Iterated Exaptation

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Abstract Exaptation is a process of linguistic change where obsolescent morphology is refunctionalized. In this article it is argued that exaptation is not a rare, one-off process, as is often assumed, but may come in successive waves, both in biological evolution, where the term originated, and in cultural evolution, including linguistics. Such iterated exaptations may result in complex ‘layering’, to use a term familiar from grammaticalization studies. Two case studies on central aspects of Proto-Indo-European morphology are looked at in depth, showing how they underwent iterated exaptation in Germanic, namely the nominal stem-building *-n-* affix and the *ǫ*-grade of the verbal ablaut system. On the theoretical side, it is argued that exaptation is the consequence of word-based morphology that gives central stage to output configurations, a basic tenet of Construction Morphology.

Keywords Ablaut · Exaptation · Grammaticalization · Hypoanalysis · Multiple source constructions · Refunctionalization · *n*-stems · *o*-grade

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1 Introduction¹

Construction Morphology assumes that the semantic interpretation of morphemes relies on their involvement in constructional schemas, which are form-function pairing with a varying degree of concreteness (see Booij 2010). In the course of time, these constructional schemas can be subject to change. One of the ways in which this can happen is by the rearrangement of the form-function relations of the constructional schema. The association of a certain part of the formal side of the construction with a certain part of the semantic side of the construction can become obscure, and a reassociation with a different semantic part or a totally new semantic function can arise. When this new association between a form and an existing or new meaning is ‘unexpected’ – in the sense that it does not result from classic extension pathways that are familiar from grammaticalization studies (Himmelmann 2004), we call the process ‘exaptation’ (Lass 1990; Norde and Van de Velde 2016, see Norde and Trousdale 2016 for the application of exaptation to Construction Morphology).

The ubiquity of exaptation is an argument in favour of a word-based morphology (Booij 2010, 2012), in which morphemes are not building blocks with independent meaning that are concatenated to form words, but rather get their meaning from the concrete instances they appear in. Construction schemas are output-oriented, as extensively argued in Booij & Audring (this volume). The output-oriented nature of constructional schemas is what drives exaptation: as morphemes are sanctioned by concrete words, meanings can easily shift by ‘abductive inference’ (see also Willis 2016). This does not mean this paper necessarily advocates the abductive language change model of Andersen (1973), which privileges first-language acquisition. Exaptation through abduction is full well compatible with usage-based accounts where adult (or adolescent) language learning is seen as the locus of change (see Croft 2000: Ch.5).

At this point, this may sound vague and abstract, but the tenacious reader will be rewarded with concrete examples further on in this article.

Let’s first examine the notion of ‘exaptation’ in more detail. Exaptation is a notion borrowed from evolutionary biology. In its broadest sense, it is defined as the opportunistic refunctionalization of an existing form for a new, unrelated function. It

¹This article has benefitted from remarks by two anonymous reviewers and by Geert Booij. I am also heavily indebted to Muriel Norde for discussing many of the examples of exaptation mentioned in this article, some of which also found their way to Van de Velde and Norde (2016) and for her inspirational article about the intermarriage of exaptation and Construction Morphology (Norde and Trousdale 2016). Further inspiration on the developments in the *-n-* affix (case study 1, below) has been found in Perridon (2011) and in an e-mail exchange with Martine Robbeets. Finally, I want to express my gratitude to Peter Alexander Kerkhof for answering a few questions I had with regard to the distribution of the *ǝ*-grade and the zero-grade in the Proto-Indo-European verbal system (case study 2, below). If the reader finds some of the claims outrageous, insulting or non-interesting, s/he should rest assured that this has nothing to do with the scholars mentioned in this footnote, but is entirely due to me.

was first introduced in linguistics by Roger Lass in a seminal article in 1990 and was further developed in his 1997 monograph on diachronic linguistics. Biological exaptation is often exemplified by the refunctionalization of feathers. They presumably originated as thermoregulatory device, but later they were ‘opportunistically co-opted’ for flight. An example of linguistic exaptation is the causative (or inchoative) *-en* suffix in English verbs like *deepen*, *lengthen* and *frighten*. Referring to earlier work by Otto Jespersen, Wischer (2010) points out that the *-en* suffix, a relic from the infinitival ending (*-an* in Old English), occurred vacillatingly in Middle English verbs, without a clear contribution to the meaning. The shift to causative or inchoative meaning came about because the old infinitival ending had become defunct in English and because there may have been analogical pressure from an old *-n* stem formant that did have causative or inchoative meaning in Old English, as in *fæstnian* ‘fasten’ (Wischer 2010: 33–34, see also Van de Velde et al. (2013: 482), who see this as an instance of a Multiple Source Construction).² In Construction Morphology terms, we could represent the Old English stage as in (1), the Middle English stage as in (2), and the Modern English stage as in (3).³ The analogical pressure comes from the (Old English) construction in (4), licensing *fæstnian*.

- (1) $[V_{\text{stem-i}} + \text{-an}_{\text{Infinitive}}] \leftrightarrow [\text{SEM}_i \text{ non-assertational}]$
- (2) $[V_{\text{stem-i}} (+ \text{-en})]_{\text{Infinitive}} \leftrightarrow [\text{SEM}_i]_{\text{non-assertational}}$
- (3) $[[A/N]_i + \text{-en}]_{V\text{-Infinitive}} \leftrightarrow [\text{causative/inchoative process of state-SEM}_i]_{\text{non-assertational}}$
- (4) $[[V_{\text{root-i-n-}}]_{V\text{-stem}} + \text{-an}_{\text{Infinitive}}] \leftrightarrow [\text{causative/inchoative process of state-SEM}_i, \text{ non-assertational}]$

Another example of linguistic exaptation is the change in the distribution of the double copula in Middle English (Petré 2013). Old English had two copulae, *is* ‘is’ and *bið* ‘will be’, sharing a preterite *wæs*. Originally, these copula had different semantics, with the former being used for present states and specific contexts, and the latter being used for future states and generic statements. In later times, this semantically driven distribution became obscured, by the rise of a specific verb for the future, *sceal*. Both copulae survived, but instead of a semantic difference, they came to express a number difference, with *is* being restricted to the singular and *bið* to the plural. This redistribution was supported by the link between generic and plural contexts (Petré 2013). The shift from Old English to Modern English can be formalized as in (5)–(6) and (7)–(8), respectively. Here, the plurality of the subject, fortuitously concomitant with the genericity of *bið*, has been promoted to the encoded meaning, a mechanism which is referred to as ‘hypoanalysis’ by Croft (2000).

²Wischer (2010: 33–34) summarizes the arguments why the *-en* suffix in Present-day English cannot be the straightforward continuation of this stem formant.

³*Non-assertational* is meant to capture the semantics of the infinitive. Cognitive Grammarians may prefer the term *non-grounded*.

- (5) [NP_i *is_v* A/N_j] ↔ [entity-SEM_i is currently in state-SEM_j / is entity-SEM_j]
- (6) [NP_i *bið* A/N_j] ↔ [class-SEM_i has property-SEM_j]
- (7) [NP_i *is_v* A/N_j] ↔ [singular entity-SEM_i has property-SEM_j / is in state-SEM_j / is entity-SEM_j]
- (8) [NP_i *be_v* A/N_j] ↔ [plural entity-SEM_i has property-SEM_j / is in state-SEM_j / is entity-SEM_j]

Exaptation is hotly debated, and not everyone agrees on its usefulness as a concept (see De Cuypere 2005 and several contributions in Norde and Van de Velde 2016). Interestingly, the notion might be more useful in the realm of cultural evolutionary products than in the realm of pure biological evolution (Larson et al. 2013). This is not the place to go into the lengthy arguments that have been put forward in defense of or against exaptation (see Van de Velde and Norde 2016 for an extensive status quaestionis). The main reason for the hesitation to accept exaptation as a process of change is that it is hard to come up with necessary and sufficient criteria that set this type of change off against other types of change. The same argument has been raised against grammaticalization (see an oft-cited special issue of *Language Sciences* in 2001). This does, however, not mean that the concept is unworkable. Exaptation is, in my opinion, a very useful term for a specific sort of linguistic change, namely the sudden unexpected lateral shift in function of an obsolescent morpheme. I think exaptation works more like a Wittgensteinian family resemblance structure, where the characteristics are neither necessary nor sufficient criteria, but occur in overlapping constellations. The following aspects have commonly been associated with linguistic exaptation:

