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***Ordnung liebend – ordnung+Ø+liebend – ordnung+s+liebend?* German noun-participle combinations between phrase and word. A diachronic case study**

Abstract: This paper focuses on the recent history of German noun-participle combinations in which the present participle governs the noun. Forms such as *schönheitsliebend* 'beauty-loving' and *Appetit anregend* 'appetite-stimulating' can be analyzed both as phrases and words. This paper studies how the noun-participle pattern diachronically evolved between the poles of syntax and word formation. Spelling and linking elements are used as central indicators for the grammatical status. For the latter, two approaches based on verb-valency are introduced. Data from the German Text Archive, DWDS core corpus, and DIE ZEIT corpus show that over the past 300 years, noun-participle combinations have undergone a process of morphologization: They are increasingly written as a single word and take linking elements that are typical of nominal root compounds, which suggests that they are more and more conceived of as lexical units. Moreover, this study shows that morphologization is expedited by high token frequency of individual types.

1   Introduction

This paper addresses noun-participle combinations in German, that is, complex structures combining a noun and a present participle. The focus is on combinations in which the noun saturates an argument of the participle or the basic verb, respectively (e.g., *ekelerregend* 'nauseating', lit. "disgust-arousing"), which will be referred to as objective (cf. Pümpel-Mader et al. 1992). Noun-participle combinations[1] are closely related to synthetic compounds or can be seen as a subgroup. What makes them special is that they occur both as phrases and words. In written language, often the difference can be only recognized on the basis of spelling (Pümpel-Mader et al. 1992: 5; Fuhrhop 2007: 129). A space between a noun and participle indicates a phrasal status (cf. 1). Noun-participle combinations may also be written as a single word and thus appear as lexical units (cf. 2).

(1)   *Vertrauen erweckend* 'inspiring confidence'

(2)   *vertrauenerweckend* 'inspiring confidence'

For the latter type, linking elements give further insight into the grammatical status. The choice of linking elements within noun-participle combinations is either syntactically determined or corresponds to the linking of root compounds.

(3a)   *auskünft+e+suchend* (Allgemeine Zeitung, 05-26-1840, DTA) 'information-seeking'

(3b)   *zeitung+Ø+lesend* 'newspaper-reading'

(4)   *zeitung+s+lesend* 'newspaper-reading'

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[1] Unless otherwise stated, the term *noun-participle combination* in the following refers to combinations with an internal argument structure.

In the first case, the compounding stem form is homophonous with an inflected form of the first constituent as required by the verbal constituent (cf. 3a–b): *Auskünfte suchen*[2] 'to seek information.PL', *Zeitung lesen* 'to read the newspaper'. If a form without an inflectional suffix is required, this can also inhibit linking elements (cf. 3b). Despite being written as one word, such noun-participle combinations exhibit syntactic features. In the second case, such as (4), the linking element cannot be analyzed as an inflectional suffix (*Zeitungs lesen*). Instead, the noun-participle combination is linked analogously to root compounds (such as *Zeitung+s+artikel* 'newspaper article', *Zeitung+s+junge* 'paperboy'). These two principles compete with each other and lead to varying linking elements as can be generally observed for synthetic compounds (Nübling and Szczepaniak 2011: 59–62), for example *Beitrag+s?+zahler* 'contributer'.

Looking at the varying spelling and linking elements, it becomes clear that noun-participle combinations are hybrids between syntax and word formation. The question of the relationship between syntax and word formation enjoys great popularity in the literature. There has been controversy in particular around the assumption that the two domains can be clearly separated or whether they represent the poles of a continuum (cf. Schlücker 2020). Synthetic compounds such as *nervenaufreibend* 'nerve-racking' are classic intermediate structures exhibiting both syntactic and morphological features. Studying their grammatical behavior thus allows us to draw conclusions on how the boundary between syntax and morphology is organized. So far, there has hardly been any empirical research on synthetic compounds in German. Noun-participle combinations are especially underrepresented. Since they are more closely related to syntax than nominal synthetic compounds are (e.g., *Feuerlöscher* 'fire-extinguisher'), their characteristics, particularly from a diachronic perspective, can shed some light on the relationship between phrase and word. This paper aims to explore how noun-participle combinations have developed from the 18th century until today, with regards to their syntactic and morphological features. Based on prior research, it is expected that noun-participle combinations have diachronically evolved away from syntax and have taken on morphological properties. To examine this assumption, a diachronic corpus study of newspaper texts will be conducted.

This paper is organized as follows. Section 2 gives a brief overview of prior research on synthetic compounds, with special attention given to noun-participle combinations. Research questions, hypotheses, and the design of the corpus study are outlined in Section 3. The empirical results will be presented in Section 4. The results confirm that noun-participle combinations have become more morphological over time. However, there is a tendency that combinations of low frequency have kept their syntactic features. It is argued that the phenomenon is best characterized by assuming a gradient distinction between syntax and word formation. Sections 5 summarizes the main findings.

2 Synthetic compounds in German

2.1 Prior research on synthetic compounds

Words with the structure noun + verbal stem + suffix that exhibit an internal argument relation between the noun and the verb are called synthetic compounds (e.g., *ölexportierend* 'oil-exporting', *Rasenmäher* 'lawn mower').[3]

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[2] Note that *Auskunft* 'information' usually takes a linking -*s*- when occurring as a compositional first constituent (e. g. *Auskunft+s+pflicht* 'duty of disclosure'). Thus, an influence of root compounds is unlikely for the compounding stem form in (3a).

[3] This paper focuses on synthetic compounds with a verbal base. In general, the governing constituent can also be an adjective, for example *liebenswürdig* 'kind', lit. "worthy of love".

That is, in the underlying verbal phrase, the noun functions as an object of the verb, for example *Feuerlöscher* 'fire extinguisher' – *Feuer löschen* 'to extinguish fire'. Synthetic compounds need to be distinguished from root compounds. Throughout this paper, the term *root compound* is used to refer to compounds without an internal argument relation (e.g., *Teetasse* 'tea cup', *Regenwald* 'rain forest'). Root compounds may, nevertheless, have deverbal second constituents (e.g., *silberglänzend* 'silvery', lit. "silver-shining").

Especially remarkable about synthetic compounds is their ambivalent status between word and phrase. Consequently, this word class has often been considered in the literature, most of which takes a theoretical approach (e.g., Rapp 2001; Rivet 1999; Leser 1990 for German; Lieber 1983 for English). One contentious point is which word formation process underlies synthetic compounds. Due to limitations of space, the discussion cannot be presented here in its entirety. Central suggestions in the literature are compounding (cf. 5, e.g., Brinkmann 1962: 267–268; Lohde 2006: 167; Henzen [3]1965: 66) and derivation (cf. 6, e.g., Behaghel 1924: 393; Pümpel-Mader et al. 1992: 298; Siebert 1968: 121–122; Fleischer [4]1975: 282), optionally hierarchically combined (cf. 7, e.g., Rivet 1999: 322–324 for German; Lieber 1983 for English; Booij 2010: 49 for Dutch). Other authors argue that synthetic compounds are the product of incorporation or related processes, which may interact with the word formation processes illustrated in (5)–(7).[4] Each of these approaches has its problems. It is not the aim of this work to resolve this paradox.

(5) *Herz + erwärmend > herzerwärmend* 'heart-warming' (compounding)

(6) *Herz erwärmen > herzerwärmend* (derivation of a verbal phrase)

(7) *Herz + erwärmen > herzerwärmen > herzerwärmend* (derivation of a verbal compound)

Much of the literature focusing on German considers synthetic compounds as a subclass of (determinative) root compounds (e.g., Donalies [2]2011: 47; Eisenberg [3]2006: 230–232; Kopf 2018: 5–6). This leads to the problem that many empirical studies do not strictly differentiate between synthetic compounding and root compounding. Consequently, they do not take into account the distinctive features of synthetic compounds, for example their linking behavior (Nübling and Szczepaniak 2011). However, in recent years there has been growing interest in synthetic compounds in empirical work, with consideration to their exceptional position.

Using the web corpus deWaC, Gaeta and Zeldes (2012) examine how synthetic compounds in contemporary German are interpreted and generated. The authors find that 21% of all compounds (types) are synthetic. However, the study is based on a broad understanding of synthetic compounds including words such as *Naturforscher*[5] 'natural scientist'. Therefore, the proportion of noun-verb formations with an internal argument relation is likely to be lower. Further results suggest that synthetic compounds are mainly motivated by phrases in the mental lexicon: At least 86% of the formations of the pattern noun + verbal stem + *er* (e.g., *Wetterbeobachter* 'weather

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[4] The term *synthetic compound* "is traditionally used to indicate that this kind of word-formation looks like the simultaneous use of compounding and derivation" (Booij [3]2012: 93). This could be misleading as it has not been conclusively clarified which formation processes are involved. Nevertheless, in this study, the term is used in order to not exacerbate terminological ambiguities that are already linked to synthetic compounds. Still, the term *noun-participle combination* (instead of *compound*) is preferred here, since it is neutral regarding morphological structures.

[5] Note that normally, the verb *forschen* does not select arguments with directly assigned cases: **Natur forschen*. *Natur* can be seen as an adjunct, but not as an argument here.

observer') correspond to freely occurring predicate-object pairs (*das Wetter beobachten* 'to observe the weather'). However, morphological patterns also motivate synthetic compounds (see also Gaeta and Zeldes 2017).

Linking elements allow us to draw further conclusions on the grammatical status of synthetic compounds. They interface the constituents of complex words (Fleischer and Barz [4]2012: 185; Nübling and Szczepaniak 2008: 2), for example *-n-* in *Blume+n+topf* 'flowerpot'. It is widely assumed that linking elements have lost their initial morphosyntactic meaning (Ortner et al. 1991: 51; Duden [8]2016: 337); originally, they functioned as genitive markers. Normally, the first constituent determines the choice of a linking element (e.g., Nübling and Szczepaniak 2008: 2–3; Kopf 2018: 42–43). Nominal root compounds with first constituents ending in the suffix *-ung*, for example, usually take a linking *-s-* (e.g., *Heizung+s+rohr* 'heating pipe', *Meinung+s+freiheit* 'freedom of speech').

In contrast, noun-participle combinations frequently lack the linking *-s-* although it is typical of several first constituents (Duden [7]2011: 345). Instead, a zero element (i.e., no linking element) occurs: *achtung+Ø+gebietend* 'imposing' as opposed to *Achtung+s+erfolg* 'respectable achievement'. The unlinked first constituents correspond to inflected forms with the case required by the basic verb, compare *Achtung gebieten* 'to command respect' (accusative combination). Other first constituents are homophonous to plural forms. In that respect, they differ from corresponding first constituents in root compounds. An example of this is *kräft+e+sparend* (Archiv der Gegenwart, 2001 [1944], DWDS) 'power-saving' (lit. "saving efforts"), plural form, versus *Kraft+Ø+werk* 'power station', singular form. In such cases, it is hardly possible to speak of mere linking elements (Fleischer and Barz [4]2012: 321, 331) since they have a grammatical function indicating plurality. Many authors agree that linking elements within synthetic compounds and noun-participle combinations, in particular, can be syntactically determined (Augst 1975: 121; Duden [7]2011: 345; Fuhrhop 2000: 211; Nübling and Szczepaniak 2011: 59–62). This is not necessarily the case. The linking *-s-* in *Geschmack+s+verstärker* 'flavor enhancer', for example, cannot be syntactically motivated because the corresponding phrase **Geschmacks verstärken* is ill-formed. However, *Geschmack* usually takes a linking *-s-* when occurring as a first constituent in root compounds (e.g., *Geschmack+s+knospe* 'taste bud'). Apparently, synthetic compounds can be influenced by the model of root compounds (Fuhrhop 2007: 30). Corresponding linking elements that are influenced by root compounds can be seen as morphologically motivated (e.g., *-s-* in *richtung+s+weisend*).

It is noteworthy that synthetic compounds often show variation in terms of linking elements (Nübling and Szczepaniak 2011: 59–62), for example *krieg(+s+)führend* 'warring'. According to Nübling and Szczepaniak (2011), alternating linking elements generally indicate that there is an ongoing language change. In the case of synthetic compounds, syntactically motivated linking elements compete with linking patterns of root compounds, which is illustrated by the examples in Table 1.

Table 1: Competing models for linking synthetic compounds

Phrase	Synthetic compound	Root compound
Ordnung lieben	*ordnung(s?)liebend*	*Ordnung+s+amt, ...*
(eine) Brille tragen	*brille(n?)tragend*	*Brille+n+bügel, ...*
Leben retten	*leben(s?)rettend*	*Leben+s+ziel, ...*

The current trend is towards a more morphological and less syntactic character for synthetic compounds (Werner 2017; also see Fuhrhop 2000: 211). Fuhrhop (2000: 211) states that the more a noun-participle combination is lexicalized, the more likely it is to occur with the linking element that is commonly used for root compounds with the same first constituent, for example *richtung+Ø+weisend > richtung+s+weisend* 'trendsetting' (also see Fuhrhop 1996: 546–547; Kopf 2018: 183, fn. 164).[6] She assumes that linking elements indicate the morphologization of compounds (cf. Fuhrhop 2000). Here, the term *morphologization* describes a process in which linguistic units abandon structural features that are typical of syntax and instead adopt typically morphological characteristics (Fuhrhop 2000: 201). Morphologically motivated linking elements blur the argument relation between the constituents (Nübling and Szczepaniak 2011: 58). Thus, a usual linking element (e.g., *ordnung+s+liebend*) indicates that a synthetic compound is more morphological than a synthetic compound with a syntactically motivated linking element (*ordnung+Ø+liebend*).

