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How typology shapes the constructional network: Denominal verb constructions in English, Dutch and German[1]

Abstract: This study proposes a cross-linguistic, corpus-based, and constructionist analysis of denominal verbs (DNVs) in English, Dutch and German. DNV constructions include various morphological construction types, such as conversion (e.g. English *bottle* > *to bottle*), prefixation (e.g. Dutch *arm* 'arm' > *omarmen* 'to embrace') and suffixation (e.g. German *Katapult* 'catapult' > *katapultieren* 'to catapult'). We investigate the correlation between the distribution of DNV constructions and the typological properties of the languages, focusing on boundary permeability, inflectional complexity, syntactic configurationality and word-class assignment. The study shows that, although the three languages have the same repertoire of DNV constructions at their disposal, a Germanic cline can be detected in their preferences for non-overt vs overt marking of the word-class change. As such, the study highlights the impact of typological factors on the shape of language-specific constructional networks.

Keywords: denominal verbs, Construction Morphology, corpus analysis, comparative analysis, English, Dutch, German

1. Introduction

'Denominal verbs' (henceforth DNVs) is a cover term referring to verbs formed from nouns by means of various word-formation processes (see McIntyre 2015; Baeskow 2019, among others). Typological studies, such as Kaliuščenko (2000), have shown that the most common processes for DNV formation cross-linguistically are conversion (e.g. Eng. *bottle* > *to bottle*), suffixation (e.g. Germ. *das Symbol* 'symbol' > *symbolisieren* 'to symbolize') and prefixation (e.g. Dutch *huis* 'house' > *verhuizen* 'to move (house)'). However,

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other construction types may also form DNVs, such as complex verbs with a separable particle (e.g. Dutch *stof* 'dust' > *afstoffen* 'to dust off').

DNVs have been independently studied in English (see Gottfurcht 2008, among others), Dutch (see, for example Booij 2019b; Booij & Audring 2020a) and German (see Eschenlohr 1999; Kaliuščenko 2000 among others), but there is currently no comparative study of DNV constructions in these three Germanic languages. A number of topics have focused attention on DNV formation in these languages, such as the competition between (mainly English) suffixes for the formation of DNVs and the constraints of their distribution (see Plag 1999; Bauer et al. 2013).

Importantly, typological research has shown that languages do not use different DNV patterns in the same proportions (see, for example, Kaliuščenko 2000; Štekauer et al. 2012). That is to say, languages may display specific preferences for one or more DNV construction types. As an illustration, it has been claimed that conversion is a "specifically English process" (Marchand 1969: 363–364) and a large body of research on conversion is strongly linked to the prototypical case of English. Hence, a major question that arises is how to account for potential cross-linguistic differences in the distribution of these patterns and how to relate them to more general properties of the languages involved.

In this paper, we present a comparative analysis of all available DNV constructions in English, Dutch and German. These three closely related languages constitute an interesting triplet for a comparative analysis: according to what is known as the "Germanic Sandwich Hypothesis", originally going back to van Haeringen (1956), they are situated along a cline, not only geographically but also linguistically. As we will show, these three Germanic languages have at their disposal the same morphological construction types to build DNVs, but do not make use of them in the same proportions. Building on the findings of typological research related to language-specific parameters such as inflectional complexity (e.g. Marchand 1969), boundary permeability (see Berg 2014), syntactic configurationality (e.g. Hawkins 2004; Bentz & Christiansen 2013) and word-class assignment systems (see Lehmann 2008), we examine the correlation between the distribution of DNV constructions in the three languages and their typological properties, and show how these typological features shape the constructional networks of the languages under study differently. As such, this study aims to make a significant contribution to a typological approach to Construction Morphology (Booij 2010, 2019a) and, concomitantly, adds to the – still limited – existing body of research in contrastive Construction Grammar (see Boas 2010b, among others). At the methodological level, the study provides an original corpus-based method that allows for a quantitative analysis of

the synchronic distribution of the full array of DNV constructions in the three languages under study.[2]

The paper is structured as follows. In Section 2, we provide a constructionist analysis of the available DNV constructions in English, Dutch and German. In Section 3, we present the typological framework of our study, based on interrelated language-specific parameters such as boundary permeability, inflectional complexity, syntactic configurationality and word-class assignment systems. Based on the cross-linguistic differences between the three Germanic languages, we will subsequently formulate our research hypotheses for the language-specific distribution of DNV constructions. Section 4 presents the data and methods of our cross-linguistic corpus study, and Section 5 its results. These results will be further discussed in Section 6.

2. Denominal verb constructions in Germanic languages: A constructionist overview

2.1 A cross-linguistic constructionist analysis

From its very beginning, Construction Grammar (CxG) has almost exclusively focused on English. However, contrastive studies in CxG are of key theoretical interest for the development of a linguistic model that strives for universal power and psychological plausibility. It is therefore crucial to examine the validity of the theoretical CxG principles and of empirical results obtained for English for as many other languages as possible, and "not to lose sight of the many linguistic details exhibited by constructions in individual languages" (Boas 2010a: 5). This is all the more true because it has been shown that "the relationship between meaning and form may be constrained by typological differences between languages" (Boas 2010a: 15).

In this vein, this study provides a cross-linguistic constructionist analysis of morphological constructions that form DNVs in English, Dutch and German. Morphological constructions are form-meaning pairs at the word level (e.g. $[[X]_V$ *er*$]_N \leftrightarrow$ 'one who Vs': *swimmer, teacher, eater,* etc.) (Booij 2010: 2).[3] In constructionist approaches, the mental grammar of speakers is seen as a dynamic, hierarchical network of constructions (also known as the

2 It is worth noting that this study results from a common research interest of two broader projects, the first dealing with category change from a constructionist perspective (Van Goethem 2017, Van Goethem & Koutsoukos 2018, Van Goethem et al. 2018), and the second focusing more specifically on DNVs in different European languages (Koutsoukos 2021).

3 These constructional schemas represent formal (left) and semantic (right) properties of constructions and the symbolic link between them (indicated by a double arrow).

'constructicon') (Hoffman & Trousdale 2013: 3) that range from fully schematic, i.e. abstract schemas with open slots, to fully substantive patterns, i.e. lexically filled constructions in which all slots are prespecified (e.g. Goldberg 2006). Constructions may interact along both the vertical and the horizontal axes of the network by means of processes such as (multiple) inheritance (De Smet et al. 2013; Trousdale 2013, among others).

Semantically speaking, DNVs all "denote events in which the referents of their base nouns (…) participate in a non-arbitrary way" (Baeskow 2019: 2) and generally refer to the prototypical use of the meaning of the noun they derive from, independent of their structural shape.[4] The Dutch verb *voetballen* 'to play football', converted from the noun *voetbal* 'football', for instance, receives an instrumental interpretation because a football is prototypically used to play this sport.

At the most abstract level, DNV constructions may therefore be represented as follows:

(1) Constructional schema for DNV formation:
[(PREF/PREV) $[X_i]_N$ (SUFF)]$_V$ ↔ "action that involves the prototypical use of SEM_i"[5]

The schema in (1) indicates that a DNV construction creates a verb (V) out of a noun (N) that prototypically refers to an action involving the canonical use of the referent of that noun. However, as we will discuss below, the addition of substantive material in the form of particular prefixes (PREF), (inseparable/separable) preverbs (PREV) or suffixes (SUFF), on top of contextual factors, may strongly affect the meaning component of the construction.

Studies such as Plag (1999) and Lieber (2004) provide detailed overviews of the semantic functions that are most frequently involved in DNV formation (e.g. resultative, ornative, causative and locative functions). Clearly, there is no one-to-one mapping between formal DNV types and semantic patterns. On the one hand, one semantic class can be expressed by different types of DNV constructions. The ornative function, meaning "to supply with, to add", for instance, can be illustrated by a suffixed DNV in English (*to computerize*), a separable complex verb in Dutch (*invetten* 'to grease')

4 This principle goes back to Kiparsky's *Canonical Use Constraint*: "if an action is named after a thing, it involves a canonical use of this thing" (Kiparsky 1997: 482).

5 The uppercase subscripts denote word classes such as noun (N) and verb (V), and the lowercase subscripts are lexical indices. The abbreviations PREF, PREV and SUFF stand for prefix, preverb and suffix, respectively. These terms are explained later in the text (Sections 2.3–2.5).

and a conversion, alternating with a suffixed DNV, in German (*chloren/chlorieren* 'to chlorinate'). On the other hand, a particular DNV construction type may express different meanings. This is especially the case of conversion, which has been characterized by its high semantic versatility in English (see, for example, Clark & Clark 1979) and Dutch (e.g. Booij 2002). Conducting an in-depth semantic analysis of DNVs may, however, turn out to be highly complicated for different reasons, such as metaphoric shifts, idiosyncratic specialization, context-dependency and semantic change (see McIntyre 2015; Schönefeld 2018; Baeskow 2019; Michaelis & Hsiao 2021), and goes beyond the scope of this study, which concentrates on the distribution and language-specific networks of the different patterns in English, Dutch and German.

Six different sub-constructions of the more general construction for the formation of DNVs are available in these three Germanic languages: conversion, suffixation, prefixation, separable and inseparable complex verbs, parasynthesis and back-formation. Alternatively, these different word-formation patterns, which all instantiate the same abstract meaning, as formalized in (1), could be considered "allostructions" (Cappelle 2006), i.e. different forms of constructions to express the same function. In turn, these sub-constructions represent abstractions from a number of more specific semi-schematic constructions (for instance with a pre-specified suffix such as *-ize)* that exhibit more specific meanings and functions, and generalize over concrete instantiations of DNV verbs (e.g. *hospitalize*). In Sections 2.2–2.7, we briefly discuss these DNV constructions, present their constructional schemas and give some examples for the three Germanic languages under study. Section 2.8 presents a summary of the different DNV types in English, Dutch and German.

2.2 Conversion

Although conversion is a common pattern in the languages of the world, it is quite problematic to formulate a definition that applies to all languages and to all cases of conversion.[6] Prototypically, conversion can be defined as a morphological pattern whereby a lexical item changes word class without any marking of this change in its formal make-up: the word-class change is not overtly marked (e.g. Bauer & Valera 2005; Valera 2014).[7] However, this definition may be adapted according to the specific properties of the

6 As an indication, Štekauer et al. (2012: 215) have recorded conversion in 61.82% of the languages in their study sample.

7 Word classes and word-class changes are discussed in detail in Simone & Masini (2014). Word-class change from a constructionist perspective is discussed in Van Goethem (2017) and Van Goethem et al. (2018).

languages involved (see Manova 2011) and/or the theoretical premises of the analysis (see Booij & Audring 2020a; Díaz-Negrillo & Fernández-Alcaina 2018; Martsa, 2013, 2020, among others).

Conversion is common in languages like English, which do not show fully fledged inflectional paradigms. The constructional schema for "prototypical" DNV formation by conversion is represented in (2).

(2) Constructional schema for denominal verb formation by conversion:
$[[X]_N]_V$
e.g. $[[\textit{bridge}]_N]_V \leftrightarrow$ 'to build a bridge over or across (something)'

However, several non-prototypical cases of conversion can be observed. Even in English, minor formal changes, such as stress shift (3) and consonant voicing (4), may accompany the word-class change.

(3) Eng. $[\underline{\textit{con}}\textit{trast}]_N$ > $[\textit{con}\underline{\textit{trast}}]_V$[8]

(4) Eng. $[\textit{shelf}]_N$ > $[\textit{shel}\underline{\textit{v}}\textit{e}]_V$

Apart from minor formal changes, in languages that show richer inflection, we need to consider that conversion applies to stems and not to words.[9] DNV formation by conversion should take as input inflection-less nouns that shift to verbs and then adopt the new inflectional paradigm, as illustrated in (5). In addition to inflection[10], conversion may display formal changes in the stem, such as vowel change (umlaut) in German, as illustrated in (6).