- (i) Unexpectedness: the new function of an exapted element should not be an extension or recurrent grammaticalization pathway, but should present a sort of leap-like shift (Gardani 2016; Narrog 2016; Wall et al. 2016).
- (ii) Novelty of the new function. Exaptation often leads to the establishment of novel functions in a language, such as the establishment of a new gender distinction that was formerly not known in the language (Lass 1997: 320; Simon 2010), or, in a weaker version of this criterion, a function that did already exist in the language, but was formerly not associated with the exaptatum.
- (iii) The ‘junk’ status. Linguistics exaptation happens especially – though certainly not exclusively – in cases where obsolescent morphology, with an increasingly obscure function, is residually present in a language’s structure and is ready to take on a new function (Lass 1990; Willis 2010).
- (iv) Exaptation occurs much more rarely than grammaticalization, and as a consequence, a morpheme generally does not undergo successive waves of exaptation (Heine 2003; Traugott 2004)

Characteristics (i) and (ii) are the most defining ones for exaptation. The other two characteristics are more problematic, and will be dealt with below. I will focus especially on Characteristic (iv), which has received less attention in the literature.

Characteristic (iii), the junk status, has been discussed the most and is considered the most problematic to use as a necessary or sufficient condition to diagnose exaptation. It has been pointed out that languages change gradually and morphemes are rarely fully devoid of meaning (Vincent 1995; Smith 2011; Van de Velde and Norde 2016: 21–27; though see Lass 2017: 121 for a dissenting view). This is the reason why Willis (Willis 2010, 2016, see also Narrog 2016) prefer to talk about ‘obsolescent’, rather than ‘obsolete’ morphology. The result is that exaptation displays a feature that is familiar from grammaticalization theory, namely ‘layering’ (Hopper 1991), the phenomenon that old and new forms coexist. When the body part *back* grammaticalizes into an adposition (e.g. *two years back*) or when French *pas* (‘step’) grammaticalizes into a negation marker, the word does not suddenly cease to exist in its old use. The old and the new meaning peacefully coexist.⁴

The same is true for exaptation, both in biology and in linguistics. Feathers on bird wings serve a function in flight, but their original insulation function is still there, as can be seen when birds tuck away their heads in their feathered wings. In linguistic exaptation as well, the old and new function can coexist. This is nicely illustrated with the ‘mirative’ use of what originally was an indefinite singular-count article: in (9) and (10), it occurs before plural nouns, and expresses mirativity, in combination with other (prosodic and morphosyntactic) cues (see also Corver 2016: 245). Crucially, this does not mean that *een* cannot be used anymore in its regular function as an indefinite singular-count article.

- (9) *Ik heb daar een mensen gezien!*
 I have there a people seen
 ‘I have seen so many people seen’
- (10) *wat een schatten van kinderen!*
 wat a treasures of a children
 ‘such cute children!’

Even when the morpheme had no clearly discernible function anymore at the time it was exapted into a new function, it can still be used in its a-functional context after the exaptation. The causative/inchoative *-en* in English verbs discussed above is a case in point: in some verbs, like *listen* it just sits there as an irregular relic.

Now let’s turn to Characteristic (iv). Of the list of characteristic features commonly associated with exaptation, the issue of rarity has been much less discussed than the junk issue. The assumption seems to be that if a change is ‘unexpected’, it should be a one-off process. But this is a non-sequitur. Exaptation can come in chains or bursts. This is most clear in the area of technology, where several techniques have been repurposed over and over again. Take Polytetrafluoroethylene

⁴One reviewer points out that the reason for this peaceful coexistence may be that the old and the new form occupy different niches, and are not paradigmatic competitors anymore. The French negation *pas* follows a verb, whereas the noun follows a determiner. I am, however, not convinced that this applies to all cases. The German numeral *ein* and the indefinite article *ein* can occupy the same slot in the NP, and Dutch auxiliaries can occupy the same slot as lexical verbs, for instance.

(PTFE), commonly known under its brandname *Teflon*. It is used for cable coating, bike chain lubricant, water-repellent clothing, non-sticky coating for cookware, graft material in surgical invention and many more applications (see Wikipedia entry *Polytetrafluoroethylene*). Each unexpected jump in function, for instance from cable coating to cookware, can be seen as an exaptation (see also Larson et al. 2013), albeit often with a non-empty exaptatum. But such ‘iterated’ exaptation is not restricted to technology. It also occurs in biology. The canonical example of feathers, mentioned above, is a good example. Feathers did not undergo just one single exaptation from a thermoregulatory device to a device for flight. Probably earlier in time, another exaptation occurred, where the feathered wings were used for predation, as a screen to catch insects. And in some birds, e.g. the black egret, feathered wings are used for ‘mantling’, where the bird uses the feathered wing as a canopy to cast a shadow on the glistening water surface, to see the fish beneath (Van de Velde and Norde 2016: 4). Yet another exaptation is the use of brightly coloured feathers into a marker used in sexual selection, such as the peacock’s tail. Or take the vertebrate skeleton. Originally it was used as a calcium and phosphate storage device, and it was later repurposed as a support structure and, in the form of skulls and ribs, the protection of vital organs in a case. Subsequently, in some species parts of the skeleton took on yet another function. Irish elk, for instance, grow a large hump, originally a by-product of vertebrae growth to support the antlers, but later exapted for mating display (Gould 1997: 10754). Mammals have exapted part of their jawbones into ossicles in the middle ear as a hearing device. This was made possible by the development of a new jaw structure in therapsids, ancestral to mammals, freeing the precursors of the ossicles to refunctionalize (Anthwal et al. 2013).

Let’s now turn to some linguistic cases of iterated exaptation. I will deal with two case studies, and show how the morphemes are exapted over and over, resulting in functional radiation.

2 Case Study 1: Iterated Exaptation in Nominal *n*-Stems

Proto-Indo-European had a so-called ‘stem-building’ affix *-n-*. Stem-building affixes turn roots into stems, to which additional (portmanteau) endings are attached for case, gender and number (see Beekes 2011: 179). Sometimes, there is no stem-building affix, and the endings are directly attached to the root. The morphological architecture of a Proto-Indo-European word can be visualized as in (11). An example, with a stem-building vowel *ǝ* is given in (12).⁵

⁵The use of diacritics for reconstructed forms (as well as attested forms, occasionally) in historical linguistics is not consistent across handbooks and articles. I have made no attempt to make all forms consistent, as the phonology plays little role in the present paper. I have taken the forms as they are represented in the sources I quote from. Greek forms are transliterated to Roman.

- (11) [root (+ stem-building affix)]_{stem} + inflectional affix]_N
 (12) [$d^h\delta g^h$ _{root}- δ _{stem-building affix}]_{stem} - s _{inflectional ending}]_N ($d^h\delta g^h$ - δ - s ‘day’)

It is commonly assumed that stem-building affixes had derivational meanings, but that these meanings were bleached and lost in the daughter languages, so reconstructing a unifying meaning for each of these affixes is not possible at the present state of our linguistic knowledge, and by the end of the Proto-Indo-European stage, they merely functioned as declension class markers (Nübling 2008). In many cases, attested stem-building affixes seem to be cases of relic morphology, without a clear meaning, making them ideal candidates for exaptation.

