivity in action nouns that do not tend to lexicalize factitively (d_1) and somewhat higher quotas (respectively, 1.13 and 1.11 coinages) for an average stem in lexicalizable action nouns (d_2) and factitive lexicalizations ($d_{2'}$). In adjectival deverbal derivation this quota will rise to 1.15 derivatives, even less for second order coinages, per mean stem. It does not look like a lot statistically, although in absolute terms shear formal or, more interestingly, formal-semantic variance of pairs or even three- or four-member sets of shared-root same category coinages involves the derivation from several hundred verbs. All the peculiarities of such variant pairs of shared-root deverbal coinages still await a comprehensive description.

Patient nouns (d_4), which unite occasional nouns denoting the object, are mostly in *-ee*, sporadically in *-er* and even *-ant*. They number the total of 346 *OED*-attested derivatives.

The deverbal coinages that are characterized by the onomasiological feature of 'property' encompass adjectives (d_5), lexicalized present participles (d_6), modal adjectives (d_7) and lexicalized past participles (d_8). In their vast majority they were given separate entries in the *OED*. The participles are single suffix deverbal categories. The present participles that end in *-ing* (6,537 *OED*-attested lexemes) are outnumbered by the past participles in *-ed* (8,909 *OED*-attested derivatives).

The modal adjectives (d_7), onomasiologically adjacent with past participles, end in either of the two allomorphic variants *-able* or/and *-ible*. They provide us with 2,144 coinages. which relate to 2,090 verbal stems. Deverbal adjectives (d_5) are yielded by 2,051 bases.

However, owing to the contribution of seven rival suffixes they are represented by 2,463 coinages – downscale, 1036 in *-ive*, 457 in *-ant* and 190 in *–ent*, 317 in *-y*, 228 in *-ory*, 95 in *-ful* and 46 in *-ous* yielding some amount of suffix wise variant adjectives from the same verb.

The adjectives reveal [>1.15x] *OED*-types frequency as compared with modal adjectives. This is comparable with the [>1.36x] *OED*-types frequency advantage for lexicalized past participles, though with converse directionality as onomasiologically adjacent deverbal adjectives / present participles fall on a more frequent category in the former correlation and on a less frequent one in the latter.

Second order deverbal coinages reveal a two-fold stratification: by the resultant onomasiological outcome (adverbs vs. nouns) and by the intermediate motivating base. The category of the adverb (d_9) is derived from 507 bases. The nouns from deverbal adjectives (d_{10}) are productivitywise in a deficient position with the total of 346 *OED*-attested sources of derivation types. Conversely, the nouns derived from model adjectives (d_{14}) manifest themselves in 519 derivatives in *-(a/i)bility* and 288 coinages in *-(a/i)bleness*. They also yield [>4.0x] *OED*-types frequency with respect to adverbs (d_{13}) with just 262 *-(a/i)bly* outcomes.

In the derivation from the past participle, both adverbs (d_{15}) and nouns (d_{16}) almost equally yield, respectively, 447 coinages in *-edly* and 430 types in *-edness*. This productivity evenness is not observed in the derivation from the present participles. Here 1,436 *OED*-registered adverbs in *-ingly* (d_{11}) are juxtaposed at [>4.9x] *OED*-types frequency with only 289 nouns in *-ingness* (d_{12}).

The complete lists of *OED*-confirmed single or variant suffix productivity as regards the complete, etymologically stratified and/or chronologically distributed list(s) of parent verbs are downloadable from the developed framework.

Each deverbal family with the dates of the textual prototypes of its same-root constituents was typed into a downloadable electronic lattice. Wherever a derivational category revealed attested coinages with variant suffixes these were put into the respective extensions with their own dating. In the derivational family the oldest/older (or more common, if dated identically) suffix occupied the respective categorial position. However, with respect to the roots that admit suffix rivalry the oldest main base suffix could be replaced by one or several (in an interchanging manner) variant formant(s). The coinage with the oldest suffix in the main base could be exchanged for any of the rival suffixal coinages.

The *OED*-modelled deverbal families are characterized by varied constituents-dated categorical (correspondingly numbered) and suffixal compositions (see e.g. below). Here factitive lexicalization of action nouns ($d_{2'}$) is attributed the slot 17 that concludes the lattice.