(5) Dutch $[\textit{zon}]_N$ 'sun' > $[[\textit{zon}]_N \textit{-en}_{INFL}]_V$ 'to sunbathe'

(6) Germ. $[\textit{Flucht}]_N$ 'flight' > $[[\textit{fl}\underline{\textit{ü}}\textit{cht}]\ \textit{-en}_{INFL}]_V$ 'to flee'

An interesting question is whether such minor formal modifications in the bases should be regarded as patterns of denominal verb formation *per se* or formal changes accompanying conversion (see Bauer 2005; Valera 2015; Bauer et al. 2013, among others). A constructionist representation does not necessarily result in a dichotomic answer to this issue. Since every construction is a combination of different formal morphological/phonological and semantic features, the formal representation can indicate that a noun-to-verb word-class change by conversion may be accompanied by changes such as a stress shift towards the last syllable or a vowel change.[11]

8 Denominal verb formation by stress shift is no longer productive in English (Plag 2003: 218).

9 See also a detailed discussion in Manova (2011).

10 For similar cases in other heavily inflected languages, see Koutsoukos (2013).

11 See also the discussion in Jackendoff and Audring (2020: 118–120).

Moreover, in conversion it may be difficult to determine whether we are dealing with a denominal verb (N>V) or with a deverbal noun (V>N). This "problem of directionality" (see Iacobini 2000, among others) was closely linked to generative models that represent morphological creativity as rules that operate on bases (inputs) in order to produce the final output. In constructionist models, the relationship between the different components should not be conceived of as a sequenced derivation but rather as possibly violable constraints, which establish (or license) well-formed links between different kinds of structure (Jackendoff 2010: 587–588). In Section 4, we will discuss how we checked directionality of conversion in our corpus study.

2.3 Suffixation

DNVs in English, Dutch and German can also be derived by means of suffixation, i.e. the formation of a new verb by means of a derivational suffix. Unlike conversion, suffixation entails overt marking of the word-class change by means of the derivational suffix (or the so-called verbalizer). The abstract construction representing suffixed DNV formation is shown in (7).

(7) Constructional schema for denominal verb formation by suffixation:
$[[X]_N \text{ SUFF}]_V$
e.g. $[[\textit{hospital}]_N \textit{ -ize}]_V$ ↔ 'to admit or cause (someone) to be admitted to hospital for treatment'

English, Dutch and German employ several suffixes in DNV formation, which differ in productivity and distribution (see, among others, Plag 1999; Gottfurcht 2008; Booij 2019b; Hüning 2018). Plag (1999), for instance, examines the semantic competition between the productive English suffixes *-ize*, *-ify*, *-ate* (e.g. *hospitalize, mythify, fluoridate*) and the unproductive *-en* (e.g. *heighten*), and identifies their distribution and the phonological constraints that play a role in suffix selection.[12]

Native suffixes are not necessarily more productive than non-native ones; on the contrary. The Dutch and German suffix *-ig* is indigenous but unproductive (8), whereas German *-ier* and Dutch *-eer* are productive suffixes borrowed from the French inflectional suffix *-er* (9). Interestingly, the French inflectional suffix *-er* has been reinterpreted as a verbalizing derivational

12 Similar constraints are also examined in Bauer et al. (2013) and Dixon (2014), among others.

suffix in the Germanic languages, to which native inflectional endings are attached (Booij & Audring 2020a; Hüning 2018).[13]

(8) Du. *zonde* 'sin' > *zondigen* 'to commit a sin', Germ. *Angst* 'fear' > *ängstigen* 'to frighten'

(9) Du. *experiment* / Germ. *Experiment* > Du. *experimenteren* / Germ. *experimentieren* (cf. Fr. *expérimenter*) 'to experiment'

For each verbalizing suffix, one has to assume a different semi-schematic construction that represents the formal properties as well as the semantics of the pattern. In (10), we represent the semi-schematic construction of *-ize* suffixation (e.g. *to hospitalize*).

(10) Constructional schema for DNV formation with the suffix *-ize*
$[[X_i]_N$ *-ize*$]_V \leftrightarrow$ 'action that involves the canonical use of SEM_i'[14]

2.4 Prefixation

An intriguing and much-debated question is whether prefixes can trigger word-class change in the same way as suffixes do. Williams (1981) argued that the most prominent elements in word formation, such as the heads in compounds and category-changing affixes, are always to be found in the right periphery of the formation. This generalization is commonly referred to as the "Right-hand Head Rule" (RHR). According to this view, prefixes should be considered category-preserving in contrast to suffixes, which are assigned category-changing capacity. Nevertheless, the RHR has been heavily criticized because of its overgeneralization, among other reasons (see Lieber 1981; Selkirk 1982; Anderson 1992, among others), and different theoretical accounts have been proposed to deal with the problematic status of prefixed formations without any overt suffix responsible for the word-class change.[15]

13 Germanic suffixed DNVs can be based on borrowed or native nouns (e.g. German *attackieren* 'to attack' (cf. Fr. *attaquer*) vs *buchstabieren* 'to spell') and, as shown by Hüning (2018), German *-ier* and *-isier* are productively used to coin neologisms (e.g. *merkelisieren* 'lit. to merkelize, from Merkel', *Lattemacchiatisierung* 'lit. lattemacchiatization, from latte macchiato').

14 As mentioned before, the addition of particular substantive material to the general pattern for DNV formation, in the form of particular suffixes, for instance, may strongly affect the meaning component of the construction. However, describing the range of semantic patterns yielded by any verbalizing suffix goes beyond the scope of this study.

15 Lieber (1981) and Štekauer (2009) put prefixes and suffixes on a par, arguing that both can function as heads, although not necessarily in the same proportions.

Consider the following examples of prefixed DNVs for the three languages under study:

(11) a. Eng. *cage* > *to encage*, *witch* > *to bewitch*, *bug* > *to debug*
b. Dutch *kalk* 'lime, calcium' > *ontkalken* 'to decalcify', *snaar* 'string' > *besnaren* 'to fit a string or strings to (a musical instrument, a racket or a bow)'
c. Germ. *Krampf* 'cramp' > *verkrampfen* 'to cramp', *Fleck* 'spot' > *beflecken* 'to soil, stain, spot'

From a constructionist perspective, we postulate that the change in the category of the base is the result of a conversion schema and that prefixation merely adds semantic/functional load to this converted base. More specifically, since constructional schemas may interact with each other and can even be merged, DNVs with a prefix can be considered the result of "schema unification" of two constructions (Booij 2010: 41-50): noun-to-verb conversion and prefixation of verbs. This account is represented in (12).

(12) Constructional schema for denominal verb formation by prefixation:
$[[X]_N]_V$ + [PREF $[X]_V]_V \rightarrow$ [PREF $[[X]_N]_V]_V$
e.g. [*de-* $[[bug]_N]_V]_V \leftrightarrow$ 'to identify and remove errors from (computer hardware or software)'

This constructionist account does not assign word-class-changing capacity to prefixation and has the advantage that it builds on existing productive schemas.

2.5 Complex DNVs: separable/separate and inseparable complex verbs

A fourth DNV construction in our three Germanic languages consists in complex denominals coexisting with separable or inseparable preverbs. Unlike prefixes that only occur as bound morphemes (Section 2.4), separable and inseparable preverbs also have independent use, for instance as a preposition or adverb.[16] However, in some cases, the preverb-less verb, derived

Other morphologists, for instance Scalise (1988), assume an intermediate stage of zero-suffixation. In this case, the noun is first derived into a verb by means of a zero-suffix, before the attachment of the prefix.

16 Separable preverbs are commonly called particles. The latter term is more appropriate, especially for English, because the morpheme is not separable but separate, and does not precede but follows the verb (compare Eng. *to pile up vs* Dutch *ophopen*). However, for practical convenience, we use the term "preverb" here as an umbrella term to refer to separable, separate and inseparable preverbs in English, Dutch and German.

from a noun, does not exist independently of the preverb and these cases can be considered complex DNVs.

Germanic separable complex verbs (SCVs) are illustrated in (13) and inseparable complex verbs (ICVs) in (14). Separable preverbs (or separate particles in English) are separated from their verbal stems in main clauses and carry main stress (13b), whereas inseparable preverbs cannot be separated from their verbal stems and do not carry the main stress of the word; in this case, stress is on the verb stem (14b) (Booij & Audring 2020b; see Los et al. 2012 for a detailed description of Germanic preverbs and their historical development).

(13) Separable/Separate Complex Verbs (SCVs)
   a. Eng. *to pig out* 'to eat too much' (**to pig*), Dutch *ophopen* 'to pile up' (**hopen*), Germ. *aufbahren* 'to place on a bier' (**bahren*)
   b. Dutch *De problemen hopen zich* ***op***. 'The problems pile up.'

(14) Inseparable Complex Verbs (ICVs)
   a. Dutch *overbruggen* 'to bridge' (**bruggen*), Germ. *umranden* 'to edge' (**randen*)
   b. Dutch *We* ***over****bruggen onze meningsverschillen*. 'We overcome our differences of opinion.'

Intriguingly, SCVs can be shown to display both morphological and syntactic properties (Booij 2010: 118–145). To give an example, in spite of their separability, particles may develop a "bound meaning" when part of a particle verb. For example, Dutch *door-* expresses a continuative aspect in verbs such as *doorwerken* 'to continue to work' and *doorstuderen* 'to go on studying'. The addition of a separable preverb may even affect the valence of the verb, in the same way as prefixes may do (e.g. *iemand opbellen* 'lit. to call somebody up' vs *naar iemand bellen* 'lit. to call to somebody').

The problem that arises here is similar to the one described in the previous section: even less so than prefixes, separable or separate preverbs cannot be considered category-changing elements, but there is no overt suffix that assigns the category either. To resolve this issue, we adopt a two-step argumentation, following Booij (2010: 118–145). First, we need to recognize that SCVs are instantiations of constructional idioms, i.e. partially filled constructional schemas with a conventionalized meaning. As shown for *door-* above, separable/separate preverbs adopt one or more fixed meanings within SCVs and productively combine with a series of verbs, as long as their semantics is compatible with the semantics of the preverb. Similarly, Dutch SCVs combined with *op-* regularly express an upward movement: e.g. *optillen* 'to lift up', *opgooien* 'to throw up', *ophijsen* 'to pull up'. Both constructional schemas are represented in (15) and (16).

(15) [*door* $[X]_V]_{V/VP}$ ↔ 'to go on V-ing'

(16) [*op* $[X]_V]_{V/VP}$ ↔ 'to (cause to) move upward (by V-ing)'

Note that because of their properties at both lexical and phrasal level, we have indicated that the resulting construction is a V/VP, situated at the boundary of morphology and syntax. This is not problematic from a constructionist perspective, where lexicon and grammar are situated on a cline and where morphological and syntactic units may be used to serve the same (naming) functions (Booij 2010: 169–192).

The next step is to account for category change in denominal SCVs. We argue that these patterns result from schema unification, combining the SCV idiom with conversion: DNV conversion is embedded within the SCV construction, as represented in (17).

(17) Constructional schema for denominal SCVs:
$[[X]_N]_V$ + [PREV$_{SEP}$ $[X]_V]_{V/VP}$ → [PREV$_{SEP}$ $[[X]_N]_V]_{V/VP}$
e.g. [*op* $[[hoop]_N]_V]_{V/VP}$ ↔ 'to arrange things in a pile; to increase in quantity or amount'

In this account, we do not need to proliferate our lexicon with possible, but not attested verbal bases, such as **hopen* in the sense of 'to pile', in order to assume a base for preverbation (Booij 2010: 127). Denominal SCVs directly result from filling up the schematic slots in the constructional schema. A strong empirical argument in favour of this view is that the schema can be productively used to coin neologistical denominal SCVs, such as *opAppen* 'to pep someone up by sending a WhatsApp message':

(18) *Elkaar* ***opAppen!*** *Pep elkaar op met een WhatsApp naar elkaar.*
'Apping each other up! Pep each other up with a WhatsApp to each other.'
https://www.ben.nl/blog/vier-tipsoor-het-leren-met-een-mobiele-telefoonverslaving
(last accessed on 23 March 2020)

Compared with SCVs, ICVs are less frequently attested in the Germanic languages under study.[17] Following the analysis that we applied to SCVs, denominal ICVs can be examined as constructional blends from the ICV construction with conversion, as indicated in (19). The difference between

17 Diachronic research has shown that several ICVs actually derive from SCVs but are no longer separable (Los et al. 2012).

the two lies in the fact that in this schema the resulting formation does not have the indication of a VP, because it cannot stand as a verb phrase.