The stem-building *-n*-affix (in different ‘grades’: zero-grade *-n-*, full grade *-ēn-* and *-ōn-*, lengthened grade *-ēn-* and *-ōn-*), extensively attested in Indo-European daughter languages, must have had a wide array of derivational functions (see Kroonen 2011 for an in-depth study). It is often used in derived property-denoting words, such as **krs-nó-* (‘black’, see Sanskrit *kṛṣṇá-*), **h₂iu-h₁en-* (‘young’, Sanskrit *yúvan-*, Lat. *iuvēnis*), see Beekes (2011: 181). Though maybe not all of these words can be unified under a single function, and scholars have characterized the meaning in different terms (see Brugmann and Delbrück 1889: 131, 424–426, 431, 437; Hirt 1927: 149vv.; Prokosch 1939: 260–161; Ranheimsæter 1945: 13–14; Pronk 2015), the common denominator of many formations is that the property-denoting words have a generalising meaning. This means that they denote so-called ‘individual-level’ qualities, i.e. permanent qualities (Prokosch 1939: 260), as opposed to ‘stage-level qualities’, i.e. temporary qualities (see Carlson 1977 for this terminological distinction). Thus, Greek *mélās* (neuter *mélan*, ‘black’), is an *-n* derivative of Proto-Indo-European **mel-* (‘dirty’), and could be understood as individual-level dirty (i.e. inherently dirty, permanently dirty), changing into ‘black’. This function of the *-n*-affix explains several uses:

- (i) the frequent use of *n*-derivations as nicknames, as in Greek *strab-ó-s* (‘squinting’) vs. *stráb-ō-n-* (‘the squinter’) (Greek), Latin *catus* (‘shrewd’) vs. *catō-n-* (‘the shrewd one’) or *rufus* (‘red’) vs. *rufō-n-* (‘ginger’) or for function names like Gothic *weiha* (‘priest’, literally ‘the holy one’) (Pronk 2015: 327);
- (ii) the frequent lexicalization of *n*-derivations as animal nouns, e.g. Ancient Greek *phrúnē* ‘frog’ as well as Old High German *bero* < Proto-Indo-European **b^her-*, ‘brown’, Pokorny 1959: 136), **uk^ws-en-* ‘ox’, derived from Proto-Indo-European **h₂ueks-* ‘grow’, cf. Greek *aúksein* (‘increase’), so that the meaning of *ox* is originally ‘the (permanently) grown one’, Greek *āēdōn-* (‘nightingale’) (Kroonen 2011: 29), derived from Proto-Indo-European **auēd-* (‘speak’, ‘sing’), Old Prussian *sasins* ‘hare’, derived from the zero-grade of Proto-Indo-European **keh₁-* ‘grey’, Gothic *ara* (‘eagle’) < Proto-Germanic *aran-* (cf. Present-day Dutch *arend* with paragogic *d*) and Greek *orn-īth-* (‘bird’) < Proto-Indo-European **er-n-*, **or-n-* (‘big bird’), possibly a derivation of

- Proto-Indo-European *er-*, *or-*, *r-* ‘move, bring upward’, compare Greek *órnumi* (‘stir’, ‘excite’) (cf. Van Wijk 1929, s.v. *arend*, *rennen*), Hittite *lahḫanzan-* (‘duck’, lit. ‘the travelling/swimming one’, Pronk 2015: 327).
- (iii) the use of *n*-derivation for tools, such as Proto-Germanic **wagna-* ‘car’ (Old Saxon *wagan*, Old High German *wagan*, Old Frisian *wein*, Old English *wægn*, Old Norse *vagn*), Old Irish *fēn*, a Proto-Indo-European *n*-derivation **ueg^h-no-*, **uog^h-no-*, derived from root **ueg^h-* ‘move’ (Philippa et al. 2003–2009 s.v. *wagen*), i.e. ‘the permanently/characteristically moving one’, or Proto-Indo-European **g^wreh₂u-ōn* ‘pressing stone, millstone’ (Sanskrit *grāvān-*, Old Irish *bráu* (genitive *broon*), English *quern*) (Fortson IV 2010: 124), with the meaning, ‘the permanently/characteristically heavy one’,
 - (iv) the possessive formations that go under the name of ‘Hoffmann suffix’, e.g. Latin *iuvēnis* ‘young’, an *n*-derivation of the zero-grade of **h₂oiu* ‘life force’, i.e. ‘having life-force’ (Fortson IV 2010: 124), or Avestan *maq³ra-*, genitive *maq³ra^{nō}* ‘prophet’, an *n*-derivation from **mn-tro* (‘thought’) (Kroonen 2011: 29).

The use in (i), (ii) and (iii) works on the salient nature of individual-level, permanent, qualities to single the individual referent out. This may also underlie the use in (iv), where the possessive derivations are used to refer to individuals with characteristic features. The individual-level function may also account for *n*-derivations like Sanskrit *rājān-* (‘king’), from Proto-Indo-European **h₃reg-* (‘stretch, erect’), i.e. ‘the one of inherently erect quality’, and maybe even the cardinal *one* in many Indo-European languages, which is an *n*-derivative (Proto-Indo-European **oi-no-s*) of a deictic stem, and could thus mean ‘inherently, and hence recognisably “this”’ (Pronk 2015: 342), see also Lithuanian *ýnas*, *inas* ‘true, real’ (Pokorny 1959: 286). The same identifying capacity of the cardinal *one* is still visible in English ‘the one’. Furthermore, the individualising meaning of the *-n*-affix may explain its use with singulatives, i.e. the singular use of referents that normally come in pairs or larger quantities (Pronk 2015).⁶

This Indo-European stem-building affix came to play an important role in Germanic morphology, as it became the formant of the weak adjectival inflection, one of the unique hallmarks of Germanic morphology. To understand what has happened, we first have to look at a typological shift that swept through the Germanic branch of Indo-European. (Early) Proto-Indo-European did not distinguish between adjectives and nouns as parts-of-speech, but has a ‘nominal’ part-of-speech, covering property-denoting and entity-denoting lexemes (Bammesberger 1992: 52; Kurzová 1993; Van de Velde 2009: 170–177; Van de Velde et al. 2014: 1–2 for extensive argumentation for this idea, which goes back to Paul and Meillet). Relics of this system can be seen

⁶This singulative meaning of the *-n*-affix may be considered an exaptation (pace Pronk 2015: 344, who objects to it being a reanalysis). In Germanic, it was widely used to derive body parts, and in Tocharian it developed into a marker for rational beings (Pronk 2015: 328, 340–341), which appear to be further exaptations. These developments will not be the focus of the present article though, which instead focusses on the exaptations in Germanic adjectives (see below).

in Hittite, Greek, Latin and Sanskrit. In the course of its development, Germanic started to distinguish adjectives from nouns as a separate part-of-speech:

The development of the adjective is perhaps one of the most conspicuous innovations in Germanic morphology. In Germanic the adjective is not only semantically delimited by generally expressing some ‘quality’ (...), but it is also morphologically clearly definable. (Bammesberger 1992: 52–53).

As is well-known, Germanic did not just end up with one type of adjectival inflection, but two: the strong and weak inflection. The strong inflection came about by the infusion of the endings of the demonstrative pronoun in the adjective flexion (see e.g., Prokosch 1939: 261), probably through a class of adjectives that already declined pronominally, such as *other* and *last*, which are sometimes referred to as ‘semi-pronouns’ (Kluge 1913: 209) or ‘pronominal adjectives’. The weak inflection is a continuation of the inherited Indo-European *-n*-formations. The original functional distribution was probably such that strongly inflected adjectives were qualifying in nature, whereas weakly inflected adjectives retained their individual-level property-denoting function of Indo-European, and functioned as classifying adjectives (see Spamer 1979; Van de Velde 2006). The classifying function of the weak adjectival inflection meshes well with its nominal nature (Brugmann and Delbrück 1893: 400, 402; Fischer 2001: 258), and its thematic information structure (Fischer 2000, 2001, 2004). This can be seen in examples (13) and (14), where the weak inflection occurs in indefinite NPs, a context that they later cannot occur in anymore. As Fischer points out: “It must be clear that in these examples it is not a temporary or particular state of (...) blindness that is emphasized, but the inherent quality.” (Fischer 2001: 268).

