[to appear in Thomas Hoffmann and Graeme Trousdale (eds.) *The Oxford Handbook of Construction Grammar*. Oxford: Oxford University Press, 2013, 255-273.]

Morphology in Construction Grammar

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1. Introduction: morphological constructions

Morphology is the subdiscipline of linguistics that deals with the systematic relationships between form and meaning of linguistic constructs at the word level. The framework of Construction Grammar (hereafter CxG) may be expected to provide an adequate framework for morphological analysis, since CxG takes as its starting point that 'the grammar represents an inventory of form-meaning-function complexes, in which words are distinguished from grammatical constructions only with regard to their internal complexity' (Michaelis and Lambrecht 1996: 216). This approach to morphology can be referred to as Construction Morphology, which is also the title of a recent monograph (Booij 2010) that provides a range of arguments for this way of doing morphology.

Let me first give an example of a morphological construction. English features a large set of deverbal adjectives ending in the suffix *-able*, such as *accept-able, afford-able, approach-able, believ-able,* and *do-able*. The meaning of these adjectives can be circumscribed informally as 'can be V-ed', where V stands for the meaning of the base verb of the adjective.[1] The verbs in these adjectives are transitive verbs, and the object arguments of these verbs correspond to the subject arguments of the respective derived adjectives. On the basis of the systematic form-meaning correspondences between a set of such adjectives and the set of corresponding verbs, the English language user can form an abstract schema that expresses a generalization concerning the form-meaning correspondences that hold for these adjectives:

(1) $[V_{TR_i}\text{ -able}]_{A_j} \leftrightarrow [[\text{CAN BE SEM}_i\text{-ed}]_{\text{PROPERTY}}]_j$

(V_{TR} = transitive verb, SEM stands for the meaning of the relevant constituent). The notation that I use here is in essence that proposed by Jackendoff (2002). The double arrow expresses that there are correspondences between (parts of) the formal and the semantic representation,

expressed by co-indexation. The semantic representation is a partially informal one. The representation on the left of the double arrow is the form specification of the deverbal adjectives. The formal representation of a word comprises two sub-representations, a morphosyntactic representation and a phonological one (Jackendoff 2010, 2011), which are conflated here into one representation for ease of exposition.

In this chapter I will provide a range of arguments for a CxG approach to morphology as introduced by the brief characterization of English adjectives in *–able* above. In section 2, it is argued that both complex words and the abstract schemas that they instantiate must be specified in the lexicon. There are degrees of schematicity, which implies the idea of a hierarchical lexicon. In this respect morphology is strikingly similar to the way that CxG deals with syntactic constructs and constructions. Section 3 shows that morphological constructions may have holistic properties. This means that the meaning of a morphological construction must indeed be specified as a property of the construction as a whole.

A desirable implication of this view of the lexicon as a richly structured component of the grammar (instead of just a list of idiosyncratic information) is that it is possible to specify and refer to paradigmatic relations between complex words and between morphological constructions. In section 4, it is shown that we need this type of relationship for a proper account of word formation. The notion of paradigmatic relationship also plays an essential role in inflectional morphology (section 5), and inflectional morphology is shown to strongly support the basic conceptions of Construction Morphology.

The relationship between morphology and syntactic constructions is the topic of sections 6 and 7. In section 6 it is argued that the distribution of bound morphemes may depend on their occurrence in specific syntactic constructions. That is, bound morphemes may function as morphological markers of constructions. Section 7 shows that morphological and phrasal constructions may have identical functions in the grammar, and hence compete, since there are productive classes of phrasal lexical units.

Finally, section 8, presents a summary of findings and conclusions concerning morphology in CxG.

2. The hierarchical lexicon

Schema (1) summarizes the predictable common properties of the adjectives ending in *-able* mentioned above. Hence, schema (1) dominates the individual listed existing adjectives in *-able*.

At the same time, the schema specifies how new adjectives of this type can be derived from transitive verbs. The required transitivity of the verbal base is confirmed by adjectives like *playable* and *debatable* which select a transitive sense of the polysemous verbs *play* and *debate*. Moreover, the V-able construction can coerce a transitive interpretation of intransitives, as in *laughable* and *unlistenable.*

By specifying both the individual existing *-able* adjectives and the productive schema, we avoid the 'rule versus list fallacy', the mistaken idea that a linguistic construct that is completely regular and hence predictable cannot at the same time be listed. Listing is a way of specifying the lexical conventions of a language, whereas schemas express the generative power of the grammar. Language users acquire abstract morphological schemas on the basis of the individual complex words that they have acquired in the first place.