(19) Constructional schema for denominal ICVs:
$[[X]_N]_V + [\text{PREV}_{\text{INSEP}}\ [X]_V]_V \rightarrow [\text{PREV}_{\text{INSEP}}\ [[X]_N]_V]_V$
e.g. [*over-* [[*brug*]$_N$]$_V$]$_V$ ↔ 'to build a bridge over or across (something)'

Following the schema in (19), *overbruggen* 'to bridge', for example, may be seen as the result of filling in the noun *brug* 'bridge' in the [*over* [[X]$_N$]$_V$]$_V$ semi-schematic construction.

2.6 Parasynthesis

Denominal verb formation also involves some patterns that have attracted less attention in the relevant literature. Among these patterns we find parasynthesis, which can be defined as a DNV construction that involves the simultaneous presence of a prefix and a suffix (Lieber 2010: 78). Examples are given in (20).

(20) a. English *caffeine* > *to decaffeinate* 'to remove most or all of the caffeine from (coffee or tea)'
b. Dutch *schuld* 'guilt, blame' > *beschuldigen* 'to blame'
c. German *Volk* 'nation, people' > *entvölkern* 'to depopulate'

Each morpheme carries its own functional load, but we cannot consider the prefix or the suffix to be added separately and we should exclude structures of the [α + [β + γ]] or [[α + β] + γ] type (Bisetto & Melloni 2008; Iacobini 2010; Efthymiou 2015). Simultaneous addition of two elements has been quite challenging for models based on word-formation rules that result only in binary structures (see Scalise 1984). However, parasynthetic DNV formation finds a consistent account in constructionist models, as parasynthesis can be considered the result of unification of the schemas for suffixation and prefixation (Booij 2010: 41–47), as indicated in (21).

(21) Constructional schema for parasynthetic DNVs:
$[[X]_N\ \text{SUFF}]_V + [\text{PREF}\ [X]_V]_V \rightarrow [\text{PREF}\ [[X]_N\ \text{SUFF}]_V]_V$
e.g. [*de* [[*caffeine*]$_N$ *ate*]$_V$]$_V$ ↔ 'to remove most or all of the caffeine from (coffee or tea)'

In the resulting schema, the suffixed verb is embedded in the construction for prefixation. However, the suffixed verb does not need to occur independently of the parasynthetic DNV; the latter can be directly coined by adding an N into the schema for parasynthetic DNVs (with potential phonological modifications).

2.7 Back-formation

Finally, DNVs may be the result of back-formation, i.e. a phenomenon whereby a new word is formed by removal of a suffix. Some indicative examples for the three Germanic languages are given in (22):

(22) a. Eng. *editor* > *to edit, baby-sitter* > *to baby-sit*, *demarcation* > *to demarcate*
b. Dutch *handtekening* 'signature' > *handteken*(*en*) 'to sign'
c. Germ. *Weihnachten* > *weihnacht*(*en*) 'to be nearly Christmas; to have a Christmassy atmosphere'

Back-formation has mainly been considered a diachronic phenomenon.[18] From a synchronic point of view, it is indeed difficult to assess whether we are dealing with a back-formation derived from a noun (e.g. *baby-sitter*$_N$ > *baby-sit*$_V$), or with a verb that gives rise to a derived suffixed noun (e.g. *baby-sit*$_V$ > *baby-sitter*$_N$).[19] However, if the semantic interpretation of the verb depends on the semantics of the suffixed noun, we will analyse the verb as an instance of back-formation.[20] An indicative example is the verb *bulldoze* 'to destroy buildings and flatten an area with a bulldozer', which refers to the noun *bulldozer*, although the latter is morphologically more complex and could be derived from the corresponding verb with the addition of the suffix *-er*. If we accept the validity of the semantic criterion, then back-formation could be schematically represented as in (23).

(23) Constructional schema for DNVs by back-formation:
[[[X SUFF]$_N$] ~~SUFF~~]$_V$

2.8 Overview of denominal verb constructions in English, Dutch and German

The different subtypes of DNV constructions, generated by the overarching hyperschema for DNV formation, are represented in the constructional network in Figure 1. Table 1 provides an example for each construction in each of the three Germanic languages.

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18 For an overview of various approaches to back-formation, see Štekauer (2015).

19 Huddleston and Pullum (2005: 286), for instance, argue that "[T]here is nothing in the forms themselves that enables one to distinguish between affixation and back-formation: it's a matter of historical formation of words rather than of their structure".

20 Alternative approaches draw attention to the analogy with compounding. Kiparsky (1982), for instance, analyses verbs such as *to air-condition* (< *air-conditioning*) and *to baby-sit* (< *baby-sitter*) as compounds.

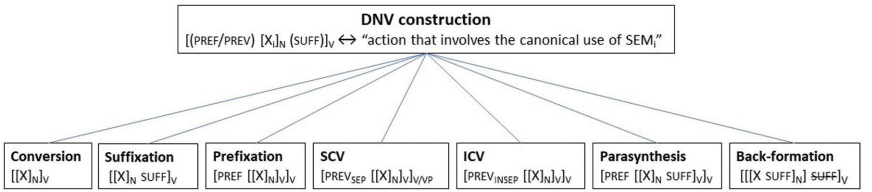

Fig. 1: Constructional network of DNV constructions

Tab. 1: DNV constructions in English, Dutch and German

Construction type	English	Dutch	German
Conversion $[[X]_N]_V$	$[[pilot]_N]_V$	$[[tafeltennis]_N]_V$ 'to play table tennis'	$[[scherz]_N]_V$ 'to joke'
Suffixation $[[X]_N \text{ SUFF}]_V$	$[[ritual]_N \text{ -}ize]_V$	$[[nest]_N \text{ -}el]_V$ 'to nest'	$[[experiment]_N$ $\text{-}ier]_V$ 'to experiment'
Prefixation $[\text{PREF } [[X]_N]_V]_V$	$[en\text{-} [[slave]_N]_V]_V$	$[ver\text{-} [[huis]_N]]_V$ 'to move'	$[ent\text{-} [[kalk]_N]_V]_V$ 'to decalcify'
SCV $[\text{PREV}_{SEP} [[X]_N]_V]_{V/VP}$	$[[[size]_N]_V \text{ } up]_{V/VP}$	$[in [[lijst]_N]_V]_{V/VP}$ 'to frame'	$[ein [[tüt]_N]_V]_{V/VP}$ 'to put in a bag'
ICV $[\text{PREV}_{INSEP} [[X]_N]_V]_V$	$[under\text{-} [[line]_N]_V]_V$	$[over\text{-} [[brug]_N]_V]_V$ 'to bridge'	$[um\text{-} [[rand]_N]_V]_V$ 'to edge'
Parasynthesis $[\text{PREF } [[X]_N \text{ SUFF}]_V]_V$	$[de\text{-} [[caffein(n)]_N$ $\text{-}ate]_V]_v$	$[be\text{-} [[kost]_N \text{ -}ig]_V]_V$ 'to bear the cost of'	$[be\text{-} [[gnade]_N$ $\text{-}ig]_V]_V$ 'to bless'
Back-formation $[[[X \text{ SUFF}]_N] \text{ ~~SUFF~~}]_V$	$[[[bulldoz\text{-}er]_N] \text{ -}\sout{er})]_V$	$[[[handteken\text{-}ing]_N]$ $\text{-}\sout{ing}]_V$ 'to sign'	$[[[weihnacht\text{-}$ $en]_N] \text{ -}\sout{en}]_V$ 'to be nearly Christmas; have a Christmassy atmosphere'

Table 1 shows that every DNV type is available in each of the three languages: all boxes in the table are filled. However, we are interested in examining the proportions in which DNV constructions occur in each of the three languages, and in explaining the observed cross-linguistic differences. Before presenting our corpus analysis of DNV verbs in English, Dutch and German, we will therefore first outline the typological framework of our study and focus on the most relevant typological parameters that result in cross-linguistic differences between the three languages. These parameters involve boundary permeability, inflectional complexity, syntactic configurationality and the different systems of word-class assignment.

3. Typological framework

3.1 Boundary permeability and inflectional complexity

Typologically speaking, languages vary with respect to the flexibility shown by grammatical items in shifting to another grammatical category. This phenomenon has been analysed in depth by Berg (2014), who refers to it as the notion of "boundary permeability". Boundary permeability is a gradient notion that shows whether "a given language is generally characterized by (relatively) soft or (relatively) sharp boundaries" (Berg 2014: 489). The degree of boundary permeability of a given language can be measured using several criteria, while even languages that are genetically close may differ with respect to this parameter.

Based on 14 comparisons to assess the relative degree of boundary permeability in English and German (for example in the fields of word class, countability, voice and semantic roles of subjects), Berg's study reveals that, even though both languages are genetically close, they occupy the extreme endpoints of the scale: German is a predominantly sharp-boundary language, while English is a largely soft-boundary language, in which items tend to shift category easily. In the specific area of word-class flexibility, word-class permeability is shown to be much higher in English than in German.[21]

Furthermore, Berg (2014) argues that all linguistic levels (phonology, morphology, lexis, syntax, semantics) are interconnected and cooperate, with adjacent levels (for instance morphology and lexis) interacting more strongly than non-adjacent ones, confirming the conception of language as "un système où tout se tient". As an example, Berg (2014: 492) refers to word-class information that is prototypically coded by morphology (e.g. *the idol – to idolize*), and less prototypically by phonology (e.g. *the belief – to believe*), because the lexical and morphological levels are adjoining, while the lexical and phonological levels are not.

This interconnection between the linguistic levels can be shown by the close relationship between boundary permeability and inflection. Berg (2014) does indeed refer to the role of inflectional marking, i.e. the addition of (overt) inflectional suffixes to mark such distinctions as tense, person, number and voice, as a pivotal factor underlying the differences in boundary permeability. Additionally, Berg (2014) considers inflectional markers as "dividers" between syntax and lexicon: the presence of inflectional markers

21 Based on a case study of a comparable number of dictionary entries starting with <n> in English and German, Berg (2014: 495–496) shows that 7.85% of the English items are used in more than one word class (e.g. *noble* N/ADJ), against only 0.65% of the German entries (e.g. *Nutzen/nutzen* 'use/make use of' N/V).

on a lexical item reveals its syntactic status and integration, while their absence does not alter the lexical status of a unit. Consequently, languages with poor inflection do not establish sharp boundaries between lexicon and syntax, while languages with rich inflection prototypically feature a clear-cut lexicon-syntax divide (Berg 2014: 521).

The assumption of a close relationship between boundary permeability and inflection is borne out by the differences found between German and English. Whereas German displays relatively rich inflection, English inflection is highly impoverished. German is indeed a prime example of a European language that has a fully-fledged system of inflectional marking in which nouns and verbs are inflected according to different paradigms and mark distinctions by means of different inflectional suffixes. Indicatively, German shows four distinct inflectional suffixes in the paradigm of the simple present, as can be seen in Table 2. English, on the other hand, shows little inflectional marking on nouns and verbs. There are no different inflectional classes for nouns and verbs (apart from the distinction between strong and weak verbs), while there are only two inflectional forms in the paradigm of the simple present, as also shown in Table 2.

Several facts lead us to assume that Dutch has an intermediate degree of boundary permeability between that of English and German. According to the "Germanic Sandwich Hypothesis", Dutch is not only geographically, but also linguistically 'sandwiched' between English and German (see, for example, van Haeringen 1956; Hüning et al. 2006; Lamiroy 2011; König & Gast 2018). This continuum can be found in several linguistic domains. Table 2 provides some examples from the fields of phonetics and morphology (Lamiroy 2011: 175–176). With respect to phonetic reduction, verbal inflection and the number of definite articles, these show that Dutch does in fact occupy an intermediate position between English and German.

Tab. 2: The Germanic Sandwich Hypothesis: examples from phonetics and morphology

	English	**Dutch**	**German**
Phonetic reduction	*sleep, sun*	*slap**en**, zon*	*schlaf**en**, Sonne*
Verbal inflection (simple present)	2 inflectional forms: *sing, sing**s***	3 inflectional forms: *zing, zing**t**, zing**en***	4 inflectional forms: *sing**e**, sing**st**, sing**t**, sing**en***
Definite article	1 article: ***the** day, **the** sun, **the** water*	2 articles: ***de** dag, **de** zon, **het** water*	3 articles: ***der** Tag, **die** Sonne, **das** Wasser*

Based on the fact that Dutch has richer inflection than English, but poorer inflection than German (see verbal inflection in Table 2, and the same holds for adjective and noun inflection; see Booij 2019b, ch. 2)[22], we may hypothesize that the lexicon-syntax divide in Dutch is less clear-cut than in German, but sharper than in English. Moreover, we expect Dutch boundary permeability, and in particular word-class permeability, to be situated at an intermediate level between English and German.[23]

3.2 Syntactic configurationality and word-class assignment

An important feature that also relates to the formation of DNV patterns is the syntactic configurationality of the languages involved (see, for example, Hale 1982; Hawkins 2004; Bentz & Christiansen 2013). Like boundary permeability, configurationality is a gradient notion because languages vary with respect to the number of word-order patterns they allow. English, Dutch and German show different degrees of syntactic configurationality.