Linking elements in root compounds have been widely studied. Most compounds are unlinked, with the linking *-s-* being the most frequent linking element today (e.g., Krott et al. 2007). Kopf (2018) shows that the linking *-s-* became productive in Early New High German. Until today it has been spreading, mainly alternating with the zero element (Nübling and Szczepaniak 2011: 48; Donalies 2011: 59–60; but cf. Kopf 2018: 280–286). Relatively little is known about how linking elements in synthetic compounds are distributed. Nübling and Szczepaniak (2011) provide a first impression. Using a *Google* search, they show that linking *-s-* and zero element alternate greatly for numerous synthetic compounds (Nübling and Szczepaniak 2011: 59–60). The incidence of the linking *-s-* depends on the specific word formation pattern, or the degree of verbality of the second word part. Nominalized infinitives barely occur with a linking *-s-* (*das Antrag+Ø+stellen* 'application'), other than derivatives in *-ung* and *-er* (*Antrag(+s+)stellung* 'application', *Antrag(+s+)steller* 'applicant', examples quoted from Nübling and Szczepaniak 2011: 60) (Nübling and Szczepaniak 2011: 59–62). The authors conclude that the lower the degree of verbality, the more likely a linking *-s-* is to occur (Nübling and Szczepaniak 2011: 61–62). Considering that present participles contain a high degree of verbality, noun-participle combinations should often inhibit the linking *-s-*. Accordingly, the Duden ([7]2011: 345) states that the linking *-s-* is often omitted in noun-participle combinations (e.g., *erfolg+Ø+versprechend*). It is clear from the literature that synthetic compounds should be treated as separate from root compounds.

Fuhrhop (2007) examines how noun-participle combinations are linked, based on a sample of 420 words from a contemporary newspaper corpus. Most combinations take the same linking elements as root compounds with corresponding first constituents do (e.g., *entzündung+s+hemmend*, *arbeit+s+fördernd*) (Fuhrhop 2007: 141). Some combinations lack a linking element (*aufschwung+Ø+hemmend*) or they show variation (*richtung(+s+)weisend*) (Fuhrhop 2007: 141). It seems that noun-participle combinations, like other synthetic compounds, tend to be matched with nominal root compounds. However, mere correspondence of linking elements is not sufficient to deduce how morphologized noun-participle combinations are. In Section 3, it will be argued that verb valency should also be taken into account when examining linking elements in synthetic compounds.

There is little research on how synthetic compounds have diachronically developed (but see e.g., Joeres 1995; Meibauer 1998; Werner 2017; Werner et al. 2020). Werner (2017) examines their qualitative development from

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[6] In this paper, it is assumed that linguistic patterns are lexicalized or conventionalized with increasing token frequency (e.g., Zeldes 2013: 243).

Old High German to contemporary German in multiple corpora. She observes that from the New High German period onwards and especially in contemporary German, synthetic compounds are approaching root compounds. According to Kopf (2018: 183–184), the linking *-s-* occurs considerably less frequently in synthetic compounds than in root compounds (16.3% vs. 44.3% linking *-s-*) in the Mainz (Early) New High German corpus (1500 to 1710).

To sum up, synthetic compounds are characterized by syntactic features, which can be concluded from their phrasal motivation (Gaeta and Zeldes 2012) and from their linking behavior. However, there is a diachronic tendency for synthetic compounds to approach root compounds. In the following section, we will have a closer look at noun-participle combinations in particular.

2.2   Grammatical characteristics of noun-participle combinations

As mentioned above, synthetic compounds are situated between word formation and syntax. Noun-participle combinations are especially ambivalent. They can either be perceived as phrases, as words or as in-between structures. This structural ambiguity is triggered by the present participle that for its part has adjectival and verbal features (Fuhrhop 2007: 129; see Fuhrhop and Teuber 2000 for discussion).[7]

The nouns that constitute the first part of noun-participle combinations usually occur without determiners, whereby two cases ought to be distinguished (Fuhrhop 2007: 136; Wilss 1983: 235). In the first case, the determiner is optional in the corresponding verbal phrase, as for plural forms and most mass nouns: *kräftesparend – jmd. spart Kräfte* 'saving efforts', 'someone is saving efforts'; *blutsaugend – jmd. saugt Blut* 'bloodsucking', 'someone is sucking blood'. Such combinations can occur both as graphematic words and phrases (*kräftesparend* vs. *Kräfte sparend*) (Duden [27]2017: 54). Compound spelling, however, is more common (Duden [7]2011: 406). This tendency is particularly strong when noun-participle combinations are used in predicative or adverbial function (Duden [7]2011: 406). In the second case, the determiner is obligatory in the corresponding verbal phrase: *abendfüllend – etw. füllt *Abend/den Abend* 'full-length', lit. "evening-filling". By abandoning its determiner, the noun loses syntactic autonomy. As such these combinations can only be analyzed as words (*abendfüllend* vs. **Abend füllend*). In contemporary German, such combinations have to be realized as one graphematic word (Duden [7]2011: 406). According to Fuhrhop (2007: 36), both optional and obligatory determiners are common for noun-participle combinations.

In terms of their syntactic distribution, noun-participle combinations behave like adjectives. For example, they occur in an attributive position: *ein aufsehenerregender/Aufsehen erregender Hut* 'a sensational hat'. Despite their distributional behavior, most noun-participle combinations hardly exhibit any further adjectival features. For the most part, they cannot take the comparative or superlative form (Fleischer and Barz [4]2012: 321) (**hausbesitzender*, lit. "more homeowning", **am fleischfressendsten*, lit. "most carnivorous").[8] Unlike prototypical adjectives, noun-participle combinations do not allow further derivational affixation (Fuhrhop 2007: 143–144; Fleischer and Barz [4]2012: 321), for example *schön > unschön* 'unbeautiful', *Schönheit* 'beauty' versus **furchtunerregend –*

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[7] Unlike in English, present participles in German do not occur in analytic verb forms (*He is walking – *Er ist gehend*). Therefore, their categorial status is controversially discussed.

[8] Noun-participle combinations are nongradable probably due to semantics (Gersbach and Graf 1985: 616). Like *pregnant* and *dead*, for example, they usually denote absolute properties (cf. Motsch [2]2004: 184 on present participles).

unfurchterregend 'unscary', *Zigarettenrauchendheit*, lit. "cigarette-smokingness'. Furthermore, the predicative position is not equally possible for all combinations (Fuhrhop 2007: 143), compare (8) and (9).

(8) *Das Vorhaben ist erfolgversprechend.* 'The project is promising'

(9) *?Das Gerät ist seifespendend.* 'The device is soap-dispensing'

While (8) is grammatically correct, (9) is grammatically questionable.

It must then be assumed that lexicalized noun-participle combinations behave more adjectivally (Fuhrhop 2000; also see Pümpel-Mader et al. 1992: 260). The same has already been observed for present participles (e.g., Duden [8]2009: 378; Fuhrhop and Teuber 2000: 173; Motsch [2]2004: 186; Thim-Mabrey 1990: 385; Zifonun et al. 1997: 2208).

To summarize: For noun-participle combinations with simple nouns, both compound and separate spelling are permissible (Duden [27]2017). Being written as a compound indicates word status, whereas separation suggests the syntactic status of a noun-participle combination. This structural ambiguity is also reflected in grammar. Although noun-participle combinations behave like adjectives regarding their syntactic distribution, their phrasal character inhibits adjectival features such as comparison and derivation. In the next section, it will be argued that a constructional network can accommodate the hybrid character of noun-participle combinations.

2.3   Noun-participle combinations in a constructional network

Section 2.1 briefly introduced various approaches to describe the morphological structure of synthetic compounds: compounding, derivation of a verbal phrase, and derivation of a verbal compound. In the case of noun-participle combinations, we have to consider that they occur not only as synthetic compounds (e.g., *teetrinkend* 'tea-drinking') but also as phrases (e.g., *Tee trinkend*). Both as synthetic compounds and as phrases, noun-participle combinations exhibit morphological as well as syntactic features. This raises the question of how noun-participle combinations are represented in the mental lexicon. The following is an attempt to place them in a constructional network.

It is a fundamental assumption in Construction Grammar that linguistic knowledge is organized in constructions, that is, pairings of form and meaning (Booij 2010: 11). Moreover, "it's constructions all the way down" (Goldberg 2006: 18). This implies that constructions differ with their level of abstraction. A morphologically complex word usually activates many different constructions, some of them being more schematic, others being more specific (Zeldes 2013: 244; Hilpert 2018; Goldberg 2006: 10, 21). Each of these levels contributes to the meaning of the word (Zeldes 2013: 244). An example for this is *brotbackend* 'bread-baking' (cf. 10):

(10) *brotbackend*

Constructions *Brot*, *backen*

Present participle construction

Adjective construction

Verbal phrase construction

Both the producer and perceiver of *brotbackend* have to know the specific constructions *Brot* 'bread' and *backen* 'to bake' in order to coin or interpret this formation. Furthermore, they need to know which (e.g., semantic, syntactic) characteristics are linked to the abstract constructions of present participles, adjectives, and verbal phrases, respectively.

Because constructions are on different levels of abstractions, they can be unified and hierarchically arranged. Constructions thus together form a network, a cognitive structure in which linguistic knowledge is organized (e.g., Croft 2002: 25; Goldberg 2003: 219; Hilpert 2018: 92). Apart from a hierarchical organization, constructions are also linked by means of similarity in a constructional network.[9] Constructions whose form or meaning overlap are associated with each other (e.g., allomorphs such as *mouse* and *mice*).

Zeldes (2013) describes compounding as a part of the constructional network, also taking synthetic compounds into account. He assumes that networks are closely related when their members compete and semantically resemble each other (Zeldes 2013: 244–245; also see Hilpert 2018: 93). For example, synthetic compounds and corresponding verbal phrases are closely related (see Gaeta and Zeldes 2012) (e.g., *heartbreaker – to break a heart*).

The principle of similarity (see Hilpert 2018: 93; Yoshikawa 2015) seems to be essential when locating synthetic compounds in a constructional network. Firstly, it allows us to explain variation (e.g., *achtung(s?)gebietend*, *Antrag(s?)steller*), which is common for synthetic compounds (Nübling and Szczepaniak 2011). Individual synthetic compounds can be formally similar to either root compounds (*achtung+s+gebietend ~ Achtung+s+erfolg*) or verbal phrases (*achtung+Ø+gebietend ~ Achtung gebieten*). Especially for well-established words such as *achtung(+s)gebietend* 'imposing' and *richtung(+s)weisend* 'trendsetting', it would not make sense to assume different word formation processes.[10] Hence, variation results from similarity on a superficial level rather than from conflicting morphological hierarchies. Secondly, similarity can explain why there is grammatical gradience among noun-participle combinations. Certain types are more integrated into the adjectival system, for example lexicalizations. Other types are more similar to phrases with respect to their grammatical behavior.

To empirically analyze noun-participle combinations thoroughly, a diachronic corpus of newspaper texts will be examined. The methodological procedure is presented in the following chapter.

3   Corpus study on noun-participle combinations

3.1   Research questions

The previous sections have shown that noun-participle combinations occupy an unstable position between word and phrase. This leads to variation in spelling (*Eisen schaffend* vs. *eisenschaffend*) and in the occurrence of linking elements (*krieg+Ø+führend* vs. *krieg+s+führend*). This paper aims to study how noun-participle combinations diachronically develop between the poles of syntax and word formation. Previous research suggests that noun-participle combinations or synthetic compounds, respectively, evolve from phrases to words (Fuhrhop 2007; see

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[9] Furthermore, constructions are linked by contiguity, that is, they are associated with each other when they frequently occur with each other (e.g., Hilpert 2018: 93–94).

[10] Smirnova (to appear) doubts that linking elements provide information about morphological structure. Nevertheless, they allow us to draw conclusions about the status of morphologization.

also Pümpel-Mader et al. 1992: 260). Fuhrhop (2000) assumes that especially lexicalized combinations undergo this change. However, this phenomenon has yet to be studied on a larger empirical basis. To fill this research gap, a diachronic corpus of German newspapers will be examined. Spelling and linking elements will be used as central indicators for the grammatical status of noun-participle combinations. Based on the literature, the following hypotheses will be tested:

1. Noun-participle combinations diachronically undergo morphologization, that is, they are increasingly written as one word and take the same linking elements as root compounds with corresponding first constituents do.
2. The higher their token frequency, the more prone noun-participle combinations are to undergo morphologization.

In the next section, the methodology—including data sampling, annotation, and data analysis— will be presented.

3.2   Methods

3.2.1   Sampling

The main data for this study were taken from two newspaper corpora extending over the period from the 18th until the 20th century. Newspaper language is expected to authentically represent German standard language (Eisenberg 2007: 217). Firstly, newspaper articles from the German Text Archive (DTA) were used to cover the years 1700 to 1899.[11] This subcorpus contained a total of 13,280,605 word forms [tokens?] when the data were collected in December 2019. Since the DTA mostly consists of texts of supra-regional importance (BBAW online[12]), it is expected to represent the early stages of German standard language. It must be noted that the DTA is not balanced over time. This was taken into account in the later analyses.

Secondly, in order to study the 20th century, the core corpus of the Digital Dictionary of the German Language (DWDS) was used, also limited to newspaper articles.[13] For copyright reasons, not all parts of this corpus are publicly accessible, especially from 1980 onwards. Therefore, the study focused on the period up until 1979. This subcorpus contained a total of 26,424,829 word forms as of December 2019.

To gain an insight into how noun-participle combinations behave from 1980 until the early 21st century, the DIE ZEIT corpus was examined, which consists of articles from the national weekly newspaper *Die Zeit* and additional online articles.[14] To limit the number of results, only the January issues of the years 1980, 1990, 2000, 2010, and 2017 were queried, comprising 2,823,945 word forms in total when the data were collected in April 2020. Since the DIE ZEIT corpus is limited to one newspaper, internal editorial guidelines or individual editors could have a stronger influence on different levels of language (especially on spelling) than in corpora with mixed sources. Therefore, the focus of the study is on the data from the DTA and DWDS.

The DTA, DWDS, and DIE ZEIT corpora are lemmatized and tagged for parts of speech with the same tag set and according to similar guidelines, thus identical queries can be used. To retrieve noun-participle combinations, the interfaces were queried for adjectives ending in *-end*, *-elnd* or *-ernd*, compare (11), qualifying them as present

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[11] https://www.dwds.de/d/k-referenz#dta.

[12] http://www.deutschestextarchiv.de/doku/textauswahl.

[13] https://www.dwds.de/d/k-referenz#kern.

[14] https://www.dwds.de/d/k-zeitung#zeit.

participles or noun-participle-combinations written in one word. Additionally, nouns followed by such adjectives were queried to retrieve separately spelled combinations, compare (12). Hits that were already retrieved by the query in (11) were manually removed.