The relation between a schema and its instantiations can be modeled in a hierarchical lexicon by making use of the mechanism of default inheritance: the individual *-able* adjectives inherit all their predictable properties from their dominating schema by default. By using inheritance as a default mechanism we allow for individual *-able* adjectives to have idiosyncratic properties that differ from what is predicted by the schema. For instance, the adjective *agreeable* is derived from the verb *agree* which is not transitive, but requires a prepositional object (*agree with / on / to*). In the case of *applicable*, the form of the verb stem, *applic-* is not identical to that of the verb *apply*. The adjective *clubbable* 'worthy of membership of a club' is derived from the noun *club*, not from a verb. Finally, there are also adjectives in *-able* with the relevant meaning type, but without a base verb being available, adjectives such as *amenable, ineluctable,* and *tractable.* This implies that the part before *-able* cannot be co-indexed with an independent verb. Hence, the representation of these adjectives contain less predictable, redundant information since they do not inherit part of their meaning from the meaning of a corresponding base verb.

Default inheritance can be interpreted in two ways. In the impoverished entry theory (Sag et al. 2003: Chapter 8) all predictable information concerning a lexical entry is omitted from that entry itself, and specified in the schemas or constraints that dominate it. The lexical entry inherits these properties from its dominating nodes. In the full entry theory (advocated in Jackendoff 1975) lexical entries are fully specified, and inheritance is a mechanism for computing the amount of non-independent information. This latter variant is to be preferred, because abstract morphological schemas are constructed on the basis of lexically stored complex words. There is no evidence that, once a language user has acquired the abstract schema, information in the lexical entries for individual complex words is deleted.

Schema (1) accounts for a productive word formation process. For instance, since the noun *Skype* has been converted into a new verb *to skype*, we may now also say that we are *skypable*, as a Google search will confirm. Hence, it has to be specified that this schema is not just a generalization over a set of existing words, but can be used productively as well (see Jackendoff 2010: 28-34 for discussion). This schema thus represents a morphological construction, and the individual *-able* adjectives are morphological constructs. In this morphological construction, one constituent is specified (*-able*), whereas the other constituent is an open position, a variable for 'transitive verb'. Hence, this morphological schema is a 'constructional idiom' at the word level. A constructional idiom is a (syntactic or morphological) schema in which at least one position is lexically fixed, and at least one position is variable. The morpheme *-able* is a bound morpheme. It does not occur as a lexical item by itself, but only as part of the listed adjectives of this type, and of the word formation schema (1).

The psychological reality of morphological schemas is shown by the productive use of the corresponding word formation processes. Children are able to discover abstract patterns in sets of complex words, and use these patterns productively (Mos 2010). This does not mean that all word formation processes have the same degree of productivity: there is cline from unrestricted productivity to extension of a pattern based on a specific word as model, the prototypical case of analogy. Productivity correlates with type frequency, and thus with degree of entrenchment of a schema (Baayen 2003; Barδdal 2008, 2011; Hay and Baayen 2005).

Since morphological schemas define how new complex words can be coined, one may wonder whether the assumption of an abstract schema necessarily implies productivity of the relevant morphological process. This is not the case. For instance, we should be able to express that English compounds are all right-headed, including the restricted set of verbal compounds such as *to babysit* and *to head-hunt*, coined by means of back formation from *babysitter* and *head-hunter* respectively (verbal compounding is not productive in English, Lieber 2009). Similarly, the suffix *-ship* is clearly discernible in words like *friendship* and *leadership*, yet it cannot be extended to *managership*. Hence, we must be able to state as an independent property to what extent and in which subdomains a particular schema can be used productively.

The most common type of word formation in the languages of the world is compounding, the juxtaposition of two words to form a new one (Bauer 2009). English, like all Germanic languages, has a productive process for making right-headed compounds, such as NN compounds. The most abstract schema for English compounds may therefore look as follows:

(2) $[X_i \; Y_j]_{Yk} \; \leftrightarrow \; [SEM_{Yj} \text{ with relation R to } SEM_{Xi}]_k$

In this schema the structure on the left of the arrow expresses that the category of the word as a whole is identical to that of the right constituent, since they share the category variable Y. The schema expresses through co-indexation that the formal head of the compound is also its semantic head. A *windmill*, for instance, is a type of mill, not a type of wind, and it denotes a mill which has some semantic relation with the left constituent *wind*, namely 'powered by'. This specific interpretation of the relation variable R is provided by conceptual and encyclopedic knowledge, and is conventionalized for existing, listed compounds.

Schema (2) dominates various subschemas. For instance, there is a subschema for NV compounds that dominates verbs like *head-hunt*, and has to be qualified as unproductive. On the other hand, the subschema for NN compounds is productive. Subschemas may thus differ in their degree of extensibility (Barðdal 2008, 2011).