Modern English has rigid SVO order, in both main and subordinate clauses, which results in [SV] chunking. English diverged from the West Germanic SOV mould, losing SOV order in the course of its history, which had a widespread impact on, for instance, the morphosyntax of its particles becoming postverbal (see Los et al. 2012). Modern Dutch and German, by contrast, have V2 order in main clauses and SOV order in subordinate clauses. As a result, in these two languages more variation occurs in the order and distance between S and V. We provide some indicative examples in Table 3.

22 Booij (2019b: 16) demonstrates "that the Dutch inflectional system is richer than that of English because Dutch has two genders for nouns and determiners, exhibits (a restricted form of) adjectival inflection, and has a slightly richer verbal paradigm than English. On the other hand, Dutch inflection is poorer than German inflection because the category Case is only expressed on nouns in a number of lexicalized expressions and specific constructions, the number of gender classes is smaller, and the inflection of adjectives is far less elaborate".

23 With respect to word-class permeability in Dutch and French, Lauwers and Van Goethem (2020) demonstrate that Dutch has sharper boundaries between noun and adjective than French. Compared to French, Dutch allows less easily category changes from nouns to adjectives without additional formal marking (especially derivational suffixes). Since French is compared to English with respect to analyticity and degree of grammaticalization, and both languages are considered the most analytical ones on the respective Romance and Germanic Sandwich clines (Lamiroy 2011), this finding would support the assumption that Dutch has less-soft category boundaries than English.

Tab. 3: Word-order patterns in English, Dutch and German

English	Dutch	German
SVO	V2/SOV	V2/SOV
*She **sings** very well.*[24]	***Zij zingt** heel goed. / Heel goed **zingt zij**.*	***Sie singt** sehr gut! /Sehr gut **singt sie!***
*I know **she sings** very well.*	*Ik weet dat **zij** heel goed **zingt**.*	*Ich weiß, dass **sie** sehr gut **singt**.*

The question now arises how configurationality relates to DNV formation patterns. In the previous section, we showed that languages may differ with respect to the flexibility they exhibit in category shift, and specifically word-class change. However, it is important to mention that languages may also differ in the way they assign lexical category (or word class) to their stems (or bases). Lehmann (2008) proposes a cline that describes the different categorization systems:

> Before a sign reaches the level of the utterance, it may be categorized and recategorized several times. (…) The **primary categorization** is the one at the lowest level, the **final categorization** is the one at the highest level. (Lehmann 2008: 549) [emphasis in original]

Primary (or stem-level) categorization implies that the syntax contributes very little to the categorization of lexical units, and stems (or words) are lexically specified as for their word class, that is, they have high stem categoriality (Lehmann 2008: 557–558). According to Lehmann, an indicative example of this group of languages is Latin. Conversely, a language such as English presents low stem categoriality and categorization is fully achieved at phrase level (final categorization) (Lehmann 2008: 557). In such languages, syntactic context disambiguates the word class of the item.[25]

Without underestimating the value of Lehmann's categorization system, we should point out that the contrasts between languages are not necessarily

24 We acknowledge that fronting is also possible in English for pragmatic reasons, as in *Up she rises* or *There she goes*. However, English does not apply the same V2 structure as in Dutch and German in these fronting patterns (cf. Dutch *Daar gaat ze* 'There she goes').

25 Lehmann's (2008) concept of final (phrase-level) categorization ties in with the claims of Construction Grammar and Radical Construction Grammar, arguing that lexical and grammatical categories of words are determined by the constructions of which they are part. Croft's Radical Construction Grammar explicitly argues that "categories and relations are construction-specific" (Croft 2001: 58).

as sharp as suggested above because languages may also display hybrid properties and intra-linguistic variation, as will be shown in the present study.

The three Germanic languages involved in this study belong to different types of stem categoriality. Following Lehmann (2008), we claim that English is a language with low stem categoriality, while German is a language with high stem categoriality. Without going as far as to argue that German could be qualified as a language with the same level of stem categoriality as Latin, significant differences with respect to syntactic configurationality and inflectional complexity are observed between English and German, as shown above. Based on the same parameters, we also assume that Dutch lies in between the two languages. The fact that Dutch shows relatively rich inflection indicates that stems should be assigned to a word class before they achieve the level of syntax.

3.3 Research hypotheses

Table 4 summarizes the typological features discussed above, applied to the three Germanic languages under study, and correlates these properties with their different systems of word-class assignment.

Tab. 4: Typological features and word-class assignment systems in English, Dutch and German

	English	**Dutch**	**German**
Inflection	poor	in between	rich
Boundary permeability	soft boundaries	in between	strong boundaries
Syntactic configurationality	rigid	less rigid	less rigid
Word-class assignment	final (phrase-level) categorization	in between	primary (stem-level) categorization

In languages where word-class assignment is only achieved in syntax, lexical categories should be seen as flexible entities and word-class shifts should be determined by syntax as well. Conversely, in languages where syntactic configurations are less rigid, morphology should play a major role in word-class assignment and the marking of word-class change.

In more specific terms, we assume that because of its poor inflection, English does not establish a clear-cut distinction between lexicon and syntax and word-class assignment is fully achieved at the syntactic level. Boundaries between word classes are soft and word-class shifts do not require overt marking because rigid syntactic patterns may suffice to identify the class to which each word belongs. German, by contrast, is a language characterized

by rich inflection and strong boundaries, not only between linguistic levels but also between lexical categories. The shift from one lexical category to another therefore needs to be formally marked. Finally, Dutch occupies an intermediate position, featuring an intermediate amount of inflection and presumably of boundary permeability. Word-class assignment can then be expected to present hybrid properties, combining overt and non-overt marking.

Based on these facts, we may assume that the use of DNV constructions in English, Dutch and German follows the same Germanic cline. In other words, we hypothesize that English would exhibit the greatest proportion of non-overtly marked DNV constructions. Conversely, we expect to find the highest proportion of overtly marked DNV constructions in German. Dutch, finally, should be situated in between, having reasonable proportions of both overt and non-overt DNV constructions. Furthermore, we argue that the non-overt strategies include conversion and back-formation and that the overt strategies include suffixation and parasynthesis. Prefixation and complex DNVs (SCVs and ICVs) can be taken together as instances of preverbation that have a hybrid status with respect to the covert-overt distinction. These three groups of DNV constructions (non-overt, hybrid and overt) can be situated along a cline because:

– Conversion by definition implies a non-overt marking of word-class change, except in cases of phonological change accompanying the conversion (see Section 2.2). Because of the suffix removal involved in back-formation, we also consider it a non-overt strategy of marking word-class change (Section 2.7).
– Suffixation and parasynthesis involve overt marking of word-class change by means of a derivational suffix, placed to the right of the base word, which in Germanic languages is the expected position for headedness and word-class marking (see Sections 2.3 and 2.6).
– Preverbation may be considered to have special (hybrid) status. As argued in Sections 2.4 and 2.5, preverbed DNVs (prefixation, SCVs and ICVs) are close to conversion because they result from schema unification of $[[X]_N]_V$ (conversion) and $[\textsc{preverb}\ [X]_V]_V$ (preverbation). These three types of DNV constructions, merging conversion with a schema for preverbation, could be considered to be situated in the middle of the covert-overt cline, precisely because they combine a covert strategy of DNV formation (conversion) with the addition of a preverb, flagging verbhood in a less explicit way than suffixation. Because of their position to the left of the base word (in the case of prefixes and inseparable preverbs), and because of their separability in the case of SCVs, we consider preverbs semantic operators rather than word-class-changing operators.

4. Data and methods

4.1 Corpora and data extraction

Research on DNVs, and on conversion in particular, is mostly based on lexicographical sources and lists of neologisms, partly because conversions are particularly difficult to retrieve automatically from corpora due to the absence of formal marking. Our approach, by contrast, is fundamentally corpus-driven and bottom-up in order to ensure representative, usage-based and comparable samples of DNVs in the three languages under study.

Specifically, the comparative data analysis is based on the *TenTen* web corpora, which are available on the *Sketch Engine* platform (Kilgarriff et al. 2014). We made use of the most recent *TenTen* subcorpora available at the time of data collection (2018–2019): *enTenTen15* for English, *nlTenTen14* for Dutch and *deTenTen13* for German. The choice of the *TenTen* web corpora was motivated by the following factors:

i. the *TenTen* web corpora are available for a large set of languages, including the three under study;
ii. the corpora provide recent (2013–2015) and authentic (not translated) language material;
iii. the language material belongs to comparable registers (both formal and informal language use) and comparable topics for the three languages;
iv. the size of the corpora is sufficiently large to extract lists of DNVs in different frequency ranges (high, medium and low frequency), which enables us to take into account type and token frequencies for the analysis. The exact size of the corpora and selected datasets is given in Table 5 (see Section 4.2).

In what follows, we will detail how we proceeded to extract comparable samples of verbs from the three corpora.

We used the "word list" option in *Sketch Engine* to extract all verb types from the corpora automatically. This was done by operating a selection on "lempos"[26] (a combination of lemma and part of speech (pos)) and specifying "verbs" to be extracted by means of the regular expression ".*".[27] Table 5 (in Section 4.2) indicates the total number of verb types and their token frequencies that were extracted during this first stage.

26 https://www.sketchengine.eu/my_keywords/lempos/

27 Since word list downloads are limited to 1,000 items in the standard version of *Sketch Engine*, we had to obtain paid access to unlimited word lists. This ensured that our datasets were not restricted to only the 1,000 most frequent verb types per corpus, but included random samples of verb types belonging to different frequency ranges.

However, we observed numerous problems occurring in the lowest frequency ranges, mainly spelling mistakes (e.g. verb type **poss* instead of *possess*) and incorrect tagging (for instance, Dutch plural nouns ending in *-en* that had been tagged as Dutch infinitives also ending in *-en*, e.g. *bommen* 'bombs'). To resolve this problem, we decided to set a cut-off point for a minimum frequency at 1 per 1 million verb tokens for each of the languages. For instance, as the Dutch corpus consisted of 351,637,464 verb tokens, we set a minimum token frequency at 352, and replicated this method for the English and German datasets. We thereby obtained "cleaner" lists of 6,115 English verb types, 5,400 Dutch verb types and 9,050 German verb types.[28]

These verb lists were then exported to Excel and used to extract a random sample of 1,000 verb types per language. For each verb type, we added the absolute and normalized token frequency (per 1 million verb tokens) in the Excel file.

Subsequently, the three samples of 1,000 verb types were subjected to manual analysis in order to extract all DNVs that comply with specific selection criteria. These criteria will be discussed in the next section.

4.2 Selection criteria

Starting with the English data, we have jointly designed the annotation procedure and conducted a pilot analysis of the English dataset.[29] This method allowed us to discuss and fine-tune the selection and annotation criteria before extrapolating them to the Dutch and German data.[30]

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28 We acknowledge that a significant drawback of this method is that it does not allow us to include the lowest-frequency types, e.g. hapax legomena, which are usually considered indicative of productive schemas. Nevertheless, these lowest-frequency items contained too many erroneous verb types to be included in the analysis. Moreover, since the corpora for English, Dutch and German have widely divergent sizes, comparing the number of hapaxes in the three languages would not have resulted in a useful comparison of productivity. Setting an identical cut-off point enabled us to keep the datasets comparable.

29 The English dataset has been analysed in-depth by Koutsoukos (2021), but we made two minor changes in the categorization of the English DNVs in this study. First, the categories of conversion with or without phonological change have been merged into one category. Second, among the verbs originally classified as conversions, we identified four that almost exclusively co-occur with a particle in the corpus examples and categorized them as SCVs in the present analysis (see Section 5.1).

30 Kristel Van Goethem is a native speaker of Dutch and analysed the Dutch dataset. For the analysis of the German dataset, we were assisted by two university students who are native speakers of German (Virginie Houtart, UCLouvain, and Sarah Sippach, HUBerlin).