- (13) *an blinda mann* (Old English, Fischer 2001: 268)
a blind:WEAK man
‘a blind man’
- (14) *sum eorðlice æ* (Old English, Mitchell 1985: 60)
a worldly:WEAK law
‘a secular law’

Conversely, the strong inflection can also occur in definite contexts. This is the case when it is premodified by *so*, like in (15), which proves it is not a classifying adjective, as these can, as a rule, not be submodified by a degree adverb. Indeed, submodified adjectives always have the strong inflection (Fischer 2000: 168–169, 2001: 262).

- (15) *(in) dero sō mihileru ursuahida* (Old High German, Grimm 1967: 623)
in this so great:STRONG temptation
‘in this temptation so strong’

The shift from a derivational nominalising affix in Proto-Indo-European to an adjectival inflectional affix in Germanic can be seen as an exaptation: the derivational function of the stem-building affixes had become partially opaque, to the extent where they merely indicated inflectional classes, and this opacity

made the *-n*-affix a target for refunctionalization (Braunmüller 2008: 360–361). The ‘opportunistic’ nature of the refunctionalization is supported by the observation that the shift to adjectival function is an idiosyncratic development in Germanic. It has to be added, though, (i) that the productivity of the *-n*-affix had not been entirely lost in the Germanic languages, as we find some derivations that are peculiar to Germanic (see Van de Velde and Norde 2016: 25–26): Proto-Germanic **haz-an-* (English *hare*, Dutch *haas*), a derivation of **has-ua* ‘grey’,⁷ and (ii) that there is of course a natural association with individual-level semantics and classifying adjectives. The exaptation, then, does not primarily consist of a leap in the semantics, but rather in its differential opposition with the strong inflection in a novel part-of-speech category, so more on the level of the morphosyntactic function than on the level of the semantics.

The use of the *-n*-inflection in a new adjectival system in Germanic was not the end of the functional development of this affix. A new shift occurred: the weak inflection came to express definiteness. This happened in all branches of Germanic, suggesting it is a fairly early development. In later stages, the *-n*-inflection did not express definiteness by itself anymore, but had to be accompanied by an explicit definite determiner, though there are early examples where the weak adjectives are used in determiner-less noun phrases (Prokosch 1939; Traugott 1992: 171). An example is given in (16). The new function of definiteness is illustrated in examples (17)–(20). The semantics make it unlikely that the adjectives are classifying in nature.

- (16) *Þá wæs forma sīð geongan cēpan þæt hé (. . .)* (Beowulf vv. 2625–2626)
Then was first time young:WEAK champion that he
‘That was the first time for the young champion that he (. . .)’
- (17) *sa liuba brōthar* (Gothic, Grimm 1967: 618)
that kind:WEAK brother
‘that kind brother’
- (18) *sô managfalthô handugei* (Gothic, Grimm 1967: 618)
that manifold:WEAK wisdom
‘that manifold wisdom’
- (19) *thizôs andvaírthôns thaúrftáis* (Gothic, Grimm 1967: 618)
this present:WEAK need
‘this present need’

⁷It cannot be ruled out that the stem-building *-n*-affix grew in productivity in Proto-Germanic, in its functioning as nominalizer from adjectives, like for instance in **manniskan-* (‘human’, cf. Dutch *mens*, German *Mensch*), from weak adjective **mann-iska-* ‘concerning man’ (Van Loey 1964: 131). Still, productivity is not the same as transparency. It seems that Germanic has extended the *-n*-affix to a wide range of contexts, beyond the original semantic constraints. This phenomenon can be seen elsewhere in Germanic morphology. The Germanic languages have a “reputed preference for ablaut” (Mailhammer 2008: 281), and use ablaut in contexts where it was unmotivated from an Indo-European perspective, probably because the transparency of its function was lost (see also below). In short, the productivity of the *-n*-affix in Germanic does not entail it was non-transparent.

- (20) *se Ælmihtiga God* (Old English, Mitchell 1985: 65)
 the almighty:WEAK God
 ‘the almighty God’

Of course, the danger of circularity is lurking: if the odd inflectional behaviour of examples (13), (14), (15) is the *only* indication that we have an obsolete pattern, it cannot in turn be explained by an appeal to the obsolete nature of those examples. We can avoid such circularity by adducing independent evidence for the archaic nature of these attestations. Independent evidence comes from the observation that these constructions are mainly found in poetry, a genre that is known for its retention of obsolete patterns.⁸

The shift from classifying adjective to definiteness marker is a new exaptation. It is not entirely clear whether the classifying function of the adjectival *-n*-inflection had become obsolescent first, but with the increased reliance on word order, one of the major drifts in the Germanic noun phrase (see Van de Velde 2009), the difference between classifying and qualifying adjectives could easily be signalled by positional differences as well, instead of by morphological means. When preceding the noun, classifying adjectives follow qualifying adjectives, see (21) and (22) from present-day English. The adjective ‘criminal’ in (22) cannot have a classifying function (‘specializing in criminal law’) as in (21), but can only mean ‘with an inclination to engage in illegal activity’. In older stages of English and Dutch, strongly inflected adjectives never occur in-between a weakly inflected adjective and the noun. Either they precede them, or – more commonly – they follow the noun, as stacking of adjectives in the prefield of the NP was uncommon (see Fischer 2000; Van de Velde 2006: 52–53, 2009: Ch.6).

- (21) *Ask any experienced criminal lawyer and he will tell you so.* (COHA, Davies 2010-)
 (22) *#Ask any criminal experienced lawyer and he will tell you so.*

The weak inflection, the direct descendant of the Indo-European *-n*-affix, exapted further in Belgian Dutch, where the weak inflection became a marker of gender. The weak inflection withered down to a mere schwa, so the original *n* is not visible anymore. The distribution in attributive adjectives is such that in singular noun phrases, it is used for masculine and feminine nouns, whereas neuter nouns are attributively modified by strongly inflected (i.e. zero-ending) adjectives.⁹

⁸See Mitchell’s (1985: 56–60) discussion of the construction at issue for references to the theory that it may represent an older language stage.

⁹This is the main rule. There are many exceptions, motivated by subrules. In Netherlandic Dutch, the distribution is slightly different: the ‘strong’ inflection is used on attributive adjectives only when they occur in neuter indefinite singular NPs. So in that variety, definiteness still plays a role.

- (23) *een/het bruin paard* (Belgian Dutch)
a/the brown:STRONG horse:NEUTER
- (24) *een/de bruine hond* (Belgian Dutch)
a/the brown:WEAK dog:NON-NEUTER
'the brown dog'

In Dutch, further exaptations can be witnessed. Van de Velde and Weerman (2014) argue that currently, the weak inflection is undergoing a reinterpretation, where the weak inflection is turning into a marker of 'attributivity', without interacting with gender, definiteness or number. In the prefield of the noun phrase, it is functioning as a watershed between the determiner zone and the zone for attributive adjectives. On the basis of corpus data, Van de Velde & Weerman show that the weak inflection is increasingly found in adjectives where it was formally absent, and is shed from determiners, where the schwa formerly did occur.¹⁰ Take a nineteenth-century example like (25). Here, the possessive determiner (*zijn*) cannot be inflected anymore in Present-day Dutch, see (26). The attributive adjective (*natuurlijke*) retains its weak inflection, however.

- (25) *van zijne natuurlijke noodzakelijkheid* (nineteenth-century Dutch, Van de Velde and Weerman 2014: 130)
of his_{Determiner}:WEAK natural_{Adjective}:WEAK necessity
'of its natural necessity'
- (26) *van zijn natuurlijke noodzakelijkheid* (Present-day Dutch)
of his_{Determiner}:STRONG natural_{Adjective}:WEAK necessity
'of its natural necessity'

If we extend our attention to finer-grained varieties, other exaptations can be discerned with the Indo-European *-n*-inflection. Berteloot (2005: 35) remarks that the thirteenth-century Flemish/Zeelandish writer Jacob van Maerlant refunctionalized the distinction between the strong and weak inflection such that attributive adjectives are declined strongly, and nominalized adjectives are declined weakly. This was a fairly non-disruptive change, as both functions were already associated with the strong and weak adjectival declination before, but the distinction seems to crystallize in an exapted system. The Van Maerlant-system did not make it, though, as it cannot be found with other writers systematically.