Additional evidence for the claim that we need subschemas for subclasses of compounding in which one of the constituents is lexically specified, is found in the existence of 'affixoids', that is, words that are affix-like in that they have a specific bound meaning when forming part of a compound (Booij 2005, Van Goethem 2008). In Dutch NN and NA compounds, which are right-headed, the modifier constituent may develop a more abstract meaning of intensification. For instance, the noun *reuze* (citation form *reus* 'giant', here followed by the linking element -*e*), combines with both nouns and adjectives, and has acquired the more abstract meanings 'great' and 'very' respectively:

(3)   a.   *reuze*-N
               reuze-idee 'great idea'
               reuze-kerel 'great guy'
               reuze-mop 'great joke'
               reuze-plan 'great plan'
       b.   *reuze*-A
               reuze-aardig 'very kind'
               reuze-leuk 'very nice'
               reuze-gemeen 'very nasty'

This implies that the Dutch lexicon contains constructional idioms, subcases of NN and NA compounding, with the first constituent lexically specified:

(4)　　a.　　　　$[[\text{reuze}]_{Ni} \ [x]_{Nj}]_{Nk} \leftrightarrow [\text{great}_i \ \text{SEM}_j]_k$

　　　　b.　　　　$[[\text{reuze}]_{Ni} \ [x]_{Aj}]_{Ak} \leftrightarrow [\text{very}_i \ \text{SEM}_j]_k$

As discussed in detail in Van Goethem (2008), the Dutch adjective *oud* 'old' has acquired the meaning 'former' when used as part of a compound, as in:

(5)　　　oud-docent 'lit. old-teacher, former teacher'

　　　　oud-student 'lit. old-student, former student'

　　　　oud-strijder 'lit. old-warrior, war veteran'

This use of *oud* requires a constructional idiom, a subcase of AN compounding:

(6)　　　$[[\text{oud}]_{Ai} \ [x]_{Nj}]_{Nk} \leftrightarrow [\text{former}_i \ \text{SEM}_j]_k$

A similar type of semantic development can be observed for Mandarin Chinese (Arcodia 2011). Arcodia observes that the English loan morpheme *bā* 'bar' has developed a more general meaning in Chinese right-headed compounds, as illustrated in (7):

(7)　　　*bōli-bā* 'glass-bar, a glass workshop where customers may create their own products'

　　　　bù-bā 'cloth-bar, a textile workshop where customers may create their own products'

　　　　wàiyǔ-bā 'foreign language-bar, a (virtual) place for learning foreign languages'

　　　　yóuxì-bā 'game-bar, amusement arcade'

Arcodia also points out that when the word *bā* is used as the left, non-head constituent of a compound, it has the regular meaning of English *bar*. Therefore, he generalizes the following, bound generalized meaning of *bā*: 'place (actual or virtual) where some kind of service related to N_i (the left constituent) is offered or where information related to N_i may be exchanged'. This meaning must be specified in a constructional idiom, with the head N_j of the N_iN_j compound specified as *bā*.

　　　In sum, the pervasive phenomenon of generalizations for subclasses of complex words requires a hierarchical lexicon. Moreover, such subschemas explain why parts of compounds can develop into real affixes (Booij 2005): words receive a special 'bound', often more abstract interpretation, within compounds. When the actual lexeme gets lost, its corresponding bound

version may survive as an affix. For instance, the English affixes *-hood* and *-ship* derive from nouns which were once the head constituents of compounds .

The rise of such affixoids means that a lexical word develops into a word with a more generalized meaning and exhibits context expansion: a word attaches to a larger class of words than its original semantics would justify. The Dutch word *reuze* 'giant' for instance, not only attaches to concrete entities with a physical size, but to all kinds of abstract nouns, as the examples (3) illustrate. This pattern of change may also lead to the development of grammatical meanings for such affixoids, and hence to grammaticalization (cf. Himmelmann 2004 for discussion of the relation between lexicalization and gramaticalization).

3. Holistic properties

An essential argument for CxG is that a construction may have holistic properties that are not derivable from the properties of its constituents and/or its structure. This argument also applies to morphological constructions. An example of a type of morphological construction with holistic properties is reduplication. In the case of full reduplication, a word is copied, and the reduplicated structure can express all sorts of meanings such as increase in number, quality, or intensity. In Indonesian, reduplication is used for expressing plurality on nouns (Sneddon 1996: 16):

(8)   meja 'table'   meja-meja 'tables'
        rumah 'house'   rumah-rumah 'houses'
        singkatan 'abbreviation'   singkatan-singkatan 'abbreviations'

This semantic property of plurality cannot be derived from one of the constituents of the plural noun, nor from its formal structure (a sequence of two identical constituents). It is the copying configuration as such that evokes the semantic notion of plurality. Hence, we might assume the following constructional schema for the formation of plural nouns in Indonesian (where the co-indexation of the two nouns with *i* indicates that they have to be identical; PLUR is a quantifier, the semantic operator of plurality):[2]