abase (1393); 1: abasing (1555; -ing, 1555; -ance, 1671); 2: abasement (1561); 3: abaser (1650); 6: abasing (1665); 8: abased (1611); 15: abasedly (1571); 16: abasedness (1900); 17: abasement (1611). Etymology: OF: abaissier 'to bring low'

accelerate (1525); 1: accelerating (1591); 2: acceleration (1531); 3: accelerater (1611; -er, 1611; -ant, 1909; -or, 1841); 5: accelerative (1751; -ive, 1751; -ant, 1909); 6: accelerating (1829); 7: accelerable (1900); 8: accelerated (1803); 15: acceleratedly (1751); 17: acceleration (1534). Etymology: L: accelerare 'to hasten'

exhaust (1533); 1: exhausting (1539); 2: exhausture (1611; -tion, 1661; -ment, 1621; -ture, 1611); 3: exhauster (1743); 4: exhaustee (1900); 5: exhaustive (1786); 6: exhausting (1847); 7: exhaustible (1667); 8: exhausted (1623); 9: exhaustively (1816); 10: exhaustiveness (1816); 11: exhaustingly (1882); 14: exhaustibility (1836); 15: exhaustedly (1835); 16: exhaustedness (1840); 17: exhausture (1611; -tion, 1646; -ment, 1621; -ture, 1611). Etymology: L: exhaurire

persuade (1513); 1: persuading (1530); 2: persuasion (1382); 3: persuader (1538); 5: persuasive (1485); 6: persuading (1581); 7: persuasible (1382); 8: persuaded (1538); 9: persuasively (1667); 10: persuasiveness (1611); 11: persuadingly (1552); 13: persuasibly (1555); 14: persuasibility (1627); 15: persuadedly (1638); 16: persuadedness (1648); 17: persuasion (1534). Etymology: F: persuader

reveal (1375); 1: revealing (1345; -ing, 1345; -ment, 1584); 3: revealer (1545); 6: revealing (1593); 7: revealable (1672); 8: revealed (1562); 11: revealingly (1868); 14: revealableness (1847; -ability, 1864; -ableness, 1847); 15: revealedly (1624). Etymology: ME: revelen; MF: reveler; OF: reveler; F: reveller

stint (1200); 1: stinting (1338; -ing, 1338 -ance*, 1605); 3: stinter (1598); 6: stinting (1867); 8: stinted (1513); 11: stintingly (1857); 15: stintedly (1863); 16: stintedness (1827); 17. stintage (1641). Etymology: English

Understandably, some suffixal variants are just nonce words hardly used after their attestation. The *OED* approximation of the dating of some first quotation had to be omitted and made precise by the year for reasons of modelling.

The entire corpus of deverbal derivational families could be partitioned according to the etyma of the verb marked in the respective slots or origin of the suffix(es) in specified categories as well as chronologically. All the queries are sustained by the software using DMS.

4. Discussion

4.1 *Solo and juxtaposed deverbal productivity*

The notion of productivity as a realized attachment of the suffix to a(n) (un)specified type of bases is intrinsically singular. However, in the lexical system of deverbal word-formation only a small proportion of derivation types do not co-occur with others and, respectively, few verbal bases yield single derivatives. In the resultant selectivity of derivation categories both the filled-in position(s) and the missing one(s) are relevant from the point of view of the patterns of re-categorization of the verb in a primary and subsequent derivation acts or in the sequence(s) of such derivation acts. This distinction makes it possible to draw the line between solo and juxtaposed derivatives and their productivities,

Running the query for juxtaposed and solo productivities of a deverbal category it is possible to place the attested results of deverbal derivation within the genuine (non)combinatorial setting. The solo productivity cases are well-expected as an ‘extra’ or ‘unmatching’ part of the derivatives within a category of a higher productivity as compared with the lower productivity category. Nonetheless the *OED* provides us with a less expected situation. In a pair of categories the one with a lower productivity yields solo derivatives as well. The productivity of the category is then representable as an additive value consisting of the juxtaposed and solo manifestations.

In the entire lattice, solo productivity in primary deverbal derivation presupposes the absence of any other shared-root derivative in the deverbal word family. Its quota may be related to some specific peculiarities of the nature of a deverbal category.

This feature is best manifested in lexicalized past participles (d_8) in which 1,906 (of 9,040) coinages are non-related to shared-root counterparts. In the present participles solo productivity is several fold less common: 607 (of 6,537) derivatives. Adjectives and modal adjectives, unlike nouns, yield statistically insignificant quotas of solo productivity.

In the categories of deverbal nouns, solo productivity is not conceivable with respect to lexicalizable action nouns (d_2). It is quite uncommon among patients (d_4). In the class of

factitive nouns ($d_{2'}$) 148 coinages have no other shared-root counterparts. Non-lexicalizable action nouns (d_1) and agent nouns (d_3) claim most of the cases of solo productivity with 3,328 of 11,378 and 404 of 6,658 derivatives, respectively.

In secondary derivatives solo productivity does not exclude the intermediate participial or adjectival base. However, it is numerically insignificant.

The heuristics of the two tier modeling of deverbal word-formation is more visible in specific segments of the framework. For instance, if we limit the shared-root juxtaposed productivity to deverbal categories that are non-nominative (d_{5-8}) then the 'local' solo productivity of adjectives (d_5) will be increased by the instances where it co-occurs with the nouns. The rest of the instances of deverbal adjectives will be those combined with at least one more type of non-nominal deverbal coinages.