In nouns, the Indo-European *-n*-affix underwent its own exaptive course. In German and Dutch, the *-n*-affix, originally part of the stem, was exapted as a marker of plurality. English went with a different plural suffix (*-s*), though in the word *oxen* the plural-exaptation can be seen at work as well (Van de Velde and Norde 2016: 22), suggesting the *-n*- strategy for the plural was experimented with in older stages of English as well. The exaptation to plurality, constituting a clear functional

¹⁰Note that the schwa inflection on the determiner is synchronically similar to the weak adjectival inflection, but etymologically, in fact, a residue of the strong inflection. Such a reanalysis happens often in historical morphology, as shown in Van de Velde and Van der Horst (2013).

leap, can be understood if we look more closely at the stepwise fashion in which it proceeded (see Van Bree 1987: 238–240; Marynissen 1996). The starting point is the functionalization of the *n* in distinguishing the singular from the plural in Middle Dutch feminine *n*-stems. These words, like *tonge* ('tongue'), had no *n* in the nominative singular, due to sound laws, but had an *n* in the nominative of the plural. This distinction spread to the feminine *ō*-stems, such that singular *siele* ('soul') vs. plural *siele*, where there was no *n* in either of the numbers, was replaced by singular *siele* vs. plural *sielen*. A following step in the expansion of the *n*-plurals was the removal of the *-n* from the singular dative and accusative of the masculine *n*-stems, such as *hanen* ('cock'), to the effect that the singular of all cases (except the genitive) was *hane*, contrasting with plural *hanen*. The next, logical step was the extension of the system to masculine nouns ending in a schwa in the singular, like *u*-stem *sone* ('son'), so that parallel to what happened with *siele*, original singular *sone* vs. plural *sone* was replaced by singular *sone* vs. plural *sonen*. In all these cases, the use of the *n* in the plural had the effect that ambiguity as a result of singular-plural syncretism was avoided. Subsequently, the plural *n* cropped up in Middle Dutch words which did not have the syncretism, like singular *dag* ('day') vs. plural *dage*, which was eventually replaced by singular *dag* vs. plural *dagen*.

This does not exhaust the exaptations that befell the Indo-European *-n*-affix. In Afrikaans, the adjectival schwa, the descendant of the *-n*-affix, was refunctionalized as a marker of the morphophonology of the adjective (see Lass 1990 for details), and is undergoing a new exaptation today, in its use for emotive expressions (see Conradie 2017, who explicitly qualifies this as 'exaptation'). This use is illustrated in the contrast in (27) and (28).

- (27) *die arm man* (Afrikaans, Conradie 2017)
 the poor man
 'the poor (i.e. impecunious) man'
- (28) *die arm-e man* (Afrikaans, Conradie 2017)
 the poor-INFL man
 'the poor (i.e. to-be-pitied) man'

The manifold changes of the affix in Dutch creoles, some of which also qualify as exaptation, is discussed in Van Marle (1995).

In summary, the so-called stem-building *-n*-affix, which had already become obsolescent or at least partially non-transparent in (late) Proto-Indo-European, was refunctionalized. This did not happen just once, but several times, leading to a chain of exaptation. Such 'iterated exaptation' testifies to the ubiquity of the process, contra Heine (2003) and Traugott (2004).

The changes can be made clear in Construction Morphology formalizations. By way of example, take the exaptation of the *-n*-affix in nouns yielding a plural marker in Continental-West-Germanic. As the *-n*-affix becomes non-transparent, it is up for grabs for refunctionalization. This happens not just inevitably, but because the original plural ending gets lost through sound laws (*es* > *iz* > $\emptyset$). This is the state in Proto-Continental-West-Germanic in (31), where the root is followed by a non-

transparent affix and a zero-affix, with a function. This causes a reshuffling of the meaning components, such that the non-transparent affix takes over the function of the zero-affix.¹¹ The status of zero-affixes is a contended issue in any morphological theory, and Construction Morphology is no exception. Given its reliance on output configurations (see above), a paradigmatic zero may easily go unnoticed, which increases the probability of reanalysis, of course. The idea is that the meaning part of the construction consists of a lexical part (SEM) and a grammatical-procedural part (PLURAL). Given that Indo-European languages, including (Middle) Dutch, mostly expresses number with affixes, the language user abductively reasons that *ossen* consists of stem *os* and affix *-en*, as the *-en* affix had become non-transparent earlier. From there, the *-en* can then analogically spread to new contexts as a plurality marker, i.e. as a constructional schema. In a morphological theory where words are seen as concatenations of morphemes, it is much harder to account for the reanalysis. It is unclear why language users lacking the morpheme *-en* for plurality in their mental lexicon should use it, instead of relying on the much more straightforward solution to just drop the affix.

- (29) PROTO-INDO-EUROPEAN *uksénes* ‘oxen’ (Ringe 2006: 49)
 $[Root_i + -n_{stem-building-affix-j}]_{stem-k} + -es_{affix-l} \leftrightarrow [entity/property/predicate-SEM_i + individual-level_j]_{entity-nominalization-k} + nom/voc/acc-plural_l$
 $[uks_{root-i} + -én_{stem-building-affix-j}]_{V-stem-k} + -es_{affix-l} \leftrightarrow [GROW_i + individual-level-property_j]_{entity-nominalization-k} (lexicalized) + nom/voc/acc-plural_l$
- (30) PROTO-GERMANIC *uhsaniz*¹² ‘oxen’
 $[Root_i + -n_{stem-building-affix}]_{stem-j} + -iz_{affix-k} \leftrightarrow [entity/property-SEM_i + untransparent]_{entity-j} + nom/voc/acc-plural_k$
 $[uhs_{root-i} + -an_{stem-building-affix}]_{stem-j} + -iz_{affix-k} \leftrightarrow [OX_i + untransparent]_{entity-j} + nom/voc/acc-plural_k$
- (31) PROTO-CONTINENTAL-WEST-GERMANIC *uhsan* ‘oxen’
 $[Root_i + -n_{stem-building-affix}]_{stem-j} + -\emptyset_k \leftrightarrow [entity/property-SEM_i + untransparent]_{entity-j} + nom/voc/acc-plural_k$
 $[uhs_{root-i} + -an_{stem-building-affix}]_{stem-j} + -\emptyset_k \leftrightarrow [OX]_{entity-j} + nom/voc/acc-plural_k$
- (32) MIDDLE DUTCH *ossen* ‘oxen’
 $[Stem_i] + -n_{affix-j} \leftrightarrow [entity-SEM_i] + plural_j$
 $[os_i] + -n_{affix-j} \leftrightarrow [OX_i] + plural_j$

¹¹One is welcome to disagree with the particulars of the formalization in (27)–(30), both the formal and especially the meaning parts to the left and right of the double arrows respectively, in the Proto-Indo-European, Proto-Germanic and Proto-Continental-West-Germanic state, which all rely on reconstruction, as far as they do not concern the main idea of the refunctionalization. The co-indexing of ‘affixes’ on the left hand side and the grammatical functions on the right hand side (e.g. $-n_{affix-j} \leftrightarrow plural_j$) is not in conformity with the output-oriented, word-based approach in Construction Morphology, and is here used merely for convenience’s sake.

¹²As one reviewer points out, the *-é-* of **uksénes* would not become *-a-* but *-e-*. The *-a-* can be explained as analogically transferred from other cases (probably the accusative singular), or the vowel could be reconstructed as *-o-* in Proto-Indo-European. This does not affect the analysis at hand, however.