(9) $[N_i\ N_i]_{Nj} \leftrightarrow [\text{PLUR}\ [\text{SEM}_i]]_j$

An interesting case for a constructional analysis of compounding is formed by the class of resultative V_1V_2 compounds in Mandarin Chinese, where V_1 represents the action and

functions as the head of the compound, and V_2 mentions the state brought about by the action specified by V_1. The following examples illustrate this type of compounding (Basciano 2010: 278-79):

(10)   a.   Zhāngsān   yáo-xǐng   le   Lǐsì

                        Zhangsan   shake-awake   ASP   Lisi

                        'Zhangsan shook Lisi awake'

        b.   Tā   kū-shī le   shǒupà

                        He   cry-wet ASP   handkerchief

                        'He cried the handkerchief wet'

(ASP = aspectual marker). These VV compounds are semantically similar to the resultative construction in English, instantiated by the glosses of the sentences (10). Note that in (10b), the main verb *kū* 'cried' in isolation is intransitive, and cannot take the direct object *shǒupà* 'handkerchief', a so-called unselected object. It is the resultative construction as a whole that makes the occurrence of a direct object possible (Goldberg 1995). This Chinese VV compound construction makes the same semantic contribution of resultativity. As in the case of the English resultative construction, the resultative meaning is not derivable from one of the V-constituents, but is evoked by the VV-compound as such. The resultative compound is not necessarily transitive, as shown in (11), but the state mentioned by V_2 in (11) is again a result of the event denoted by V_1:

(11)   Píngzi pò-suè   le

        Vase   break-smash   ASP

        'The vase broke into pieces'

This implies a constructional schema for VV compounds in Mandarin Chinese with this resultative meaning specified: the event or property specified by the second verb is brought about by the event specified by the first verb:

(12) $[V_i\ V_j]_{Vk} \leftrightarrow [SEM_i\ CAUSE\ [SEM_j]]_k$

The argument structure of V_2 which is part of its SEM might introduce an unselected object for V_1.

A subclass of these VV compounds is formed by compounds in which the first V is a light verb with a bleached meaning. The meaning contribution of these verbs is that of causation; they are comparable to causative verbs or affixes in other languages. These are verbs like *dǎ* 'beat, strike', *nòng* 'make, handle', and *gǎo* 'do', which may not denote any particular action. Basciano (2010) points out that some of the compounds with these three verbs are in fact ambiguous. A compound like *dǎ-huài* can either mean 'hit/strike and ruin/break as a result', or simply 'break' (Basciano 2010: 209). Similarly, this verb when combined with the verb *sǐ* 'to die' can either mean 'cause to die = kill' or, with the non-bleached meaning of *dǎ*: 'beat and kill as a result'.

This subclass of causative verbs with a light verb in V_1 position can be characterized by means of subschemas, dominated by schema (12), in which these light verbs are lexically specified:

(13) $[[dǎ\ ]_{Vi}\ V_j]_{Vk}\quad \leftrightarrow\ [\text{CAUSE}_i\ [\text{SEM}_j]]_k$

$[[nòng]\ _{Vi}\ V_j]_{Vk}\ \leftrightarrow\ [\text{CAUSE}_i\ [\text{SEM}_j]]_k$

$[[gǎo]_{Vi}\ V_j]_{Vk}\quad \leftrightarrow\ [\text{CAUSE}_i\ [\text{SEM}_j]]_k$

These schemas express that these light verbs can be used as causative markers without contributing a specific lexical meaning: in the semantic parts of these subschemas SEM_i (the lexical meaning of V_1), has been omitted, and V_1 only expresses the meaning CAUSE. This specification will overrule the meaning as specified in (12). The other, more literal interpretation of these VV compounds is still available as well, since they can be generated by means of schema (12).

The schemas (13) are constructional idioms, because one of the positions is lexically specified. This concept is also relevant in relation to *suru*-compounds in Japanese (Kageyama 1982, 1999). These are right-headed compounds with the verb *suru* 'do' as their head; the non-head is a verbal noun, and it is only with this verb that verbal nouns combine into such compounds. The following examples illustrate this type of compounding:

(14)   a.   yama-nobori-suru

mountain-climbing-do

'to do mountain climbing'

b.   kenkyuu-suru

research-do

'to do research'

c.   saikuringu-suru
    cycling-do
    'to do cycling'

Instead of *suru*, a number of suppletive forms with the meaning 'to do' can be used: the potential form *dekiru*, the honorific form *nasaru*, and the humble form *itasimasu* (Kageyama 1999: 313). That this type of compounding is only productive with the verb *suru* and its suppletive forms mentioned above, is expressed by the following constructional schema:[3]

(15) $[[x]_{VNi} [suru]_{V0j}]_{V0k} \leftrightarrow [DO_i SEM_j]_k$

where *suru* stands for the lexeme SURU and its suppletive forms.

The holistic interpretation of compounds is further illustrated by the class of exocentric compounds, that is, compounds for which their lexical class cannot be identified with that of one of their constituents.