The quotas of solo and juxtaposed productivity of deverbal categories and suffixal models are conducive to the modelling of mutual attraction values determining the probabilities of the co-occurrence of derivatives.

The absence of derivational gaps among primary shared-root derivatives is quite uncommon with only 37 attested cases. Among secondary derivatives not a single set was found where all the positions would be filled by the respective shared-root coinages.

The interplay of the attested and missing coinages in the shared-root deverbal derivation constitutes the corresponding primary and sometimes secondary deverbal paradigms.

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4.2 *Part-of-speech pre-emption in the productivity of deverbal pairs*

The total number of deverbal nouns as reflected in the *OED* separate deverbal glosses and occasionally inside the glosses of verbs amounts to almost 24,000 deverbatives. This additive productivity exceeds the total productivity of deverbal adjectives and lexicalized participles amounting to just a little over 20,000 coinages. This may prompt a hypothesis that in shared-root binary juxtapositions of noun-adjective/participle coinages the noun tends to fill in the chronologically precedent position more often than the adjective or participle.

To check this hypothesis we put aside the same year dating of coinages (altogether 765 pairs) and compare the earliest quotations of the remaining almost 26,400 deverbal pairs (cf. 1).

Each of the counterparts of such pairs was attested at least one year after the verb, which is a justification for treating such pairs as manifestations of parallel derivational productivity from the shared-root verb. For space sake, we will compare the categorical slots of the deverbal derivation on the earlier/earliest filling principle
towards the common verb with no account of suffix rivalry.

(1) Diachronic pre-emption of primary deverbal categories with the preceding verb (note: each derivative is followed by the date of its earliest *OED* attestation and the number of the category label as in Section 3 in brackets; chronologically divergent categories are separated by a semicolon.

(1.1) v; d_1; d_5 = 682 vs. v; d_5; d_1 = 223 (at v; d_1, d_5 = 15)
E.g., accept 1360, accepting 1577 (1), acceptive 1596 (5) vs.
calculate 1570, calculating 1710 (1), calculatory 1611 (5)

(1.2) v; d_1; d_6 = 2134 vs. v; d_6; d_1 = 857 (at v; d_1, d_6 = 234)
E.g., riot 1375, rioting 1599 (1), rioting 1887 (6) vs.
console 1693, consolement 1797 (1), consoling 1704 (6)

(1.3) v; d_1; d_7 = 967 vs. v; d_7; d_1 = 237 (at v; d_1, d_7 = 10)
E.g., grant 1225, granting 1340 (1), grantable 1548 (7) vs.
delete 1495, deleting 1711 (1), delible 1610 (7)

(1.4) v; d_1; d_8 = 1938 vs. v; d_8; d_1= 1271 (at v; d_1, d_8 = 118)
E.g., rivet 1430, riveting 1485 (1), riveted 1606 (8) vs.
hire 1000, hiring 1400 (1), hired 1230 (8)

(1.5) v; d_2; d_5 = 464 vs. v; d_5; d_2 = 94 (at v; d_2; d_5 = 7)
E.g., chip 1461, chipping 1611 (2), chippy 1729 (5) vs.
bewail 1300, bewailment 1828 (2), bewailful 1592 (5)

(1.6) v; d_2; d_6 = 1063 vs. v; d_6; d_2 = 336 (at v; d_2, d_6 = 31)
e.g., circulate 1471, circulation 1535 (2), circulating 1632 (6) vs.
beset 1000, besetment 1830 (2), besetting 1795 (6)

(1.7) v; d_2; d_7 = 705 vs. v; d_7; d_2 = 110 (at v; d_2, d_7 = 16)
E.g., allot 1547, allotment 1574 (2), allottable 1869 (7) vs.
smell 1175, smelling 1509 (2), smellable 1449 (7)

(1.8) v; d_2; d_8 = 1029 vs. v; d_8; d_2 = 572 (at v; d_2, d_8 = 40),
E.g., batter 1325, battering 1542 (2), battered 1592 (8) vs.
wad 1579, wadding 1778 (2), wadded 1595 (8)

(1.9) v; $d_{2'}$; d_5 = 504 vs. v; d_2; d_5 = 195 (at v; $d_{2'}$, d_5 = 9)
E.g., coerce1475, coercement*1586 (2'), coercive1600 (5) vs.
puff 1225 puffing 1654 (2'), puffy 1599 (5)

(1.10) v; $d_{2'}$; d_6 = 1958 vs. v; d_6; $d_{2'}$ = 633 (at v; $d_{2'}$, d_6 = 30)
E.g., toll 1350, tollage 1551 (2'), tolling 1641 (6) vs.
maze 1230, amazement 1606 (2'), amazing 1593 (6)