3 Case Study 2: Iterated Exaptation in the Indo-European Perfect with *ǵ*-Grade

Proto-Indo-European morphology makes use of affixes of all sorts, but it also sports root-vowel alternation, also known as ‘apophony’, ‘vowel gradation’, or ‘ablaut’. It is not entirely clear what the origins of the ablaut are. As in the case of the stem-building *-n*-affix, the ablaut had become partially non-transparent by the stage that can be safely reconstructed. The ablaut vowel may have arisen as a by-product of stress shifts, as Proto-Indo-European is assumed to have had a dynamic accent, but this is contested (Fortson IV 2010: 80–81). The root vowel comes in five shapes, called ‘grades’. It can either be in the zero-grade, so without a vowel, or it can be in the full grade, which is either *ǵ* or *ǵ̌*, or it can be in the lengthened grade, which is either *ǵ̄* or *ǵ̄̌*. It is hard to exhaustively list under what circumstances each of these grades occur, but for the verbal system, the full grade *ǵ̌* is characteristic of the singular of what is called the ‘perfect’. Thus, Greek root *l_{ip}* ‘leave’ has a zero-grade *lip*, occurring in the aorist *é-lip-on* (‘I left’), a full *ǵ̌*-grade, occurring in the present, *leíp-ō* (‘I leave’), and an *ǵ̌*-grade in the (reduplicating) perfect *lé-loip-a* (‘I have left’). It is the latter grade that concerns us here, in particular in its contrast to other grades.

The Proto-Indo-European perfect is the subject of an ongoing debate about its function and origin. It shifted in several daughter languages to indicate grammatical aspect and later even tense, but it is likely that it originally expressed a present **state**. In ancient Greek, the present *thnēiskei* means ‘he is dying’, and the aorist *éthane* means ‘he died’. The perfect, by contrast, does not express an action in the present or the past, but a state: perfect *téthnēke* means ‘he is dead’ (Clackson 2007: 121). Of course, the difference between a present state ‘he is dead’ and the perfective ‘he has died’ is vanishingly small. A clearer example is Greek *óllumi* ‘I destroy’, which has a perfect *ólōla*, meaning ‘I am lost’, so a present state, not ‘I have destroyed’. Another interesting example is Greek *tétoka*, a perfect from *tíktō* ‘beget’. The perfect is associated with females, as men do not enter into a new state after having given birth (Clackson 2007: 121). The stative meaning of the perfect is also clear in the ancient perfect **uoid-h₂e* ‘know’. It is a non-reduplicating perfect of the stem **uēid-* ‘see’, and turns up in Sanskrit as *véda*, in Greek as (w)*oída* ‘I know’, and in Gothic as *wait*. This is not, in fact, a preterite ‘saw’, but rather a state resulting from having-seen.

The stative meaning of the Proto-Indo-European perfect may have been the result of an exaptation of what was originally a middle voice, expressing lack of control on the part of the subject. This reconstruction is especially motivated by linking the evidence from the so-called *-hi* conjugation in Hittite to the perfect (Clackson 2007: 138–151), though this is a notoriously controversial issue in Indo-European linguistics, and one that I will not go into here.

A more securely reconstructed exaptation is the drastic change the *ǵ̌*-grade perfect underwent in Germanic. In fact, it is a triple exaptation.

	ě-grade	ǫ-grade	zero-grade
Proto-Indo-European	present * <i>b^héyd^h-e/o-</i> (cf. Greek <i>péithō</i>)	perfect * <i>b^heb^hóyd^he</i> (cf. Greek <i>pépoithe</i>)	aurist * <i>é-b^hid^h-</i> (cf. Greek <i>épithon</i>)
Proto-Germanic	present * <i>bīdanq</i> (< <i>beid-</i>) (cf. Gothic <i>beidan</i>)	preterite-singular * <i>baid</i> (cf. Gothic <i>baid</i>)	preterite-plural * <i>bidum</i> (cf. Gothic <i>bidum</i>)

Fig. 1 Ablaut in Proto-Indo-European **b^héyd^h* ‘trust, believe’ (Greek, active: ‘persuade’), Proto-Germanic **bīdanq* (‘wait’). Gothic forms are not all attested as such

The first major exaptation is the one that Roger Lass already used as an illustration in his seminal paper on exaptation (Lass 1990). It concerns the use of the ǫ-grade as a number marker in the Germanic preterite in Class I-V of the so-called strong verbs.

The Germanic preterite is a direct continuation of the Indo-European perfect. According to one theory, this is only true for the singular. The plural reflects the aorist. The main argument is that the singular has the ǫ-grade, which turns up as /a/ in Germanic in the singular, and zero-grade or lengthened ē-grade in the plural, in class I-III and in class IV-V, respectively. Indeed, in the Greek verb *leíp-* ‘leave’, mentioned above, we see that the present has full ě-grade (*leipō*), the perfect has the ǫ-grade (*léloipa*), and the aorist has zero-grade (*élipon*). The correspondence for the root *b^héyd^h*- (Ringe 2006: 156) is illustrated in Fig. 1 (assuming reduplication to be original in the perfect and the augment *e-* to be original in the aorist).

Not everyone agrees, though. Ringe (2006: 157) insists that there are no traces of the aorist in the Germanic preterite. An argument in support is the occurrence of zero-grade plural perfects like Greek *ísmen* (< (*w*)*ídmēn* < (*w*)*ídmén*), plural of (*w*)*oīda*. Even if the plural of all Germanic preterites can be traced back to Proto-Indo-European perfects, the restructuring such that the vowel gradation more systematically reflects number is a case of exaptation, working on an untransparent heirloom of Indo-European ablaut vowels.¹³ Untransparent, because neither the ablaut, nor the reduplication was a fully reliable marker of the perfect in Indo-European: the ǫ-grade could be used in the present tense of causative verbs (e.g. Greek present *dokéō* ‘teach’, with ǫ-grade of Proto-Indo-European root **dek-* (Pokorny 1959: 189–191), or **h₂kous-* ‘hear’ (cf. Greek *akoúō*, Gothic *hausjan*), which only appeared in the ǫ-grade (Fortson IV 2010: 80), although Indo-Europeanists tend to consider the ǫ-grade presents as secondary developments, to be fair) and in nominal¹⁴ derivations, as in **b^hoso-* ‘naked’, cf. Old High German

¹³Of course, to the extent that the ablaut systematically distinguished the singular and the plural of the perfect, marking number may have been its original function. Still, the ǫ-grade is a more conspicuous marker of the perfect, as it is neither found in the singular of the present nor of the aorist.

¹⁴As pointed out above, the ‘nominal’ category in Proto-Indo-European includes the adjectival function.

bar, Old Church Slavonic *bosŭ* ‘barefooted’, probably related to **b^hes-* ‘rub off’ (Pokorny 1959: 163). Moreover, reduplication was used not only in perfects, but in some derived present stems as well: **d^hi-d^heh₁-* (cf. Luwian *titaimi-* ‘nurtured’) derived from the Proto-Indo-European root *d^heh₁(y)-* ‘suckle’ (Clackson 2007: 151). Furthermore, on the basis of **uoid-h₂e* ‘knows’, it has been assumed that at least some perfects were non-reduplicating, and given the good attestation of this perfect, non-reduplication in perfect appears to be an old feature.

A second exaptation is the use of the *ǝ*-grade in the present, in verbs of class VII. These verbs originally did not have ablaut, but reduplication. This can be seen in Gothic, where the preterite of *háitan* ‘call’ is *haiháit*, the preterite of *haldan* is *haihald* and the preterite of *slēpan* ‘sleep’ is *saislēp* (Streitberg 1920: 147–148).^{15,16} Several of these verbs have an *ǣ* instead of an *ē* in the present, as in Gothic *haldan* ‘hold’, *fraisan* ‘try’, *aukan* ‘multiply’. As the Germanic *ǣ* is the result of a merger of Indo-European *ǣ* and *ǝ*, the *ǣ* in the present could easily be taken for the reflex of the *ǝ*-grade, and sometimes it actually was the reflex of the *ǝ*-grade, for instance in *háitan*, which is cognate of Proto-Indo-European *koih₂-d-*, from the root **keih₂-*. In West-Germanic, the reduplication was remodelled to make it look like an ablaut-pattern. So Proto-Germanic **háitan* had a reduplicating preterite **hæ-gait*, in which the initial consonant of the root had changed under Verner’s law, from *h* (originally /χ/) to *g*.¹⁷ This mutilation of the root made it harder to recognize the preterite as a pure reduplication. If anything, the preterite **hægait* looked more like something *inside* the stem had been changed, as the initial consonant of the reduplication was equal to the original anlaut-consonant. By reduction of the original stem (the second syllable), **hægait* was reanalysed as **hǣl(g)t*, and then changed into *hēzt*, as a result of *a*-umlaut. The details of the development are neatly laid out in Van Coetsem (1983, 1990). A supporting argument is the Old English preterite form *heht*, where the second *h* is a trace of the reduplication. As such, it is a missing-link between Gothic *haiháit* and Middle Dutch *hiet* (with <ie> developed from *ē₂*). The result of this wholesale restructuring of class VII verbs is that they came to fit the ablaut pattern in West-Germanic strong verbs (and no longer had the odd reduplication), but, for some verbs at least, mirror-wise, with the historical *ǝ*-grade, reflected in Germanic as *ǣ*, now ending up in the present. This exaptation took as its point of departure the non-transparent morphology of class VII reduplication.