A well known class of exocentric compounds in Romance languages are VN compounds that denote the agent or instrument of the action expressed by the V; the N denotes the object of the action, as in Italian $[[lava]_V[piatti]_N]_N$ 'lit. wash-dishes, dish-washer', $[[porta]_V[lettere]_N]_N$ 'lit. carry-letters, postman', and $[[ruba]_V[cuori]_N]_N$ 'lit. break-hearts, heart breaker'. There is no subpart in these compounds that expresses the notion of 'agent' or instrument'. One might try to solve this problem by assuming a nominalizing zero-suffix. For instance, one might assume that the morphological structure of Italian *portalettere* 'postman' is $[[[porta]_V [lettere]_N]_V Ø]_N$, with a zero-suffix that is category-determining and carries the meaning of agent / instrument. However, the assumption of such a zero-suffix is a completely arbitrary way of making these compounds endocentric, since there is no independent evidence for such a zero-morpheme. Instead, in a constructional analysis the word class and meaning of these compounds are specified as properties of the morphological construction as such:

(16) $[V_i N_j]_{Nk} \leftrightarrow [x [x SEM_i y], y=SEM_j]_k$

That is, such compounds denote the *x*-argument (agent or instrument) of the predicate expressed by the V-constituent, and the N functions as the *y*-argument (patient) of that predicate.

Exocentric compounding is not restricted to Romance languages. Similar VN compounds occur in Polish (Szymanek 2009: 474):

(17)   [VN]$_N$ łam-i-strajk 'lit. break-strike, strike breaker'

       [NV]$_N$ list-o-nosz 'lit. letter-carry, postman'

Compounds of the type N + nominalized V are "frequently exploited in Japanese to name the agents, instruments, products, and other concrete entities that figure prominently in the events or states described by the compounds" (Kageyama 2009: 515):

(18)   e-kaki 'lit. picture-drawing, painter'

       tume-kiri 'lit. nail-cutting, nail cutter'

       tamago-yaki 'lit. egg-frying, omelette'

Again, these meanings do not derive completely from the N and V constituents of these compounds, and are thus to be seen as being evoked by the morphological construction.

4. Paradigmatic morphology

When conventionalized complex words are listed in the lexicon, as assumed in Construction Morphology, they may be paradigmatically related. For instance, when the English words *social*, *socialist* and *socialism* are all listed, the language user may consider *socialist* and *socialism* as the concatenation of *social* and *-ist* /*-ism* (syntagmatic relationships), but also establish a direct, paradigmatic relationship between *socialism* and *socialist* in terms of suffix substitution since they share their base word *social*. Such paradigmatic relationships may lead to the coining of new words by means of substitution. Indeed, the creation of derived complex words is not just a matter of attaching affixes to base words. There are clear cases of affix substitution. Consider the following related pairs of English words:

(19)   alpin-ism   alpin-ist

       commun-ism   commun-ist

       de-ism   de-ist

       fasc-ism   fasc-ist

       solips-ism   solips-ist

Semantically, the meaning of the nouns on the right can be circumscribed as a compositional function of the meaning of the nouns on the left. For instance, a *communist* may be defined as an 'adherent of communism'. Yet, from a formal point of view the word in *-ist* is as complex as the corresponding word in *-ism*. For that reason, Aronoff (1976) proposed truncation rules that delete suffixes before other suffixes: *-ism* is deleted before *-ist* in a complex word like *alpin-ist* derived from underlying *alpin-ism-ist*. The assumption of truncation rules can be avoided once we make use of schemas instead of rules: schemas for complex words with the same degree of morphological complexity can be represented as paradigmatically related (symbolized here by ≈):

(20) $<[x\text{-}ism]_{Ni} \leftrightarrow [SEM]_i> \approx <[x\text{-}ist]_{Nj} \leftrightarrow [PERSON \text{ involved in } SEM_i]_j>$

(the angled brackets mark the boundaries of the individual constructional schemas). In (20) it is expressed that we interpret nouns in *-ist* as denoting persons involved in some ideology, belief, propensity, or activity. Note that we can learn and understand the meaning of, for instance, *alpinist* without having the word *alpinism* in our lexical memory. In that case, there is no co-indexation of the relevant semantic part (SEM) of the word in *-ist* with a lexeme with that meaning SEM. An additional advantage of this analysis is that we do not have to arbitrarily decide whether the word in *-ist* is formally derived from the word in *-ism*, or vice versa. The schema pair (20) allows us to go in both directions in coining a new word. Yet, the meaning of the word in *-ist* will be a compositional function of the meaning of the word in *-ism* if such a word in *-ism* is available.

