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Schema unification and morphological productivity: A diachronic perspective

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Abstract

Unified schemas which allow for deriving multiply complex word-formation products are a central concept in Construction Morphology (CxM). Based on examples such as *un-V-able* formations in English, Booij (2007: 38) argues that unified schemas (in this case: $[un[V-able]_A]_A$) can be conceived of as “short cuts in coining new complex words”.

In this paper, we explore three prospective cases of schema unification and discuss what kind of evidence supports the assumption of unified schemas. The first two case studies are diachronic in nature. Drawing on corpus analyses of data from the Early New High German period (1350–1650) and from the early stages of New High German, we show how the developments of the complex patterns diverge from the developments of their counterparts. To this end, we analyze the frequency and productivity of the (sub-)constructions and assess the semantics of the word-formation products. Firstly, nominalization with the suffix *-ung* has been shown to undergo a diachronic decrease in morphological productivity (Demske 2000; Hartmann 2016). However, unified schemas such as $[Be-X-ung]_N$ or $[(\text{PREF})-X-ierung]_N$ are shown to be still productive, e.g. *Beplankung*, *Belaberung*, *Vercomedianisierung* (from www.wortwarte.de, a collection of neologisms). In a similar vein, complex derivation of the type $[un-V-lich]_{ADJ}$ ‘un-V-able’ is shown to have remained productive for a longer period of time than its simplex parent schema $[un-V-lich]_{ADJ}$. Moreover, many *un-V-lich* derivatives historically precede their unprefixed counterparts, or lack them altogether (*unwiderstehlich* ‘irresistible’, but **widerstehlich*). Our third case study explores present day German pseudo-participles (*bebrillt* ‘bespectacled’) using web data. The complex pattern can be shown to diverge stylistically from its parents schemas and also to provide semantically more uniform derivatives. Overall, our results show that the concept of unified schemas can help explain important differences in the development of the individual subpatterns in terms of morphological productivity and in terms of semantic aspects of the word-formation constructions.

1 Introduction

Multiply complex word-formation products like *unforgettable* or *decaffeinated* pose a challenge to theories of morphology. As Plag (2005: 38) points out, the question emerges “how they are derived and what their internal structure may be.” For instance, a derivative like *reorganization* could be analyzed as $[re-[organize-ation]]$ or as $[[re-organize-]ation]$ (cf. Plag

2005: 40). The analysis proves even more problematic in the case of so-called parasynthetic formations like *decaffeinate*, where neither *caffeinat* nor **decaffein* are attested before the complex derivative was coined (cf. Plag 1999: 110). Construction Morphology (CxM) therefore assumes multiply complex word-formation schemas, so-called unified schemas (cf. Booij 2010: 41–50). In CxM, word-formation products are seen as constructions, i.e. form-meaning pairings at various levels of abstraction (cf. e.g. Goldberg 2006). In a CxM framework, derivational patterns can be conceived of as partially filled constructional schemas with an open slot. Consider, for example, the schema $[un-A]_A$, which is instantiated in word-formation products like *unknown*, *unworthy*, and *undead*, or $[V-able]_{ADJ}$, which is instantiated in formations like *doable* and *believable*. As word-formation products can themselves serve as bases for word-formation patterns, it seems reasonable to assume that in the case of patterns that frequently go together, language users will “make use of short cuts in coining new complex words” (Booij 2007: 38). For instance, the aforementioned patterns $[un-A]_A$ and $[V-able]_A$ can be unified as in (1) (from Booij 2010: 42).

$$(1) \quad [un-A]_A \quad + \quad [V-able]_A \quad = \quad [un-[V-able]_A]_A$$

This idea is informed by theoretical assumptions and empirical findings from cognitive psychology. Booij (2010: 5, 41) relates the concept of constructions to Rumelhart’s (1980) concept of schemas, which, like constructions, are conceived of as having variables (open slots), representing knowledge at all levels of abstraction. In addition, and most importantly for the question at hand, constructions can embed within one another. Booij (2007: 38) also points to the empirically well-supported hypothesis of production compilation (cf. Anderson et al. 2004), i.e. the idea that if a task is repeated multiple times, the representations of the individual productions involved are combined to ensure a smooth and rapid execution of the task. In this paper, we argue that historical language data can provide additional support for the assumption of multiply complex word-formation schemas. For some word-formation patterns, it has been observed that their complex subschema became more productive over time and/or remained productive for a longer period of time than the corresponding simplex subschema (cf. e.g. Kempf 2016). In Sections 2.1 and 2.2 of this paper, we systematically investigate two German word-formation patterns where this seems to be the case, namely substantival derivation with *-ung* and adjectival derivation with *-lich*. Corpus-based quantitative assessments of productivity are complemented by an in-depth analysis of a sample of the data, in which the first attestations of the derivatives in the sample are assessed using multiple sources (corpora and dictionaries). Section 2.3 discusses a further case study, investigating so-called pseudo-participles like *bebrillt* (‘wearing glasses’, lit. ‘be-glassed’), for which no corresponding verb exists (**bebrillen*), on the basis of data from the largest currently available corpus of web data, DECOW14AX. This pattern is particularly interesting for our study because it arguably offers the most convincing arguments for the assumption of complex schemas. Most importantly, the pattern exhibits specific semantic properties (cf. Booij 2010: 45) that make the assumption of a complex schema seem superior both to a purely analogy-based explanation and to accounts that recur to unattested, but theoretically possible, “virtual” words. In Section 3, we discuss how the findings from the three case studies feed back into a constructionist theory of morphology and morphological change.

2 Case studies

2.1. Case study 1: complex *ung*-nominals

Our first case study investigates the development of German *ung*-nominalizations with a complex base, as compared to *ung*-nominals with a simplex base. In particular, we will focus on the pattern [PREFIX-X-*ung*], e.g. *Bespaßung* ‘entertainment’ (< *Spaß* ‘fun’). The suffix *-ung* (< Old High German *-ingo/-ungo*) derived nouns from other nouns in its very early stages (cf. e.g. Paul 1897: 703; Horlitz 1986: 480). However, it very soon came to derive deverbal nouns, e.g. *Bewegung* ‘movement’ from *bewegen* ‘to move’ (cf. e.g. Pimenova 2002). Drawing on a corpus of Early New High German (ENHG, 1350–1650), Demske (2000) has already argued that while *ung*-nominalization experiences a steep increase in token frequency, its morphological productivity has decreased considerably from ENHG to New High German (NHG, 1650–today). She understands morphological productivity in terms of Baayen’s (e.g. 1992, 2009) measure of “category-conditioned” or “potential productivity”, i.e. the ratio of hapax legomena to the total number of tokens belonging to a construction. Hartmann’s (2016) quantitative analysis based on the Mainz Early New High German Corpus (MzENHG, Kopf 2016) and the GerManC corpus (Durrell et al. 2007) has lent further support to this hypothesis.¹

However, if one looks at neologisms in *-ung* attested, for example, in *Wortwarte*, an online collection of neologisms found in the web which is updated on a daily basis, it seems that complex new formations occur quite frequently. These neologisms tend to follow the pattern [Prefix/Particle + Nominal or adjectival Base + *ung*], e.g. *Aufkalkung* ‘up-chalk-ing’, *Bebeutelung* ‘be-bag-ing’, *Beranzung* ‘be-satchel-ing’, *Entphilologisierung* ‘dephilologization’, *Verdenkmalung* ‘monumentization’, *Zerstreuselung* (roughly:) ‘turning to crumbs’, which might point to the conclusion that this particular sub-construction of *ung*-nominalization is still productive. This would also be in line with Demske’s (2000: 399) observation that in present-day German, neologisms in *-ung* are restricted to denominal and deadjectival verbs with resultative meaning, such as *Vergreisung* (‘aging’, from *Greis* ‘very old man’), *Verschneckung* (‘snailing’, from *Schnecke* ‘snail’) or *Verblödung* (‘becoming stupid’, from *blöde* ‘dumb’). As pointed out in the Introduction, we suggest that the “detour” via the verb that Demske takes is not necessary if we assume a complex schema. However, the assumption that a complex (sub-)schema has been reanalyzed from instances of a word-formation pattern is only plausible if the subschema is somehow salient. In the simplest case, we can assume a correlation between high (type) frequency and the salience of a schema (Taylor 2002: 291; see Schmid 2007 for a more nuanced discussion on the notion of salience). We will therefore test the hypotheses that over time, a) *ung*-nominals with complex bases have become more frequent (in terms of type and token frequency) as compared to simplex *ung*-nominals, and b) *ung*-nominalization with complex bases becomes more productive, which should be reflected in the proportion of complex *ung*-nominals among hapax legomena and/or words first attested in the respective corpus period (for a discussion of hapax-based vs. first-attestation-based measures of productivity, see Kempf 2016).

¹ A reviewer correctly points out that this measure is not without problems. For an in-depth discussion of this issue (incl. the application of additional measures) see Hartmann forthc.

To test these hypotheses, we use data from three different corpora:

a) the Mainz Early New High German corpus (Kopf 2016), which consists of 80 texts covering the time span from 1500 to 1710. In sum, the corpus comprises c. 300,000 running word forms;

b) the GerManC corpus (Durrell et al. 2007), which comprises about 600,000 words from 1650 to 1800;

c) a balanced 1-million-word sample of the German Text Archive (*Deutsches Textarchiv*, DTA), covering six 50-year-periods from 1600 to 1900 (see Hartmann forthc. for more details).

The 21,163 *ung*-nominals (tokens; 2,076 types) in the aggregated data from the three corpora have been annotated for whether their bases are prefixed or particle verbs. As Figures 1 and 2 show, *ung*-nominals with complex bases (here: prefixed or particle verbs as base) become more prominent in terms of token frequency in the aggregated data from all three corpora. While they already make up for about half of the attestations at the beginning of the period under investigation, their share increases to around two thirds in the 19th century data. However, this is largely due to some derivatives which significantly gain in frequency. If we use type rather than token frequencies, the pattern is already much less clear, even though there is still a slight decrease in the relative frequency of types with simplex bases, relative to the total number of types in *-ung* (see Figure 2). If we only take hapax legomena into account, or *ung*-nominals that are not attested in any previous corpus period, no clear pattern can be detected at all. Instead, the proportion of *ung*-nominals with complex bases remains quite consistently at the same, fairly high level in these cases. Thus, the data confirm hypothesis a) introduced above (complex *ung*-nominals become more frequent), while they do not confirm hypothesis b) (complex bases become more prominent as bases for newly coined *ung*-nominals). This might indicate that the preference towards complex bases already has developed in the time preceding these three corpora.

To test this latter hypothesis, we used a more qualitatively-oriented method that has already been applied in Kempf (2016). The idea is to determine as exactly as possible the time of coinage for a sample of derivatives. As this is only feasible for a small portion of the data, we used a random sample of 65 *ung*-nominals from the morphologically annotated “TAGGED-M” subcorpus of the German Reference Corpus (DEREKO/COSMAS II; Kupietz et al. 2010). For each nominal, we determined the time of its first attestation by comparing five different sources: two historical corpora (the German Text Archive = DTA and the Google Books corpus *German 2012*) and three dictionaries (the Early New High German dictionary = FWB, Pfeifer’s (1993) etymological dictionary, and the Dictionary of Legal German = DRW) (all accessed in August 2016). We will refer to this method as the *comparative dating method* (CDM).

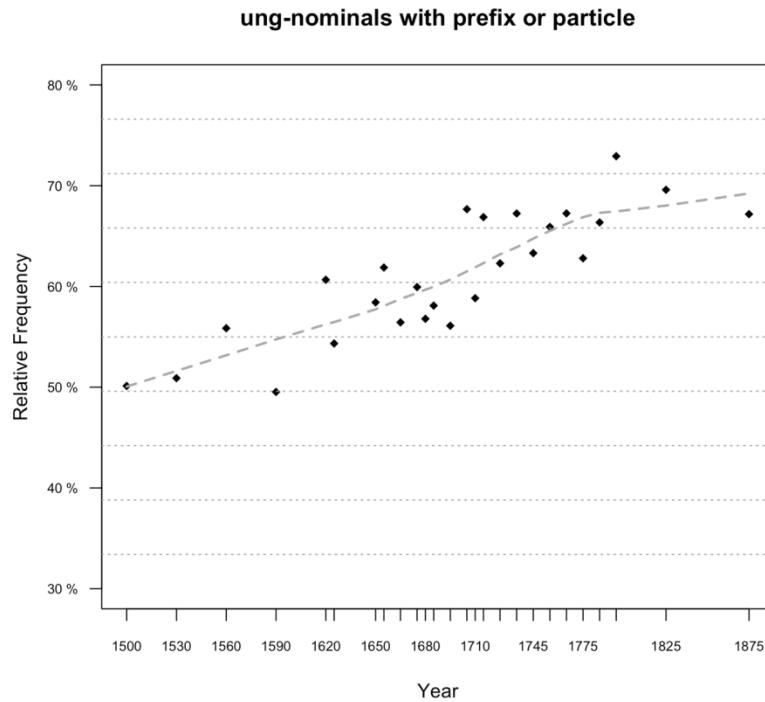


Figure 1: Frequency of *ung*-nominals (tokens) with a prefixed or particle verb as base relative to the total number of *ung*-nominals in the respective corpus period.