A third exaptation of the *ǝ*-grade is its use in the Germanic modal verbs. In Proto-Germanic, the Indo-European perfect developed into the preterite, but a number of old static perfects of Indo-European held out. These verbs had perfect morphology, but present-static meaning, and are commonly referred to as preterite-presents. An example is Proto-Germanic **wait* ‘knows’ (Gothic *wait*, Old Norse *veit*, Old English *wāt*, Old High German *weiȝ*) from Proto-Indo-European **wóyde* ‘knows’ (Greek

¹⁵There are some verbs that have both reduplication and ablaut as preterite markers in Gothic, e.g. *lētan* ‘let’ – *laflōt*.

¹⁶The <ai> vowel in the reduplicating part is an /æ/.

¹⁷Vernerization of the anlaut-consonant of the stem was lost in Gothic.

(w)oīda ‘I know’) (Ringe 2006: 153), or Proto-Germanic **(ga)man* ‘remembers’ (Gothic *(ga)man*, Old Norse *man*, Old English *(ge)man*) from Proto-Indo-European **memóne* ‘remembers’ (Ringe 2006: 153). The *ō*-grade was recognized as an ablaut vowel, as the plural had zero-grade, just like strong preterites: 1SG *man* contrasts with 1PL *munum* (the Germanic *u* being the reflex of the Indo-European zero-grade). The group of preterite-presents thrived in Germanic (Prokosch 1939: 188), and some of these verbs have either no perfect stem in Proto-Indo-European or not even a related present or aorist stem. Proto-Germanic **kann* ‘knows’ (Gothic *kann*, Old Norse *kann*, Old English *cann*, Old High German *kan*), for instance, cannot be related to an Indo-European perfect, but can be related to a present with a nasal infix **ġneh₃-* ‘recognize’, present **ġnhéh₃ti* ‘recognizes’ (Sanskrit *jānāti*, Tocharian A 2SG *knānat*). This suggests that the stative perfect was still productive in Proto-Germanic (Ringe 2006: 154). The problem is compounded when root-etymologies can be established, but reconstructing the stem is hard or impossible because of scant attestation in other Indo-European languages, e.g. for Proto-Germanic **ann* ‘grants’, **mag* ‘can’ and **skal* ‘owes’, and when there are no known Indo-European cognates at all, for instance with Proto-Germanic **mōt* ‘is allowed to’ and **lais* ‘knows’ (Ringe 2006: 154–155).

By coining new preterite-presents, apart from those inherited from Indo-European, the category of these stative perfects shifted semantically. In Proto-Indo-European, the emphasis was on the state resulting from a completed action. This could be either a psychological state (cf. Greek *(w)oīda* ‘I know’) or a physical state (cf. Greek *ólōla*, ‘I am lost/destroyed’). In Proto-Germanic, the expanded group displays higher semantic homogeneity, as the members of this group seem to converge on psychological states or (dynamic) modality (or impersonal verbs like **ganah* and **daug*):

(33) Proto-Germanic

- *wait* ‘know’ (<Proto-Indo-European **wóyde* ‘knows’)
- *(ga)dars* ‘dare’ (<Proto-Indo-European **d^hed^hórse* ‘dares’)
- *(ga)man* ‘remember’ (<Proto-Indo-European **memóne* ‘remembers’)
- *ganah* ‘it is enough’ (<Proto-Indo-European **h₂eh₂nó(n)ké* ‘is at’)
- *aih* ‘possesses’ (<Proto-Indo-European **h₂eh₂óyke* ‘possesses’)
- *ōg* ‘be afraid’ (<Proto-Indo-European **h₂eh₂óg^he* ‘is upset’)
- *parf* ‘needs’ (<Proto-Indo-European **tetórpe* ‘enjoys’)
- *daug* ‘be useful’ (<Proto-Indo-European **d^hed^hówg^he* ‘is productive’)
- *ar* ‘is’ (<Proto-Indo-European **h₁eh₁óre* ‘is there, has arrived’)
- *kann* ‘recognizes, knows how’
- *ann* ‘grants’
- *mag* ‘can’
- *skal* ‘owes’
- *mōt* ‘is allowed to’
- *lais* ‘knows’

Later in their development, the preterite-presents developed into modal auxiliaries, pruning the group of the 15 verbs mentioned in (33), so that non-modal verbs were increasingly dismissed from the group, or changed their meanings to become core modals (see Harbert 2007: 286; Plank 1984: 311–312). In English *need*, originally not part of the preterite-presents, took over the characteristic zero-ending for 3SG of the preterite-present morphology. In colloquial German, the same happened with *brauchen* (Gaeta 2010: 149). This shows that the group of preterite-presents were felt as a group, with modal meanings.

The above is certainly not an comprehensive overview of the exaptations of the δ -grade / zero-grade alternation in Germanic. In different varieties and in different verbs, other exaptive changes may occur. In some varieties of English the difference between *was* (with the reflex of Indo-European δ -grade) and *were*, for instance, originally a tense/number difference much in line with other strong verbs, was exaptively reanalysed as a polarity marker (Schilling-Estes and Wolfram 1994: 289; Van de Velde and Norde 2016: 23; Willis 2016: 213–215).

Summarising we can say that part of what was originally the Proto-Indo-European perfect morphology has undergone successive waves of exaptation. Its δ -grade was exapted into a marker of mental states and impersonal verbs, later exapted into a marker for modality. The δ -grade was also exapted into a singular number marker in the Proto-Germanic preterite. Later, in West-Germanic, there was an additional exaptation to mark the present of some class VII verbs, namely those with an /a/ in the present.

The use of the vowel gradation (δ -grade, realized as $\tilde{a}$ in Germanic) to signal singular number in the preterite may have been helped by the zero-ending for the inflection in 1/3SG in the preterite. Speakers of Germanic may have inferred from the verbal output-configurations they were confronted with, that the ablaut functioned as a portmanteau strategy for tense and number. In the absence of explicit morphological marking for 1/3SG, and with the difficulties of processing zero-affixes in output-oriented constructional schemata (see above), a reanalysis suggested itself so that the morphological residue in the form of vowel gradation that accompanied the person endings of the singular perfect (reconstructed as $-h_2$, $-th_2$ and $-e$ in Proto-Indo-European (Clackson 2007: 148), now took over the function of those endings. Construction Morphology's emphasis on the output-oriented nature of morphology explains why Germanic strengthened the association of the δ -grade both with tense and with number: in Proto-Indo-European the perfect was recognizable by (i) specific endings ($-h_2$, $-th_2$ and $-e$ for 1/2/3SG, a distinct set from the 'eventive' endings in the present and the aorist), (ii) the δ -grade/zero-grade for singular and plural, respectively, and (iii) reduplication. The endings were actually the most reliable markers, as neither the δ -grade nor the reduplication were exclusively associated with the perfect (see above). As soon as the specific endings were lost, and as reduplication remained a marginal strategy in Germanic preterites, strategy (ii) was beefed up. Indeed, Germanic strongly invested in ablaut (see also Mailhammer 2008: 281). A Germanic form like *baid* would then not have been analysed as an ablauting past with a zero 1/3SG ending, but would have refunctionalized the ablaut vowel $\tilde{a}$ as a portmanteau morpheme for PAST:1/3SG. I

have tried to render this refunctionalization in Construction Morphology formulas in (34) and (35), following the representation of ablaut in Booij (2010: 241), in adjusted form.¹⁸