Such schematic correspondences can also be used in cases of non-concatenative morphology such as vowel alternation, the mechanism used for making the past tense forms of the strong verbs in Germanic languages. However, in the latter case, the pair of paradigmatically related schemas is not productive, since these alternations cannot be extended to new verbs.[4]

5. Inflection

Inflectional phenomena provide clear arguments for the constructional approach to morphology introduced in the previous sections. The basic arguments concern the holistic properties of inflectional forms, and the relevance of paradigmatic relations. This leads to a word-based approach to inflection, the Word-and-Paradigm model.

The classical problem of inflectional morphology is the complicated relation between form and meaning. It is often impossible to assign a specific meaning to an inflectional affix,

because its actual value depends on the kind of stem it combines with, and the properties of that stem, unless one allows for large sets of homonymous inflectional affixes. Consider, for instance, the paradigm of masculine and neuter nouns (declension I) in Russian (Gurevich 2006), exemplified by *stol* 'table' and *bljudo* 'dish':

(21)

	MASCULINE		NEUTER	
	SG	PL	SG	PL
NOM	stol	stol-y	bljud-o	bljud-a
ACC	stol-a	stol-y	bljud-a	bljud-a
GEN	stol-a	stol-ov	bljud-a	bljud
DAT	stol-u	stol-am	bljud-u	bljud-am
INST	stol-om	stol-ami	bljud-om	bljud-ami
LOC	stol-e	stol-ax	bljud-e	bljud-ax

As these paradigms illustrate, the same ending, for instance *-a*, may have different interpretations depending on the class of the noun. Moreover, the particular value expressed is a combination of properties, such as [ACC.SG] or [NOM.PL]. That is, there is no one-to-one correspondence between form and morpho-syntactic properties. One also finds elements in inflectional forms such as the thematic vowels of verbal conjugation in Latin and the Romance languages that do not contribute by themselves to the meaning of the inflected forms; they are 'morphomic' properties (Aronoff 1994). These are familiar observations supporting a Word-and-Paradigm based approach to inflectional morphology (Ackerman et al., 2009; Blevins, 2006). From a Construction Morphology perspective this means that the morphosyntactic properties of each word form in a paradigm are best considered as constructional properties, that is, as properties of the word form as a whole. This can be expressed by morphological schemas, for example schemas that abstract over word forms of the same declension class (cf. Gurevich 2006 for such an analysis of Georgian). The schema for the ACC/GEN.SG word forms *stola* and *bljuda* is given in (22):

(22) $(x\text{-}a)_{\omega i} \leftrightarrow [N]_{i,\,sg.acc/gen} \leftrightarrow SEM_i$

where *x* is a phonological variable for nominal stems, and ω is a phonological word. The meaning SEM_i mentioned here is that of the lexeme. The semantic interpretation of the morphosyntactic features is not specified here, since this interpretation depends - as far as the case features are concerned- on the syntactic contexts in which a word occurs.

As argued by Harris (2009), the problem of 'exuberant exponence', the phenomenon that a particular morpho-syntactic property is expressed more than once by the same morpheme within one grammatical word (and hence a subcase of extended exponence), is a problem for morpheme-based morphological theories. Harris shows that for a proper account of the recurrent class agreement markers in verb forms of Batsbi, a Nakh-Dagestanian language, it is essential to make use of schemas and subschemas in a hierarchical lexicon. For example, the following schemas can be assumed to characterize specific sets of verbal forms with the class marker *d* (Harris 2009: 298; LEX stands for a lexical stem). In the examples, they are followed by the endings -*i*^{n} and *iy-e*^{n} respectively:

(23) a. Schema for verb stems
          [**d**-LEX]$_V$ example**: d**-ek'-i^n 'they fell'
      b. Schema with extension for transitive verbs
          [V-**d**-i]$_V$
      c. Unified schema a + b
          [[**d**-LEX]$_V$ **d**-i]$_V$ example: **d**-ek'-**d**-iy-e^n 'threw it off'

These schemas specify the formal make-up of the various verb forms. Thus, the phenomenon of extended exponence supports a constructionist approach to inflectional morphology.

For many languages, the construction of a particular inflectional form cannot be conceived of not a matter of concatenation of a stem and one or more inflectional morphemes. Instead, a particular inflectional form may have to be computed on the basis of another form of its inflectional paradigm. A particular inflectional form may play two different roles in accounting for the construction of inflectional forms. First, particular inflectional forms may be used to identify the inflectional class to which a word belongs (Finkel and Stump 2007, 2009). For instance, the genitive singular form of the Latin noun *genus* 'type', *gener-is*, identifies this noun as belonging to the 3rd declension. That is, *gener-is* is a principal part of the inflectional paradigm of *genus*. Secondly, an inflectional form may be used to compute the form of other cells in the same inflectional paradigm (Blevins 2006, Ackerman et al. 2009). For instance, in Saami first declension nouns exhibit a pattern based on two principal parts, the genitive singular and the nominative singular. These noun forms are subject to gradation. If the nominative singular form is strong, and hence has a geminate, the illative singular and the essive form are also strong. In that case, the genitive singular. has a weak form, with a single consonant (as in *bihttá* vs *bihta* 'piece, nom. sg./gen. sg.). Conversely, if the nominative singular form is weak, the corresponding illative

sg. and the essive are weak as well, whereas in that case the genitive singular form is strong (as in *bargu* vs *barggu* 'work, nom.sg./gen.sg.' (Blevins 2006: 546). In other words, morphological generalizations about such paradigms can only be made in terms of systematic paradigmatic relationships between cells of these paradigms. The relations between the nominative sg., the illative sg., and the essive can be expressed as paradigmatic correspondence relations between morphological schemas:

(24) $[\text{x-á}]_{\text{NOM SG}} \approx [\text{x-ái}]_{\text{ILLATIVE SG}} \approx [\text{x-án}]_{\text{ESSIVE}}$

If the variable *x* stands for a strong stem with a geminate consonant, as in *bihttá*, this geminate consonant will be predicted to recur in all three forms. Inversely, if *x* stands for a weak stem, as in *bargu* and *á* is replaced with *u*, it is predicted that this weak stem shows up in these three inflectional forms. That is, these mutually implicative relationships between paradigm cells can be expressed straightforwardly by making use of schemas for fully specified inflectional forms and paradigmatic relationships between such schemas.

Since Construction Morphology allows for both morphological schemas and their instantiations to be listed, it is possible to list inflectional forms that are completely regular, because the inflectional schemas will indicate their predictable properties. This is necessary because inflectional forms function as principal parts, and because the form of one paradigm cell may be predicted from another.

Storage of certain inflectional forms is a welcome result from a psycholinguistic point of view. It has been shown, for instance, that regular plural nouns in Italian exhibit a frequency effect in lexical decision tasks. This implies the lexical storage of these plural nouns (Baayen et al. 1997). Moreover, inflected forms may be regular from the morphological point of view, but exhibit idiosyncratic properties in other domains. The plural form of Italian *amico* [amiko] 'friend' is *amici* [amitši], with palatalization of the stem-final /k/ to [tš]. However, this rule does not apply to all Italian nouns (compare *buco* [buko] 'hole', plural *buchi* [buki]), and hence one has to memorize which plural nouns have palatalization. Therefore, a plural noun such as *amici* has to be lexically stored for phonological reasons. Yet, the inflectional schema for pluralization of nouns will indicate that it is morphologically regular.

Another argument for the constructional approach to inflection is formed by periphrastic tense forms. For instance, in English the word combination '*have* + past participle' is used to express the perfect tense of verbs. In this construction, the verb *have* does not express the meaning 'to possess', but a grammatical meaning of perfectivity, in combination with the past

participle. The grammatical meaning of perfect tense is a property of this construction as a whole (Ackerman and Stump 2004, Sadler and Spencer 2001, Spencer 2004). Hence, periphrastic inflectional forms are to be treated as constructional idioms in which the auxiliary is lexically fixed, whereas the slot for the participle is a variable. The semantic properties of periphrastic forms, such as perfectivity, are holistic properties that are specified as properties of the construction. Word combinations may therefore fill cells of morphological paradigms. This shows that morphological and syntactic constructs may have the same morpho-syntactic function. This can be handled adequately in a construction-based approach to morphosyntactic phenomena.

6. Construction-dependent morphology

The concept of 'construction' is not only important for a proper characterization of complex words: syntactic constructions may be essential for a proper characterization of the distribution of bound morphemes as well. An example is the distribution of the relics of the old Germanic genitive suffix -s in various Dutch constructions, discussed in Booij (2010). Originally, all words in NPs in specifier position were marked by means of the genitive case, as illustrated here for Middle Dutch:

(25) a.   Symon-s Dankard-s son-s huse
              Symon-GEN Dankard-GEN son-GEN house.NOM.SG
              'the house of the son of Symon Dankard'
       b.   De-r duechd-en moedere
              the-GEN.PL virtue-GEN.PL mother.SG.NOM
              'the mother of the virtues'

Languages like English, Swedish, and Dutch have lost their case system. Yet, the bound morpheme -s, sometimes referred to as the Possessor suffix, is still used in particular constructions in these languages.[5] Norde refers to this change of the role of the suffix -s as deinflectionalization (Norde 2009). The -s has become a marker of specific constructions. In the case of Dutch, proper names -but only these- can be used as prenominal specifiers, and hence (26c) is ill-formed, unlike its English gloss with the same structure:

(26) a.   Jan-s boek 'John's book'
       b.   Prins Bernhard-s zes dochters 'Prince Bernhard's six daughters'

      c.   *de directeur-s pet 'the director's cap'