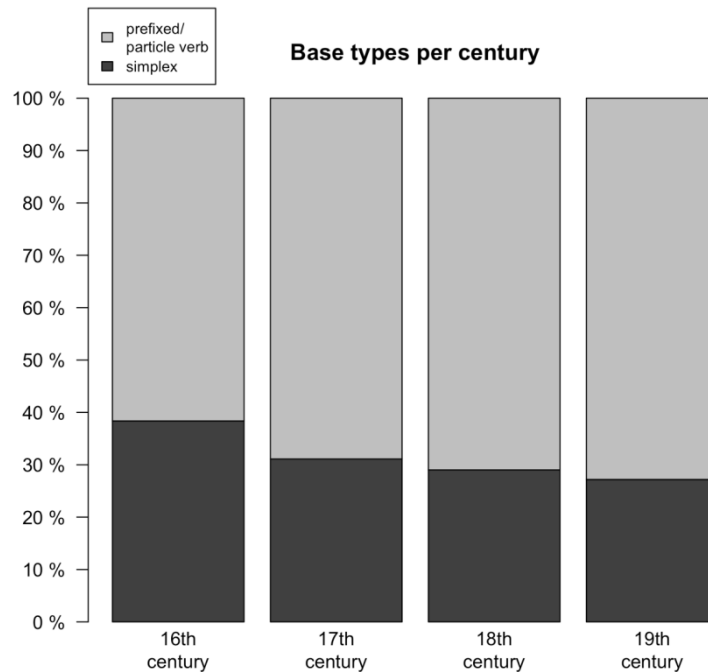


Figure 2: Proportion of simplex vs. complex bases relative to the total number of lemma types in each of the four centuries covered by the aggregated corpus data.

The individual derivatives of our sample and their times of first attestation are listed in Table 3 in the Appendix. Figure 3 shows the aggregated results: All seven derivatives that date back to the Old High German and Middle High German periods have simplex bases. In the Early New High German and New High German periods, complex verbs become more prominent

as bases for *ung*-nominalization. Compared to the picture gained from the diachronic corpus data, the increase in the proportion of complex bases sets in somewhat earlier: In **Error! Reference source not found.**, complex bases account for about 70% of the types in the three rightmost, i.e. NHG, columns. With the more exact dating of the coinages, complex bases reach 77% already in ENHG and 89% in NHG (cf. the two right-hand columns in Figure 3). These data are, of course, somewhat low in absolute numbers. Yet, they have the advantage of having been researched profoundly, taking into account many different sources. To be sure, the procedure partly suffers from the same disadvantages as methods relying on one single corpus. For instance, less frequent words are more likely to be attested in later stages due to the general availability of a greater amount of data. But as the CDM takes multiple data sources into account, it may be able to remedy this problem at least to a certain extent.

Even if the percentages calculated from such little data cannot be expected to be exact, the overall tendency they indicate confirms our expectations: It can be expected that the tendency towards complex bases becomes visible earlier in the CDM than in the corpus data, since they depend on the accidental occurrence of the derivatives in the corpus texts and thus are likely to show some artificial delay.

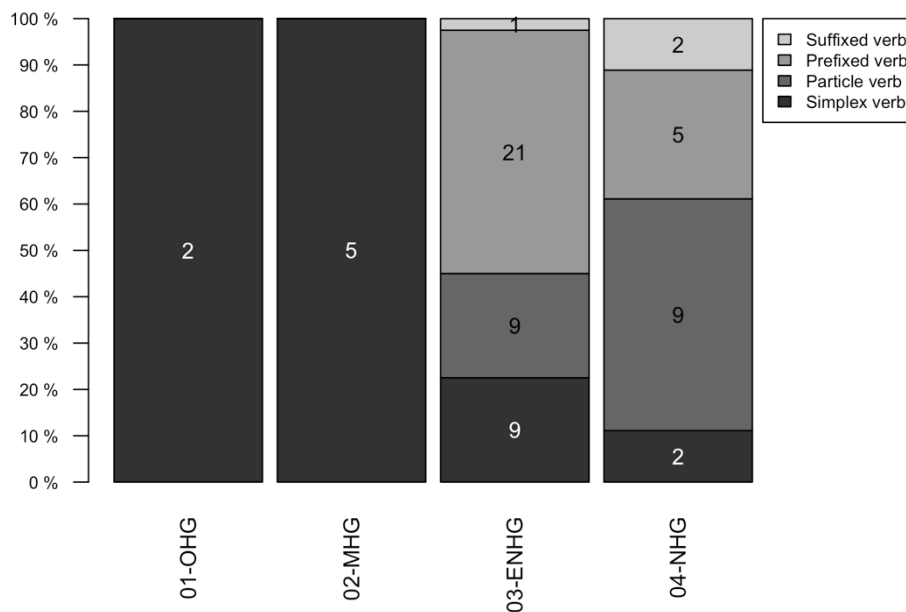


Figure 3: Results of a “comparative-dating” approach applied to 65 randomly selected *ung*-nominals. For each nominal, its first attestation was looked up in five different sources.

Taken together, the different methods suggest that *ung*-nominalization has indeed developed an increased preference towards complex bases, which may have given rise to a complex schema of the type [Prf/Prt-X-*ung*]_N. This could also account for the present-day formations cited earlier. A potential objection against such an approach is, however, that in the case of the present-day formations mentioned above, the corresponding verb seems at least possible, even if it may in some cases be unattested. In this case, it would seem more plausible to

analyze the schema as $[[\text{Prf/Prt-X}]_V\text{-ung}]_N$. For instance, *verschnecken* (roughly: ‘become populated with slugs’) might seem marked to many native speakers of German, but it is hardly less marked than *Verschneckung* ‘the state of becoming populated with slugs’, which is itself so rare that it does not even occur in the DECOW14AX webcorpus (but it can be found using Google).

Unlike most *ung*-nominals with simplex bases, which tend to be strongly lexicalized (see Demske 2000, Hartmann 2016), productively coined *ung*-nominals with prefixed or particle verbs as bases tend to be semantically very close to their base verbs. In CxM terms, then, we can assume a *paradigmatic relationship* between $[\text{Prf/Prt-X}]_V$ and $[\text{Prf/Prt-X-ung}]_N$ (see also Booij 2015: 304, who offers an alternative analysis of nominalizations of particle verbs). Note that the relationship between present-day *ung*-nominals and their *simplex* bases is much less straightforward. In our view, this is a major argument in favor of assuming a complex scheme: While the association between $[X_i]_V$ and $[X_i\text{-ung}]_N$ is fairly unpredictable, it is very systematic for $[\text{Prf/Prt-X}]_V$ and $[\text{Prf/Prt-X-ung}]_N$. The idiosyncrasy vs. systematicity of the relation between base and derivative can consequently be seen as part of language users’ knowledge about the schemas in question.

2.2. Case study 2: *un-V-lich* adjectives

Our second case study investigates complex derivation of the type *un-V-lich*, as in *un-bes-tech-lich* ‘unbribeable’ or *un-glaub-lich* ‘unbelievable’. The adjective-forming suffix *-lich*, cognate to English *-ly*², has been highly productive throughout the history of German. In fact, in Old High German (OHG, ca. 500/750–1050) and Middle High German (MHG, 1050–1350), it was one of the two most productive adjectival suffixes (together with *-ig*, cognate to English *-y*; cf. Winkler 1995, Klein et al. 2009: 313, Ganslmayer 2012). While originally combining mostly with nouns and adjectives (OHG *kuning-lîh* ‘royal’, *frî-lîh* ‘free’), the suffix attached increasingly to verbs during the Early New High German period (ENHG, 1350–1650). The share of deverbal *lich*-types increased from about 10% in MHG (Klein et al. 2009: 311, Ganslmayer 2012: 535) to over 20% in ENHG (cf. Thomas 2002: 327, confirmed by data of the present study). Deverbal *lich*-derivatives display an active or a passive meaning and sometimes allow for both readings (ENHG *begier-lich* lit. ‘desire-ly’, ‘desirous’ or ‘desirable’).

Especially with the passive sub-schema, the negation prefix *un-* occurs rather frequently at various points in history, e.g. *(un)-ersinn-lich* ‘(in)conceivable’ (17th century, Winkler 1995: 368; cf. also 127–131). In the historical data, there is often no affirmative variant that would precede the variant with negation prefix. In her in-depth study on the history of *lich*-derivation, Winkler (1995: 127–128, 368–372) provides an abundance of *un-V-lich*-derivatives that lack an unprefixed equivalent, e.g. *un-ermeß-lich* ‘unfathomable’, *un-verberg-lich* ‘unconcealable’ (both coined in the 17th century). Similarly, there are cases where a corresponding positive form occurs only secondary to the complex derivative, remains less

² On the divergent development of *-lich* and *-ly* in German and English, see Pounder (2001). The early adverbial uses of German *-lich* are also discussed in detail in Kempf (2016).

frequent and often falls out of use again (e.g. *un-widersteh-lich* vs. *widersteh-lich* ‘(ir)resistible’, see also below).

Data like these pose a challenge to the assumption that these complex derivatives (*un-V-lich*) are derived from simple derivatives of the type *V-lich*. The dates and frequencies for the pairs of simple and complex derivatives render it implausible to assume that there is always an underlying *lich*-derivative and that the prefixation followed in a second step. One would have to resort to argue the simple derivative only existed “virtually” and then was prefixed. Based on the data at hand, it seems far more plausible to assume that prefixation and suffixation happen simultaneously. This simultaneousness can be captured with combined schemas as envisaged in CxM. Booij’s (2010: 42) schema for English *un-V-able*, repeated below in (2), can be adopted for *un-V-lich* (cf. (3)). Alternatively, it can be modified as in (4), where the internal bracketing in the combined schema is omitted. This notation reflects the idea that prefixation and suffixation occur simultaneously and that we do not necessarily have to assume an intermediate formation.

$$(2) \quad [\text{un-A}]_A \quad + \quad [\text{V-able}]_A \quad = \quad [\text{un-}[\text{V-able}]_A]_A$$

$$(3) \quad [\text{un-A}]_A \quad + \quad [\text{V-lich}]_A \quad = \quad [\text{un-}[\text{V-lich}]_A]_A$$

$$(4) \quad [\text{un-A}]_A \quad + \quad [\text{V-lich}]_A \quad = \quad [\text{un-V-lich}]_A$$

Note that option (4) assumes the *simultaneous* attachment of prefix and suffix. As such, the schema is largely independent of its “parent” schemas and their formal constraints. While *un-* does not attach to verbs in German (which is why it would be inadequate to assume a schema like $*[[\text{un-V}]_V\text{-lich}]_A$), the combined schema in (4) interprets *un-V-lich* as a complex pattern which takes verbal bases, without taking the detour via the simplex $[\text{V-lich}]_A$ formation.

While a combined schema as in (3) or (4) appears adequate on a descriptive level, it is difficult to assess whether the combined schema was cognitively real in the speakers’ minds at any point in time. From a pragmatic point of view, however, the complex schema seems to fulfill a very specific and widespread communicative need: Often, the property that needs to be expressed is precisely an entity’s resistance towards being *V*-ed (*unverwüstlich* ‘indestructible’, *unvergesslich* ‘unforgettable’). Winkler (1995: 129–131) documents an increase in *un-V-lich*-derivatives around the year 1300. One explanation she offers for this phenomenon is the mystics’ desire to express the unimaginable. She also shows an even stronger prosperity of *un-V-lich*-derivatives between 1650 and 1700. For this second surge in productivity, she holds linguistic economy responsible: a derivative *un-V-lich* ‘un-V-able’ is much shorter and syntactically more versatile than e.g. a corresponding relative clause ‘that cannot be V-ed’.