(1.11) v; $d_{2'}$; d_7 = 722 vs. v; $d_{2'}$; d_7 = 239 (at v; d_2, d_7 = 11)
E.g., bend 1000, bending 1398 (2'), bendable 1611 (7) vs.
-dig 1320, digging 1559 (2'), diggable 1552 (7)

(1.12) v; $d_{2'}$; d_8 = 978 vs. v; d_8; $d_{2'}$ = 975 (at v; $d_{2'}$, d_8 = 33)
E.g., allow 1300, allowance 1377 (2') allowed 1382 (8) vs.
pound 1000, pounded 1600 (8), pounding 1872 (2')

(1.13) v; d_3; d_5 = 650 vs. v; d_5; d_3 = 428 (at v; d_3, d_5 = 26)
E.g., adjust1611, adjuster 1673 (3), adjustive 1883 (5) vs.
obey 1290, obeyer 1551 (3), obeyant* 1400 (5)

(1.14) v; d_3; d_6 1774 vs. v; d_6; d_3 = 1399 (at v; d_3, d_6 = 78)
E.g., check 1393, checker 1535 (3), checking 1548 (6) vs.
scare 1200, scarer 1740 (3), scaring 1641 (6)

(1.15) v; d_3; d_7 = 1105 vs. v; d_7; d_3 = 374 (at v; d_3, d_7 = 24)
E.g., abuse 1413, abuser 1450 (3), abusable 1660 (7) vs.
vex 1423, vexer 1530 (3), vexable 1502 (7)

(1.16) v; d_3; d_8 = 1414 vs. v; d_8; d_3 = 1612 (at v; d_3, d_8 = 71)

E.g., brood 1440, brooder 1599 (3), brooded* 1674 (8) vs.
retort 1557, retorter 1611 (3), retorted 1597 (8)

(1.17) v; d_4; $d_5 = 25$ vs. v; d_4; $d_5 = 24$ (at v; d_4, $d_5 = 4$)
E.g., confess 1340, confessee 1601 (4), confessant 1603 (5) vs.
indict 1303, indictee 1581 (4), indictive 1656 (5)

(1.18) v; d_4; $d_6 = 43$ vs. v; d_6; $d_4 = 0$ (at v; d_4, $d_6 = 2$)
E.g., grant 1225, grantee 1491 (4), granting 1593 (6)

(1.19) v; d_4; $d_7 = 66$ vs. v; d_7; $d_4 = 139$ (at v; d_4, $d_7 = 3$)
E.g., indict 1303, indictee 1581 (4), indictable 1706 (7) vs.
cut 1275, cuttee 1798 (4), cuttable 1449 (7)

(1.20) v; d_4; $d_8 = 43$ vs. v; d_4; $d_8 = 190$ (at v; d_4, $d_8 = 3$)
E.g., resign 1366, resignee 1611 (4), resigned 1654 (8) vs.
evict 1503, evictee 1879 (4), evicted 1604 (8)

Classes of deverbal derivatives singled out in Section 3 in the context of comparing their productivity make up twenty part-of-speech oppositions of a noun and an adjective or participle inside shared-root deverbal families. Within such oppositions the onomasiological refashioning of the verb as a substance (noun) is opposed to its reshaping as a feature (adjective or participle) in terms of the chronological pre-emption/succession within a shared-root paradigm and the inclusion of a specific verb into the categorial expansion of the lexicon. In fifteen such oppositions the expansion of the deverbal onomasiological space via it being filled with the nouns was happening faster than with the adjectives. In four low productivity pairs (1.16-17, 1.19-20) the patient noun follows its counterpart. With regard to factitive nouns and past participles the pre-emption quotas are nearly equal. Agent nouns are more often superseded by their shared-root past participles.

Parallel productivity of two derivational processes takes place between the optional second order derivation from deverbal participles and nouns (cf. 2). Repeating the same counting procedure as in (1), in 1,143 pairs of shared-root second order derivatives the adverb pre-empted a secondary deverbal noun whereas in 700 pairs their sequential priority fell on the shared-root noun.

Hence in parallel processes of the onomasiological reshaping of the verb substantivization tended to precede adjectivization. Then among the derived categories of the second order deverbal derivation substantivization was more often superseded by the formation of the adverb.

The diachronic placement of the earliest *OED*-attestations of the juxtaposed verb and deverbatives is also assessable as a distribution of the age differential values. In this case we would reflect not only the fact of the chronological pre-emption or succession between the shared-root verb and their two derivatives, but also the widths of time that elapse from one attestation to another. The respective curvature characterizes the numeric representation of the *OED*-attested lexemes and the differential intervals in their dating. This is shown for random examples on *Figure 1*. Here on axis *x* the nods represent the derivation time value – first between the verb and its realized earlier productivity, then an extension to its later productivity as a difference in the respective years of attestation. Axis *y* shows the number of such documented sequences. A compatible distribution can be built for the chronology of the *OED*-attestations of all categorical sequences of a verb and its two or more later derivatives.