(11) $l=/e[lr]?nd$/ WITH $p=ADJ*

(12) $p=NN $l=/e[lr]?nd$/ WITH $p=ADJ*

Both queries are able to retrieve all noun-participle combinations available, as long as they are correctly tagged. However, the queries are imprecise and require forms such as *tausend* 'thousand' and single participles to be manually excluded. Additionally, noun-participle combinations with determined nouns were excluded (*den Redner beleidigend* 'insulting the speaker', Berliner Tageblatt (morning issue), 02-12-1902, DWDS). These structures are clearly phrasal and thus not part of the continuum between syntax and morphology that is the scope of this study (cf. Table 2). In future research, combinations with determined nouns should be considered, however.

Table 2: Scope of the present study. Gray-shaded cells represent the constructions under examination

	Phrasal	**Morphological**
Obligatory determiner	*die Strafe mildernd* 'mitigating (the penalty)'	*strafmildernd* 'mitigating'
Optional determiner	*(die) Milch trinkend* 'milk-drinking'	*milchtrinkend* 'milk-drinking'

The noun had to have the interpretation as an object of the underlying verb, thus hits such as *schweißglänzend* 'shining with sweat' were excluded. The syntactic context was used to clarify whether a noun occurs autonomously. In (13), for example, the noun *Butter* 'butter' is preceded by the determiner *der* 'the'. This determiner, however, refers to *Frauen* 'women', as can be seen from the inflection. Hence, *Butter* occurs autonomously. On the contrary, the noun *Umweltschutz* 'environmental protection' in (14) is determined and was excluded. Coordinated nouns were considered if none of the nouns were modified or part of a prepositional phrase.

(13)   *die Abwesenheit der Butter einkaufenden Frauen* (DWDS)[15]

         the absence the.GEN.PL butter.ACC.SG buy.PTCP woman.GEN.PL

         'the absence of the butter-buying women'

(14)   *ihre den Umweltschutz betreffenden Maßnahmen* (DWDS)[16]

         their.AKK.PL the.ACC.SG environmental protection.ACC.SG concern.PTCP measure.ACC.PL

         'their measures relating to environmental protection'

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[15] Vossische Zeitung (evening edition), 03-03-1916, provided by the DWDS core corpus.
[16] Archiv der Gegenwart, 2001 [1979], provided by the DWDS core corpus.

In twenty-two cases, it was not clear from the syntactic context whether the noun was autonomous or modified.[17] Those structurally ambiguous cases were taken into account. Finally, noun-participle combinations that are used as nouns were excluded (e.g., *Vorstandsvorsitzende* 'chairwoman').

Descriptive statistics were performed with *R* (version 2.5.1, *R* Core Team 2018). The dataset and the *R* scripts are available upon request.

3.2.2 Annotation and data analysis

Noun-participle combinations were annotated for spelling, linking element, syntactic position, and valency of the basic verb. Additional levels of annotation were set up for the linking elements and will be introduced at the end of this section.

Token frequencies were determined for the entire period from 1700 to 1979. In order to simplify the statistical evaluation, individual frequencies were combined into coarser classes (cf. Table 3).

Table 3: Frequency classes

Frequency class	Tokens	Types
1–2 tokens per type	1,661	1,482
3–20 tokens per type	1,765	263
21–81 tokens per type	1,504	39
112–429 tokens per type	1,984	8
602–670 tokens per type	1,888	3
> 1,000 tokens per type	2,295	2
> 2,000 tokens per type	2,416	1

3.2.3 Classifying linking elements

A classification of linking elements often considered in the literature is based on the inflectional paradigms of the first constituents (cf. Wellmann et al. 1974: 359, fn. 5). As will be shown below, this classification is inappropriate for analyzing synthetic compounds as it does not consider verb valency. Fuhrhop (2007) therefore uses a different approach. She examines whether synthetic compounds take the linking elements that would be expected to occur after corresponding first constituents in root compounds. A further two approaches are based on verb valency. In what follows, the approaches will be briefly explained and compared with each other. In the present study, Fuhrhop's (2007) approach as well as the approaches based on valency were used.

Inflectional paradigms of the nouns: Wellmann et al. (1974: 359, fn. 5) distinguish between paradigmatic and nonparadigmatic linking elements. A paradigmatic linking element formally agrees with an inflectional suffix of the noun. For example, the linking *-n-* in *Wolke+n+formation* 'cloud formation' is paradigmatic because *Wolken* 'clouds' is the plural form of *Wolke*. A nonparadigmatic linking element does not occur in the inflectional paradigm

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[17] An example of this is *frohe Hoffnung erweckende Nachrichten* (Vossische Zeitung (morning edition), 03-02-1912, provided by the DWDS core corpus). This phrase can be analyzed either as [[*frohe Hoffnung*] *erweckende*] *Nachrichten* 'news that awakens joyful hope' or as [*frohe*] [*Hoffnung erweckende*] *Nachrichten* 'happy hopeful news'.

of the noun. For example the *-s-* in *Geburt+s+tag* 'birthday' is nonparadigmatic since **Geburts* does not correspond to an inflectional form of *Geburt* 'birth'. This distinction is common and useful for root compounds but insufficient to determine whether a synthetic compound is syntactically or morphologically shaped. For example, the *-s-* in *leben+s+verlängernd* 'life prolonging' would be paradigmatic according to this approach (*Lebens* 'life.GEN.SG'). However, the fact that the verb *verlängern* normally requires a complement in the accusative case (*Leben*) is disregarded.

This shows that a comprehensive analysis of synthetic compounds has to consider the valency of the governing constituent. Hence, this study takes into account the case required by the base verb of the noun-participle combination. To give an example: The verb *lieben* 'to love' usually requires an accusative complement. Since *Ordnung* 'order' is an accusative form, *ordnung+Ø+liebend* conforms to the valency of *lieben*. In the following, linking elements conforming to verb valency will be referred to as valency-compliant (or compliant). The verb *decken* 'to cover' requires the accusative case as well (*den Bedarf decken* 'to cover demand'). In contrast, the form *Bedarfs* in *bedarf+s+deckend* cannot be analyzed as an accusative form, therefore, the linking *-s-* is not valency-compliant.

Comparison to root compounds: Fuhrhop (2007: 141–142) examines how noun-participle combinations are linked in comparison to nominal root compounds, that is, to which extent root compounds serve as models for linking. Since root compounds are so dominant and ubiquitous in German (e.g., Ortner et al. 1991: 3, 112; Schlücker 2012: 2), the distribution of their linking elements can be seen as a benchmark for other word formation patterns that involve linking elements. Fuhrhop (2007) thus describes linking elements in root compounds as usual. For example, in *produktion+s+anregend* (Berliner Tageblatt (morning issue), 02-13-1902, DWDS) 'production stimulating' the linking *-s-* is usual because it regularly occurs after derivatives in *-ion* (cf. Nübling and Szczepaniak 2008: 4), for example *Produktion+s+kosten* 'manufacturing costs', *Delegation+s+mitglied* 'delegation member'. In contrast, the zero element in *religion+Ø+bildend* (Völkischer Beobachter (Berlin issue), 03-04-1934, DWDS) 'religion-forming' stands out. The usual *-s-* after the first constituent in *-ion* does not occur. Since *religion+Ø+bildend* 'religion-forming' is unlinked, this combination apparently is not modelled analogously to root compounds but rather corresponds to the verbal phrase *Religion bilden* 'to form religion'.

In the context of this study, it would have been too time-consuming to determine the usual linking element for each noun on an empirical basis, especially since diachronic developments would have to be considered as well.[18] Therefore, this examination is limited to how noun-participle compounds are linked that have derivatives in *-ung* or nominalized infinitives as first constituents, for example *achtung(+s+)gebietend* 'imposing', *vertrauen(+s+)erweckend* 'inspiring confidence'. In contemporary German, the linking *-s-* is regularly attached to first constituents as such (Nübling and Szczepaniak 2008: 4; 2011: 58; Kopf 2018: 29) (e.g., *Achtung+s+applaus* 'polite applause', *Vertrauen+s+person* 'person of trust'). This was already true for the 18th century (Kopf 2018: 264–265), which means that *-s-* is usual throughout the entire period of investigation, whereas a zero element is most likely syntactically determined.

Linking motivation: The third approach combines the distinctive parameters presented above: Whenever a linking element is formally identical to an inflectional suffix as required by the basic verb, it was classified as

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[18] Furthermore, some first constituents occur with different linking elements (e.g., Augst 1975; Nübling and Szczepaniak 2011; Fuhrhop 1998: 190).

syntactically motivated (e.g., *vertrauen+Ø+erweckend*). Whenever a linking element corresponds to the linking element that would be expected in a corresponding root compound, it was annotated as morphologically motivated (e.g., *leben+s+rettend*).

One weakness in Fuhrhop's (2007) approach and in the approach of valency-compliance is that linking elements and inflectional suffixes sometimes formally agree. For example, root compounds with *Blume* 'flower' as a first constituent usually take a linking *-n-* (e.g., *Blume+n+strauß* 'bouquet of flowers'). The linking *-n-* in *blume+n+pflückend* 'flower-picking' is thus usual. However, this does not imply that this formation is influenced by root compounds. The *-n-* is also formally identical to the (plural) accusative inflectional suffix of *Blume* which is required by the basic verb *pflücken* (– *Blumen pflücken*). Therefore, it cannot be decided whether the linking element is morphologically or syntactically motivated. As a result, a further category for ambiguous cases like *blume+n+pflückend* has to be established. The zero element can be ambiguously motivated as well: *gold+Ø+erzeugend* 'gold-producing' – *Gold erzeugen* 'to produce gold' – *Gold+Ø+barren* 'gold bar'.

Example analyses for the three approaches are compared in Table 4. The example of *gold+Ø+erzeugend* discussed above shows that the concept of linking motivation is the most accurate approach.

Table 4: Various analyses for linking elements in synthetic compounds, (+) for syntactic tendency, (-) for morphological tendency, (±) for ambiguous cases

	achtung+s+gebietend	*krieg+s+führend*	*gold+Ø+erzeugend*	*zeitung+Ø+lesend*
Valency-compliance	noncompliant (-)	noncompliant (-)	compliant (+)	compliant (+)
Usual/unusual linking elements	usual (-)	usual (-)	usual (-)	unusual (+)
Linking motivation	morphological (-)	morphological (-)	ambiguous (±)	syntactic (+)

4 Results of the corpus study

4.1 Frequencies

The procedure described above retrieved 13,513 tokens of objective noun-participle combinations and 1,798 types in the period from 1700 to 1979.[19] Data from the DIE ZEIT corpus yielded 858 tokens and 324 types for the years 1980 to 2017.[20]

The data show that noun-participle combinations have undergone a remarkable increase in token frequency over the past three centuries. Figure 1 illustrates this development. The number of tokens per one million words increased from 68,74 (1710s) to 626,45 (1970s). The relative increase of tokens plus the unbalanced corpus lead

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[19] Variants of spelling and linking are put together as one type.
[20] The absolute number of types (1700 to 2017) is 1.987.

to an unequal distribution of tokens along the time axis. From the 18th century there are only 31 records of noun participle combinations. 2,286 combinations date from the 19th century. Most of the tokens originate from the 20th century (until 1979: 11,196 tokens).
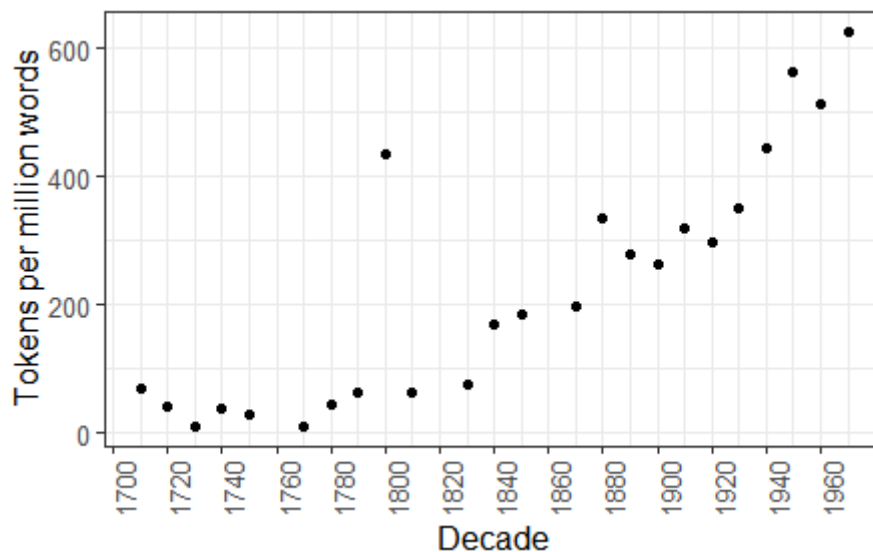

Fig. 1 Token frequencies in the DTA and DWDS core corpus projected to one million words

Since the corpus is not balanced over time, it would not be reasonable to compare normalized type frequencies (e.g., Lüdeling 2009: 336–337). Therefore, this study refrains from showing the development of type frequencies.

Absolute frequencies of specific types suggest that several noun-participle combinations are lexicalized. Top frequent types are *stellvertretend* 'deputy' (2,416 tokens), *grundlegend* 'basic' (1,226 tokens) and *maßgebend* 'decisive' (1,069 tokens).

Newly coined types "will in general be less frequent than well-established words" (Lüdeling and Evert 2005: 362). Among the 1,798 types are 1,303 hapax legomena, suggesting a high level of productivity of the noun-participle pattern.[21] In particular, it is the participles that are likely to coin new combinations, according to what is stated in the literature (Wilss 1983: 238–239; Müller and Müller 1961: 73; Fleischer and Barz [4]2012: 321) (e.g, *welt+schöpfend*, *welt+verderbend*, *welt+umgestaltend*). The most frequent participle occurring in hapax legomena is *suchend* 'searching' with 41 occurrences, followed by *betreffend* 'concerning' and *erzeugend* 'producing', which each occur 28 times. Top nouns are *Welt* 'world', *Herz* 'heart', and *Leben* 'life', occurring 19, 18, and 17 times, respectively.

Based on verb valency, the noun corresponds to an accusative object in 99.16% (13.400 instances, e.g., *volksbeglückend*) of cases. Combinations with dative (0.78%, 105 instances, e.g., *gottvertrauend*) and genitive (0.06%, 8 instances, e.g., *dienstenthebend*) are considerably less frequent. This result is consistent with the literature on noun-participle combinations, according to which accusative combinations are most frequent (Fuhrhop 2007: 135; Wilss 1983: 230; Müller and Müller 1961: 72; Lohde 2006: 167).