The manual data analysis of the 1,000 verb types per language complied with the following selection criteria:

i. the verb form instantiates one of the DNV constructions presented in Section 3;
ii. the verb is derived from a noun, and not vice versa;
iii. the denominal verb is semantically and formally compositional in synchronic terms;
iv. the verb form is actually attested in the intended DNV construction in the majority of the corpus data exemplifying this type.

According to the first criterion, all non-denominal verbs had to be discarded. For example, simplex verbs or complex verbs that are not denominal (such as deadjectival verbs, e.g. *socialize* < *social*) were excluded from further analysis.

In the next step, the most intriguing part of the selection process was to determine the directionality of derivation in noun-verb pairs that have identical form. Four distinguishing criteria are commonly mentioned in the literature, all going back to Marchand (1963, 1964): (a) the historical/etymological relationship between noun and verb, (b) the semantic dependence between both items (in our case, the meaning of the verb should depend on the meaning of the noun), (c) the semantic range criterion (in our case, the range of meanings of the derived verb should be smaller than that of the source noun), and (d) the frequency criterion (i.e. the derived word should occur less frequently than the source item).[31] Additionally, other criteria can be used. For example, denominal verbs in English and Dutch have default (weak) inflection, as shown in examples (24) and (25) (adapted from McIntyre 2015 and Booij & Audring 2020a).

(24) Dutch *prijzen* 'to praise' vs. 'to price'
  a. *Ze* ***prees*** *zichzelf gelukkig dat ze er jonger uitzag dan haar werkelijke leeftijd.*
  'She considered (lit. praised) herself lucky that she looked younger than her real age.'
  b. *Tijdens haar studentenjob* ***prijsde*** *ze alle nieuwe artikelen.*
  'During her student job, she priced all new items.'

31 Lohmann (2017) adds empirical phonological cues to these four criteria, based on the typical phonological properties of verbs and nouns that may determine the directionality of conversion in English.

(25) English *to slide* 'to glide' vs. 'to put on a slide'
a. *I* ***slid*** *the sample under the microscope.*
b. *I* ***slided*** *the sample.*

In (24), the verb *prijzen* corresponds either to the ablauting verb meaning 'lit. to praise' (24a), or to the denominal weak verb meaning 'to price', derived from the noun *prijs* 'price' (24b). Likewise, in (25a), English *to slide* refers to the non-denominal verb meaning 'to glide', featuring strong inflection; the weak inflection in (25b) reveals the denominal origin of *to slide*, meaning 'to put on a slide'.

In line with these distinguishing criteria, we checked etymological dictionaries to obtain reliable information about the origin of the noun-verb pairs.[32] This etymological filter showed, for instance, that the Dutch verb *verraden* 'to betray' is not denominal, because the noun *verraad* 'betrayal' is derived from the verb and not vice versa. Pairs of nouns and verbs that emerged simultaneously were also discarded. The word *waste*, for instance, borrowed from French, has appeared simultaneously as a noun and a verb in English since ca 1200, and was removed from the corpus selection for this reason.[33]

Independently of the etymological information, noun-verb pairs were also checked by at least two native speakers of each language in order to evaluate the formal and semantic relationship between the noun-verb pair and the direction of derivation. Our native informants for German, for instance, considered that the verb *wittern* 'to scent' does not stand in a synchronic transparent relationship with the noun *Wetter* 'weather', to which it is

32 We used the *Online Etymology Dictionary* (https://www.etymonline.com/) for English, the *Etymologiebank* (http://www.etymologiebank.nl/, van der Sijs 2010) for Dutch and the *Digitales Wörterbuch der deutschen Sprache* (https://www.dwds.de/) for German.

33 Moreover, the etymological and morphological information provided by the dictionaries assured us that the DNV formation is the last step of the morphological process. Based on this criterion, forms such as English *reschedule* or Dutch *terugschakelen* 'to gear down' were also excluded, because the last step of the process does not consist in the creation of the DNV, but in prefixation or preverbation of an already existing converted noun (e.g. *schedule* or *schakelen* 'to change gear').

etymologically related. Such non-transparent pairs were also excluded from further analysis.[34]

Finally, in order to comply with the fourth criterion, the actual attestation of the DNV lemma was checked in the *TenTen* corpus data. For each (polysemous) lemma analysed as a DNV, we checked whether, in the majority of the corpus examples (checked on a random sample in the case of highly frequent verbs), it was actually used with the noun-related meaning assigned to it in the lexicographical sources. An example of a verb type excluded due to this criterion is the English verb *to express,* which potentially instantiates a conversion from the noun *express* (*letter*) in the sense of 'to send something somewhere very quickly', but was used with the meaning 'to show a feeling, opinion or fact' in the large majority of the corpus examples.[35]

This four-stage selection method was carefully applied to the three datasets. As a result of this procedure, we ended up with comparable datasets of 159 denominal verb types in English, 171 in Dutch and 164 in German, which were manually annotated for their DNV construction type, specific morphological and phonological features (e.g. prefix-type, umlaut), and etymology.[36]

Table 5 summarizes the quantitative results of each step in this procedure. The final row in Table 5 indicates the average normalized token frequency for the DNV verb types in each language sample: it shows that the selected English DNV verb types appear on average 33.62 times per million tokens, the Dutch ones 56.81 times and the German ones 76.11 times.

34 For the same reason, we also discarded DNVs that are only used with a figurative meaning (e.g. *to slave*).

35 Additionally, this procedure allowed us to discard mistagged forms that were not instantiating verbs, even though they surpassed the minimal frequency cut-off point. For instance, the Dutch form *biggen* 'to pig', which according to the dictionaries can be analysed as an N>V conversion, instantiated either the Dutch plural of the Dutch noun *big* 'pig' or the borrowed English adjective *big* in the majority of the corpus examples. Likewise, the form *dressen* had been tagged as a German verb type, but the concordance examples showed that it only appeared in English sentences (e.g. *Come casual but dress smart, lautet die Devise*).

36 Our full datasets can be found in the Appendix.

Tab. 5: Size of the corpus samples

	English enTenTen15	Dutch nlTenTen14	German deTenTen13
Total number of words	15,703,895 409	2,576,596,803	16,432,078,370
Total number of verb types	936,069	6,437	498,378
Total number of verb tokens	2,393,433,270	351,637,464	2,430,613,798
Cut-off point (min. token frequency = 1/1 million verb tokens)	2,393	352	2,431
Total number of verb types (≥ cut-off)	6,115	5,400	9,050
Total number of verb tokens (≥ cut-off)	2,384,719,004	351,483,194	2,405,679,956
DNV-type frequency in random 1,000-verb sample	159	171	164
DNV normalized token frequency (per 1 million verb tokens) in random 1,000-verb type sample	5,345	9,715	12,482
Proportion of DNVs in random 1,000-verb type sample	15.9%	17.1%	16.4%
Average normalized DNV token frequency (normalized token freq/number of DNV types)	33.62 (5,345/159)	56.81 (9,715/171)	76.11 (12,482/164)

The results of the analysis for the three languages will be presented in the next section.

5. Results

5.1 English

Table 6 shows the absolute frequencies and the proportions of the different DNV types in the English corpus sample.

Tab. 6: DNV construction types in English

DNV construction types	Verb types	%
Conversion	135	84.91%
Suffixation	18	11.32%
Prefixation	1	0.63%
SCV	4	2.52%
Back-formation	1	0.63%
TOTAL	**159**	**100.00%**

The figures indicate that the vast majority (about 85%) of DNV types in English are conversions (e.g. *to partner, to sample*, *to network*). Only in two cases out of the 135 conversions does the process involve a phonological change (*grief* > *to grieve, grass* > *to graze*). Closely related to conversion are SCVs. In four verb types, the corpus examples show that the verb appears almost exclusively in combination with one or more particle(s): *to line up, to freak out, to dish out/up, to sally out/forth*. Suffixation represents only about 11% of the dataset. We found 15 cases of *-ise/-ize* suffixation (e.g. *to crystallise, to idolize*) and three of *-ate* suffixation (e.g. *to carbonate*). Prefixation (e.g. *to befriend*) and back-formation (e.g. *to bulldoze*) are marginal DNV construction types in the English dataset. English DNVs formed by parasynthesis or by ICV do not occur in the corpus sample.

5.2 Dutch

Table 7 contains the results of the analysis of the Dutch corpus sample.

Tab. 7: DNV construction types in Dutch

DNV construction types	Verb types	%
Conversion	83	48.54%
Suffixation	27	15.79%
Prefixation	24	14.04%
SCV	26	15.20%
ICV	8	4.68%
Parasynthesis	3	1.75%
TOTAL	**171**	**100.00%**

Compared with the English dataset, the Dutch sample displays a more diversified spectrum of DNV construction types.

As in English, conversion is the most frequent DNV construction type in Dutch, but represents only half of the Dutch types in the dataset (e.g. *hameren* 'to hammer' from *hamer* 'hammer', *grappen* 'to joke' from *grap* 'joke'). It is

worth noting that different formal types of nominal bases may undergo conversion. As an indication, we can mention the verb *tafeltennissen* 'to play table tennis' from the compound *tafeltennis* 'table tennis', and the verb *bankieren* 'to act as a banker' from the suffixed noun *bankier* 'banker'. We also noticed that nouns borrowed from English, such as *cluster* or *bridge* (the game), systematically undergo conversion when used to create Dutch verbs (e.g. *clusteren* 'to cluster', *bridgen* 'to play bridge'). Only 1 out of the 83 conversions involves a phonological change: i.e. vowel lengthening that occurs in the shift from the noun *lot* 'lottery ticket' to the verb *lo:ten* 'to draw lots'.

Besides conversion, the figures in Table 7 show that a large proportion of Dutch denominal verbs in our sample is formed by SCVs (e.g. *opzwepen* 'to whip up' from *zweep* 'whip', *inlijsten* 'to frame' from *lijst* 'frame') and prefixation (e.g. *bestraten* 'to pave' from *straat* 'street', *ontkrachten* 'to disprove, invalidate' from *kracht* 'strength'). ICVs, such as *omarmen* 'to embrace' from *arm* 'arm' and *overbruggen* 'to bridge' from *brug* 'bridge', are less frequently attested in the sample.

The proportion of suffixed DNVs in Dutch (almost 16%) is larger than in English (about 11%), but it has to be noted that, in the majority of cases (22 out of 27), Dutch makes use of the non-native suffixes *-eer* and *-iseer* (e.g. *structureren* 'to structure', *inventariseren* 'to make an inventory', *standaardiseren* 'to standardize'). Native suffixation with *-el* (e.g. *nestelen* 'to nest' from *nest* 'nest'), *-er* (e.g. *punteren* 'to toe-kick' from *punt* 'point, tip') and *-ig* (e.g. *zondigen* 'to sin' from *zonde* 'sin') is not frequently attested (5 out of 27 cases).

Finally, the Dutch dataset contains three cases of parasynthetic DNVs (*bekostigen* 'to bear the cost of' from *kost* 'cost', *verdrievoudigen* 'to triple' from *drievoud* 'triplicate', *ontmoedigen* 'to discourage' from *moed* 'courage'), but no instances of back-formation.

5.3 German

Table 8 presents the results of the analysis of the German dataset.

Tab. 8: DNV construction types in German

DNV construction types	**Verb types**	**%**
Conversion	89	54.27%
Suffixation	39	23.78%
Prefixation	15	9.15%
SCV	14	8.54%
ICV	1	0.61%
Parasynthesis	6	3.66%
TOTAL	**164**	**100.00%**

As in the English and Dutch data samples, the majority of German DNVs are formed by conversion (e.g. *sonnen* 'to sunbathe' from *Sonne* 'sun', *frühstücken* 'to have breakfast' from *Frühstück* 'breakfast'). The percentage of 54.27% is in between the proportions found for English and Dutch. Note that about 13% of these conversions (12 out of 89 cases) involve a phonological change, mostly the addition of an umlaut (e.g. *Kampf* > *kämpfen* 'to contend with, combat'), but consonantal change also occurs (e.g. *Kennzeichen* > *kennzeichnen* 'to characterize'). A similar proportion of the German conversions (13 out of 89 cases) involves base nouns borrowed from English (e.g. *grillen* < *Grill, finishen* < *Finish*).