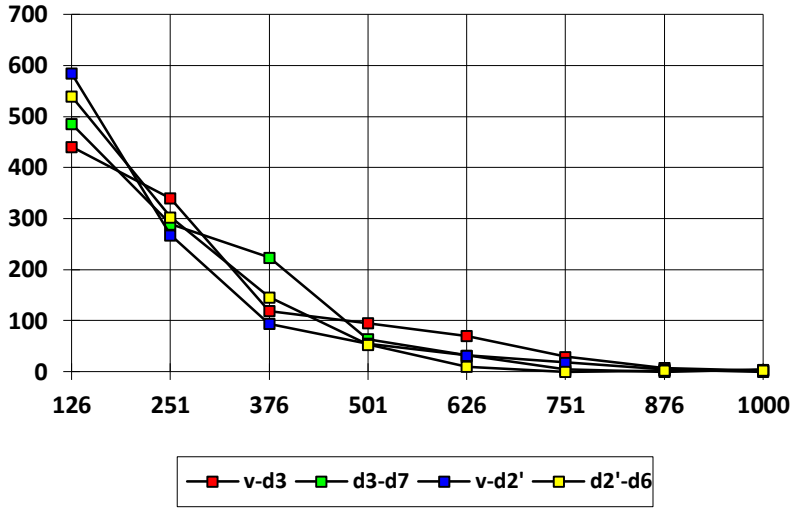

Figure 1. *Distribution of the temporal differential values in sequences of verbs and two compared pairs of shared-root derivatives (v; d_3; d_7 and v; $d_{2'}$; d_6) where $d_{2'}$ stands for factitive nouns, d_3 for 'source of action' nouns, d_6 for present participles and d_7 for modal adjectives*

(2) Diachronic pre-emption of secondary deverbal coinages with the preceding adjective or participle. Symbols specification same as in (1) above.

(2.1) v; d_9; $d_{10} = 147$ vs. v; d_9; $d_{10} = 75$ (at v; d_9, $d_{10} = 16$)
E.g., attract 1540, attractively 1604 (9), attractiveness 1673 (10) vs.
drag 1440, draggily 1900 (9), dragginess 189 (10)

(2.2) v; d_9; $d_{12} = 23$ vs. v; d_{12}; $d_9 = 8$ (at v; d_9, $d_{12} = 1$)
E.g., depress 1325, depressively 1670 (9), depressingness 1923 (12) vs.
penetrate 1530, penetratively 1697 (9), penetratingness 1662 (12)

(2.3) v; d_9; $d_{14} = 68$ vs. v; d_9; $d_{14} = 38$ (at v; d_9, $d_{14} = 1$)
E.g., suggest 1526, suggestively 1859 (9), suggestibility 1890 (14) vs.
solve 1440, solvently 1872 (9), solvability 1722 (14)

(2.4) v; d_9; $d_{16} = 32$ vs. v; d_9; $d_{16} = 26$ (at v; d_9, $d_{16} = 1$)
E.g., direct 1374, directively 1642 (9), directedness 1922 (16) vs.
connect 1537, connectively 1745 (9), connectedness 1697 (16)

(2.5) v; d_{11}; $d_{10} = 76$ vs. v; d_{10}; $d_{11} = 46$ (at v; d_{11}, $d_{10} = 0$)
E.g., observe 1386, observantness 1660 (10), observingly 1599 (11) vs.
fidget 1754, fidgetiness 1772 (10), fidgetingly 1882 (11)

(2.6) v; d_{11}; $d_{12} = 191$ vs. v; d_{12}; $d_{11} = 51$ (at v; d_{11}, $d_{12} = 10$)
E.g., beseech 1175, beseechingly 1830 (11), beseechingness 1863 (12) vs.
invite 1533, invitingly 1667 (11), invitingness 1656 (12)

(2.7) v; d_{11}; $d_{14} = 125$ vs. v; d_{14}; $d_{11} = 77$ (at v; d_{11}; $d_{14} = 2$)
E.g., comply 1602, complyingly 1654 (11), compliableness 1684 (14) vs.
digest 1450, digestingly 1885 (11), digestibleness 1662 (14)

(2.8) v; d_{11}; $d_{16} = 80$ vs. v; d_{16}; $d_{11} = 78$ (at v; d_{11}; $d_{16} = 1$)
E.g., deserve 1300, deservingly 1552 (11), deservedness 1628 (16) vs.
curve 1594, curvingly 1923 (11), curvedness 1676 (16)

(2.9) v; d_{13}; $d_{10} = 16$ vs. v; d_{10}; $d_{13} = 13$ (at v; d_{13}, $d_{10} = 1$)
E.g., resist 1374, resistiveness 1803 (10), resistibly 1674 (13) vs.
impress 1374, impressiveness 1663 (10), impressibly 1900 (13)