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[21] Note that the number of hapax legomena largely depends on the corpus size (cf. Baayen 2001; Lüdeling 2009: 336–337). This is one of the many reasons why hapax legomena are not necessarily neologisms (Hilpert 2018: 95).

4.2 Spelling: compound spellings spread diachronically

Most of the evidence is written as a single word (92.86%, 12,548 tokens). 6.99% of the noun-participle combinations (945 tokens) are written separately, whereas only 0.15% of the combinations (20 tokens) are hyphenated.[22] Figure 2 shows how the ratio of compound and separate spelling diachronically develops. Compound spelling clearly predominates in most of the decades;[23] its share even increased in the course of the 19th and 20th centuries. 80.97% of the combinations are written as one word between 1840 and 1849. This percentage rose to 96.93% until the 1960s. Looking only at the data from 1840 until 1979 and ignoring hyphenation, the correlation between spelling variant and decade proves to be significant with small effect size (χ^2 = 575.52, df = 12, p < 2.2e-16, Cramérs V = 0.2072).
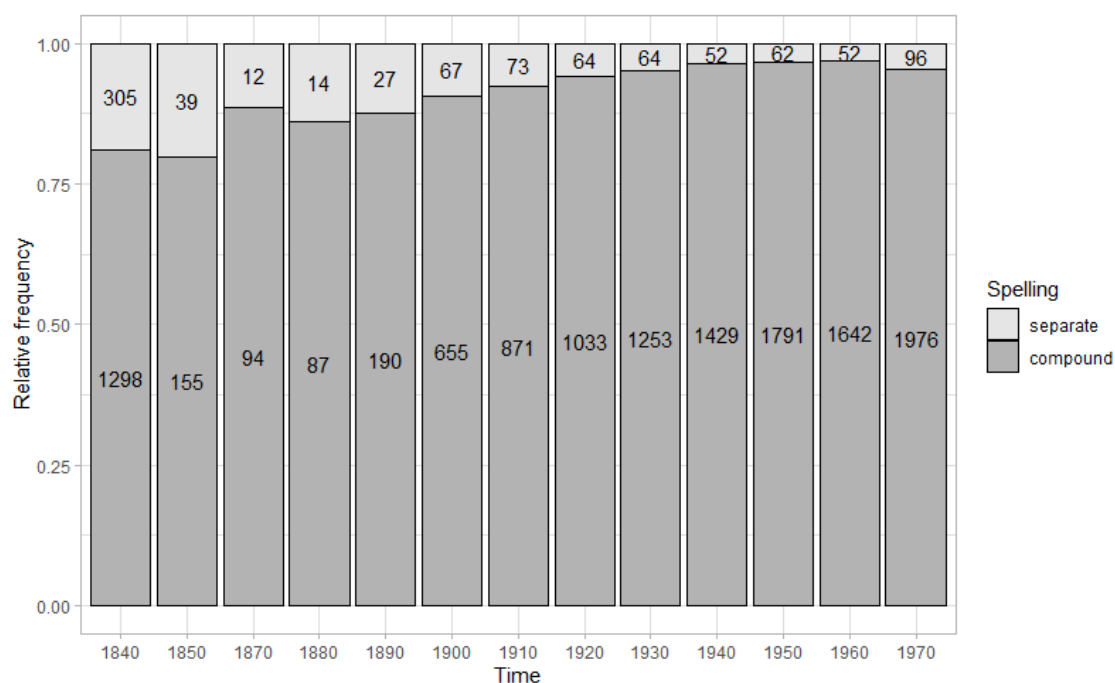
Fig. 2 Diachronic development of the spelling of noun-participle combinations (tokens) (n = 13,401)

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[22] Since hyphenations are highly infrequent, they will not be taken into account in the following analyses.

[23] Due to the scarcity of the data, the time sections from 1710 to 1839 (92 records in total) are not included in the Figure. Up to 1839, the data show more variability of spelling than in the subsequent decades, though compound spelling is generally favored.
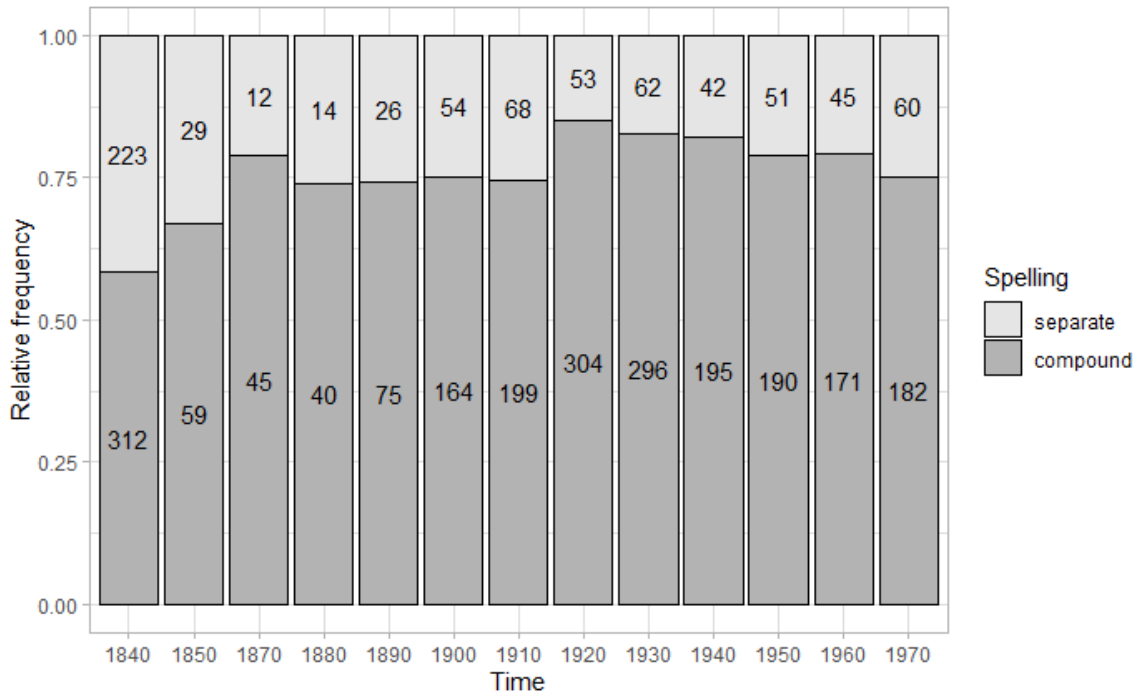
Fig. 3 Diachronic development of the spelling of noun-participle combinations (types) (n = 2,971)
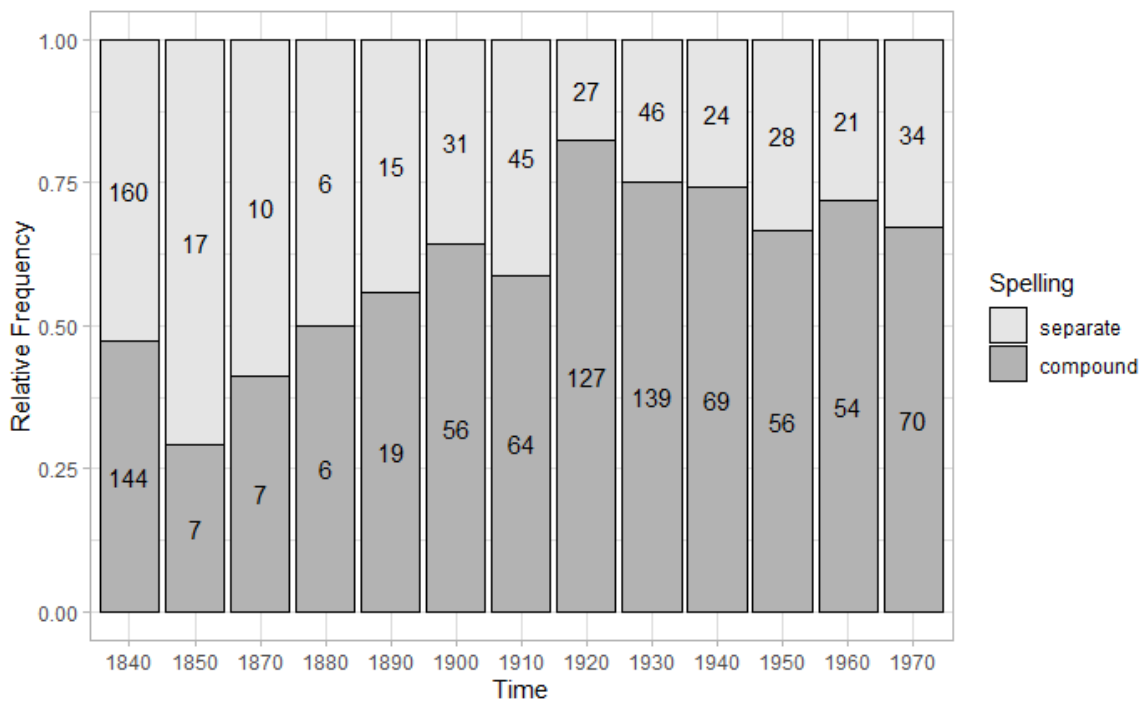

Fig. 4 Diachronic development of the spelling of noun-participle combinations (hapax legomena) (n = 1,282)

The development of types is illustrated in Figure 3. Whenever a noun-participle combination displayed both separate and compound spelling, it was treated as two types (e.g., *Öl fördernd* vs. *ölfördernd* 'oil-producing'). There is a diachronic increase of compound spellings for types as well, albeit the proportions of noun-participle combinations written as a single word are generally lower than for tokens. The peak is reached between 1910 and

1919 with 85.15% of the types being written as one word. From 1920 onwards, this percentage even decreased.[24] The data from 1840 to 1979 also show a significant correlation between spelling and decade for types (χ^2 = 124.83, df = 12, p < 2.2e-16, Cramérs V = 0.2049). Similar results can be found for hapax legomena (cf. Figure 4) where the proportion of compound spelling is even smaller (peak: 82.47% in the 1920s).

When comparing the developments of tokens, types, and hapax legomena, it becomes clear that mainly frequent types are written as one word. Figure 5 shows the relationship between spelling and frequency class of noun-participle combinations, which turns out to be statistically significant with medium effect size (χ^2 = 2,477.3, df = 6, p < 2.2e-16, Cramérs V = 0.4285). The more often a specific noun-participle combination occurs, the more likely it is to be written as one word.
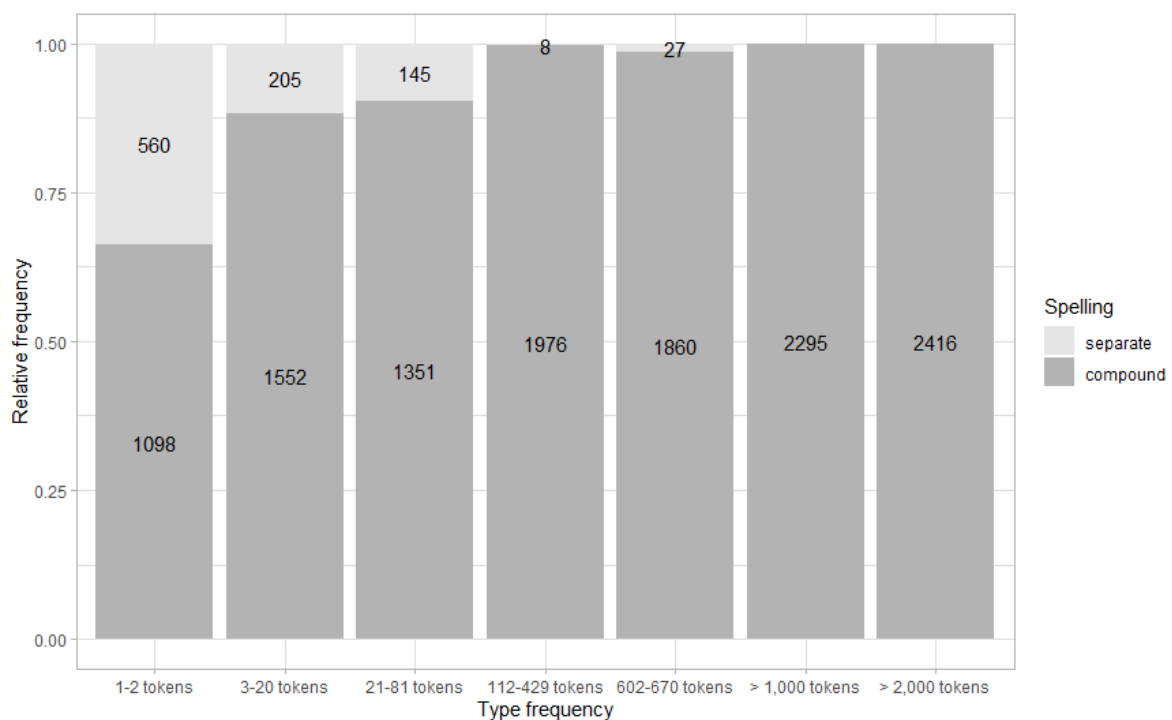

Fig. 5 Spelling depending on frequency classes of different types (n = 13,493) (data until 1979 without hyphenation)

The ratio between the spelling variants stabilizes over time. Noun-participle combinations increasingly tend to be written as a single word. However, separately spelled combinations stand their own ground. Especially in the 20th century, the development is very stable. Between 1900 and 1979, the change in the proportion of the spelling variants never exceeds ±2%.

Data from the DIE ZEIT corpus confirm that the distribution of spelling variants indeed stabilized.[25] In the samples from 1980 until 2017, between 91.5% and 96.99% of the noun-participle combinations (tokens) are written as a single word.

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[24] The increasing number of separately spelled types could be due to disambiguation. Although the data as a whole show a trend towards morphologization, a subset of noun-participle combinations becomes more syntactic.

[25] Orthographic regulation is unlikely to play a role here given that before 1996, the spelling of noun-participle combinations was not officially regulated or variation was allowed, respectively. The rule from 2004 that single

Overall, the findings suggest that noun-participle combinations are perceived as a morphological pattern. This perception seems to be reinforced: The increasing proportion of compound spellings implies that noun-participle combinations undergo morphologization in Fuhrhop's sense (2000).