The second most frequent DNV type in the German dataset is suffixation (about 24%). As in Dutch, it mostly involves non-native suffixes, namely *-ier/-isier* (35 out of 39 cases) (e.g. *katapultieren* 'to catapult' < *Katapult* 'catapult', *idealisieren* 'to idealize' < *Ideal* 'ideal'). The native suffixes *-el* (e.g. *radeln* 'to cycle, to bike' < *Rad* 'wheel') and *-er* (e.g. *wildern* 'to poach' < *Wild* 'game') only appear four times in the data sample.

DNVs formed by 'preverbation'– used as an umbrella term for SCVs, ICVs and prefixation– represent in total about 18% of the verb types. Prefixation (e.g. *verkabeln* 'to cable' < *Kabel* 'cable', *beeindrucken* 'to impress' < *Eindruck* 'impression', *entkernen* 'to stone, to pit' < *Kern* 'seed', *erhöhen* 'to heighten' < *Höhe* 'height') and SCVs (e.g. *einfetten* 'to grease' < *Fett* 'fat', grease', *ausklinken* 'to unlatch' < *Klinke* 'handle, latch', *abzielen* 'to aim at' < *Ziel* 'aim, goal') outnumber ICVs (e.g. *umranden* 'to edge' < *Rand* 'edge'). Based on the data sample, the latter category appears to be marginal for German DNV formation. This also holds for parasynthetic DNVs (e.g. *beerdigen* 'to bury' < *Erde* 'earth', *entvölkern* 'to depopulate' < *Volk* 'nation, people'). Back-formation is not attested in the German sample.

5.4 Comparative analysis

Table 9 and Figure 2 summarize the proportions of the different DNV construction types in English, Dutch and German.

Tab. 9: DNV construction types in English, Dutch and German

	English	Dutch	German
Conversion	135 (84.71%)	83 (48.54%)	89 (54.27%)
Suffixation	18 (11.32%)	27 (15.79%)	39 (23.78%)
Prefixation	1 (0.63%)	24 (14.04%)	15 (9.15%)
SCV	4 (2.52%)	26 (15.20%)	14 (8.54%)
ICV	0	8 (4.68%)	1 (0.61%)
Parasynthesis	0	3 (1.75%)	6 (3.66%)
Back-formation	1 (0.63%)	0	0
TOTAL	**159**	**171**	**164**

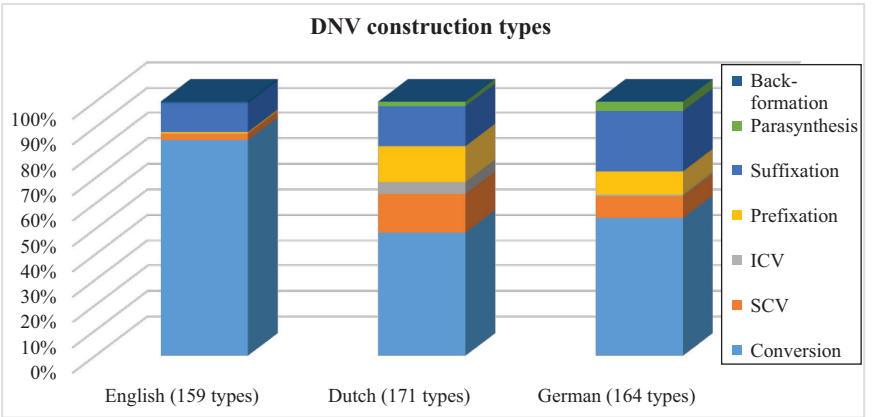

Fig. 2: DNV construction types in English, Dutch and German: type frequencies

In Figure 2, it can clearly be seen that conversion is the main and almost exclusive DNV construction type in the English sample, whereas the Dutch and German samples show more diversified profiles. Although conversion is still the most frequent DNV construction type in both Dutch and German, covering about half of the verb types in the respective datasets, the proportion in both languages is significantly smaller than in English (Eng. vs Dutch: $\chi 2$ (1, N = 330) = 48.6, p < .00001 and Eng. vs Germ.: $\chi 2$ (1, N = 323) = 35.7, p < .00001).[37]

By contrast, we note a large proportion of preverbation as being typical of Dutch, mostly SCVs and prefixation. Merging the three types of preverbed DNVs (SCV, ICV and prefixation), we observe a significantly higher proportion of preverbation in the Dutch sample compared with English ($\chi 2$ (1, N = 330) = 48.5, p < .0001) and with German ($\chi 2$ (1, N = 335) = 9.8, p < .01).

The proportion of preverbed DNVs is smaller in the German dataset, but compensated by a larger amount of suffixation. The proportion of suffixation in German is significantly higher than in English ($\chi 2$ (1, N = 323) = 8.6, p < .005) but not than in Dutch ($\chi 2$ (1, N = 335) = 3.4, p > .05). When parasynthesis is included as a subtype of suffixation, the proportion of this merged category in the German sample significantly exceeds the proportion in Dutch ($\chi 2$ (1, N = 335) = 4.2, p < .05).

Table 10 and Figure 3 present the normalized token frequencies (per 1 million verb tokens) of the different DNV construction types.

37 When comparing the frequency of conversion in the three languages, the expected occurrence of conversion is as follows: 98.81 in English, 106.27 in Dutch and 101.92 in German ($\chi 2$ (2, N = 494) = 52.8, p < .00001).

Tab. 10: DNV constructions in English, Dutch and German: normalized token frequencies (per 1 million verb tokens)

	English	Dutch	German
Conversion	5, 076 (94.97%)	6,547 (67.39%)	8,783 (70.37%)
SCV	141 (2.64%)	220 (2.26%)	1,028 (8.24%)
ICV	0	177 (1.82%)	4 (0.03%)
Prefixation	17 (0.32%)	1,851 (19.05%)	1,224 (9.81%)
Suffixation	106 (1.98%)	859 (8.84%)	1,333 (10.68%)
Parasynthesis	0	61 (0.63%)	110 (0.88%)
Back-formation	5 (0.09%)	0	0
TOTAL	**5,345**	**9,715**	**12,482**

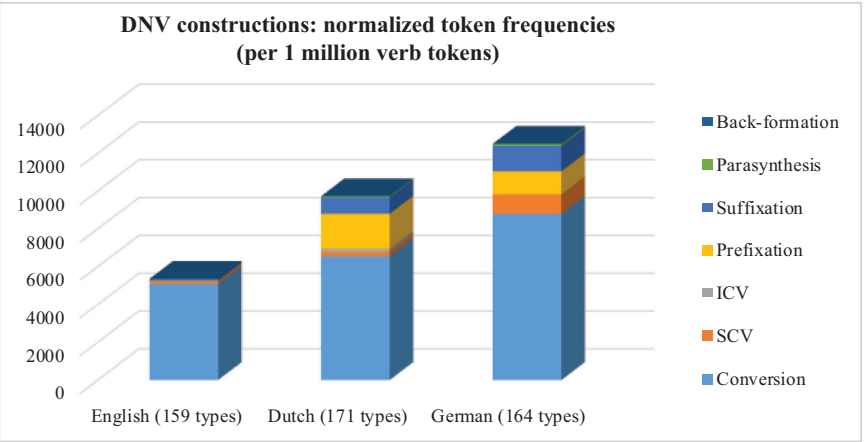

Fig. 3: DNV constructions in English, Dutch and German: normalized token frequencies (per 1 million verb tokens)

First, we note a considerable cline in the totals: whereas the number of DNV types is not highly dissimilar, the number of normalized tokens is quite divergent. Looking at the figures more closely, we can see that the German verb types represent the highest number of tokens, followed by the Dutch and the English types, in that order. In other words, the German DNV types in the sample correspond – generally speaking – to more frequently used verbs than the Dutch and the English ones, as was already observed in Section 4.2 (average normalized DNV token frequency in Table 5). When we compare the proportions of the normalized DNV tokens per language, we can see that conversion is even more predominant in English than when the comparison is based on the type frequencies, and that this construction type also has more relative importance in both the Dutch and the German samples. Based on the

normalized token frequencies, the importance of conversion is nevertheless still significantly higher in English than in Dutch ($\chi 2$ (1, N = 15,060) = 1488.7, p < .00001) and German ($\chi 2$ (1, N = 17,827) = 1309.01, p < .00001). The significantly higher proportions of preverbation (SCV + ICV + prefixation) in Dutch and of suffixation (including parasynthesis) in German still hold when calculated on the basis of the token frequencies.[38]

Although it is extremely valuable to consider both token frequencies and type frequencies in order to compare language structure with actual language use (see Berg 2016), the corpus results based on the token frequencies should be treated with caution.[39] As explained in Section 4.2, for verb types with high token frequency, we checked on a random sample whether the verb type was actually used with the noun-related meaning assigned to it in the lexicographical sources, but we cannot guarantee that all tokens represent the intended DNV type. The following discussion of the results will therefore be based exclusively on the type frequencies of the DNV constructions per language.

Table 11 and Figure 4 show the proportions of the merged overt, non-overt and hybrid DNV constructions (type frequencies) in the three languages, as defined in Section 3.3.

38 Preverbation in Dutch vs English ($\chi 2$ (1, N = 15,060) = 1046.4, p < .00001); Preverbation in Dutch vs German ($\chi 2$ (1, N = 22,197) = 86.7, p < .00001); Suffixation in German vs English ($\chi 2$ (1, N = 17,827) = 432.7, p < .00001); Suffixation in German vs Dutch ($\chi 2$ (1, N = 22,197) = 25.1, p < .00001).

39 In his analysis of derivational affixes in English, Dutch and German, Berg (2016) finds a preponderance of suffixation compared with prefixation at both type and token level, but – interestingly – the suffix-to-prefix ratios vary considerably according to the level of analysis. Comparing the suffix-to-prefix ("pure prefixation") ratios in our dataset, we also observe a preference for suffixation in the three languages at the type level, but not at the token level: in Dutch, the token frequency of prefixation is more than twice as high as the token frequency of suffixation. When comparing suffixation with preverbation (SCV + ICV + prefixation), the picture is quite different: the type frequency of preverbation exceeds that for suffixation in Dutch and all languages show more preverbation than suffixation at token level. These findings provide additional evidence for Berg's study by showing that frequency should be studied at a multiplanar level in order to compare language structure with actual language use. However, the results of our study are not entirely comparable with Berg's (2016) results because our dataset only includes denominal verbs.

Tab. 11: DNV constructions: overt vs non-overt marking

	English	Dutch	German
Non-overt marking (conversion and back-formation)	136 (85.5%)	83 (48.5%)	89 (54.3%)
Overt marking (suffixation and parasynthesis)	18 (11.3%)	30 (17.5%)	45 (27.4%)
Preverbation (SCV, ICV, prefixation)	5 (3.1%)	58 (33.9%)	30 (18.3%)
TOTAL	**159**	**171**	**164**
Non-overt/overt ratio	**7.6**	**2.8**	**2.0**

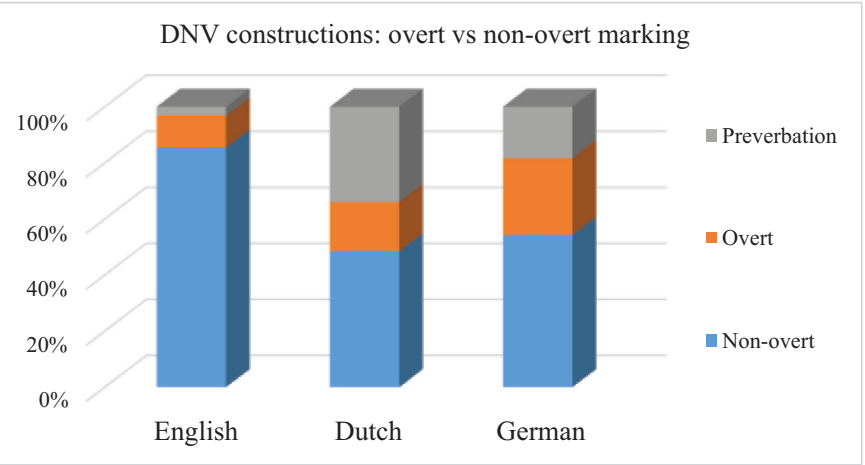

Fig. 4: Overt vs non-overt DNV constructions

In the three data samples, the proportion of non-overt marking of the DNV word-class change is higher than the proportion of overt marking. However, the ratios in the bottom line of Table 11 indicate an interesting cline: whereas non-overt marking can be found with a type frequency that is 7.6 times higher than overt marking in English, these ratios are much lower in Dutch (2.8) and German (2.0).