With these functional factors at work, the combined use of both schemas, $[\text{un-A}]_A$ and $[\text{V-lich}]_A$, may have flourished at various times, and it certainly did around 1700. This can be conceived of as a strengthening of the horizontal connection between the two schemas (i.e. a connection between different morphological schemas at the same level of abstraction in a CxM hierarchy, cf. Van de Velde 2014). One possible consequence may have been the entrenchment of a combined schema as suggested in (3) or (4), bolstered by an increasing number of established *un-V-lich*-derivatives. As is generally the case for historical idioms, it is an

open question what may count as evidence for the actual entrenchment of this schema. The wealth of complex derivatives (*un-verberg-lich* ‘unconcealable’) without unprefixated counterparts (**verberg-lich* ‘concealable’) supports the assumption of a complex schema. Another piece of evidence would be gained if the complex schema was shown to somehow have diverged functionally or formally from what the parent schemas amounted to when combined.

The historical data discussed in Kempf (2016), which will also be introduced in more detail below, do not support the claim that there has been any strong divergence. However, it can be argued that the complex schema *un-V-lich* was more transparent than the simple *V-lich* schema: The simple *V-lich* schema corresponded to active derivatives (*förderlich* ‘supportive, adjuvant’) as well as passive ones (*merklich* ‘noticeable’); the complex schema, on the other hand, corresponded more clearly (if not exclusively) to the passive function (*unverwüstlich* ‘indestructible’). A third type of evidence could be provided by differing productivity developments. Therefore, we will analyze the productivity developments of the simple schema [*V-lich*]_A and the assumed combined schema [*un-V-lich*]_A to assess whether the combined schema developed a productivity of its own at any point in time. As in the previous section (**Error! Reference source not found.**), we will compare the results of two different methods.

The first method uses a dataset gathered from the Bonn Early New High German corpus (henceforth: BonnC, 1350–1700) and the German Manchester Corpus (GerManC, 1650–1800). Together, both corpora provide seven periods of fifty years each, two of them overlapping (1650–1700 is covered by both corpora). In order to obtain roughly equal corpus sizes for each fifty-year period, we used only four of the eight genres of the GerManC. For the best possible consistency with the BonnC, we selected the genres Sermons, Scientific texts, Newspapers, and Narrative prose (see the GerManC documentation and Kempf 2016: 105 for further detail). From the selected corpus texts, all tokens of suffixed adjectives were extracted along with their lemma annotations, and, in the case of the BonnC, also suffix annotations. All annotations were then corrected manually, or added in the case of GerManC suffix annotations. For the present study, we additionally added a very rough part-of-speech annotation for the individual bases, e.g. “noun” for *könig-lich* ‘royal’, lit. “king-ly” or “verb” for *dien-lich* ‘serving, useful’ (based on *dienen* ‘to serve’). Unclear cases or cases in which several base types are possible (e.g. *tröstlich*, which can be traced back to the noun *Trost* ‘consolation’ or the verb *trösten* ‘to console’) were assigned an “X”. Importantly, the relevant *un-V-lich* cases were assigned a category of their own (“un-V”) so that their development could be tracked over time.

In order to approach the question of whether the complex *un-V-lich*-derivation shows a development independent of the simple *V-lich*-derivation, we assigned all *lich*-derivatives in the corpus to the period in which they were attested for the first time (within the corpus). Figure 4 shows the shares of the various base categories for each period. The share of deverbal derivation increases at first (V and *un-V* together attain 15%, 32%, 44%, and 65% in the first four periods). After this, its percentage drops again to 43%, 37%, and 37% in the last three periods).³

³ Note that the last period of the B[onn] corpus and the first period of the M[anchester] corpus coincide. Thus, they were both calculated against the backdrop of the first three periods. Still, the period “1650-1700M” displays

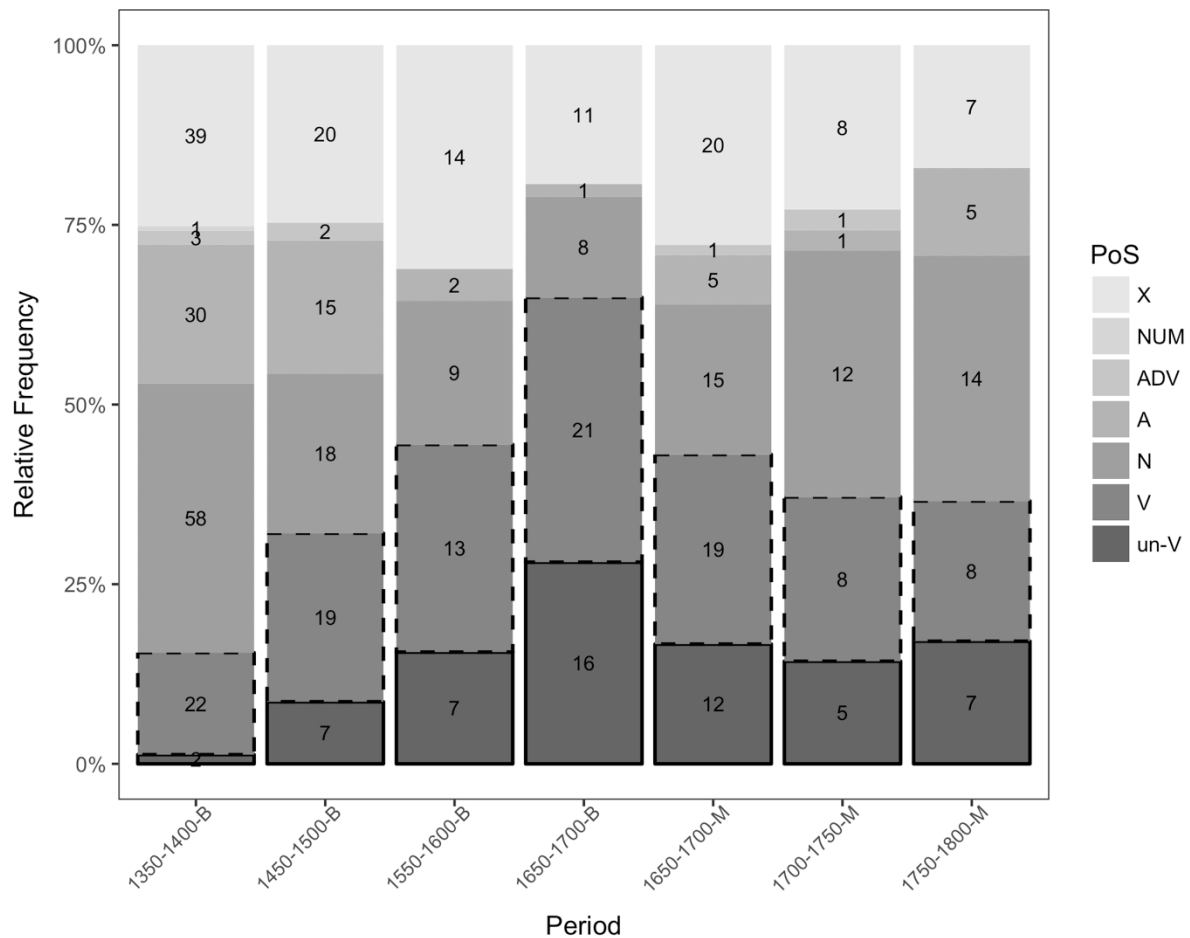


Figure 4: Parts of speech of the bases of *lich*-derivatives arranged according to the corpus period they are first attested in.⁴ un-V = *un*-verb, V = verb, N = noun, A = adjective, ADV = adverb, NUM = numeral, X = unclear.

Figure 5 focuses on the deverbal derivatives exclusively. Here, we can see a change in the relation of the two subschemas: Over time, the complex subschema (*un*-V-*lich*) gains more ground compared to the simple deverbal pattern.

more progressive results, since the corpus contains a higher share of modern genres, i.e. newspapers and scientific texts (see Kempf forthc.).

⁴ Note that the fourth and the fifth columns do not show subsequent periods, but rather the two overlapping periods of the two corpora. We chose to plot the BonnC data on the left and the GerManC data on the right for reasons of corpus composition: While the BonnC contains a high percentage of religious texts that behave more conservatively, the GerManC contains scientific and newspaper texts that behave progressively in terms of word formation (cf. Kempf 2016: 104–109, 116).

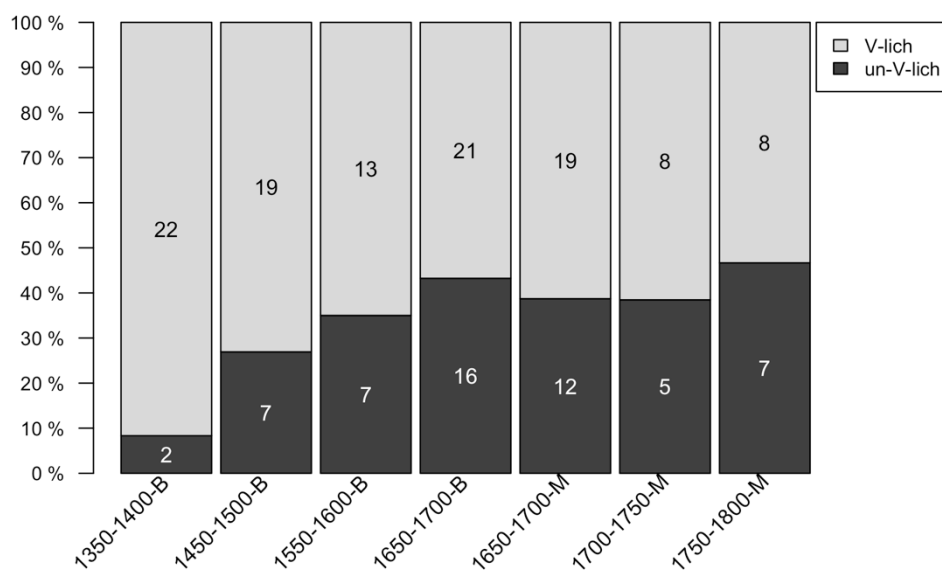


Figure 5: Relation of simple vs. complex deverbal *lich*-derivatives (based on first attestation in the corpus).

The approach via the first attestations looks quite promising. Yet, it is limited by the corpus size and the coincidental occurrence or non-occurrence of a newly coined word in the limited corpus (which may yield a delayed picture of the actual word formation activity). Therefore, we additionally applied the comparative dating method (CDM). As in our first case study (section **Error! Reference source not found.**), we selected a sample of relevant derivatives and identified their age as accurately as possible by checking and comparing the sources already mentioned in Section 2.1. The goal of this study was to determine the productivity developments of the simple and the complex deverbal subschema more accurately. Particularly, we wanted to check whether the complex subschema has indeed gained ground over the simple one, and/or if it might even have remained productive for a longer period of time. As a sample, we used the list of deverbal passive *lich*-derivatives (simple or complex) provided by Kühnhold et al. (1978: 393–394; cf. footnote 16). Figure 6 below shows how the first attestations of these types are distributed over the different time periods.⁵ The full list of derivatives and their first attestation dates is given in Table 4 in the appendix.

⁵ The periods span fifty years each, except for the first two periods, where only coarse-grained dates of attestation were available, e.g. “Middle High German”.

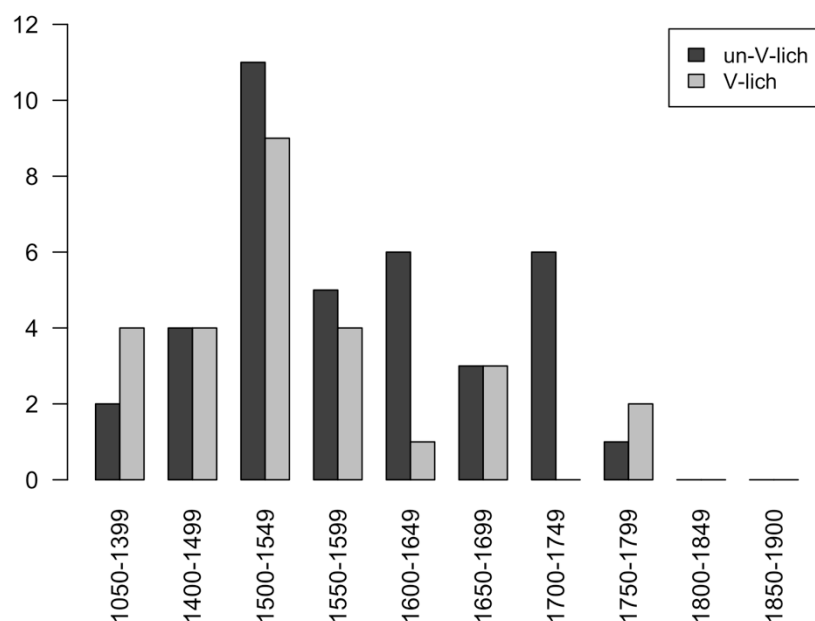


Figure 6: First attestations of deverbal *lich*-derivatives (sample of 65 types).