(2.10) v; d_{13}; $d_{12} = 11$ vs. v; d_1; $d_{13} = 14$ (at v; d_{13}; $d_{12} = 0$)
E.g., pass 1225, passingness 1839 (12), passably 1610 (13)
love 825, lovingness 1574 (12), loveably 1825 (13)

(2.11) v; d_{13}; $d_{14} = 100$ vs. v; d_{14}; $d_{13} = 88$ (at v; d_{13}; $d_{14} = 7$)
E.g., pervert 1374, pervertibly 1642 (13), pervertibility 1850 (14)
prefer 1386, preferably 1729 (13), preferableness 1648 (14)

(2.12) v; d_{13}; $d_{16} = 20$ vs. v; d_{13}; $d_{16} = 7$ (at v; d_{13}, $d_{16} = 0$)
E.g., perceive 1300, perceivably 1603 (13), perceivedness 1871 (16)
deplore 1559, deplorably 1653 (13), deploredness 1608 (16)

(2.13) v; d_{15}; $d_{10} = 37$ vs. v; d_{10}; $d_{15} = 22$ (at v; d_{15}, $d_{10} = 0$)
e.g., digest 1450, digestiveness 1727 (10), digestedly 1608 (15) vs.
exhaust 1533, exhaustiveness 1816 (10), exhaustedly 1835 (15)

(2.14) v; d_{15}; $d_{12} = 29$ vs. v; d_{12}; $d_{15} = 15$ (at v; d_{15}, $d_{12} = 1$)
E.g., deserve 1300, deservingness 1631 (12), deservedly 1548 (15) vs.
engross 1400, engrossingness 1848 (12), engrossedly 1865 (15)

(2.15) v; d_{15}; $d_{14} = 76$ vs. v; d_{14}; $d_{15} = 37$ (at v; d_{15}, $d_{14} = 0$)
E.g., dispose 1340, disposability 1830 (14), disposedly 1610 (15) vs.
excite 1340, excitability 1788 (14), excitedly 1852 (15)

(2.16) v; d_{15}; $d_{16} = 112$ vs. v; d_{16}; $d_{15} = 105$ (at v; d_{15}, $d_{16} = 9$)
E.g., determine 1374, determinedly 1540 (15), determinedness 1748 (16) vs.
curse 1050, cursedly 1386 (15), cursedness 1300 (16)

The study of secondary coinages in chronological juxtaposition with the categories of deverbal nouns would shed some light on the connection between the width and depth of the word-forming families over time.

4.4 *Retrospective and prospective modeling of juxtaposed coinages*

The constituents of the word-forming families are placed in searchable slots of the two-tier electronic lattice.

Two kinds of queries into the shared-root verbs and their coinages are possible: inclusive (combinatorial) and exclusive (paradigmatic). The former queries reflect juxtaposed and the latter – solo productivities of deverbal categories in their single or precedent, eventually also variant, suffix manifestations.

In the combinatorial juxtaposed queries the mutual occurrence of deverbal categories irrespective of other attested shared-root counterparts, if any, is revealed. For instance, in the entire *OED* first quotation database there are 2,504 instances of shared-root parent verbs, agent nouns (d_3), present participles (d_6) and past participles (d_8).

In the paradigmatic solo queries the set of chosen categories has no other shared-root counterparts. In the above case, there are 33 derivational paradigms (within a wide, but sometimes quite condensed and even recent chronology – see below) in which the verb, its derived agent noun and both participles do not co-occur with other shared-root derivatives:

$vd_3d_6d_8$ = 35 sets:
-arminianize 1637, arminianizer 1698 (3), arminianizing 1674 (6), arminianized 1637 (8)
-beep 1936, beeper 1946 (3), beeping 1936 (6), beeped 1962 (8)
-blockade 1680, blockader 1849 (3), blockading 1708 (6), blockaded1846 (8)
-bob 1280, bobber 1542 (3), bobbing* 1567 (6), bobbed* 1573 (8)
-caution 1641, cautioner 1565 (3), cautioning 1748 (6), cautioned1720 (8)
-counterbalance 1603, counterbalancer 1881 (3), counterbalancing 1651 (6), counterbalanced 1611 (8)
-de-incline* 1727, deincliner 1727 (3), deinclining 1727 (6), deinclined 1727 (8)
-devast 1537, devaster 1789 (3), devasting 1659 (6), devasted1632 (8)
-embrace 1475, embracer 1495 (3), embracing 1769 (6), embraced*1475 (8)
-enkindle 1548, enkindler 1853 (3), enkindling 1626 (6), enkindled1549 (8)
-enrapture 1740, enrapturer 1850 (3), enrapturing 1801 (6), enraptured 1751 (8)
-foliate 1665, foliator 1848 (3), foliating 1835 (6), foliated1650 (8)
-free-boot 1592, free-booter 1570 (3), free-booting 1659 (6), free-booted 1592 (8)
-gladden 1300, gladdener 1879 (3), gladdening 1729 (6), gladdened 1728 (8)
-guarantee 1791, guarantor 1853 (3), guaranteeing 1876 (6), guaranteed 1882 (8)
-indemnify 1611, indemnifier 1882 (3), indemnifying 1769 (6), indemnified 1817 (8)
-manumit 1432, manumitter 1865 (3), manumitting 1616 (6), manumitted 1685 (8)
-outlive 1472, outliver 1580 (3), outliving 1630 (6), outlived 1800 (8)
-outrage 1303, outrager 1873 (3), outraging 1567 (6), outraged 1711 (8)
-overlive 830, overliver 1440 (3), overliving 1578 (6), overlived 1856 (8)
-panegyrize 1617, panegyrizer 1823 (3), panegyrizing 1855 (6), panegyrized 1852 (8)
-photosynthesize 1921, photosynthesizer 1958 (3), photosynthesizing 1927 (6), photosynthesized 1910 (8)
-puritanize 1625, puritanizer 1836 (3), puritanizing 1857 (6), puritanized 1836 (8)
-refreshen 1782, refreshener 1823 (3), refreshening 1829 (6), refreshened 1790 (8)
-ruff 1548, ruffer 1611 (3), ruffing 1865 (6), ruffed 1578 (8)
-russify 1865, russifier 1895 (3), russifying 1960 (6), russified 1865 (8)
-secede 1702, seceder 1755 (3), seceding 1757 (6), seceded 1894 (8)
-sheet 1606, sheeter 1853 (3), sheeting 1592 (6), sheeted 1604 (8)
-single-foot 1890, single-footer 1890 (3), single-footing 1890 (6), single-footed 1864 (8)
-synthetize 1828, synthetizer 1890 (3), synthetizing 1892 (6), synthetized 1890 (8)
-thrall 1205, thraller 1887 (3), thralling 1871 (6), thrilled 1527 (8)
-topple 1542, toppler 1825 (3), toppling 1804 (6), toppled 1871 (8)
-tumble-dry 1962, tumble-drier 1969 (3), tumble-drying 1962 (6), tumble-dried 1977 (8)

The paradigmatic solo queries give the complete list of instances of the categories configuration within the entire database. However, their outcome can be extended, if we limit the inventory of the blocked categories. For instance, after we bar the slots of all secondary derivatives there are 12 more positive hits in the search for $vd_3d_6d_8$:

-benight 1560, benighter 1818 (3), benighting 1649 (6), benighted 1575 (8)
-blandish 1305, blandisher 1611 (3), blandishing 1374 (6), blandished 1671 (8)
-counterbalance 1603, counterbalancer 1881 (3), counterbalancing 1651 (6), counterbalanced 1611 (8)
-forthcome 1000, forthcomer 1812 (3), forthcoming 1521 (6), forthcome 1827 (8)
-interest 1608, interester 1701 (3), interesting 1711 (6), interested 1665 (8)
-mind-blow 1970, mind-blower 1968 (3), mind-blowing 1967 (6), mind-blown 1969 (8)
-need 960, needer 1553 (3), needing 1569 (6), needed 1887 (8)
-outline 1790, outliner 1900 (3), outlining 1896 (6), outlined 1798 (8)
-rebuff 1586, rebuffer 1950 (3), rebuffing 1747 (6), rebuffed 1886 (8)

-slumber 1220, slumberer 1380 (3), slumbering 1390 (6), slumbered 1590 (8)
-thirst 893, thirster 1382 (3), thirsting 1382 (6), thirsted 1611 (8)
-vapour 1407, vapourer 1653 (3), vapouring 1647 (6), vapoured 1536 (8)

In the diachronic modelling of shared-root deverbal derivation which is based on the *OED* earliest quotations of the lexemes two kinds of chronological filters are envisaged.

The first one delimits the chronological composition of the shared-root deverbal word-formation of a chosen categorial affiliation. For instance, by introducing the overall chronological sifts 2,505 $vd_3d_6d_8$ sets attested in the entire *OED* correspond to only 1,056 such sets documented by the end of the 18th c. and, respectively, 2,335 sets by the end of the 19th c.