The fact that separate spelling established itself as a rarer variant probably has several reasons. Firstly, the strong syntactic linkage of present participles continuously enables language users to perceive noun-participle combinations as phrases. Secondly, the spelling depends on frequency. As will be shown below, infrequent combinations tend to be separately written. Since they are most likely newly coined, productivity of the noun-participle pattern may lead to a certain amount of separate spellings as well. And ultimately, semantic differentiation could play a role. Separate spelling is reported to emphasize the process more strongly, while compound spelling expresses habituality (Müller and Müller 1961: 70; Pümpel-Mader et al. 1992: 5).

Finally, we will turn to the impact of the syntactic position. As already mentioned, noun-participle combinations in predicative or adverbial position particularly tend to be written as one word according to the Duden ([8]2016: 412). This statement also holds true for diachronic data from 1700 to 1979. Predicatively used combinations are written as one word in 97.39% of cases (1,379 of 1416 cases), adverbially used combinations show 98.42% compound spellings (312 of 317 cases). In attributive position, this proportion is 92.35% (10,842 of 11,740 cases).[26] Note, however, that the sample of this study contains records whose spelling is generally independent of the syntactic position (e.g., *abendfüllend*, *herzerquickend*).

4.3 Linking elements: root compounds as a model

This section is devoted to linking elements in noun-participle combinations. As shown in Section 2.1, linking elements indicate the degree of morphologization (Fuhrhop 2000) since they can either correspond to inflectional suffixes (*leben+Ø+bedrohend*, Berliner Tageblatt (evening issue), 03-01-1918, DWDS) or to linking elements in root compounds (*leben+s+bejahend*, Berliner Tageblatt (morning issue), 03-02-1915, DWDS). Several approaches to classify linking elements were introduced in Section 3.2.3. In the following, the results of the analyses will be presented. First, we will look at valency-compliance (development of types and tokens). Then we will turn to usual and unusual linking elements (Fuhrhop 2007), focusing on derivatives in *-ung* and nominalized infinitives as first constituents. Subsequently, the results on linking motivation will be presented, which are based on two random samples. At the end of this section, the relationship between token frequency of individual types and valency-compliance will be shown.

Figure 6 shows how the share of valency-compliant linking elements develops from 1800 up to present-day German. Noncompliant linking increases over time. In the 19th century, noncompliant linking elements are rather rare with a share of at most 13.25%. During the 20th century, they spread rapidly, reaching a peak of 52.5% in the 1960s.

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nouns must be separated from the participle (*Wasser tragend* 'water-bearing') was removed in 2006 after having been heavily criticized (Dürscheid [5]2016: 191, 201–202).

[26] There is a statistically significant association between syntactic position and spelling with a small effect size ($\chi^2 = 63,96$, *df* = 2, *p* = 1.291e-14, Cramérs *V* = 0,069).
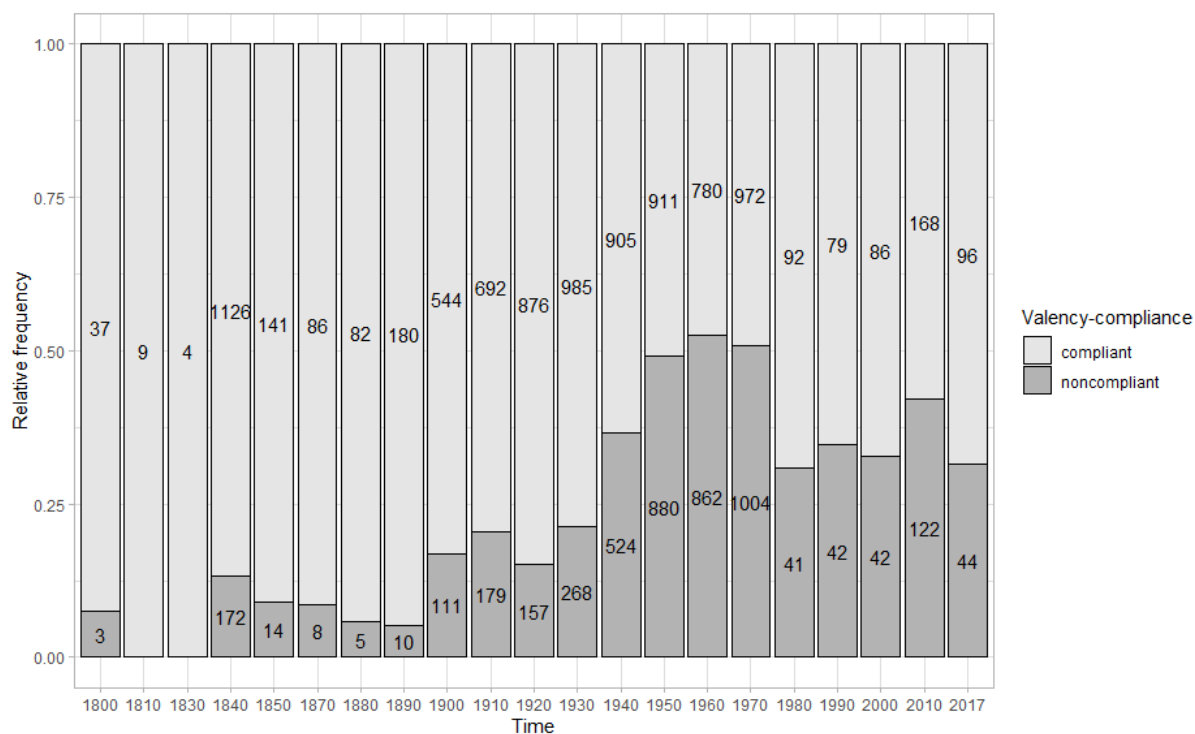
Fig. 6 Diachronic development of the valency-compliance of linking elements, tokens (n = 13,339)

The sudden decrease in the year 1980 is apparently due to the change in corpora. Certain noun-participle combinations in the DIE ZEIT corpus do not occur as often as in the DWDS corpus. This can be observed when types are considered (cf. Figure 7): The gap between the 1970s and 1980 is substantially smaller. A diachronic growth of noncompliant linking elements is still evident. The correlation between decade and valency-compliance for tokens proves to be statistically significant with a medium effect size (from 1800 until 2017: $\chi^2 = 1{,}549.2$, $df = 20$, $p < 2.2e\text{-}16$, Cramérs $V = 0.3408$). For types, too, the correlation between diachrony and valency-compliance is significant, but with a small effect size ($\chi^2 = 85.31$, $df = 20$, $p = 4.848e\text{-}10$, Cramérs $V = 0.1774$). It is clear that frequency influences valency-compliance as well. This can be seen in the token-type-ratio. Note that for example in the 1970s, the token-type-ratio is 972:129 (average of 7.53 tokens per type) for valency compliant linking elements and 1004:59 (average of 17.02 tokens per type) for noncompliant linking elements. Apparently, it is primarily the frequent types that take noncompliant linking elements. Frequency effects will be further discussed later in this section.
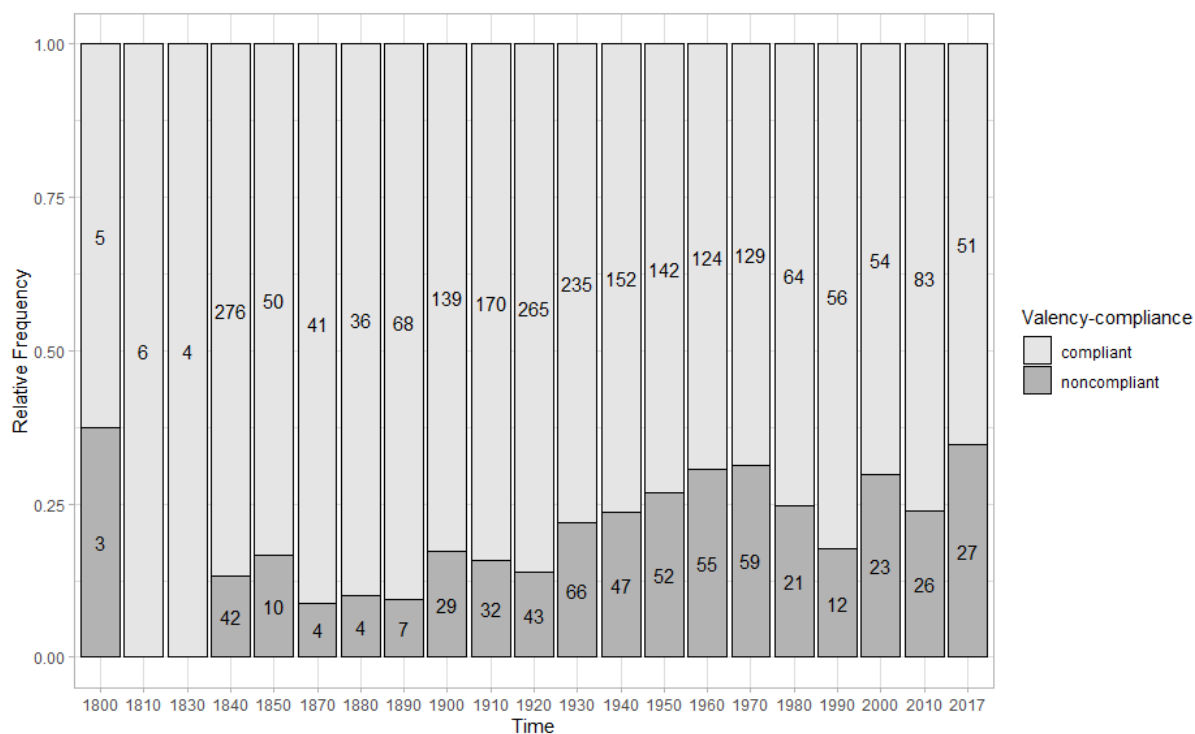
Fig. 7 Diachronic development of the valency-compliance of linking elements, types (n = 2,712)

As discussed above, the distinction between valency-compliant and noncompliant linking elements is only partly informative when examining how noun-participle combinations are linked. Further insights are provided by Fuhrhop's (2007) concept of usual linking elements and the concept of linking motivation. In the following, the results of these analyses are presented.

Kopf (2018: 317) shows that since the 18th century, almost without exception, the linking -s- is attached to first constituents suffixed with -ung in root compounds, for example *Leistung+s+sport*. According to Kopf (2018: 264–265), this applies even earlier to nominalized infinitives, for example *Schlafen+s+zeit*. In other words, for first constituents as such, -s- is the usual linking element in root compounds. However, the data show that this does not apply to noun-participle combinations. As can be seen in Figures 8 and 9, the spread of the linking -s- in noun-participles combinations lags clearly behind.
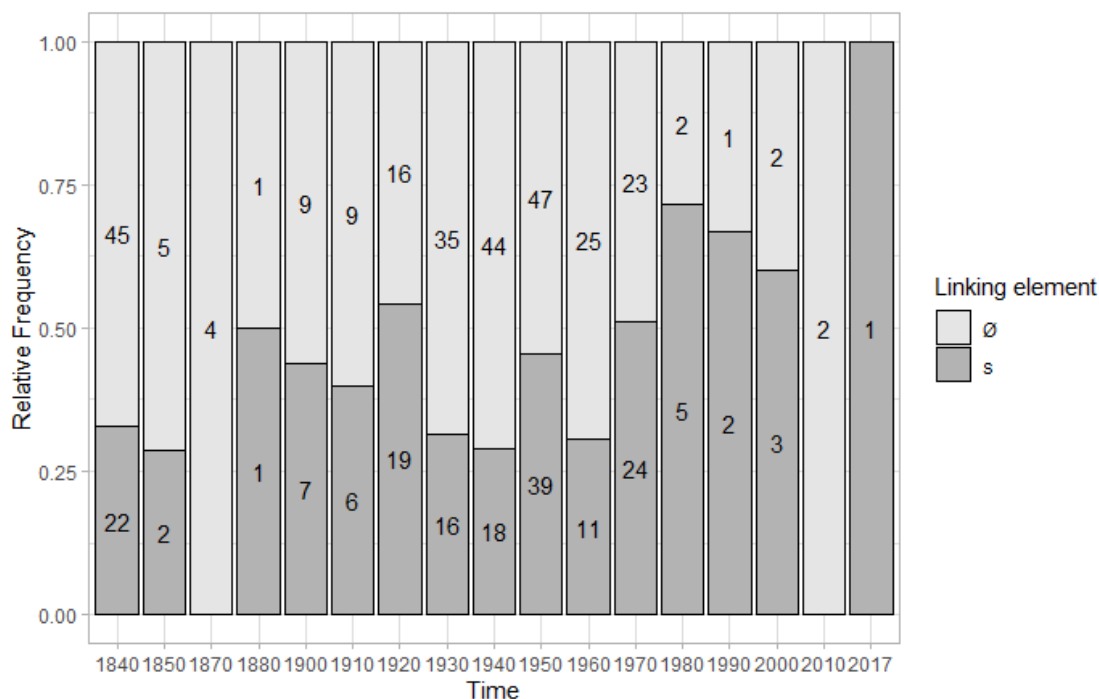
Fig. 8 Diachronic development of linking elements after derivatives in *-ung* (n = 446)

446 noun-participle combinations were identified that are written as one word and have a derivative first constituent ending in *-ung*. Of these, 270 are unlinked (60.54%, *verfassung+Ø+gebend*) and 176 take a linking *-s-* (39.46%, *verfassung+s+ändernd*).[27] Taken together, the data show that there is a great variation between zero element and linking *-s-* during the entire period of investigation (see Figure 6). Unlike for root compounds (Kopf 2018), there seems to be no clear trend towards the linking *-s-* for noun-participle combinations. The strong relation to syntax continues to inhibit the *-s-* until the later part of the 20th century. The results achieved in the DIE ZEIT corpus suggest that the variation between zero element and *-s-* still exists today. However, the results should be considered with caution given the small sample size.

The study retrieved 221 noun-participle combinations that are written as one word and have a nominalized infinitive as first constituent. 147 of these are unlinked (66.52%), 73 occur with a linking *-s-* (33.03%) and one record exhibits a subtractive linking element (0.45%, *Rennen + entscheidend > renn_entscheidend* 'race-determining').[28] The latter is most likely motivated by the model of corresponding root compounds as well (e.g., *Renn_stall* 'racing stable').[29] For the nominalized infinitives there is a clear and rapid development towards the linking *-s-*, which begins in the early 20th century. In the 1970s, the linking *-s-* already occurs with a relative frequency of 0.79. However, it has not yet completely spread and still competes with the zero element.