The CDM refines the picture of the diachronic scenario: It reveals that the deverbal *lich*-derivation reached its peak not in the 17th century, but probably already in the first half of the 16th century. Furthermore, it shows that deverbal *lich*-derivation has become unproductive – there are no new formations after 1800.⁶ Crucially, this analysis suggests that the combining subschema, *un-V-lich*, has been dominant ever since the general peak in the early 16th century. Of course the absolute numbers are very low, so this aspect may not seem reliable at first glance. However, a closer look at the actual derivatives proves very conclusive. Table 1 shows the youngest derivatives of the sample.

Table 1: Deverbal passive *lich*-derivatives after 1600, arranged by first attestation

lexeme	translation	morphol. structure	1st attestation (year)	1st attestation (period)
unfasslich	incomprehensible	un-V-lich	1559	1550-1599
[...]				
unersetzlich	irreplaceable	un-V-lich	1620	1600-1649
erhältlich	available	V-lich	1626	1600-1649
unentbehrlich	indispensable	un-V-lich	1628	1600-1649
unbeschreiblich	indescribable	un-V-lich	1650	1650-1699
entbehrlich	dispensable	V-lich	1654	1650-1699
unverzeihlich	unforgivable	un-V-lich	1655	1650-1699
ersetzlich	replaceable	V-lich	1662	1650-1699
unbestechlich	incorruptible	un-V-lich	1672	1650-1699
fasslich	comprehensible	V-lich	1682	1650-1699
unwiderstehlich	irresistable	un-V-lich	1704	1700-1749
unausstehlich	insufferable	un-V-lich	1718	1700-1749
unabweislich	irrefutable	un-V-lich	1740	1700-1749
unerschütterlich	imperturbable	un-V-lich	1741	1700-1749
unverwüstlich	indestructable	un-V-lich	1747	1700-1749

⁶ The decline of deverbal *lich*-derivation can be linked, among other things, to the rise of deverbal *bar*-derivation, cf. Kempf (2016: 189–190) and Flury (1964).

unabänderlich	unchangeable	un-V-lich	1748	1700-1749
widerstehlich	resistible	V-lich	1753	1750-1799
bestechlich	corruptible	V-lich	1773	1750-1799
unauffindlich	untraceable	un-V-lich	1784	1750-1799

It turns out that the last genuine *V-lich*-derivative is *erhältlich* ‘available’. It dates back to (at least) 1626. All subsequent *V-lich*-derivatives can be identified as back-formations of corresponding *un-V-lich*-derivatives that are attested earlier (e.g. *ersetzlich* ‘replaceable’, 1662 < *unersetzlich* ‘irreplaceable’, 1620, etc.). Based on these scarce, but carefully researched data, we can tentatively conclude that the combining schema, *un-V-lich*, indeed remained productive for a longer period of time: The last complex derivative was formed one and a half centuries later than the last simple derivative. If these observations are correct, they provide evidence that the combined schema existed independently from its parent simplex schemas.

Some related observations lend additional support to the emancipation of the combined *un-V-lich* schema. At the beginning of the period covered by our sample, i.e. at earlier stages of deverbal *lich*-derivation, the simple *V-lich*-derivative usually precedes the complex *un-V-lich*-counterpart. This is the case, e.g., with *beweislich* ‘provable’ 1294 > *unbeweislich* ‘unprovable’ 1490; *erklärlich* ‘explicable’ 1451 > *unerklärlich* ‘inexplicable’ 1562, and many more, cf. Table 4 in the appendix. This suggests that there is indeed a development from an initial phase where complex *un-V-lich*-derivatives came about by consecutive derivation processes to a later stage where the complex derivation occurred independently. This later stage can be grasped by the notion of *embedded productivity* (Booij 2010: 47–50), where a word formation process that is otherwise unproductive can still be active when embedded in a combined schema.

One final piece of evidence is added by those derivatives that lack a counterpart. The “partnerless” instances of the simple schema occur relatively early; a prime example is *bedauerlich* ‘deplorable’ 1508, where a counterpart **unbedauerlich* is attested neither in Google NGram Viewer, nor in the DTA.⁷ Other examples are *erforderlich* ‘necessary’ (1451), *vernehmlich* ‘audible’ (15th ct.), and *annehmlich* ‘acceptable’ (1520), where the prefixed counterparts are scarcely attested. With the complex *un-V-lich*-schema, the cases with (virtually) no counterpart occur relatively late, e.g.

- *unausstehlich* ‘insufferable’ 1718 (counterpart *ausstehlich*: only 2 tokens in the DTA)
- *unerschütterlich* ‘imperturbable’ 1741 (no counterpart attested in the DTA)
- *unverwüstlich* ‘indestructable’ 1747 (no counterpart attested in the DTA)
- *unauffindlich* ‘untraceable’ 1784 (no counterpart attested in the DTA)

All observations taken together, there seems to be enough evidence to assume that the combined schema *un-V-lich* underwent a different productivity development than its simple counterpart. The data suggest that the productive phase of the former lasted longer than the productive phase of the latter. Ultimately, these diachronic findings support the assumption of a combined schema.

2.3. Case study 3: pseudo-participles

⁷ Checked in January 2017.

Our third case study addresses the phenomenon of so-called pseudo-participles, i.e. forms that look like past participles but actually do not have a verbal counterpart, but are instead derived directly from a noun, e.g. *bebrillt* ‘wearing glasses’ from *Brille* ‘glasses’ (cf. Riecke 1999: 156). Booij (2007: 39f.) discusses similar cases in Dutch under the label of *participia prae-verbalia*, while Plag (1999: 103, fn. 10) mentions English derivatives of the type *bedaughtered* as examples of parasynthetic formations, i.e. “complex words with more than one affix [that] seem to have come into being through the **simultaneous attachment** of two affixes” (Plag 2005: 40, emphasis original). As such, they are of major interest for the present study. Booij (2010: 45), discussing Dutch pseudo-participles like *getand* ‘toothed’ or *kortgerokt* ‘short-skirted’, points out that they have “specific constructional properties of their own.” More precisely, he argues that they always have a possessive-ornative meaning of the type ‘provided with N, having N’. Van Haeringen (1949: 187) points out that this word-formation pattern provides a practical means for avoiding a more cumbersome prepositional phrase, as in *gebaard* ‘with a beard’, *getijgerd* ‘spotted like a tiger’.

While they have often been mentioned in passing in the literature on German word-formation (e.g. Motsch 2004: 226f.; Eisenberg 2013: 397), to our knowledge, no systematic corpus-based study has been conducted on this pattern so far. Bernstein (1992) provides an extensive dictionary-based collection of pseudo-participles, but he only mentions some selected examples of pseudo-participles directly derived from nouns. According to him, “the possibilities for coining such [pseudo-participles] are almost unlimited; even an approximately complete listing of such words would be impossible” (Bernstein 1992: 12f., our translation).⁸

The lack of truly empirical studies may partly be due to the lack of appropriate corpora. However, thanks to huge web corpora like DECOW14AX (Schäfer & Bildhauer 2012), we can now take an empirical look even at such rather low-frequency phenomena that are arguably tied to a more informal register. In the present study, we will focus exclusively on pseudo-participles of the form [*be-X-t*]_{ADJ}, neglecting (i) pseudo-participles with other prefixes such as [*ver-X-t*]_{ADJ} (e.g. *verwerbebanner* ‘covered with ad banners’; example from DECOW) or without a prefix like *talentiert* ‘talented’, and (ii) pseudo-participles with non-nominal bases, e.g. *behübscht* ‘be-prettied’. We will first give a general overview of the instances of the word-formation pattern and then discuss potential explanations for their what pseudo-participles can tell us about the much-discussed relationship between creativity and productivity.

In order to extract the data from DECOW14AX, we first searched the word form frequency lists (with POS information) for inflected forms tagged either as participle or as adjective and matching the pattern *be-x-t*.⁹ Some 40,000 hits were then manually searched for potential pseudo-participles. The word form types selected as candidates for pseudo-participles were then exhaustively extracted from the DECOW14AX files using a custom Python script. In addition to strings that exactly matched the candidates, we also extracted hits in which the respective search term is preceded by other material, which allows for taking compounds like

⁸ “Die Bildungsmöglichkeiten solcher PsPs [=Pseudopartizipien] sind fast unbegrenzt, eine auch nur annähernde Aufstellung solcher Wörter wäre unmöglich”. Van Haeringen (1949: 187) makes the same observation for Dutch pseudo-participles.

⁹ Using the lemma information available in both the corpus and the n-gram frequency list was not an option as many pseudo-participles are not recognized by taggers and therefore lemmatized as *<unknown>*. We used the following search pattern: “^be.*(en|t)((er)?e(s|n|m|r)?)”

sonnenbebrillt ‘wearing sunglasses’, lit. ‘sun-be-glassed’, into account. Again, the individual word-form types were manually checked. For the pilot study reported on here, we only took clear cases into account, while 1,128 types (14,069 tokens) were disregarded as it could not be clearly determined whether they can be considered actual pseudo-participles. In a more detailed follow-up study, it would be necessary to check these items individually in their respective context. For example, *behautet* could be a pseudo-participle based on *Haut* ‘skin’. In actual fact, however, most of the 371 instances turn out to be misspelled variants of the verb *behaupten* ‘to claim’. Similar considerations apply, for example, to *bemäntelt* (767 tokens), which can occur as a past participle of the verb *bemänteln* ‘to veil’, but also as pseudo-participle derived from *Mantel* ‘coat’. In sum, 273,242 tokens (2,831 types) remained in our data. Table 2 shows the 20 most frequent pseudo-participles.

Lemma	Freq
benachbart ‘be-neighbor-ed’ (‘adjacent’)	124,662
beheimatet ‘be-home-d’ (‘native/resident’)	45,422
bewaldet ‘be-wood-ed’ (‘wooded’)	16,678
beherzt ‘be-heart-ed’ (‘brave’)	14,692
betagt ‘be-day-ed’ (‘old’)	14,459
behaart ‘be-hair-ed’ (‘haired’)	7,466
betucht ‘be-cloth-ed’ (‘rich’)	5,430
bewölkt ‘be-cloud-ed’ (‘clouded’)	4,579
hochbetagt ‘high-be-day-ed’ (‘very old’)	3,205
begütert ‘be-good-ed’ (‘wealthy’)	3,091
beleibt ‘be-bodied’ (‘stout’)	2,071
belaubt ‘be-leaved’ (‘leafy’)	1,123
bemoost ‘be-moss-ed’ (‘mossed’, colloq. also: ‘rich’)	1,073
gutbetucht ‘good-be-cloth-ed’ (‘rich’)	1,011
bebrillt ‘be-glass-ed’ (‘wearing glasses’)	858
behelmt ‘be-helmet-ed’ (‘wearing a helmet / helmets’)	822
bemuskelt ‘be-muscle-d’ (‘muscl-ed’)	768
unbehaart ‘un-be-hair-ed’ (‘hairless’)	768
behandschuht ‘be-gloved’ (‘gloved’)	730
beblättert ‘be-leaf-ed’ (‘leafed’)	575

Table 2: Top 20 most frequent pseudo-participles in the DECOW14AX data.

While many pseudo-participles discussed in the literature can be considered “playful formations” which usually occur in humorous and/or mocking contexts, as in (5) and (6), many of the most frequent pseudo-participles are strongly lexicalized and perfectly natural, whereas many new formations appear marked to native speakers (cf. Motsch 2004: 227).