Switching the perspective, we observe that overt marking is least represented in the English dataset (11.3%), most in the German one (27.4%) and shows in-between relative type frequency in the Dutch sample (17.5%). Non-overt marking has the highest relative type frequency in English (85.5%), followed by German (54.3%) and Dutch (48.5%). Finally, preverbation, which we consider an intermediate category between overt and non-overt marking (see Section 3.3), reaches the highest proportion in the Dutch dataset (33.9%),

when compared with English (only 3.1%) and German (18.3%). These findings are statistically significant:

(i) Non-overt marking occurs significantly more frequently in English than in Dutch ($\chi 2$ (1, N = 330) = 48.9, p < .0001). The effect size of this association is moderate (Cramér's V = 0.39).[40] The same tendencies hold for the comparison of non-overt DNV marking in English and German: it occurs significantly more frequently in English ($\chi 2$ (1, N = 323) = 35.9, p < .0001). The effect size of the association is also moderate (Cramér's V = 0.34).

(ii) Overt marking has a significantly higher type frequency in German than in English ($\chi 2$ (1, N = 323) = 12.4, p < .001). The size of this effect is nevertheless small (Cramér's V = 0.20). The distinction between German and Dutch is also statistically significant ($\chi 2$ (1, N = 335) = 4.2, p < .05), with likewise a small effect size (Cramér's V = 0.12).

(iii) Finally, preverbation has significantly higher type frequency in Dutch than in English ($\chi 2$ (1, N = 330) = 48.5, p < .0001) The effect size is moderate (Cramér's V = 0.39). A significant difference with respect to German is also corroborated ($\chi 2$ (1, N = 335) = 9.8, p < .01), but with a smaller effect size (Cramér's V = 0.18).

6. Discussion: language-specific constructional networks

Figure 5 represents the constructional networks of DNV constructions in English, Dutch and German (only constructions with a type frequency > 3% are shown), based on our previous findings. The size of the boxes and characters approximates the relative importance of each construction type per language. The horizontal dotted lines indicate the links between the different construction types seen as different formal alternatives or "allostructions" of the overarching DNV hyper-construction, as described in Section 2.1.

40 Cramér's V is a measure of effect size. Its value ranges from 0 (no association) to 1 (perfect association). Values between 0.1 and 0.3 indicate a small effect size. Values between 0.3 and 0.5 suggest a moderate effect. If the value is higher than 0.5, the effect can be considered strong (Levshina 2015: 209).

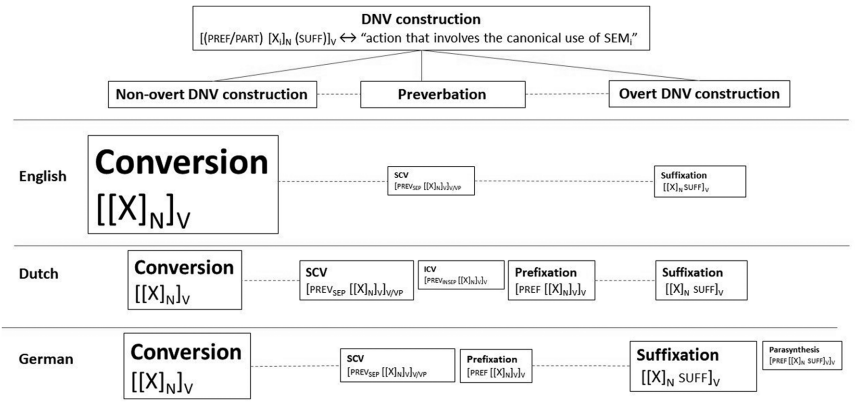

Fig. 5: Constructional networks of DNV constructions in English, Dutch and German

Although the different construction types are available in the three languages, our study has shown that idiosyncratic typological properties are responsible for considerable language-specific preferences, as visualized in Figure 5. More specifically, if we distinguish between non-overt or covert DNV constructions (conversion and back-formation), overt DNV constructions (suffixation and parasynthesis) and the hybrid class of DNV constructions with preverbation (SCV, ICV and prefixation), our data analysis points to the expected cline: comparatively speaking, we observe an English tendency towards non-overt marking of the DNV change, a German tendency towards overt marking, and, finally, a Dutch tendency towards preverbation.[41]

Illustrative of the idiosyncratic properties of English is example (26), drawn from our *enTenTen15* corpus sample. In the absence of inflection, the assignment of the verbal category to the lexical unit *snowshoe* is only marked by syntax, in particular the [SV] chunk characterizing Modern English syntax:

(26) *We go for hikes, and we* ***snowshoe*** *in winter* (…) (*enTenTen15*)

German, by contrast, is a language characterized by rich inflection and strong boundaries, and hence shows a preference for word-class change to

41 These quantitative language-specific results are confirmed if we take a more qualitative look at the data. Quite regularly, converted DNVs in English correspond to preverbed DNVs in Dutch (e.g. *to bridge/***over***bruggen, to grease/***in***vetten, to pit/***ont***pitten*). On the other hand, English cases of conversion regularly correspond to German suffixations (e.g. *to bike/rad***eln**, *to station/ station***ier***en*).

be formally marked, which explains why we find the largest proportion of overt marking of the N>V change in the dataset of this language, especially suffixation. It is worth noting that, although conversion still accounts for more than half of the German DNV types in our sample, a relatively large proportion (13%) does include formal marking in the sense of phonological change (mainly umlaut) and a similar proportion is represented by English loanwords (see Section 5.3). Example (27) illustrates the fact that word-class assignment in German is prototypically the result of cooperation between syntax (V2 in main clauses), derivational morphology (word-class-changing suffix *-ier*) and inflection (suffix *-ten*):

(27) *Auch hier* ***attackierten*** *Rechtsextremisten ein Flüchtlingswohnheim* (…)
'Here, too, right-wing extremists attacked a refugee hostel (…)'
(*deTenTen13*)

Finally, Dutch can be confirmed to occupy an intermediate position, featuring an intermediate amount of inflection and boundary permeability. Word-class assignment is often achieved at the level of syntax through word order, and word-class change is often morphologically covert (conversion, without phonological change). However, a qualitative look at our data suggests that, semantically speaking, English conversion is more flexible than Dutch conversion, and that Dutch has a strong tendency to add a preverb to render the semantic change from noun to verb more explicit. This hypothesis also ties in with a difference in boundary permeability, but at the semantic level, and should be further explored in follow-up research.[42] Example (28) from the Dutch dataset illustrates that the lexical category of the verb is often marked by a combination of syntax (SOV in a subordinate clause, as in German) and inflectional morphology. We argue that the preverb has mainly a semantic function: in example (28), *uit-* emphasizes the elevated position of the cathedral above the city of Copacabana. Interestingly, the English translation of the verb *uittorenen* does not need this preverb (*to tower*).

42 It is illustrative that English conversion is flexible enough to render opposite meanings such as ornative and privative meanings: e.g. *to powder* 'to apply (cosmetic) powder' vs *to pit/stone* 'to remove the pit/stone'. As mentioned by an anonymous reviewer, these contrary meanings are even possible within one lexeme, such as *to dust* (ornative or privative). This semantic versatility does not hold for Dutch: the latter language seems to use conversion in well-defined "semantic niches", such as verbs referring to sports (e.g. *voetballen* vs *to play football*) (Hüning 2009) and regularly relies on preverbs to mark semantic distinctions (e.g. *bepoederen* 'to apply (cosmetic) powder' vs *ontpitten* 'to remove the pit/stone').

(28) *Struin lekker door Copacabana en bezoek de imposante Moorse kathedraal die boven het plaatsje* ***uittorent***
'Stroll through Copacabana and visit the impressive Moorish cathedral that towers over the town.' (*nlTenTen14*)

The distinctions described above reveal generalized tendencies rather than clear-cut divisions. The gradience of these properties is confirmed by our corpus study. Most DNV types presented in Section 2 occur in all three Germanic datasets; only parasynthesis and back-formation appear to be marginal. Nevertheless, our corpus analysis suggests that significant preferences and tendencies can be observed. Moreover, we have argued that a trade-off between syntax (word order), inflection and derivational morphology accounts for the proportions of DNV types found in the three languages.

7. Conclusions

Our study has shown that English, Dutch and German display a similar set of DNV constructions, but that these are not equally distributed across the three languages. In a random sample of 1,000 verb types drawn from the *TenTen* web corpora, we found a comparable number of DNV constructions in English (159 types), Dutch (171 types) and German (164 types). The analysis of these DNV verb types indicated that in the three languages, conversion is the main construction type used to create denominal verbs. However, the proportions of the different DNV types differ significantly. Whereas conversion was shown to cover about 85% of the English DNV types, the Dutch and German corpus samples showed more diversified profiles in which conversion represents only about half of the DNV types. We observed that in the Dutch sample, preverbation (SCV, ICV and prefixation taken together) stands out as the second construction type used to form DNVs (about 34%), followed by suffixation (about 16%). In German, conversely, suffixation turned out be a more important DNV type (about 24%) than preverbation (about 18%).

Comparatively speaking, our corpus study suggests a significant preference for covert marking of the N>V change in English, a significant preference for overt DNV types (suffixation and parasynthesis) in German, and a significantly higher proportion of preverbation in Dutch than in either of the other two languages. Since preverbed DNV constructions are analysed as being the result of schema unification of conversion and preverbation, we consider these construction types to be intermediate between covert and overt.

These results can be accounted for by a set of interrelated typological factors. In a language such as English, with impoverished inflection and

a rigid syntactic structure (SVO), assignment of word classes can often be achieved by syntax alone. Soft boundaries between word classes allow easy shifting from one class to the other, in particular from noun to verb, and these shifts do not need to be morphologically marked on the verb. Conversion is therefore a default scenario for DNV construction in English.

Although closely related to English, German represents a typologically different language, with relatively rich inflection, more varied word-order patterns (V2/SOV) and more clear-cut boundaries between lexical categories. Because of the possible variation in word order, the verbal category is not sufficiently marked by syntax alone. In such a language with strict boundaries between word classes, the change of word class can still be achieved by conversion, but derivational suffixation has increasing importance. Interestingly, even in the case of conversion, phonological marking (umlaut) is used most frequently in this language to overtly indicate the N>V shift. Moreover, prefixes and particles are used in German more often than in English to signal the semantic change accompanying the N>V shift.

On this Germanic continuum, Dutch clearly occupies an intermediate position. It has richer (verbal) inflection than English, but less inflection than German. Syntactically, it is comparable to German, displaying more varied word-order patterns than English. The shift from noun to verb can be marked by the inflectional ending alone, in the case of conversion, but this DNV type turns out to be less flexible (semantically) than in English. Comparing the three languages, Dutch is the language that most typically adds preverbs to N>V conversions to make the semantic change more explicit.

Our case study provides additional evidence for Berg's (2014) claim that all linguistic levels (phonology, morphology, lexis, syntax and semantics) are closely interconnected and cooperate with each other (see the earlier conception of language as "un système où tout se tient"). Specifically, flexibility in syntax may be compensated by more formal marking of word class and word-class change at the morphological and even at the phonological level (e.g. umlaut in German); conversely, rigid syntactic configurationality may need less cooperation of morphology and phonology in formal marking of word class and word-class change.

From a cross-linguistic constructionist perspective, our study demonstrates that language-specific features considerably affect the shape of constructional networks in languages in synchrony and, as such, we believe that our study makes a significant contribution to a typological approach to Construction Morphology and Construction Grammar.

In follow-up research, this study could be extended to other types of word-class change, such as deadjectival verbs, and to other languages with different typological profiles. Elaborating on the comparative semantic analysis of the

DNV constructions under study and on the diachronic factors leading to the typological differences is also a potential avenue for future research.