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[27] This difference is statistically significant ($\chi^2 = 19.81$, *df* = 1, *p* < 0.001).

[28] These differences are statistically significant ($\chi^2 = 144.69$, *df* = 2, *p* < 0.001).

[29] Furthermore, contraction could play a role here because of the repeating *en*: *Renn*en, en*tscheidend*.
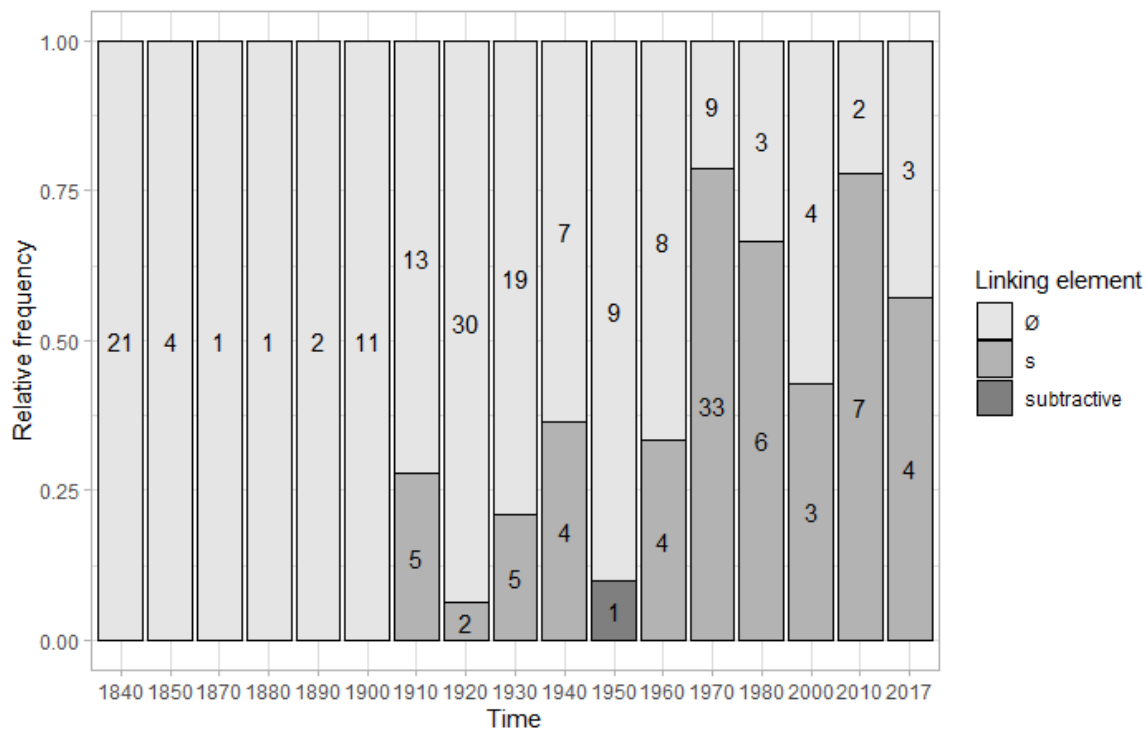
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Fig. 9 Diachronic development of linking elements after nominalized infinitives (n = 221)

For both derivatives in *-ung* and nominalized infinitives, root compounds must be the model for choosing linking elements. In the case of derivatives in *-ung*, the linking *-s-* cannot be analyzed as an inflectional suffix (**Leistungs*, **Zeitungs*); it is nonparadigmatic in the sense of Wellmann et al. (1974) (cf. Section 3.2.3). For normalized infinitives, a genitive singular interpretation of *-s-* (*des Schlafens*, *des Vertrauens*) is impossible in this context as the present study only retrieved accusative combinations for nominalized infinitives. Hence, the *-s-* cannot be explained by syntax.

The analyses show that noun-participle combinations increasingly behave like root compounds in terms of linking elements. However, in contemporary German, noun-participle combinations still differ from root compounds. The syntactic linkage is still so strong that it inhibits the linking *-s-* to fully spread, which leads to variation.

It was shown in Section 3.2.3 that considering valency-compliance and usualness of linking elements is only partially informative. To gain deeper insight into the grammatical status of synthetic compounds, the distinctive parameters of both approaches have to be combined. This allows us to determine whether the linking elements are motivated by syntax or root compounds. In order to diachronically study the linking motivation for noun-participle combinations, the period from 1840 to 1979 was divided into sections of twenty years. From each section, 50 random records were selected, so that a total of 350 noun-participle combinations were analyzed. For 218 noun-participle combinations it was impossible to decide whether their linking elements are morphologically or syntactically motivated (62.29%, e.g., *holz+Ø+verarbeitend* 'woodworking'). 77 combinations exhibit morphologically motivated linking elements (22%, e.g., *staat+s+erhaltend* 'state-preserving') and 55 linking elements are syntactically motivated (15.71%, e.g., *vertrag+Ø+schließend* 'contracting'). The diachronic distribution is illustrated in Figure 10.
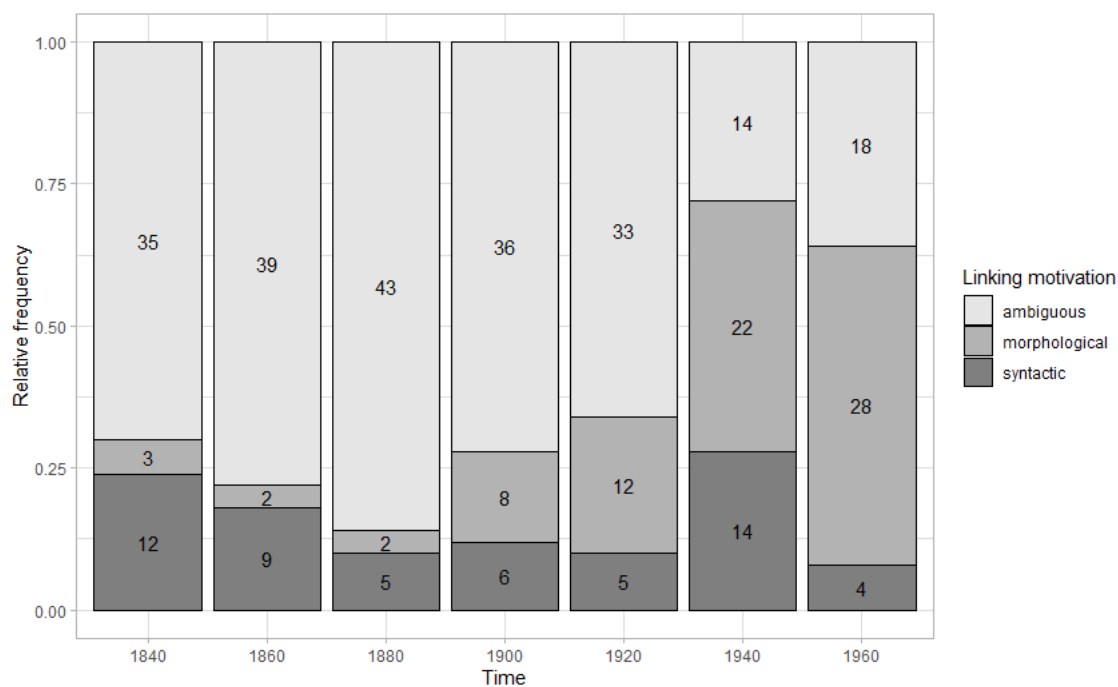
22

Fig. 10 Diachronic development of the linking motivation (tokens) (n = 350)

It is particularly striking how quickly morphological linking elements spread in the course of the 20th century. In the second half of the 19th century, only two or three out of fifty linking elements were clearly morphologically motivated. Between 1960 and 1979, 28 out of fifty linking elements are morphologically motivated. Most importantly, it is the linking elements that are ambiguous that have diminished over time (e.g, *phrase+n+liebend* 'phrase-loving'). However, this picture is distorted by some highly frequent types, which (as will be shown below for linking elements, too) are particularly prone to undergo morphologization.

To balance such frequency effects and to get an impression of how newly coined combinations behave, 50 hapax legomena per decade between 1900 and 1979[30] were randomly chosen, yielding 400 types in total. The results are illustrated in Figure 11. Ambiguously motivated linking elements predominate in all decades (relative frequencies between 0.58 and 0.86). Primarily, the ratios between clearly syntactically and morphologically motivated linking elements change. Between 1900 and 1939, both types are about equally frequent. From 1940, morphologically motivated linking elements gain ground. Their relative frequency increases from 0.16 (1930 to 1939) to 0.4 (1970 to 1979). Meanwhile, the relative frequency of clearly syntactically motivated linking elements decreases from 0.16 (1930 to 1939) to 0.02 (1970 to 1979).

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[30] Only in the 20th century is there a sufficiently large number of hapax legomena.
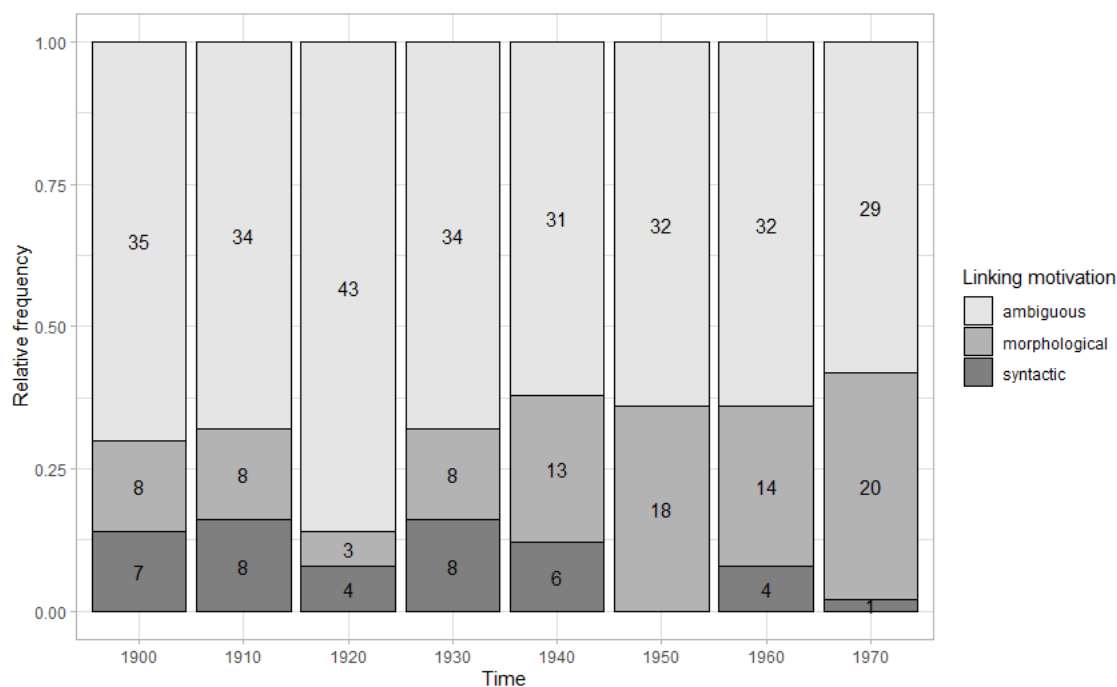
23

Fig. 11 Diachronic development of the linking motivation for hapax legomena (n = 400)

Overall, it is clear that linking elements of noun-participle combinations are characterized syntactically. This confirms Fuhrhop's (1996: 546) statement that the linking of noun-participle combinations is not yet far advanced in comparison to root compounds. However, all analyses suggest that noun-participle combinations have become more morphological. This development essentially took place in the 20th century, especially from 1940 onwards. Noun-participle combinations are increasingly aligned with root compounds. To date, this process has not yet been completed since there is still variation (*achtung(s?)gebietend*). Additionally, the large proportion of valency-compliant or ambiguously motivated linking elements (*frucht+Ø+erzeugend*) allows noun-participle combinations to be considered as structures between word and phrase.