- (34) PROTO-INDO-EUROPEAN $*b^he b^h \acute{o} y d^he$
 $[b^he - y d^h]_{V-Present} \leftrightarrow [atelic\ TRUST] \approx [b^he - b^h - o - y d^h]_{V-Perfect} - e_i \leftrightarrow [state\ resulting\ of\ completed\ TRUST] - 3SG_i$
- (35) PROTO-GERMANIC $*baid$
 $[b - e - id]_{V-Present} \leftrightarrow [present\ WAIT] \approx [b - a - id]_{V-Preterite} \leftrightarrow [past-singular\ WAIT]$

For the exaptation to the modal auxiliaries, the evolution could tentatively be formalized as in (36)–(38). Here the exaptation relied on the fact that the forms with the $\acute{o}$ -grade had no preterite meaning. The semantic side of the output form like *wait* failed to be associated by language users with the constructional schema used in (35). Speakers of Germanic thus took recourse to another solution: they exapted the $\acute{o}$ -grade by reanalysing it as a marker of psych/impersonal verbs, and later modal verbs. Though it seems like an infringement on the one-form-one-meaning isomorphism, the phenomenon that a morphological form means one thing in one construction and another in another construction is not uncommon. In German for instance, the *-er* can be an agent nominalizer (German *Arbeit-er* ‘work-er’) or can be a plural suffix (*Kind-er* ‘children’). This underscores the reality of constructions in morphology. In a concatenative theory with separate morphemes, the meaning difference is harder to make sense of.

- (36) PROTO-INDO-EUROPEAN $*uoid - h_2e$ ‘know’.
 $[u - e - id]_{V-Present} \leftrightarrow [atelic\ SEE] \approx [u - o - id] - h_2e_k \leftrightarrow [state\ resulting\ of\ completed\ process\ SEE] - 1SG_k$
- (37) EARLY-PROTO-GERMANIC $*wait$
 $[w - a - it] \leftrightarrow [singular\ present-of-psych/impersonal-SEM\ KNOW] \approx [w - \emptyset - it] \leftrightarrow [plural\ present-of-psych/impersonal-SEM\ KNOW]$
- (38) LATE-PROTO-GERMANIC, COMMON-GERMANIC $*kann$
 $[k - a - nn_i / m - a - g_j / \dots_k] \leftrightarrow [singular\ present-of-modal\ CAN_i / MAY_j / \dots_k] \approx [k - \emptyset - nn_i / m - \emptyset - g_j / \dots_k] \leftrightarrow [plural\ present-of-modal\ CAN_i / MAY_j / \dots_k]$

4 Conclusions

The last thirty years witnessed a boom in studies that showed that morphological change is more regular than what had been implicitly or explicitly been assumed since De Saussure, who in his *Cours de linguistique générale* expressed pessimism about coming up with regular tendencies in diachronic linguistics (see De Saussure

¹⁸The ‘present’ in Proto-Indo-European is best seen as atelic aspect (Bartolotta 2009).

1955: 131, 134). Grammaticalization theory (Lehmann 2002; Hopper and Traugott 2003; Narrog and Heine 2011 for overviews) has convincingly shown that morphological change does follow predictable pathways. This is clear from (i) the fact that the same pathways occur in unrelated languages (Heine and Kuteva 2002) and in different periods in time, and (ii) the fact that there is a massive (though not exclusive) tendency for unidirectionality. Despite this deep insight about regularity in morphological change, however, there is no escape in acknowledging that there are numerous changes that happen in a much more haphazard fashion. Unidirectionality may be flouted more often than early grammaticalization-enthusiasts realized (Norde 2009), and language change can proceed differently in related languages, in response to the structural environment (Fischer 2007). Analogy is a forceful factor in morphological change, but it is notoriously hard to predict where and when it will strike (Hock 2003). A concept that brings out the unpredictability and capriciousness of morphological change is exaptation (Lass 1990; Norde and Van de Velde 2016), a notion borrowed from evolutionary theory for the opportunistic refunctionalization of an existing, often obsolescent form for a new function that is not directly related to its former function. While it is not straightforward to come up with good criteria to determine whether a refunctionalization is ‘opportunistic’, and hence ‘unexpected’, there are a number of symptoms that are associated with it. One of these symptoms is that morphemes undergo exaptation much more rarely than grammaticalization, and as a consequence, a morpheme generally does not undergo successive waves of exaptation. In this article, I have undertaken to show that this is not necessarily the case. Exaptation is fairly wide-spread, and may target the same morphemes over and over. There is often a tangential relation between the old and the new function, but that does not mean it is an ‘expected’ case of grammaticalization. Indeed, what is often called ‘secondary grammaticalization’, the lateral shift from one grammatical function to another in an already grammaticalized morpheme, may often be more insightfully classified as exaptation, reserving the term grammaticalization for the transition from a fully lexical element to the morphosyntactic realm (see Von Mengden 2016 for a lengthy treatment of this proposal). To illustrate this, I have looked at two of the most prolific morphological patterns in Germanic, which are of Indo-European descent: one from the nominal domain (the stem-building *-n*-affix), and one from the verbal domain (the verbal *ǝ*-grade).

The motivation for exaptation is to be sought in the way morphology works: rather than concatenations of morphemes, language users are confronted with words that are sanctioned by one or more construction schemata (see Booij & Audring, this volume). Crucially, these construction schemata are output-oriented: morphemes are not independent carriers of meaning, but obtain their meaning by occurring in a paradigmatically related set of words. Language users may or may not see structure in those words, and associate certain recurring parts on the formal side with regularities on the semantic side. This is basically a process of abductive reasoning, as the words themselves do not necessarily converge on one possible structure, but may be motivated by multiple constructional schemata (Booij & Audring, this volume, and Van de Velde et al. 2013 for diachrony). Diachronically, this allows for morphological change, especially when under the influence of sound

change or of a break in the regular transmission of language over generations, an original motivation gets obscured. Say a word is licensed by a constructional schema consisting of three parts $[X\ Y\ Z] \leftrightarrow [A\ B\ C]$. If Z erodes under sound laws, the constructional schema can either change to $[X\ Y\ \emptyset] \leftrightarrow [A\ B\ C]$, where meaning part C is now represented by a paradigmatic zero, but alternatively, the language user could abductively arrive at a new schema $[X\ Y] \leftrightarrow [A\ B + C]$, with meaning $B + C$ corresponding to a portmanteau morpheme Y. In another scenario, the meaning part of the original $[X\ Y\ Z] \leftrightarrow [A\ B\ C]$ schema may bleach (e.g. by ‘hyperanalysis’, Croft 2000: 121–126), so that one of the formal elements now becomes morphological residue: $[X\ Y\ Z] \leftrightarrow [A\ \emptyset\ C]$. This offers opportunities for a new meaning creeping in, associated with the ‘spandrel’ Y (see Van de Velde and Norde 2016: 5, 7, 21, 26–27 for this term). This new meaning may come from the surrounding context, by way of ‘pragmatic strengthening’ (Hopper and Traugott 2003: 94) or ‘hypoanalysis’ (Croft 2000: 126–130), or may be a completely new category, for instance a category borrowed in language contact. Refunctionalization of obsolete or obsolescent morphology is called ‘exaptation’. As pointed out in Van de Velde and Norde (2016), linguists have been somewhat hesitant to adopt the notion of exaptation for various reasons. One of the reasons is the disbelief in functionless morphology (see Vincent 1995: 435), and this disbelief is understandable if one operates with a traditional morphological theory that views morphemes as carriers of meaning. Construction Morphology, by contrast, has less of a problem with functionless morphology. Formal material may be part and parcel of a constructional schema. Semiotic pressures are likely to kick in, however, leading to new form-function mappings. As a result, exaptation appears to be more pervasive than linguists have been inclined to think.

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