- (5) Spätestens, als der **rundbebrillte** Sozialwissenschaftler mit seinem an Johann König erinnernden Sprachduktus die politische Arbeitsrechtssprechung zu erklären beginnt, hat er die ersten Lacher bereits eingeheimst.
‘At the latest when the **round-glassed** social scientist begins to explain political

employment jurisdiction with his characteristic style of speaking, which reminds of Johann König, he has generated the first laughs.’ (<http://www.16vor.de/index.php/2010/12/04/wissenschaft-als-buhnenshow/>)

- (6) Was mir an ihr auffällt, sind ihre schönen, gepflegten rotblonden, glatten, dicken Haare und ihr Stringtanga, der [...] nur ihrem **bierbebauchten** Ehemann gefällt und total unpassend ist.
‘What I notice about her is her beautiful, neat, strawberry blond, smooth, thick hair, and her G-string, which only appeals to her **potbellied** husband and is totally unsuitable.’ (<http://www.stadt-wien.at/lifestyle/tagebuch/kempinski.html>)

Note that the formations in (5) and (6) both instantiate an interesting subpattern of pseudo-participle formation, in which a compound is split up such that its first constituent precedes the prefix. Hüning & Schlücker (2010: 809) briefly discuss such formations, stating that they usually express a possessive relation, e.g. *nickelbebrillt* (< *Nickelbrille* ‘metal-rimmed glasses’): ‘with metal-rimmed glasses’. Therefore, they see certain similarities between such compounds and so-called bahuvrihis like *redneck*, which refer to something outside of the compound (e.g. a person). Note, however, that compounds of the type [first constituent + *be* + second constituent + *t*] do not differ semantically from pseudo-participles with a simplex base or from pseudo-participles which incorporate the first compound constituent, like *bebierbaucht* ‘potbellied’, *besonnenbrillt* ‘sun-glassed’. While Motsch (2004: 227) points out that simple stems are much preferred and pseudo-participles with a complex base are usually strongly marked (he cites **besonnenbrillter Macho* ‘macho wearing sunglasses’ as ungrammatical), such cases do occur quite frequently in the data, as (7) and (8) exemplify.

- (7) Wahrscheinlich sind in der Musik von Lexx, Obst und Wallace zu viele Gitarren für das **bepornosonnenbrille** Housevolk.
‘In the music of Lexx, Obst, and Wallace, there are probably too many guitars for the House folk **wearing porn sunglasses**.’ (http://www.vanbause-neick.de/html/body_kn_rez_k_007.html)
- (8) Während ihr den Horden schwer schwankender Junggesellinnetrupps, die vor allem im Sommer wie eine der sieben Plagen über die Städte herfallen, peinlich berührt ausweicht, stößt eure Freundin bei der Sichtung eines **bebauchladeten** Junggesellinnenabschieds seit Jahren Verzückungsrufe wie “Oh wie cool!” aus.
‘While you, being embarrassed, avoid the hordes of heavily staggering bachelorettes, who infest the cities, especially in summer, like one of the Seven Bowls, your girlfriend has been exclaiming ecstatic noises like “Oh how cool!” for years whenever she sees a hen party **with a hawker’s tray**’ (<http://www.jolie.de/bildergalerien/hochzeit/uebersicht.html>)

In terms of type frequency, the split-compound pattern is more frequent than the incorporated-compound pattern – the former accounts for 514 types, the latter for 138. Taken together, they constitute almost a quarter of all types, which shows that, counter to Motsch’s claim, compounds are in fact quite eligible as bases for pseudo-participles. Interestingly, the split-compound pattern seems to be salient enough that even proper names are split, e.g. *neckerbemannt*

(< *Neckermann*, a travel company) or *birkenbestockt* (< *Birkenstock*, a shoe factory specialized in sandals):

- (9) Segeltoern im tuerkischen Lykien, im Land der 100.000 **neckerbemannten** Motorsegler ‘sailing trip in Turkish Lycia, land of the 100,000 neckermanned motor sailers.’ (<http://www.tomboettger.de/fethiye.html>)
- (10) Die Grünen sorgen sich um ihre **birkenbestockten** Empörungsprofis ‘The green party is worried about their birkenstocked indignation professionals.’ (<http://www.gamersplus.de/forums/archive/index.php/t-6823.html>)

The preference towards the split-compound scheme might of course be due to the increased comic effect – the pattern that characterizes established, “prototypical” pseudo-participles like those in **Error! Reference source not found.** is deliberately violated. This can be explained invoking Keller’s (1994) maxim “talk in such a way that you are noticed”, concisely termed “maxim of extravagance” by Haspelmath (1999). Haspelmath sees the maxim of extravagance as a key causal factor in grammaticalization. If we conceive of the emergence of word-formation patterns (and subpatterns) as constructionalization (Traugott & Trousdale 2013), it seems reasonable to assume that the same logic applies here:

a grammatical construction is initially used for special communicative effect that gives a short-term advantage to the innovator [...], but as more and more people are trying to get their share of this advantage [...], the advantage disappears, and the system has undergone a change. (Haspelmath 1999:1061)

In the development of the pseudo-participle construction, then, we can assume the following steps: First, innovative neologisms are coined in analogy to past participles derived from ornative verbs (cf. Bernstein 1992: 12). The “special communicative effect” achieved by coining these formations can in some cases be humorous, as in *bebrillt* (which, in the DTA, is first attested in 1830¹⁰), but it can also derive from the fact that the construction allows for a very condensed expression of rich semantic content, as observed by Van Haeringen (1949: 187) for its Dutch counterpart. This gives rise to a new constructional schema [*be-x-t*]_{ADJ}, i.e. a new node is added to the constructional system. However, this construction is not (yet) fully established in the population of speakers – as we have seen, newly coined pseudo-participles are still deemed marked or even ungrammatical. Thus, the “special communicative effect” has not yet disappeared.

In a similar vein, Koch (2004: 606) points out that language change not only encompasses change in linguistic facts (*regulata*, i.e. what is regulated by linguistic conventions) but also a change in their (extra-linguistic) variational marking (*regulans*, i.e. factors that influence linguistic norms/conventions). According to him, language change starts with *innovation*, which entails the creation of a new *regulatum* while violating an existing *regulans*. As the innovation spreads, its variational marking can change. Many pseudo-participle neologisms can potentially be ascribed to what Koch & Oesterreicher (1996) call “expressive orality”. The phenomena they subsume under this label tend to be thematically centered around emotion and evaluation (note the pejorative connotation of the examples cited above), and

¹⁰ There is one single attestation of the verb *bebrillen* in the DTA, which dates to 1802. However, it seems unlikely that *bebrillt* can be regarded as an actual participle, especially given that this one instance is massively outnumbered by the occurrences of the pseudo-participle *bebrillt*.

they make use of fundamental associational relations like contiguity and similarity. Regarding the latter point, recall that Hüning & Schlücker (2010) compare compounded pseudo-participles with *bahuvrihis*, which are fundamentally metonymic. While innovative pseudo-participles like *bierbebaucht* ‘potbellied’ in (6) or *bepornosonnenbrillt* ‘wearing porn sunglasses’ in (7) are not metonymic, what they share with *bahuvrihis* is that they characterize an entity – usually a person, or a group of persons – by referring to one particular salient feature.

Future studies should address the potential connection between the innovative use of pseudo-participles and register in more detail – the upcoming DECOW16AX corpus promises to be a fruitful resource for such a study. The meta-annotation of DECOW16AX can potentially be used to test the hypothesis that innovative pseudo-participles occur predominantly in forums and blogs, but also in essay writing and in literary texts that deliberately make use of expressive and “extravagant” patterns.

At the same time, the fact that many pseudo-participles seem deviant touches upon a problem widely discussed in linguistic morphology, namely the distinction between creativity and productivity: Can the pseudo-participle construction be regarded as a truly productive pattern, even though its domain of use is limited and even though most innovative formations may seem marked? Bauer (2001: 66–71) has already argued that this distinction is highly problematic and that productivity and creativity should not be regarded as mutually exclusive categories, but rather as a cline. A construction morphology approach can arguably incorporate these considerations in more detail. On the one hand, construction grammar holds that pragmatic and discourse-functional properties are important aspects of a construction’s function (Croft 2001: 19). Thus, the “variational marking” of pseudo-participles can be seen as part of language users’ knowledge about the form-meaning pair at hand – in other words: it can be modeled as an integral part of the constructional schema. On the other hand, Barðdal’s (2008) “productivity cline” (which she posits for syntactic constructions, but it can be generalized to morphological constructions) can prove insightful in accounting for the pattern’s productivity, which is seemingly unlimited (Bernstein 1992 and Van Haeringen 1949 both point out that their domain of application seems to be unrestricted) but, in light of the actual attestations, still fairly constrained. Barðdal (2008: 39) argues that in her model a construction’s productivity varies along the axes of semantic coherence and type frequency, for which she assumes an inverse correlation. On the upper end of her productivity cline, we find constructions with a high type frequency, which correspond to fully extendable open schemas. A construction with a high type frequency will almost necessarily exhibit a low degree of semantic coherence, which she sees as “an immediate consequence of the fact that there are limits to how much internal consistency there can be between items of a large category” (Barðdal 2008: 34). On the lower end of the cline, we find constructions with a low type frequency which can only be extended if the degree of semantic coherence is high. Analogy, i.e. extension based on only one model form, is located on the extreme pole of this lower end of the cline (cf. Barðdal 2008: 43f.).

Pseudo-participles can be allocated toward the lower end of this cline: Even though their domain of application seems to be unlimited, as pointed out by Bernstein (1992) for German and by Van Haeringen (1949) for Dutch pseudo-participles, this is only due to their semantic coherence: the possessive-ornative semantics of these formations is, in principle, compatible with every noun – but given the huge number of potential bases, the actual type frequency is almost vanishingly low. They approach the extreme pole of analogical extension in

that it seems reasonable to assume that a very limited number of more frequent instances like *bebrillt* ‘wearing glasses’ and *behandschuht* ‘wearing gloves’ serve as important templates for new formations. In semantic terms, the low-frequency pseudo-participles in our data are very homogeneous, which is also in line with Barðdal’s predictions.

Thus, both aspects – the productivity cline and the very concept of a construction, which incorporates pragmatic and discourse-functional properties – contribute to explaining the contextual and semantic constraints on the pattern’s productivity. These ideas also fit in well with Hilpert’s (2015) “upward-strengthening hypothesis”, which predicts that under certain circumstances, experiencing a linguistic unit will trigger the strengthening of a more abstract construction, i.e. a construction higher in the constructional network. This “upward strengthening” in turn is hypothesized to be necessary for grammaticalization or constructionalization to occur. For instance, experiencing a marginal member of a category (e.g. a new coinage) triggers upward strengthening as it forces the recipient to re-consider the boundaries of the category (Hilpert 2015: 139f.). However, the construction that is strengthened does not have to be the most abstract “parent” construction; instead, it can also be a subpattern, i.e. a mid-level constructional schema (Hilpert 2015: 137f.). In the case of pseudo-participles, it seems straightforward to assume that experiencing innovative pseudo-participles does not strengthen the superordinate Participle construction but rather the unified schema, i.e. the pseudo-participle construction.

This account, however, again presupposes the assumption of a unified schema. Let us conclude by briefly discussing the alternative account proposed by, e.g., Donalies (2011), who sees the assumption of a complex schema as superfluous and instead suggests to interpret pseudo-participles as adjectivizations of (partly nonexistent, but possible) ornative verbs. Re-phrasing the alternatives in constructionist terms, one could ask: Can we posit a pseudo-participle construction in its own right, or can pseudo-participles be explained in terms of other constructions, viz. the prefix construction [*be-N-en*] and the regular participle construction?

Among the most important criteria for identifying a construction are that it has some added semantic value, i.e. that it carries non-compositional meaning, and that it shows collocational preferences (Hilpert 2014: 16–22). Extending the notion of “collocational” preferences to the base-selection preferences of word-formation patterns, the latter criterion seems to be fulfilled. There are clear preferences towards certain semantic domains like clothing and body parts among the innovative formations. More importantly, however, the hypothesized pseudo-participle construction arguably adds semantic value that goes beyond regular participles of ornative verbs. Even though the meaning of most pseudo-participles can be described as possessive-ornative, the possessive reading seems to trump the ornative one, to the point that it can also encode inalienable possession, in which case a ‘provide with X’ reading is excluded, cf. *beschnabelt* ‘having a beak’ in (11).

- (11) Die Daroth sind ein **beschnabeltes**, großwüchsiges und grausames Kriegervolk.
‘The Daroth are a **beaked**, huge-grown and gruesome tribe of warriors.’
(<http://astan-magazin.de/AstanM-2/Buch.htm>)

It could of course be argued that the ornative meaning is still present and that the comic effect of many innovative pseudo-participles emerges from the mismatch between ornative semantics and the possessive reading implied by the word-formation product. However, this effect is

exploited frequently and systematically enough that it seems reasonable to see it as part of language users' rich linguistic knowledge about the construction in question. Future research could add more credibility to the complex-construction account with a more systematic corpus-based analysis of the pattern's base-selection preferences.