Figure 12 shows how valency-compliance and token frequency of individual types interact. In the frequency classes with between 1–2 and 112–429 tokens per type, 16.88% to 19.95% of the noun-participle combinations written as one word exhibit noncompliant linking elements. In the class with 602–670 tokens per type, this proportion rises to 35.97%. The high frequency classes are either completely compliant (> 1000 tokens, two types: *grundlegend*, *maßgebend*) or noncompliant in terms of valency (> 2000 tokens, one type: *stellvertretend*). However, the results for the two high frequency classes should be considered with caution since they are composed of only one or two types. If the two high frequency classes are omitted, there is a significant correlation between valency-compliance of linking elements and frequency class with small effect size ($\chi^2 = 245.74$, $df = 4$, $p < 2.2e-16$, Cramérs $V = 0.1771$). As expected, the proportion of noncompliant linking elements increases with an increasing frequency of the noun-participle combination. This result is consistent with Fuhrhop (2007).
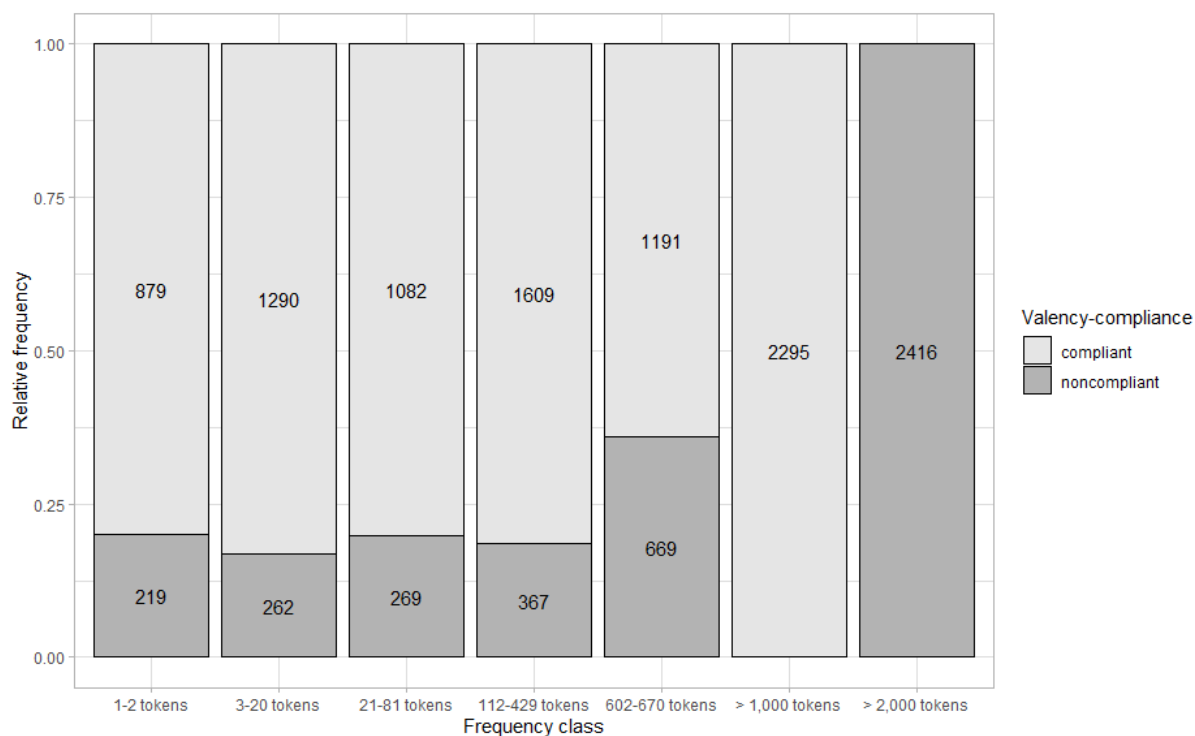
Relative frequency

1.00

0.75

0.50

0.25

0.00

879 1290 1082 1609 1191 2295 2416

219 262 269 367 669

Valency-compliance
compliant
noncompliant

1-2 tokens   3-20 tokens   21-81 tokens   112-429 tokens   602-670 tokens   > 1,000 tokens   > 2,000 tokens

Frequency class

Fig. 12 Valency-compliance of linking elements depending on token frequency of individual types (n = 12,548)

4.4 Noun-participle combinations in a constructional network

It could be shown that over the past 300 years, noun-participle combinations have increasingly adopted morphological characteristics. This becomes apparent initially in the compound spelling, which mainly increased in the 19th century. Finally, there was a spread of noncompliant linking elements (with regard to verb valency), especially in the 20th century. The latter suggests that noun-participle combinations are increasingly aligned with the model of root compounds (*verfassung(+s+)ändernd*). This development can be clearly seen in Figures 13 (tokens) and 14 (types). The data show that primarily the frequent and lexicalized types have evolved from phrase to word.
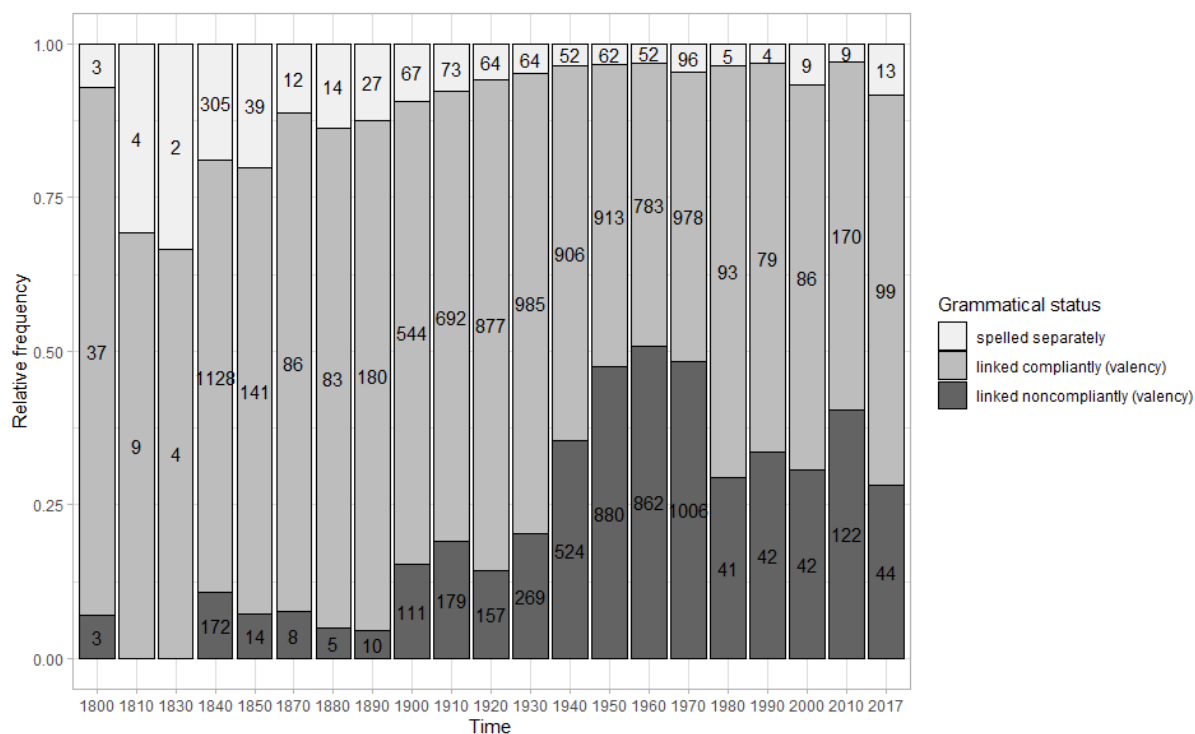
Fig. 13 Structural change of noun-participle combinations (tokens) (n = 14,340)
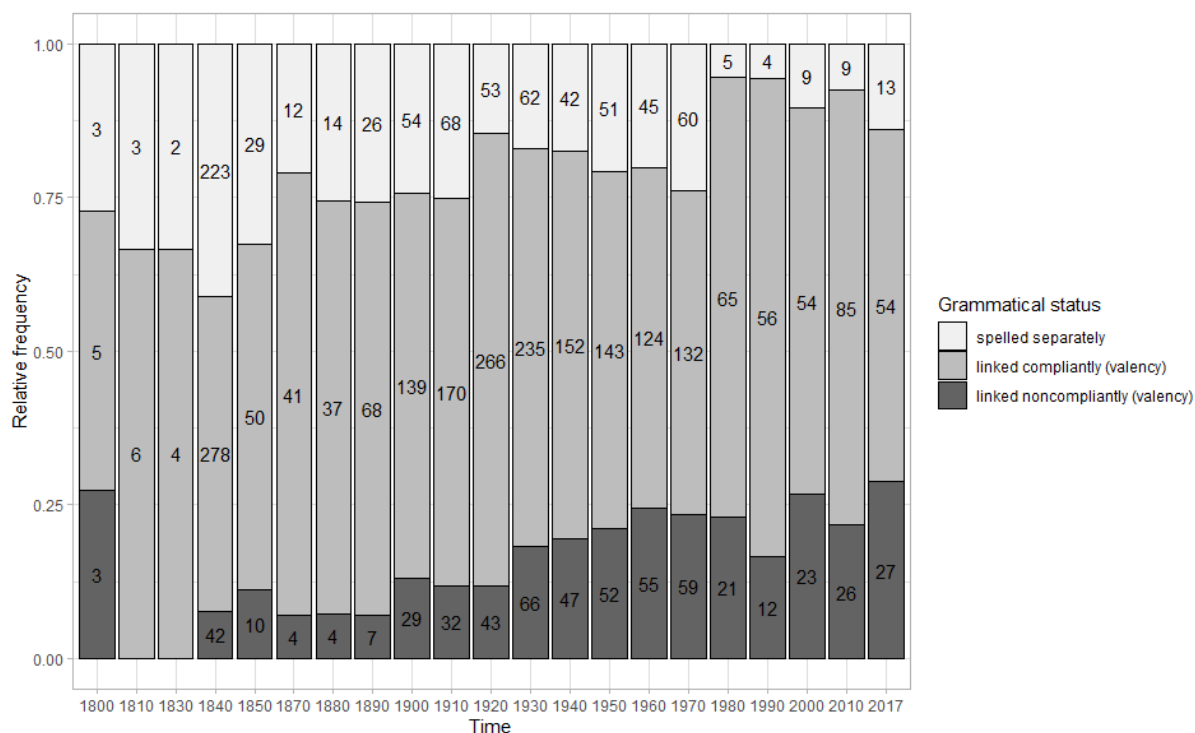

Fig. 14 Structural change of noun-participle combinations (types) (n = 3,513)

In contemporary German, noun-participle combinations have become far more structurally diverse. Some combinations are close to the morphological pole (*vertrauen+s+erweckend*, Archiv der Gegenwart, 2001 [1974], DWDS), others are close to syntax (*Aufsehen erregend*), and many combinations are in between by exhibiting ambiguously motivated linking elements, for example (*holz+Ø+liefernd*, Vossische Zeitung (morning issue), 03-

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05-1903, DWDS). Moreover, single types occur in different shapes (*Achtung gebietend* vs. *achtung+Ø+gebietend* vs. *achtung+s+gebietend*). Due to the great structural variation, it is reasonable to assume a continuum between word formation and syntax that is shaped by similarity on a formal level (spelling, linking elements) and on a syntactic level (adjectival vs. verbal behavior, e.g., syntactic position, comparison, derivation).

Figure 15 offers a suggestion of how noun-participle combinations might be organized in a constructional network. Solid lines represent hierarchy, dashed lines represent similarity between constructions. On the left side the phrasal pole is shown, on the right side the morphological pole. On an abstract level, all subschemas are united under the noun-present participle scheme, which is firmly anchored between phrase and word. At the edges, however, some subschemas are more integrated into the syntactic or morphological system, respectively. In general, noun-participle combinations are strongly linked to verbal phrases. It is likely that this connection is stronger than with nominal synthetic compounds (cf. Zeldes 2013) due to the verbal nature of the present participle. Nevertheless, root compounds have an important influence on the noun-participle pattern. This is shown firstly by the noncompliant linking elements. Secondly, nonobjective noun-participle combinations (e.g., *schweißtriefend* 'sweat-soaked') are obviously formed in analogy to root compounds (Fuhrhop 2007: 145).
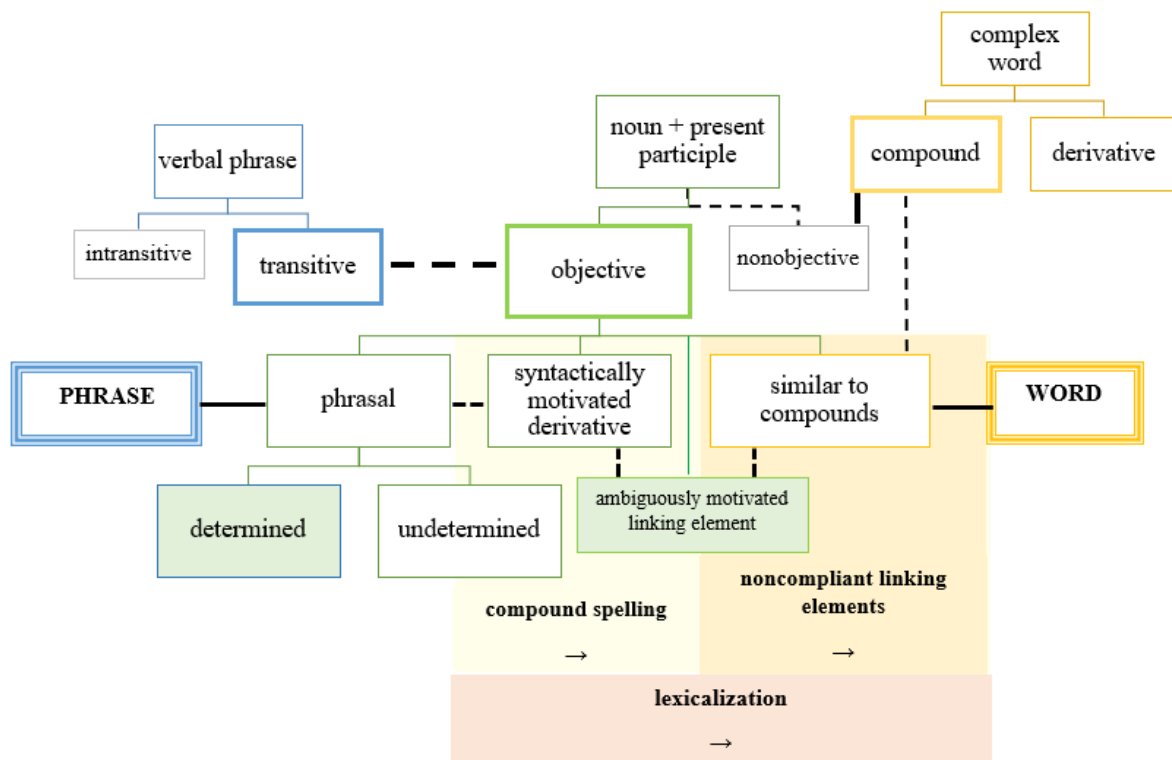

Fig. 15 Noun-participle combinations in a constructional network

Noun-participle combinations cannot be hierarchically subordinated to both the noun + present participle construction and compounds. Consequently, the relationship between objective noun-participle connections and compounds can only be on a superficial level. Thus, there is a similarity to compounds, but no hierarchical subordination. Instead, noun-participle combinations are first and foremost formally adapted to the root compounds.

There is evidence that synthetic compounds have diachronically evolved from derivation (cf. Werner 2017). Syntactically determined linking elements are a further indication that noun and verb form a close unit. However, with respect to constructional hierarchy, classifying noun-participle combinations as derivatives would lead to a contradiction as well. This could mean two things. One possibility would be that constructional hierarchies are not suitable to analyze noun-participle combinations. Another explanation is that noun-participle combinations (or synthetic compounds in general) have developed into a word formation pattern of their own, which cannot be described either by compounding or by derivation.

5   Conclusion

The aim of the present study was to examine noun-participle combinations, focusing on the diachronic development of the pattern. Since noun-participle combinations are in an ambivalent state between phrase and word, variation in spelling and linking elements occurs.