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Appendix: Datasets of English, Dutch and German DNV constructions

English		Dutch		German	
camouflage	conversion	*verlichten*	prefixation	*häkeln*	conversion
invoice	conversion	*overreden*	ICV	*beschallen*	prefixation
word	conversion	*segmenteren*	suffixation	*einlochen*	SCV
grieve	conversion	*kleuren*	conversion	*knuffen*	conversion
pressurize	suffixation	*inkleuren*	SCV	*rudern*	conversion
pilot	conversion	*schaken*	conversion	*schleusen*	conversion
picnic	conversion	*stekken*	conversion	*wildern*	suffixation
mine	conversion	*afbladderen*	SCV	*konfektionieren*	suffixation
piece	conversion	*troosten*	conversion	*häckseln*	conversion
rust	conversion	*melken*	conversion	*weihnachten*	conversion
memorize	suffixation	*afranselen*	SCV	*anpflaumen*	SCV
soap	conversion	*stroomlijnen*	conversion	*katapultieren*	suffixation
waltz	conversion	*experimenteren*	suffixation	*einrahmen*	SCV
saddle	conversion	*kanten*	conversion	*spüren*	conversion
summer	conversion	*verwikkelen*	prefixation	*zählen*	conversion
signal	conversion	*omfloersen*	ICV	*urinieren*	suffixation
silence	conversion	*betitelen*	prefixation	*beabsichtigen*	parasynthesis
line up	SCV	*examineren*	suffixation	*malochen*	conversion
tailor	conversion	*bundelen*	conversion	*erhöhen*	prefixation
pepper	conversion	*mikken*	conversion	*kodieren*	suffixation

English		Dutch		German	
tar	conversion	*ontluchten*	prefixation	*flüchten*	conversion
jewel	conversion	*zondigen*	suffixation	*rangieren*	suffixation
prank	conversion	*onttronen*	prefixation	*enden*	conversion
debit	conversion	*inlijsten*	SCV	*einfetten*	SCV
clot	conversion	*hamsteren*	conversion	*schanzen*	conversion
carbonate	suffixation	*dampen*	conversion	*reglementieren*	suffixation
trash	conversion	*bufferen*	conversion	*fräsen*	conversion
toe	conversion	*faxen*	conversion	*indexieren*	suffixation
radio	conversion	*punten*	conversion	*exmatrikulieren*	parasynthesis
terrace	conversion	*onweren*	conversion	*taktieren*	suffixation
tongue	conversion	*uitvissen*	SCV	*verkrampfen*	prefixation
polychlorinate	suffixation	*baren|gebaren*	conversion	*bremsen*	conversion
chauffeur	conversion	*blinddoeken*	conversion	*aufpeppen*	SCV
quip	conversion	*verantwoorden*	prefixation	*disziplinieren*	suffixation
dialog	conversion	*notuleren*	suffixation	*hexen*	conversion
sally out/forth	SCV	*uitmesten*	SCV	*autorisieren*	suffixation
zone	conversion	*bedoelen*	prefixation	*rebellieren*	suffixation
trademark	conversion	*bekostigen*	parasynthesis	*hebeln*	conversion
towel	conversion	*huren*	conversion	*turnieren*	suffixation
feud	conversion	*vereren*	prefixation	*mimen*	conversion
lap	conversion	*biljarten*	conversion	*bilden*	conversion
track	conversion	*plussen*	conversion	*schildern*	suffixation
wine	conversion	*bedijken*	prefixation	*modern*	conversion
grade	conversion	*schutteren*	conversion	*finanzieren*	suffixation

	English		Dutch		German	
synthesize	suffixation	*beogen*	prefixation	*adressieren*	suffixation
button	conversion	*weerspiegelen*	ICV	*verschlüsseln*	prefixation
gold-plate	conversion	*boffen*	conversion	*gefährden*	conversion
tape	conversion	*etteren*	conversion	*grundieren*	suffixation
pimp	conversion	*inventariseren*	suffixation	*salutieren*	suffixation
ratchet	conversion	*verdrievoudigen*	parasynthesis	*umranden*	ICV
concrete	conversion	*wensen*	conversion	*narren*	conversion
package	conversion	*klonteren*	suffixation	*zelten*	conversion
catalogue	conversion	*aanvragen*	conversion	*ekeln*	conversion
bling	conversion	*spuien/spuiten*	conversion	*transportieren*	suffixation
photograph	conversion	*bestraten*	prefixation	*leveln*	conversion
preface	conversion	*doorstrepen*	SCV	*löffeln*	conversion
receipt	conversion	*kicken*	conversion	*golfen*	conversion
hardwire	conversion	*begrenzen*	prefixation	*finishen*	conversion
siphon	conversion	*overhevelen*	SCV	*linsen*	conversion
grill	conversion	*sluieren*	conversion	*orakeln*	conversion
deputize	suffixation	*oppotten*	SCV	*verursachen*	prefixation
umpire	conversion	*aanvinken*	SCV	*untertiteln*	conversion
freak out	SCV	*schipperen*	conversion	*nacheifern*	SCV
dust	conversion	*omarmen*	ICV	*googlen*	conversion
anodize	suffixation	*kortwieken*	ICV	*kursieren*	suffixation
telegraph	conversion	*releasen*	conversion	*ausarten*	SCV
transition	conversion	*stomen*	conversion	*fabrizieren*	suffixation

English		Dutch		German	
group	conversion	*argumenteren*	suffixation	*packen*	conversion
ridge	conversion	*druppelen*	conversion	*selektionieren*	suffixation
headline	conversion	*doorkruisen*	ICV	*netzwerken*	conversion
bulk	conversion	*verknallen*	prefixation	*eincremen*	SCV
strap	conversion	*opzwepen*	SCV	*blockieren*	suffixation
burrow	conversion	*gerieven*	conversion	*spenden*	conversion
empathize	suffixation	*hikken*	conversion	*landen*	conversion
risk	conversion	*overbruggen*	ICV	*hosten*	conversion
outrage	conversion	*kerstenen*	conversion	*pinnen*	conversion
befriend	prefixation	*optuigen*	SCV	*materialisieren*	suffixation
subtitle	conversion	*afstrepen*	SCV	*anordern*	SCV
slate	conversion	*vaccineren*	suffixation	*orgeln*	conversion
metastasize	suffixation	*versplinteren*	prefixation	*tigern*	conversion
band	conversion	*rebelleren*	suffixation	*bombardieren*	suffixation
philosophize	suffixation	*crossen*	conversion	*zollen*	conversion
flake	conversion	*watertanden*	ICV	*begnadigen*	parasynthesis
notarize	suffixation	*ploffen*	conversion	*attackieren*	suffixation
gossip	conversion	*grondvesten*	conversion	*kämpfen*	conversion
gear	conversion	*applaudisseren*	suffixation	*stationieren*	suffixation
colonise	suffixation	*antwoorden*	conversion	*radeln*	suffixation
paper	conversion	*telefoneren*	suffixation	*frühstücken*	conversion
ritualize	suffixation	*schragen*	conversion	*stigmatisieren*	suffixation
damage	conversion	*punteren*	suffixation	*idealisieren*	suffixation

English		Dutch		German	
bronze	conversion	*merken*	conversion	*sympathisieren*	suffixation
snowshoe	conversion	*sponsoren*	conversion	*beaufschlagen*	prefixation
graze	conversion	*uithongeren*	SCV	*spaßen*	conversion
shortlist	conversion	*uitbeelden*	SCV	*fermentieren*	suffixation
handcuff	conversion	*dagdromen*	conversion	*mailen*	conversion
name	conversion	*stapelen*	conversion	*krebsen*	conversion
skate	conversion	*klooien*	conversion	*hungern*	conversion
autograph	conversion	*vijlen*	conversion	*ausklinken*	SCV
vow	conversion	*vormen*	conversion	*boykottieren*	suffixation
sabotage	conversion	*verhuizen*	prefixation	*zürnen*	conversion
warehouse	conversion	*belegeren*	prefixation	*sonnen*	conversion
surname	conversion	*opzadelen*	SCV	*krönen*	conversion
sole	conversion	*kristalliseren*	suffixation	*bocken*	conversion
dovetail	conversion	*stofferen*	suffixation	*beurkunden*	prefixation
queue	conversion	*waarborgen*	conversion	*entkernen*	prefixation
tack	conversion	*ontmoedigen*	parasynthesis	*filzen*	conversion
film	conversion	*pijpen*	conversion	*fighten*	conversion
staff	conversion	*ontregelen*	prefixation	*pflastern*	conversion
awe	conversion	*subsidiëren*	suffixation	*ankreiden*	SCV
veto	conversion	*complimenteren*	suffixation	*diagnostizieren*	suffixation
hole	conversion	*wanen*	conversion	*wachsen*	conversion
panic	conversion	*toeren*	conversion	*sinnieren*	suffixation
detour	conversion	*tippelen*	conversion	*rocken*	conversion
fragment	conversion	*structureren*	suffixation	*vergewaltigen*	parasynthesis

English		Dutch		German	
bulldoze	back-formation	*afstoffen*	SCV	*beerdigen*	parasynthesis
blossom	conversion	*standaardiseren*	suffixation	*analysieren*	suffixation
instrument	conversion	*toeteren*	conversion	*steuern*	conversion
dish out/up	SCV	*schoeien*	conversion	*stressen*	conversion
mirror	conversion	*registreren*	suffixation	*düsen*	conversion
experience	conversion	*loten*	conversion	*schippen*	conversion
space	conversion	*ontkrachten*	prefixation	*punkten*	conversion
surface	conversion	*inperken*	SCV	*abzielen*	SCV
sandwich	conversion	*lepelen*	conversion	*verschleiern*	prefixation
short-circuit	conversion	*noodzaken*	conversion	*sensen*	conversion
scoop	conversion	*indexeren*	suffixation	*verkabeln*	prefixation
winch	conversion	*lusten*	conversion	*schmücken*	conversion
epitomise	suffixation	*sleutelen*	conversion	*minimieren*	suffixation
spool	conversion	*wanhopen*	conversion	*eitern*	conversion
stereotype	conversion	*praktiseren*	suffixation	*entvölkern*	parasynthesis
partner	conversion	*fonduen*	conversion	*fußen*	conversion
paste	conversion	*inbeelden*	SCV	*hamstern*	conversion
light	conversion	*feesten*	conversion	*kennzeichnen*	conversion
map	conversion	*tennissen*	conversion	*färben*	conversion
proportion	conversion	*berouwen*	conversion	*käsen*	conversion
idolize	suffixation	*nuanceren*	suffixation	*tropfen*	conversion
box	conversion	*doemen*	conversion	*beschwingen*	prefixation
string	conversion	*kalven*	conversion	*releasen*	conversion

English		Dutch		German	
image	conversion	*patrouilleren*	suffixation	*sülzen*	conversion
program	conversion	*ophemelen*	SCV	*meutern*	suffixation
engineer	conversion	*afprijzen*	SCV	*grillen*	conversion
lecture	conversion	*afschuimen*	SCV	*herzen*	conversion
weed	conversion	*na-apen*	SCV	*übereinstimmen*	SCV
blackmail	conversion	*schminken*	conversion	*beeindrucken*	prefixation
sample	conversion	*nestelen*	suffixation	*sieben*	conversion
dock	conversion	*verbloemen*	prefixation	*balgen*	conversion
flower	conversion	*vrezen*	conversion	*gondeln*	conversion
stack	conversion	*tafeltennissen*	conversion	*löhnen*	conversion
phone	conversion	*vernikkelen*	prefixation	*campieren*	suffixation
graft	conversion	*hameren*	conversion	*rätseln*	conversion
moisturise	suffixation	*bloeden*	conversion	*fragen*	conversion
network	conversion	*verschansen*	prefixation	*striegeln*	conversion
conjecture	conversion	*opsporen*	SCV	*entarten*	prefixation
clamor	conversion	*wiegen*	conversion	*holzen*	conversion
crystallise	suffixation	*clusteren*	conversion	*kämmen*	conversion
author	conversion	*grappen*	conversion	*patchen*	conversion
batch	conversion	*verschalken*	prefixation	*campen*	conversion
shuck	conversion	*uittorenen*	SCV	*touren*	conversion
nauseate	suffixation	*bedwelmen*	prefixation	*verpesten*	prefixation
sanction	conversion	*opfleuren*	SCV	*erben*	conversion
		verongelukken	prefixation	*kernen*	conversion

English		Dutch		German	
		pingelen	conversion	*kicken*	conversion
		bankieren	conversion	*bloggen*	conversion
		rocken	conversion	*aufbahren*	SCV
		bridgen	conversion	*entkräften*	prefixation
		kandaliseren	suffixation		
		machtigen	suffixation		
		volleyballen	conversion		
		zeveren	conversion		
		moffelen	conversion		
		arbeiden	conversion		
		rentenieren	conversion		