3 Discussion

In our three case studies, we found increasingly good evidence to vindicate the assumption of combined schemas. In the case of *ung*-nominals, a combined schema may have formed in speakers' minds, based on the abundance of complex *ung*-nominals – yet, we lack evidence for actual simultaneous derivation processes (or, in other words, we can not rule out that all complex derivatives were formed in a cyclic manner). In the case of *un-V-lich* adjectives, our diachronic enquiries suggest that early derivatives may often have resulted from cyclic derivation, but later on, a complex schema may indeed have developed and generated complex *un-V-lich* adjectives independently of its parent schemas. Finally, in the case of pseudo participles, we find an abundance of derivatives that can not have been formed in a cyclic manner, so that the assumption of a combined schema seems well-justified.

3.1 Accounting for the productivity of combined schemas

The three patterns of complex derivation analyzed above can be assessed as “semi-successful” in terms of productivity. The first two cases, Pref-X-*ung* and *un-V-lich*, turned out more productive or productive for a longer period of time than the corresponding simple schemas. Yet in the first case, it is not clear if a schema has really been formed and in the second case, the schema we do believe to have existed is not productive any longer. Pseudo-participles are fairly productive today, as documented by the wealth of ad hoc formations. Yet they seem somewhat restricted to playful usage in essay and expressive writing style (such as in web commentaries).

This moderate productivity status can be linked systematically to more general historical, morphological, and cognitive factors. First, and as the most general account, the diachronic rise of complex derivation can be understood in connection with the rise of written German. During the ENHG and early NHG periods, German gradually replaced Latin as the language of written discourse. Also, the literacy rate went up – from up to 4% around the year 1500 (Gauger 1994; Knoop 1994) to virtually the entire speech community in the late 19th century (Grosse et al. 1989: 12). Writing allows for more density and complexity than speech, due to more planning time as opposed to real-time performance. An increase of complexity in the ENHG and early NHG periods has been observed in various domains of morphology (e.g. Schröder 1988, Scherer 2005, Kempf 2016) and syntax (e.g. Weber 1971, Szczepaniak 2015).

One particular feature that characterizes written registers in contrast to speech is that information is coded in a nominal(ized) rather than in a verbal manner (cf. Wells 1960, Biber & Finegan 1997, Plag et al. 1999, Halliday 2004, Hartmann 2016: 261). All three complex constructions studied in this paper contribute to shifting information from verbal to nominal expression. This is also the case for most of the Dutch, English, Polish, and Italian examples

of schema unification discussed in Booij (2010: 41–50). Notwithstanding this presumable tendency towards nominalization, there are also verbal cases of schema unification, like the English *de-caffein-ate* type.

Generally, combined schemas provide a very condensed expression of rich semantic content (e.g. *un-V-lich* derivatives or pseudo-participles are shorter than corresponding relative clauses and contribute to the respective nominal phrase being heavily packed with information). The effects of such dense expression may be various. In particular, complex derivatives may appear sophisticated, prestigious, and, in the case of pseudo-participles, evoke a humorous or expressive effect.

Related to their high complexity, combined schemas exhibit a high degree of salience. This feature, too, is likely to contribute to their entrenchment (possibly making up for a relative shortage of high-frequency types in the case of pseudo-participles) and thus to strengthening their productivity. More specifically, there are two rather different notions of salience that can both be applied to the combined schemas analyzed above.

The first one is a morphological notion of salience as summed up, e.g., in Giraudo & Dal Maso (2016). In all three cases, the combined schemas are formally salient in that they are relatively rich in material (two syllables as opposed to shorter morphemes such as **-th* in English *length*), in that they occupy both the initial and the final position of the complex words, and in that they are formally relatively consistent and thus recognizable.¹¹ Also, the complex schema may be morphologically salient in terms of Hay's (2001, 2003) observation that affixes stand out more in formations that are less frequent than their bases. For instance, *-ly* stands out more in *eternally*, which is much rarer than its base (*eternal*), while it stands out less in *exactly*, which is much more frequent than *exact*. This applies, most of all, to the pseudo-participles, as they are in many cases nonce words. Also from a functional perspective, combined schemas can be viewed as relatively salient since they tend to be more transparent or semantically uniform than the related simple schemas. Semantic transparency is a rather ambivalent factor with respect to productivity (Kempf 2016: 74–76): Besides – or by way of – strengthening its salience, it may help a schema win out over its competitors in the function it realizes. On the other hand, the productivity of a monofunctional schema is limited to the degree to which its function is needed in discourse.

The other notion of salience is much more general. In their programmatic 2016 paper, Schmid & Günther advance the idea of “a unified socio-cognitive framework for salience in language”. They assume that salience in language arises from matching the linguistic input with expectations based on previous knowledge and situational context. In this matching process, salience may arise from either the confirmation *or* the violation of the expectations. The morphological salience described above seems to point towards salience by entrenchment, i.e. salience by confirmation of expectations. However, this might be a premature and in fact false conclusion. The morphological salience of a combined schema might be strong enough to keep it entrenched on an abstract, schematic level. Yet, its instantiations tend to be low frequent if not unknown – so that encountering them may trigger “salience by novelty” (Schmid & Günther's type 4 salience, based on mismatch with long term memory). This is most clearly

¹¹ This is less so with *Prf/Prt-X-ung*, more so with *un-V-lich*, and still an open question in the case of pseudo-participles, since the variants with prefixes other than *be-* still remain to be investigated. Still, the forms are relatively consistent compared, e.g., to suffixes with multiple grapho-phonological variants like ENHG *-et/-echt/-ocht/-icht/-igt* (cf. Kempf 2016: 74).

the case with highly occasional pseudo participles. Also, instantiations of combined schemas may trigger “salience by surprisal” (Schmid & Günther’s type 3 salience, based on mismatch with expectation in current context). Some of the derivatives are exceedingly complex, so that they can neither be expected, nor parsed easily. They pose a challenge to the recipients and are thus particularly striking. This is quite noticeable in the contemporary example in (12), but can also be discerned with the *un-V-lich* derivative in the historical example in (13): It is used in a passage of a sermon that seeks to encourage people to pronounce and preach their protestant belief, thus honoring the denomination of the first protestants. Clearly, the complex derivative serves as a climax within the rhetorical question. This climax would not work if it did not come with a surprise. The surprising effect is likely created by the complex morphology rather than the content: An equivalent syntactic paraphrase would not have created the same effect (cf. “a memento that can not be extinguished”).

- (12) Und dann sehe ich für den Bruchteil einer Sekunde [...] eine bepelzhandschuhte Hand aus dem Stein ragen¹²
 ‘And then, for a split second, I saw a hand in a fur glove (lit. “a be-fur-gloved hand”) reaching out of the stone’
- (13) Wird es nicht ein Werck der höchsten Billigkeit seyn, daß ihr ihrem unerschrockenen Bekänntniß ein unauslöschliches Denckmahl stiftet?¹³
 ‘Will it not be a deed of highest justice, that you should award their dauntless denomination with “unextinguishable” memento?’

Having argued for the existence of combined schemas and having discussed how to account for their moderate success in terms of productivity, we now turn to the more theoretical question of how their emergence can be modeled in CxM.

3.2. Modeling the emergence of combined schemas

All three case studies discussed in this paper have in common that the hypothesized complex constructions combine at least two existing constructions. In the first case study, these are prefix constructions and *ung*-nominalization, in the second case study, *un*-prefixation and *lich*-derivation, and in the third one, *be*-prefixation and participle formation. In all three cases, the assumption of a complex schema is certainly contentious. We have provided arguments in favor of positing complex constructions in these cases, but it has also become apparent that the complex patterns are still strongly connected to their respective parent constructions. Thus, the question of whether, in these cases, complex schemas exist in speakers’ minds maybe cannot be answered with a simple “yes” or “no”. As Hilpert (forthc.) points out with regard to Traugott & Trousdale’s (2013) notion of constructionalization,

the term constructionalization ultimately invites the notion of a discrete threshold between an existing construction that has changed and a new construction that has come into being. This threshold may turn out to be a line in the sand that is impossible to draw with certainty.

¹² Record from DECOW; the original website <http://forum.schaesoft.de/archive/index.php/t-1085.html> is no longer available (2017-01-15).

¹³ Record from the GerManC corpus, text SERM_P2_NoD_1730_JubelFeste.

Therefore, Hartmann (e.g. 2016) argues for a more gradualistic view of constructions – rather than being an “all-or-nothing” affair, constructionalization can be a matter of degree, and a linguistic unit can have a status as an independent construction to a greater or lesser extent. This is partly in line with Schmid’s (2014, 2017) entrenchment-and-conventionalization model, which puts *associations* center stage. In the domain of word-formation, the emphasis on associations seems particularly relevant: Word-formation patterns can, in Schmid’s terms, be seen as “symbolic associations” between a form and an abstract meaning or function whose instances are understood via associations to their respective base (this would fall under Schmid’s notion of “syntagmatic associations”). At the same time, morphological constructions tend to compete with each other as well as with functionally similar syntactic constructions, yielding what Schmid calls “paradigmatic associations”.¹⁴ Thus, the combinatorial schemas discussed here can perhaps best be seen as weakly constructionalized patterns with strong connections to their parent schemas. In the case of *un-V-lich*, the pattern has ceased to be productive. In the case of *Pref-X-ung* and pseudo-participles, there is a hypothetical possibility that their constructionalization might proceed further. For the sake of the argument, imagine a situation in which the pseudo-participle construction extends its possessive semantics to more abstract domains, e.g. *behoffnungte Europäer* ‘Europeans having hope’, *beunmuteter Mensch* ‘displeasured human’ – this would suggest that the pattern is gaining ground not only against less condensed syntactic alternatives but also against more established competitors (*hoffnungsvoll* ‘hopeful’, *unmütig* ‘discontent’). This, then, would be an argument for increased construction status from the perspective of Schmid’s paradigmatic associations.

These considerations show that constructionalization is a multi-dimensional phenomenon. While this is a truism, we argue that the perspectives offered in this paper can help disentangling the complexities involved in the development of complex morphological schemas. Importantly, the theoretical toolkit of CxM with its notions of the hierarchical lexicon and schema unification offers an ideal starting point for investigating these patterns both synchronically and diachronically. Taking diachrony into account, however, requires a more nuanced view of constructions. Constructions, on this view, are emergent and continually evolving. They are emergent in that they arise from routinization of local communicative patterns (e.g. Hopper 2015, Pleyer 2017), and they are evolving in that “[e]very usage event has some impact (even if very minor) on the structure of the categories it evokes” (Langacker 1987: 376).

The case studies discussed in this paper can be considered prime examples for the emergence, spread, and/or decline of emergent constructional patterns that arise through the key mechanisms of reanalysis and analogization (cf. Traugott & Trousdale 2013) and that are tied to other constructional schemas to varying degrees. Future research could investigate the dynamics involved in these processes in more detail. For instance, psycholinguistic research could assess the connection strength between the complex schemas and their parent constructions in the linguistic knowledge of present-day speakers. Both corpus-linguistic and behavioral methods could be used to determine the semantic constraints of the respective patterns in more detail, thus working towards a more precise characterization of the schemas.

To conclude, the case studies discussed in this paper touch upon some of the most hotly-debated topics both in linguistic morphology and in construction grammar – the

¹⁴ On paradigmatic relations between constructions, see also Norde & Trousdale (2016).

problem of multiply complex word-formation schemas; the validity of “playful formations” in assessing morphological productivity; the question of when a construction can be legitimately posited, to name just a few. A diachronic perspective that conceives of constructions as emergent and dynamic patterns alleviates many of these problems and can thus add important insights to a thoroughly usage-based CxM and to a better understanding of the construction of words.

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Appendix

Table 3: Sample of *ung*-derivatives arranged by first attestation¹⁵

derivative	translation	base morphology	first attestation (exact)	first attestation (period)
Lösung	solution	simplex	OHG	01-OHG
Ordnung	order	simplex	OHG	01-OHG
Förderung	facilitation	simplex	MHG	02-MHG
Gattung	kind	simplex	MHG	02-MHG
Innung	guild	simplex	MHG	02-MHG
Prüfung	examination	simplex	MHG	02-MHG
Kürzung	reduction	simplex	late MHG	02-MHG
Begabung	gift	simplex	1321	03-ENHG
Leitung	management	simplex	1349	03-ENHG
Zeitung	information	simplex	late 14th ct.	03-ENHG
Belastung	burden	prefixed	1446	03-ENHG
Aufteilung	distribution	particle v	1449	03-ENHG
Ausstellung	exhibition	particle v	1450	03-ENHG
Erteilung	grant	prefixed	1493	03-ENHG
Versuchung	temptation	prefixed	1494	03-ENHG
Entfremdung	estrangement	prefixed	15th ct.	03-ENHG
Siedlung	settlement	simplex	15th ct.	03-ENHG
Sitzung	session	simplex	15th ct.	03-ENHG
Verbindung	connection	prefixed	15th ct.	03-ENHG
Vereinigung	coalition	prefixed	15th ct.	03-ENHG
Verwaltung	administration	prefixed	15th ct.	03-ENHG
Verbesserung	improvement	prefixed	15th ct.	03-ENHG
Verhaftung	arrest	prefixed	15th ct.	03-ENHG
Regierung	government	suffixed	mid 15th ct.	03-ENHG
Ausbildung	training	particle v	1507	03-ENHG
Beratung	counseling	prefixed	1508	03-ENHG
Erhöhung	increase	prefixed	1511	03-ENHG

¹⁵ The sample is taken from annotated “TAGGED-M” subcorpus of the DEREKE/COSMAS II. For all 65 derivatives, we checked the following resources to determine the time of their formation: DRW, DTA, FWB, Google Books, Pfeifer (1993) (all accessed August 2016).