Throughout the entire period of investigation (1700 until today), compound spelling prevailed. Its occurrence clearly increased, especially over the 19th century. This implies that noun-participle combinations were increasingly perceived as morphological units. Linking elements give further evidence of the grammatical status. They can be either syntactically or morphologically determined. Three different approaches were used to analyze linking elements in noun-participle combinations: valency-compliance, usualness, and linking motivation. All three analyses have shown that the linking elements have diachronically evolved away from formally agreeing with inflectional suffixes. Instead, noun-participle combinations have increasingly taken linking elements that occur in root compounds. Thus, the data confirm that noun-participle combinations have undergone morphologization in Fuhrhop's (2000) sense. They have abandoned syntactic characteristics and adopted features that are typical of morphology.

Moreover, this study has shown that morphologization is expedited by high token frequency of individual types. This means that the more often an individual type of a noun-participle combination occurs, the stronger is its tendency to become morphologized. Infrequent types, in contrast, tend to behave like phrases. Thus, the syntactic character of noun-participle combinations is preserved and is particularly evident in infrequent combinations.

In a constructional network, noun-participle combinations are located between syntax and word formation. Certain types are closer to the syntactic pole, others are closer to the morphological pole. Despite the morphologization, noun-participle combinations cannot be analyzed as determinative or root compounds. A constructionist analysis as derivatives would also be contradictory. The morphological features as well as the variation of noun-participle combinations can best be explained by the principle of similarity.

References

Augst, G. (1975). *Untersuchungen zum Morpheminventar der deutschen Gegenwartssprache*. Tübingen: Narr.

Baayen, R. H. (2001). *Word Frequency Distributions*. Dordrecht: Kluwer.

BBAW (online) = Deutsches Textarchiv. Die Textauswahl. Berlin-Brandenburgische Akademie der Wissenschaften. http://www.deutschestextarchiv.de/doku/textauswahl. Accessed 20 Mai 2020.

Behaghel, O. (1924). *Deutsche Syntax. Eine geschichtliche Darstellung.* Volume 2. Die Wortklassen und Wortformen. B. Adverbium. C. Verbum. Heidelberg: Winter.

Booij, G. (2010). *Construction Morphology.* New York: Oxford University Press.

Booij, G. (³2012). *The grammar of words. An introduction to linguistic morphology.* Oxford: Oxford University Press.

Brinkmann, H. (1962). *Die deutsche Sprache. Gestalt und Leistung.* Düsseldorf: Pädagogischer Verlag Schwann.

Croft, W. (2002). *Radical Construction Grammar. Syntactic Theory in Typological Perspective.* Corrected reprint from 2001. Oxford: Oxford University Press.

Deutsches Textarchiv. Grundlage für ein Referenzkorpus der neuhochdeutschen Sprache. Berlin-Brandenburgische Akademie der Wissenschaften. http://www.deutschestextarchiv.de/.

Digitales Wörterbuch der deutschen Sprache. Berlin-Brandenburgische Akademie der Wissenschaften. DIE ZEIT corpus. https://www.dwds.de/d/korpora/zeit.

Digitales Wörterbuch der deutschen Sprache. Berlin-Brandenburgische Akademie der Wissenschaften. Core corpus. https://www.dwds.de/d/k-referenz#kern.

Donalies, E. (²2011). *Basiswissen Deutsche Wortbildung.* Tübingen: Narr Francke Attempto.

Donalies, E. (2011). Tagtraum, Tageslicht, Tagedieb. *Ein korpuslinguistisches Experiment zu variierenden Wortformen und Fugenelementen in zusammengesetzten Substantiven.* Mannheim: Institut für Deutsche Sprache.

Duden (⁸2009) = Dudenredaktion (Ed.) (⁸2009). *Die Grammatik. Unentbehrlich für richtiges Deutsch.* Mannheim: Dudenverlag.

Duden (⁷2011) = Dudenredaktion (Ed.) (⁷2011). *Duden.* Volume 9. Wörterbuch der sprachlichen Zweifelsfälle. Mannheim, Zürich: Dudenverlag.

Duden (⁸2016) = Hennig, M. (Ed.) (⁸2016). *Das Wörterbuch der sprachlichen Zweifelsfälle. Richtiges und gutes Deutsch.* Berlin: Dudenverlag.

Duden (²⁷2017) = Dudenredaktion (Ed.) (²⁷2017). *Duden.* Volume 1. Die deutsche Rechtschreibung. Berlin: Dudenverlag.

Dürscheid, C. (⁵2016). *Einführung in die Schriftlinguistik.* Göttingen, Bristol: Vandenhoeck & Ruprecht.

Eisenberg, P. (³2006). *Grundriss der deutschen Grammatik.* Volume 1. Das Wort. Stuttgart, Weimar: J. B. Metzler.

Eisenberg, P. (2007). Sprachliches Wissen im Wörterbuch der Zweifelsfälle. Über die Rekonstruktion einer Gebrauchsnorm. In: *Aptum. Zeitschrift für Sprachkritik und Sprachkultur, 3,* 209–228.

Fleischer, W. (⁴1975). Wortbildung der deutschen Gegenwartssprache. Tübingen: Niemeyer.

Fleischer, W., & Barz, I. (⁴2012): *Wortbildung der deutschen Gegenwartssprache.* Berlin, Boston: de Gruyter.

Fuhrhop, N. (1996). Fugenelemente. In: E. Lang, & G. Zifonun (Eds.): *Deutsch – typologisch.* Berlin: de Gruyter, 525–550.

Fuhrhop, N. (1998). *Grenzfälle morphologischer Einheiten.* Tübingen: Stauffenburg.

Fuhrhop, N. (2000). Zeigen Fugenelemente die Morphologisierung von Komposita an? In: R. Thieroff, M. Tamrat, N. Fuhrhop, & O. Teuber (Eds.): *Deutsche Grammatik in Theorie und Praxis.* Tübingen: Niemeyer, 201–213.

Fuhrhop, N. (2007). *Zwischen Wort und Syntagma. Zur grammatischen Fundierung der Getrennt- und Zusammenschreibung.* Tübingen: Niemeyer.

Fuhrhop, N., & Teuber, O. (2000). Das Partizip 1 als adjektivischer Infinitiv. In: A. Bittner, D. Bittner, & K.-M. Köpcke (Eds.): *Angemessene Strukturen. Systemorganisation in Phonologie, Morphologie und Syntax.* Hildesheim, Zürich, New York: Olms, 173–190.

Gaeta, L., & Zeldes, A. (2012). Deutsche Komposita zwischen Syntax und Morphologie. Ein korpusbasierter Ansatz. In: L. Gaeta, & B. Schlücker (Eds.): *Das Deutsche als kompositionsfreudige Sprache. Strukturelle Eigenschaften und systembezogene Aspekte*, 197–217.

Gaeta, L., & Zeldes, A. (2017). Between VP and NN. On the constructional types of German *-er* compounds. In: *Constructions and Frames, 9*(1), 1–40.

Gersbach, B., & Graf, R. (1985). *Wortbildung in gesprochener Sprache. Die Substantiv-, Verb- und Adjektiv-Zusammensetzungen und -Ableitungen im „Häufigkeitswörterbuch gesprochener Sprache".* Volume 2. Tübingen: Niemeyer.

Goldberg, A. E. (2003). Constructions. A new theoretical approach to language. In: *Trends in Cognitive Sciences, 7*(5), 219–224.

Goldberg, A. E. (2006). *Constructions at Work. The Nature of Generalization in Language.* New York: Oxford University Press.

Henzen, W. (³1965). *Deutsche Wortbildung.* Tübingen: Niemeyer.

Hilpert, M. (2018). Wie viele Konstruktionen stecken in einem Wortbildungsmuster? Eine Problematisierung des Produktivitätsbegriffs aus konstruktionsgrammatischer Sicht. In: S. Engelberg, H. Lobin, K. Steyer, & S. Wolfer (Eds.): *Wortschätze. Dynamik, Muster, Komplexität.* Berlin, Boston: de Gruyter, 91–105.

Joeres, R. (1995). *Wortbildungen mit -macher im Althochdeutschen, Mittelhochdeutschen und Neuhochdeutschen.* Heidelberg: Winter.

Kopf, K. (2018). *Fugenelemente diachron. Eine Korpusuntersuchung zu Entstehung und Ausbreitung der verfugenden N+N-Komposita.* Berlin, Boston: de Gruyter.

Krott, A., Schreuder, R., Baayen, R. H., & Dressler, W. U. (2007). Analogical Effects on Linking Elements in German Compound Words. In: *Language and Cognitive Processes, 22*(1), 25–57.

Leser, M. (1990). *Das Problem der ‚Zusammenbildungen'. Eine Lexikalistische Studie.* Trier: Wissenschaftlicher Verlag Trier.

Lieber, R. (1983). Argument Linking and Compounds in English. In: *Linguistic Inquiry, 14*(2), 251–285.

Lohde, M. (2006). *Wortbildung des modernen Deutschen. Ein Lehr- und Übungsbuch.* Tübingen: Narr Francke Attempto.

Lüdeling, A. (2009). Rezension von Carmen Scherer: Wortbildungswandel und Produktivität. Eine empirische Studie zur nominalen *-er*-Derivation im Deutschen. Tübingen: Niemeyer 2005. In: *Beiträge zur Geschichte der deutschen Sprache und Literatur (PBB),* 333–339.

Lüdeling, A., & Evert, S. (2005). The emergence of productive non-medical *-itis*. Corpus evidence and qualitative analysis. In: S. Kepser, & M. Reis (Eds.): *Linguistic Evidence. Empirical, Theoretical, and Computational Perspectives.* Berlin, New York: Mouton de Gruyter, 351–370.

Meibauer, J. (1998). *kunst vertrücker* und *kolengreber*. Zum Wortbildungswandel der N+V+er-Bildungen im Frühneuhochdeutschen. In: I. Barz, & G. Öhlschläger (Eds.): *Zwischen Grammatik und Lexik.* Tübingen: Niemeyer, 81–101.

Motsch, W. (^{2}2004). *Deutsche Wortbildung in Grundzügen.* Berlin: de Gruyter.

Müller, W., & Müller, E. (1961). Wortbildung. Ausdruck der Zeit. In: *Muttersprache, 71*(3), 65–78.

Nübling, D., & Szczepaniak, R. (2008). On the way from morphology to phonology. German linking elements and the role of the phonological word. In: *Morphology, 18*, 1–25.

Nübling, D., & Szczepaniak, R. (2011). *Merkmal(s?)analyse, Seminar(s?)arbeit und Essen(s?)ausgabe.* Zweifelsfälle der Verfugung als Indikatoren für Sprachwandel. In: *Zeitschrift für Sprachwissenschaft, 30*(11), 45–73.

Ortner, L., Kühnhold, I., Wellmann, H., & Pümpel-Mader, M. (1991). *Deutsche Wortbildung. Typen und Tendenzen in der Gegenwartssprache.* Vierter Hauptteil. Substantivkomposita. Komposita und kompositionsähnliche Strukturen 1. Berlin, New York: de Gruyter.

Pümpel-Mader, M., Gassner-Koch, E., & Wellmann, H. (1992). *Deutsche Wortbildung. Typen und Tendenzen in der Gegenwartssprache.* Fünfter Hauptteil. Adjektivkomposita und Partizipialbildungen. With the collaboration of L. Ortner. Berlin, New York: de Gruyter.

Rapp, I. (2001). Argumentstruktur und Erstgliedinterpretation bei deverbalen Derivaten. Ein semantikbasierter Ansatz. In: *Folia Linguistica, 35*(3–4), 243–284.

R Core Team (2018). *R.* A language and environment for statistical computing. *R* Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/.

Rivet, A. (1999). Rektionskomposita und Inkorporationstheorie. In: *Linguistische Berichte, 179*, 307–342.

Schlücker, B. (2012). Die deutsche Kompositionsfreudigkeit. Übersicht und Einführung. In: L. Gaeta, & B. Schlücker (Eds.): *Das Deutsche als kompositionsfreudige Sprache. Strukturelle Eigenschaften und systembezogene Aspekte*. Berlin, Boston: de Gruyter, 1–25.

Schlücker, B. (2020). Between word-formation and syntax. Cross-linguistic perspectives on an ongoing debate. In: *Zeitschrift für Wortbildung, 4*(1), 26–74.

Siebert, H.-J. (1968). *Zur Wortbildung des zusammengesetzten Adjektivs in der deutschen Sprache der Gegenwart.* Dissertation, Leipzig.

Smirnova, E. (to appear). Deutsche Partizipialkomposita aus diachroner Perspektive. In: C. Schwarz, & C. Ganslmayer (Eds.): *Historische Wortbildung. Theorie – Methoden – Perspektiven.* Hildesheim: Olms.

Thim-Mabrey, C. (1990). Attributives Partizip Präsens im Mittelhochdeutschen. In: *Beiträge zur Geschichte der deutschen Sprache und Literatur, 112*, 371–403.

Wellmann, H., Reindl, N., & Fahrmaier, A. (1974). Zur morphologischen Regelung der Substantivkomposition im heutigen Deutsch. In: *Zeitschrift für deutsche Philologie, 93*, 358–378.

Werner, M. (2017). Zur Entwicklung der synthetischen Komposition in der Geschichte des Deutschen. In: *Zeitschrift für Wortbildung, 1*(1), 73–92.

Werner, M., Mattes, V., & Korecky-Kröll, K. (2020). The development of synthetic compounds in German. Relating diachrony with L1 acquisition. In: *Word Structure, 13*(2), 166–188.

Wilss, W. (1983). Wortbildungstendenzen in der deutschen Gegenwartssprache, dargestellt an Syntagmen des Typs Substantiv + Partizip I (*kostendeckend*). In: *Muttersprache, 93*, 230–241.

Yoshikawa, M. (2015). *Exemplars at work. Theoretical arguments for Exemplar-based Construction Grammar.* Dissertation, Keio University. http://koara.lib.keio.ac.jp/xoonips/modules/xoonips/download.php/KO10001002-20164830-0003.pdf?file_id=117488. Accessed 20 February 2020.

Zeldes, A. (2013). Komposition als Konstruktionsnetzwerk im fortgeschrittenen L2-Deutsch. In: *Zeitschrift für Germanistische Linguistik, 41*(2), 240–276.

Zifonun, G., Hoffmann, L., & Strecker, B. (1997). *Grammatik der deutschen Sprache.* Berlin, New York: de Gruyter.