The second line of filters can delimit the age of the earliest *OED* quotation of the individual constituents of the chosen set variedly and, if opted, selectively. For instance, of 2,505 $vd_3d_6d_8$ sets only in 15 examples the verb was derivationally sterile up until the end of Middle English, both participles dated back to the 16th c. and the agent noun was attested after the 17th c.

v d_3 d_6 d_8 = 15 sets:
-bounce 1225, bouncer 1762 (3), bouncing 1579 (6), bounced* 1519 (8)
-bud 1398, budder 1818 (3), budding 1561 (6), budded 1552 (8)
-cloy 1400, cloyer 1842 (3), cloying 1647 (6), cloyed 1599 (8)
-dazzle 1481, dazzler 1800 (3), dazzling 1571 (6), dazzled 1576 (8)
-disappoint 1494, disappointer 1812 (3), disappointing 1530 (6), disappointed 1552 (8)
-fade 1340, fader 1931 (3), fading 1535 (6), faded 1580 (8)
-goggle 1380, goggler 1821 (3), goggling 1586 (6), goggled 1503 (8)
-interchange 1374, interchanger 1861 (3), interchanging 1586 (6), interchanged 1567 (8)
-lure 1386, lurer 1900 (3), luring 1570 (6), lured 1576 (8)
-pamper 1380, pamperer 1775 (3), pampering 1573 (6), pampered 1529 (8)
-ruffle 1300, ruffler 1875 (3), ruffling 1596 (6), ruffled 1577 (8)
-scorch 1430, scorcher 1874 (3), scorching 1563 (6), scorched 1595 (8)
-shun 950, shunner 1806 (3), shunning 1583 (6), shunned 1591 (8)
-souse 1387, souser 1862 (3), sousing 1567 (6), soused 1550 (8)
-totter 1200, totterer 1711 (3), tottering 1534 (6), tottered* 1570 (8)

The chosen set of shared-root categories within a word-forming family can be traced back to the previous combinatorial state(s) of constituents. With this purpose we discard the constituents that do not meet the set chronological depth criterion and get coincident or modified lists of the derivational valences of the verb that were realized before a specified chronological barrier.

To illustrate this possibility we establish solo shared-root combinability of the verb and its adjectives (v d_5 d_7) for the present-day lexicon. Their list numbers 773 sets.

In the first run of the query, we remove all the quotations dated after 1850 (cf. the left-hand side upper column of numeric notations of *Table 1*). The compared shared-root derivatives become less numerous, they tend to lose some constituents or even disappear altogether as we go back in time.

The retrospective intermediate combinability for the (present-day) categorical configuration enables us to reveal the cases in which some of the filled positions had been kept under derivational constraints before such constraints were removed. We can speculate for how long they were binding and in what succession they disappeared owing to derivational creativity. This will show some fluctuations in the juxtaposed productivities from the same verbs (cf. the lines for the same notation in the respective intermediate stages in *Table 1*). In part of the sets at some stage of the reconstruction the verb is back-derived from its shared-root

non-analysable derivatives (cf. the lines in *Table 1* which entail the notation for one or both adjectives without that for the verb).

A prospective modelling of the rise of derivatives from the shared base reveals a gradual involvement of groups of verbs marked by specific age or/and other characteristics in one or more processes of deverbal derivation. During such modelling it is possible to compare the intensity and speed of the onomasiological saturation with respect to the interplay of the extents of the application of default morphological rules and recovered predictability mechanisms for derivatives.

Table 1 *Retrospective combinability reconstruction for 773 attested shared-root sets of verbs (v), adjectives (d_5) and modal adjectives (d_7):notations from left in the upper tier rightward correspond to the reconstructed states by 1850, 1700 and 1550 and, respectively in the lower tier, by 1400, 1250 and 1100*

Type	Count
v d5 d7	564
v d5	119
v d7	50
v	33
d5 d7	2
d7	1

Type	Count
v d5 d7	354
v d5	177
v	111
v d7	102
d5 d7	4
d7	4
d5	1

Type	Count
v	344
v d5	100
v d7	77
v d5 d7	55
d5	20
d7	10
d5 d7	1

Type	Count
v	253
v d5	35
v d5 d7	21
v d7	20
d5	16
d7	11
d5 d7	1

Type	Count
v	70
d5	1
d7	1
v d5	1

Type	Count
v	30

Both prospective and retrospective modelling reveal instances of petrified co-occurrences that for some reason(s) took no derived entries. More importantly, they reflect the categories mapping of the paths taken by morphological creativity over time.

5. Concluding remarks

The *OED* first quotations are a valuable resource for the study of historical word-formation and an efficient medium for the modelling of multiple diachronic lexical objects. The demonstration of their full research potential calls for a union of refined electronic possibilities and considerations of analytical expedience. The suggested framework is deemed to be heuristic for the quantitative side of various manifestations of the categorical and suffixal cases of deverbal productivity and is still to be extended by morphopragmatic analysis and corpora cross-checks. Already now it can run well on period stratifications and possible thematic or etymological references. It seems to be capable to generalize on the spots and time of the lexemic expansions of the category-bound variant configuration of deverbal word families. Perhaps, even more significantly, it reveals the places of blockage in defaults morphology and

keeps looking at them while they were still there, hence enabling us to catch some logic of how and why they got filled.

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