Spaltung	division	simplex	1522	03-ENHG
Verknüpfung	assignment	prefixed	1524	03-ENHG
Vereinbarung	agreement	prefixed	1528	03-ENHG
Vorstellung	introduction	particle v	1528	03-ENHG
Darbietung	performance	particle v	1531	03-ENHG
Betreuung	assistance	prefixed	1532	03-ENHG
Verkürzung	reduction	prefixed	1535	03-ENHG
Gründung	foundation	simplex	1536	03-ENHG
Aufforderung	prompt	particle v	1547	03-ENHG
Freistellung	release	particle v	1555	03-ENHG
Verweigerung	refusal	prefixed	1563	03-ENHG
Versammlung	gathering	prefixed	1564	03-ENHG
Abschreibung	deduction	particle v	1565	03-ENHG
Begrüßung	greeting	prefixed	1574	03-ENHG
Wirkung	effect	simplex	1578	03-ENHG
Schwankungen	fluctuation	simplex	1595	03-ENHG
Aufwendung	expenditure	particle v	1596	03-ENHG
Gestaltung	arrangement	prefixed	16th ct.	03-ENHG
Verarbeitung	processing	prefixed	1600	03-ENHG
Bewachung	surveillance	prefixed	1623	03-ENHG
Einreichung	submission	particle v	1650	04-NHG
Herausforderung	challenge	particle v	1653	04-NHG
Täuschung	deception	simplex	1676	04-NHG
Verständigung	communication	prefixed	1677	04-NHG
Entwicklung	development	prefixed	1682	04-NHG
Veranstaltung	event	prefixed	1685	04-NHG
Zuladung	payload	particle v	1734	04-NHG
Aussperrung	lock-out	particle v	1740	04-NHG
Aufarbeitung	rehabilitation	particle v	1762	04-NHG
Hervorhebung	accentuation	particle v	1791	04-NHG
Identifizierung	identification	suffixed	1793	04-NHG
Beschwichtigung	conciliation	prefixed	1803	04-NHG
Aufbesserung	amelioration	particle v	1804	04-NHG
Regelung	regulation	simplex	1808	04-NHG
Überschuldung	overindebtedness	particle v	1814	04-NHG
Sanierung	restoration	suffixed	1869	04-NHG
Bewertung	assessment	prefixed	1871	04-NHG
Stilllegung	closedown	particle v	1905	04-NHG

Table 4: Deverbal passive *lich*-derivatives arranged by first attestation¹⁶

derivative	translation	morphol. structure	1st attestation (year)	1st attestation (period)
unverständlich	incomprehensible	un-V-lich	700-1050	0700-1050
unsäglich	unspeakable	un-V-lich	1050-1350	1050-1399
unträglich	unbearable	un-V-lich	1050-1350	1050-1399

¹⁶ The sample is taken from Kühnhold et al. (1978: 393–394; for further details on the sample, see Kempf 2016: 324–327). For all 65 derivatives, we checked the following resources to determine the time of their formation: DRW, DTA, FWB, Google Books, Pfeifer (1993) (all accessed Oct 2014 + Jan 2017).

verständlich	comprehensible	V-lich	1050-1350	1050-1399
träglich	bearable	V-lich	1216	1050-1399
beweislich	provable	V-lich	1294	1050-1399
begreiflich	comprehensible	V-lich	14. ct.	1050-1399
erforderlich	necessary	V-lich	1451	1400-1499
erklärlich	explicable	V-lich	1451	1400-1499
breuchlich	suitable	V-lich	1489	1400-1499
unbeweislich	unprovable	un-V-lich	1490	1400-1499
undurchdringlich	impenetrable	un-V-lich	1496	1400-1499
unerschöpflich	inexhaustible	un-V-lich	15. ct.	1400-1499
vernehmlich	audible	V-lich	15. ct.	1400-1499
unbegreiflich	incomprehensible	un-V-lich	ca. 1400	1400-1499
unwiderruflich	irrevocable	un-V-lich	1503	1500-1549
unergründlich	fathomless	un-V-lich	1505	1500-1549
bedauerlich	deplorable	V-lich	1508	1500-1549
unüberwindlich	insurmountable	un-V-lich	1508	1500-1549
unvermeidlich	unavoidable	un-V-lich	1508	1500-1549
unaussprechlich	inexpressible	un-V-lich	1509	1500-1549
unerforschlich	inexplorable	un-V-lich	1509	1500-1549
vergleichlich	comparable	V-lich	1514	1500-1549
annehmlich	acceptable	V-lich	1520	1500-1549
unauflöslich	irresolvable	un-V-lich	1521	1500-1549
unerträglich	unbearable	un-V-lich	1521	1500-1549
unversöhnlich	unconciliatory	un-V-lich	1521	1500-1549
unwiderleglich	irrefutable	un-V-lich	1521	1500-1549
verletzlich	vulnerable	V-lich	1523	1500-1549
unübersteiglich	insurmountable	un-V-lich	1524	1500-1549
anschaulich	demonstrative	V-lich	1525	1500-1549
verzeihlich	forgivable	V-lich	1528	1500-1549
erträglich	bearable	V-lich	1531	1500-1549
ausdrücklich	expressible	V-lich	1534	1500-1549
überwindlich	conquerable	V-lich	1541	1500-1549
widerleglich	refutable	V-lich	1557	1550-1599
unfasslich	incomprehensible	un-V-lich	1559	1550-1599
unerklärlich	inexplicable	un-V-lich	1562	1550-1599
unermesslich	unfathomable	un-V-lich	1564	1550-1599
erschwinglich	affordable	V-lich	1566	1550-1599
unvergleichlich	incomparable	un-V-lich	1575	1550-1599
vermeidlich	evitable	V-lich	1580	1550-1599
unerschwinglich	unaffordable	un-V-lich	1587	1550-1599
erdenklich	imagineable	V-lich	1591	1550-1599
unumgänglich	inevitable	un-V-lich	1602	1600-1649
unumstößlich	irrevocable	un-V-lich	1610	1600-1649
unnachahmlich	inimitable	un-V-lich	1611	1600-1649
unzerbrechlich	indestructible	un-V-lich	1617	1600-1649
unersetzlich	irreplaceable	un-V-lich	1620	1600-1649
erhältlich	available	V-lich	1626	1600-1649
unentbehrlich	indispensable	un-V-lich	1628	1600-1649
unbeschreiblich	indescribable	un-V-lich	1650	1650-1699
entbehrlich	dispensable	V-lich	1654	1650-1699
unverzeihlich	unforgivable	un-V-lich	1655	1650-1699
ersetzlich	replaceable	V-lich	1662	1650-1699
unbestechlich	incorruptible	un-V-lich	1672	1650-1699
fasslich	comprehensible	V-lich	1682	1650-1699
unwiderstehlich	irresistable	un-V-lich	1704	1700-1749
unausstehlich	insufferable	un-V-lich	1718	1700-1749
unabweislich	irrefutable	un-V-lich	1740	1700-1749
unerschütterlich	imperturbable	un-V-lich	1741	1700-1749
unverwüstlich	indestructable	un-V-lich	1747	1700-1749

unabänderlich	unchangeable	un-V-lich	1748	1700-1749
widerstehlich	resistible	V-lich	1753	1750-1799
bestechlich	corruptible	V-lich	1773	1750-1799
unauffindlich	untraceable	un-V-lich	1784	1750-1799

References

Corpora and web resources

BonnC	http://www.korpora.org/Fnhd/
DEREKO/COSMAS II	http://www.ids-mannheim.de/cosmas2/
DRW	http://drw-www.adw.uni-heidelberg.de/drw-cgi/zeige
DTA	http://www.deutschestextarchiv.de/
DWDS	http://www.dwds.de/
GerManC	http://www.ota.ox.ac.uk/desc/2544
GOOGLE BOOKS	http://books.google.de/
GOOGLE NGRAM VIEWER	https://books.google.com/ngrams
MHDBDB	http://mhdbdb.sbg.ac.at/
WORTWARTE	http://www.wortwarte.de/

Literature

- Anderson, John R., Daniel Bothell, Michael D. Byne, Scott Douglass, Christian Lebiere & Yulin Quin. 2004. An integrated theory of the mind. *Psychological Review* 111, 1036–1060.
- Baayen, R. Harald. 1993. On Frequency, Transparency, and Productivity. In Geert E. Booij & Jaap van Marle (eds.), *Yearbook of Morphology 1992*, 181–208. Dordrecht: Kluwer.
- Baayen, R. Harald. 2009. Corpus Linguistics in Morphology: Morphological Productivity. In Anke Lüdeling & Merja Kytö (eds.), *Corpus Linguistics*, 899–919. (HSK 29.2). Berlin, New York: De Gruyter.
- Barðdal, Jóhanna. 2008. *Productivity: Evidence from Case and Argument Structure in Icelandic*. (Constructional Approaches to Language 8). Amsterdam/Philadelphia: John Benjamins.
- Bauer, Laurie. 1983. *English Word Formation*. Cambridge: Cambridge University Press.
- Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.
- Bernstein, Wolf Z. 1992. *Pseudopartizipien im deutschen Sprachgebrauch. Ein Nachschlage- und Übungsbuch*. Heidelberg: Groos.
- Biber, Douglas & Edward Finegan. 1997. Diachronic Relations Among Speech-Based and Written Registers in English. In Terttu Nevalainen & Leena Kahlas-Tarkka (eds.): *To Explain the Present Studies in the Changing English Language in Honour of Matti Rissanen*. Helsinki: Société Néophilologique, 253–275.
- Booij, Geert E. 2007. Construction Morphology and the Lexicon. In Fabio Montermini, Gilles Boyé & Nabil Hathout (eds.), *Selected Proceedings of the 5th Décembrettes: Morphology in Toulouse*. Somerville, MA: Cascadilla Proceedings Project, 34–44.
- Booij, Geert E. 2010. *Construction Morphology*. Oxford: Oxford University Press.

- Booij, Geert. 2013. Morphology in Construction Grammar. In Hoffmann, Thomas & Trousdale, Graeme (eds.), *The Oxford Handbook of Construction Grammar*,. Oxford: Oxford University Press, 255-273.
- Booij, Geert. 2015. The nominalization of Dutch particle verbs: Schema unification and second order schemas. *Nederlandse Taalkunde* 20(3). 285–314.
- Croft, William. 2001. *Radical Construction Grammar: Syntactic Theory in Typological Perspective*. Oxford: Oxford University Press.
- Demske, Ulrike. 2000. Zur Geschichte der ung-Nominalisierung im Deutschen: Ein Wandel morphologischer Produktivität. *Beiträge zur Geschichte der deutschen Sprache und Literatur* 122. 365–411.
- Donalies, Elke. 2011. Explizite Adjektivderivate. In: grammis 2.0. Das grammatische Informationssystem des Instituts für deutsche Sprache. http://hypermedia.ids-mannheim.de/call/public/sysgram.ansicht?v_id=1231 (last checked 10/02/2017)
- Durrell, Martin, Astrid Ensslin & Paul Bennett. 2007. The GerManC Project. *Sprache und Datenverarbeitung* 31, 71–80.
- Eisenberg, Peter. 2013. *Grundriss der deutschen Grammatik. Bd. 1: Das Wort*. 4th ed. Stuttgart: Metzler.
- Flury, Robert. 1964. *Struktur- und Bedeutungsgeschichte des Adjektiv-Suffixes -bar*. Winterthur: Keller. [Dissertation University Zürich]
- FWB = *Frühneuhochdeutsches Wörterbuch*. Robert R. Anderson, Ulrich Goebel, Oskar Reichmann, Anja Lobenstein-Reichmann (eds.). 12 volumes, 1986–. Berlin / Boston: de Gruyter.
- Ganslmayer, Christine. 2012. *Adjektivderivation in der Urkundensprache des 13. Jahrhunderts: Eine historisch-synchrone Untersuchung anhand der ältesten deutschsprachigen Originalurkunden*. Berlin, New York: De Gruyter.
- Gauger, Hans-Martin. 1994. Geschichte des Lesens. In Hartmut Günther & Otto Ludwig (eds.): *Schrift und Schriftlichkeit. Ein interdisziplinäres Handbuch internationaler Forschung. 1. Halbband*. Berlin/New York: De Gruyter, 65–84.
- Giraud, Hélène & Serena Dal Maso. 2016. The Saliency of Complex Words and Their Parts: Which Comes First? *Frontiers in Psychology* 7, 1778. <<http://doi.org/10.3389/fpsyg.2016.01778>>.
- Goldberg, Adele E. 2006. *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.
- Gries, Stefan Th. & Anatol Stefanowitsch. 2004. Extending Collostructional Analysis: A Corpus-Based Perspective on “Alternations.” *International Journal of Corpus Linguistics* 9(1), 97–129.
- Grosse, Siegfried, M. Grimberg, T. Hölscher & J. Karweick (eds.). 1989. „Denn das Schreiben gehört nicht zu meiner täglichen Beschäftigung“. *Der Alltag kleiner Leute in Bittschriften, Briefen und Berichten aus dem 19. Jahrhundert. Ein Lesebuch*. Bonn: Dietz.
- Halliday, M.A.K. 2004. *The Language of Science*. Collected Works of M.A.K. Halliday, Vol. 5. Edited by Jonathan J. Webster. London: Continuum.
- Hartmann, Stefan. 2016. *Wortbildungswandel. Eine dichrone Studie zu deutschen Nominalisierungsmustern*. Berlin, Boston: De Gruyter.
- Hartmann, Stefan (forthc.): Derivational morphology in flux. A case study on word-formation change in German. *Cognitive Linguistics*.
- Haspelmath, Martin. 1999. Why is grammaticalization irreversible? *Linguistics* 37(6), 1043–1068.
- Hay, Jennifer B. 2001. Lexical frequency in morphology: Is everything relative? *Linguistics* 39(6), 1041–1070.
- Hay, Jennifer B. 2003. *Causes and Consequences of Word Structure*. London: Routledge.

- Hilpert, Martin. 2006. Distinctive Collexeme Analysis and Diachrony. *Corpus Linguistics and Linguistic Theory* 2(2), 243–256.
- Hilpert, Martin. 2014. *Construction Grammar and its Application to English*. Edinburgh: Edinburgh University Press.
- Hilpert, Martin. 2015. From hand-carved to computer-based: Noun-participle compounding and the upward-strengthening hypothesis. *Cognitive Linguistics* 26(1). 113–147.
- Hilpert, Martin. forthcoming. Three open questions in diachronic construction grammar. In Evie Coussé, Peter Andersson & Joel Olofsson (eds.), *Grammaticalization meets construction grammar*. Amsterdam / Philadelphia: John Benjamins.
- Hopper, Paul. 2015. Emergent grammar. In Brian MacWhinney & William O’Grady (eds.), *Handbook of Language Emergence*. Oxford: Blackwell, 314–327.
- Horlitz, Bernd. 1986. Zur lexikographischen Darstellung der Verbalsubstantive auf -ung. In Herbert Ernst Wiegand (ed.), *Studien zur neuhochdeutschen Lexikographie VI, Teilbd. 1*, 479–490. (GL 87). Hildesheim, Zürich, New York: Olms.
- Hüning, Matthias & Barbara Schlücker. 2010. Konvergenz und Divergenz in der Wortbildung. Komposition im Niederländischen und Deutschen. In Antje Dammel, Sebastian Kürschner & Damaris Nübling (eds.), *Kontrastive germanistische Linguistik*. Hildesheim: Olms, 783–825.
- Keller, Rudi. 1994. *Sprachwandel: Von der unsichtbaren Hand in der Sprache*. Tübingen / Basel: Francke.
- Kempf, Luise. 2016. *Adjektivsuffixe in Konkurrenz. Wortbildungswandel vom Frühneuhochdeutschen zum Neuhochdeutschen*. Berlin, Boston: de Gruyter.
- Kempf, Luise. forthcoming. Genre influence on word formation (change): A case study on German adjectival derivation. In Richard Jason Whitt (ed.): *Diachronic Corpora, Genre and Language Change*. Amsterdam: John Benjamins.
- Klein, Thomas & Solms, Hans-Joachim & Wegera, Klaus-Peter (eds.). 2009. *Mittelhochdeutsche Grammatik: Wortbildung*. Tübingen: Niemeyer.
- Knoop, Ulrich. 1994. Entwicklung von Literalität und Alphabetisierung in Deutschland. In Hartmut Günther & Otto Ludwig (eds.): *Schrift und Schriftlichkeit. Ein interdisziplinäres Handbuch internationaler Forschung. 1. Halbband*. Berlin/New York: de Gruyter, 859–872.
- Koch, Peter. 2004. Sprachwandel, Mündlichkeit und Schriftlichkeit. *Zeitschrift für romanische Philologie* 120(4), 605–630.
- Koch, Peter & Wulf Oesterreicher. 1996. Sprachwandel und expressive Mündlichkeit. *Zeitschrift für Literaturwissenschaft und Linguistik* 102, 64–96.
- Kopf, Kristin. 2016. *Mainzer (Früh-)Neuhochdeutschkorpus (1500-1710)*. Mainz: University of Mainz.
- Kühnhold, Ingeburg, Oskar Putzer & Hans Wellmann. 1978. *Deutsche Wortbildung. Typen und Tendenzen in der Gegenwartssprache. Eine Bestandsaufnahme des Instituts für Deutsche Sprache, Forschungsstelle Innsbruck. Dritter Hauptteil: Das Adjektiv*. Düsseldorf: Schwann.
- Kupietz, Marc, Cyril Belica, Holger Keibel & Andreas Witt. 2010. The German Reference Corpus DeReKo: A primordial sample for linguistic research. In: Calzolari, Nicoletta et al. (eds.): *Proceedings of the 7th conference on International Language Resources and Evaluation (LREC 2010)*. Valletta, Malta: European Language Resources Association (ELRA), 1848-1854. <http://www.lrec-conf.org/proceedings/lrec2010/pdf/414_Paper.pdf>
- Langacker, Ronald W. 1987. *Foundations of Cognitive Grammar. Vol. 1: Theoretical Prerequisites*. Stanford: Stanford University Press.
- Motsch, Wolfgang. 2004. *Deutsche Wortbildung in Grundzügen*. 2nd ed. Berlin / New York: de Gruyter.

- Norde, Muriel & Graeme Trousdale. 2016. Exaptation from the perspective of construction morphology. In Muriel Norde & Freek Van de Velde (eds.), *Exaptation and language change*, 163–195. Amsterdam, Philadelphia: John Benjamins.
- Paul, Hermann. 1897. Ueber die Aufgaben der Wortbildungslehre. *Sitzungsberichte der philosophisch-philologischen und der historischen Classe der königlich bayerischen Akademie der Wissenschaften 1896, Heft IV*, 692–713. München: Staub.
- Pfeifer, Wolfgang. 1993. *Etymologisches Wörterbuch des Deutschen*. Online version via <https://www.dwds.de/>.
- Pimenova, Natal'ja B. 2002. Semantische Restriktionen für die unga-Ableitung im Althochdeutschen. *Germanistisches Jahrbuch der GUS „Das Wort“*, 93–106.
- Plag, Ingo. 1999. *Morphological Productivity: Structural Constraints in English Derivation*. (Topics in English Linguistics 28). Berlin, New York: Mouton de Gruyter.
- Plag, Ingo. 2005. *Word-Formation in English*. Cambridge: Cambridge University Press.
- Plag, Ingo, Christiane Dalton-Puffer & Harald Baayen. 1999. Morphological productivity across speech and writing. *English Language and Linguistics* 3, 209–228.
- Pleyer, Michael. 2017. Protolanguage and mechanisms of meaning construal in interaction. *Language Sciences* 63, 69–90.
- Pounder, Amanda V. 2001. Adverb-marking in German and English: System and standardization. *Diachronica* 18(2). 301–358.
- Riecke, Jörg. 1999. Pseudopartizipien im Althochdeutschen. Ein Beitrag zur Geschichte eines Wortbildungstyps. *Sprachwissenschaft* 24(2). 157–193.
- Rumelhart, David E. 1980. Schemata The building blocks of cognition. In Rand J. Spiro, Bertram C. Bruce & William F. Brewer (eds.), *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education*. Hillsdale, NJ: Erlbaum, 33–58.
- Schäfer, Roland & Felix Bildhauer. 2012. Building Large Corpora from the Web Using a New Efficient Tool Chain. In Cicoletta Calzolari, Khalid Choukri, Terry Declerck, Mehmet Uğur Doğan, Bente Maegaard, Joseph Mariani, Asuncion Moreno, Jan Odijk & Stelios Piperidis (eds.), *Proceedings of LREC 2012*, 486–493.
- Scherer, Carmen. 2005. *Wortbildungswandel und Produktivität. Eine empirische Studie zur nominalen -er-Derivation im Deutschen*. Tübingen: Niemeyer.
- Schmid, Hans-Jörg. 2007. Entrenchment, salience, and basic levels. In Dirk Geeraerts & Hubert Cuyckens (eds.), *The Oxford Handbook of Cognitive Linguistics*. Oxford: Oxford University Press, 118–138.
- Schmid, Hans-Jörg. 2014. A blueprint of the entrenchment-and-conventionalization model. In Martin Hilpert & Susanne Flach (eds.), *Yearbook of the German Cognitive Linguistics Association*, Vol. 2. Berlin / Boston: de Gruyter, 3–25.
- Schmid, Hans-Jörg. 2017. A framework for understanding entrenchment and its psychological foundations. In Hans-Jörg Schmid (ed.), *Entrenchment and the Psychology of Language Learning. How We Reorganize and Adapt Linguistic Knowledge*, 9–39. Berlin / Boston: de Gruyter.
- Schmid, Hans-Jörg & Franziska Günther. 2016. Toward a Unified Socio-Cognitive Framework for Salience in Language. *Frontiers in Psychology* 7, 1110. <<http://journal.frontiersin.org/article/10.3389/fpsyg.2016.01110>>
- Schröder, Marianne. 1988. Entwicklungstendenzen in der Wortbildung. In Karl-Ernst Sommerfeldt (ed.): *Entwicklungstendenzen in der deutschen Gegenwartssprache*, 174–192. Leipzig: Bibliographisches Institut.
- Stefanowitsch, Anatol. 2006. Distinctive collexeme analysis and diachrony: A comment. *Corpus Linguistics and Linguistic Theory* 2(2), 257–262.

- Szczepaniak, Renata. 2015. Syntaktische Einheitenbildung – typologisch und diachron betrachtet. In Christa Dürscheid & Jan Georg Schneider (eds.): *Handbuch Satz, Äußerung, Schema*. Berlin/Boston: de Gruyter, 104–124.
- Taylor, John R. 2002. *Cognitive Grammar*. Oxford: Oxford University Press.
- Thomas, Barbara. 2002. *Adjektivderivation im Nürnberger Frühneuhochdeutsch um 1500: Eine historisch-synchrone Analyse anhand von Texten Albrecht Dürers, Veit Dietrichs und Heinrich Deichslers*. Berlin: de Gruyter.
- Traugott, Elizabeth Closs & Graeme Trousdale. 2013. *Constructionalization and Constructional Changes*. (Oxford Studies in Diachronic and Historical Linguistics 6). Oxford: Oxford University Press.
- Van de Velde, Freek. 2014. Degeneracy: The maintenance of constructional networks. In Ronny Boogaart, Timothy Coleman & Gijsbert Rutten (eds.): *Extending the scope of Construction Grammar*. Berlin, Boston: De Gruyter, 141–180.
- Van Haeringen, Conrad B. 1949. Participia praeverbalia. *De Nieuwe Taalgids* 42. 187–191.
- Weber, Heinrich. 1971. *Das erweiterte Adjektiv- und Partizipialattribut im Deutschen*. München: Hueber.
- Wells, Rulon. 1960. Nominal and verbal style. In Thomas A. Sebeok (ed.): *Style in language*. Cambridge, Mass., & New York: Technology Press & Wiley, 213–20.
- Winkler, Gertraud. 1995. *Die Wortbildung mit -lich im Alt-, Mittel- und Frühneuhochdeutschen*. Heidelberg: Winter.