An additional semantic property of this construction is that it makes the Noun Phrase definite, even though there is no overt grammatical morpheme to express this definiteness. Hence, we have to assume a specific construction for Dutch NPs with such proper names as specifiers, of which the bound morpheme -*s* is part and parcel:[6]

(27)   *The Definite -s Construction (Dutch)*

        $[[\dots [x\text{-}s]_N]_{NPi} \dots N_j]_{NPk} \leftrightarrow [\text{the} \dots N_j \text{ of } NP_i]_k$ Condition: NP_i is a proper name

Apparently, the genitive case marker developed into the morphological marker of a particular construction. This shows that morphological markers may get tied to specific constructions. That is, the distribution of bound morphemes may depend on specific constructions due to reanalysis of syntactic constructions. Croft qualifies this kind of reanalysis as hypoanalysis: 'In hypoanalysis, the listener reanalyzes a contextual semantic/functional property as an inherent property of the syntactic unit. In the reanalysis, the inherent property of the context […] is then attributed to the syntactic unit, and so the syntactic unit in question gains a new meaning or function' (Croft 2000: 126-7).

       A slightly different example of the use of a particular morphological form being tied to particular construction is that of the superlative form of Dutch adjectives, which occurs in two specific constructions, exemplified in (28):

(28)   a.   Hij zingt het mooi-st(e) van alle mannen

               He sings the beautiful-est of all men

               'He sings more beautifully than any other man'

    b.   Die boom is op zijn mooi-st in mei

               That tree is on his beautifull-est in May

               'That tree is most beautiful in May'

In (28a) the superlative form of the adjective is preceded by the determiner *het*, and optionally followed by the ending -*e*. The position of the superlative after a determiner implies that it functions as a noun. Hence, the superlative must have been converted from adjective to noun in this construction. Dutch adjectives can be converted to nouns, either by means of conversion ('zero-derivation'), or by means of suffixation with -*e*. These two processes lead both to neuter

nouns that select the definite determiner *het* that shows up in the examples (28). However, only the option with overt morphological marking is productive in Dutch outside the context of this specific construction. For instance, *het mooi-e* 'the beautiful thing' is grammatical, but *het mooi is ungrammatical, unlike *het geel* 'the yellow colour', a conversion of the adjective *geel* 'yellow'. Conversion of A to N only applies to a restricted set of adjectives such as colour adjectives. So it is these two specific constructions that enable productive conversion of the superlative adjective (A-SUP) to a noun. Moreover, NPs of the type [*het* A-SUP] are only used adverbially: we cannot use the NP *het mooist* 'the most beautiful things' as a subject-NP or an object-NP, whereas the form with final -*e* leads to grammatical result since it is a case of regular, productive derivation of nouns from adjectives by means of suffixation with -*e*:

(29)   a.   Het {*mooi-st / mooi-st-e} is nog niet goed genoeg

                The {beautifull-est / beautifull-est-NOM} is yet not good enough

                'The most beautiful stuff is not good enough yet'

        b.   Hij verkocht het {*mooi-st / mooi-st-e} aan zijn vrienden

                He sold the {beautifull-est / beautifull-est-NOM} to his friends

                'He sold the most beautiful stuff to his friends'

        The superlative construction exemplified in (28b) also has special syntactic properties. The PP [*op zijn* + A-SUP] in (28b) contains the fixed preposition *op* 'on' and the fixed 3.SG possessive pronoun *zijn* /zɛin/ 'his', obligatorily realized with the weak form [zən] (spelled as *z'n*), but the choice of possessive pronoun optionally co-varies with the person of the antecedent. For all persons, the weak form of the possessive pronoun must be chosen. Hence, both of the following sentence variants are grammatical:

(30)   In die jurk ben je op {je / zijn} mooist

        In that dress are you at {your / his} beautifull-est

        'In that dress you look most beautiful'

        Both constructions are constructional idioms, with one variable position, that for the superlative adjective. They may be represented as follows:

(31)   a.   [[*het*]$_{Det}$ [A$_{[+SUP]i}$](e)]$_N$]$_{NPj}$ ↔ [with highest degree of SEM$_i$]$_j$

        b.   [[*op*]$_P$ [POSS [A$_{[+SUP]i}$]$_N$]$_{NP}$]$_{PPj}$ ↔ [with highest degree of SEM$_i$]$_j$

(where POSS is a weak possessive pronoun and may be fixed as *z'n*)

The schemas (31) express that the conversion of the superlative form of an adjective without overt morphological marking is possible in this specific syntactic context. This is therefore another illustration of how morphological operations can be construction-dependent.

In this case, there is no reference in the constructional schema to the superlative suffix as such, only to the morphological feature [+ superlative]. This correctly predicts that Dutch adjectives with an irregular superlative forms such as *best* 'best' and *meest* 'most', the superlative form of *goed* 'good' and *veel* 'much' respectively, can also occur in these constructions: *op zijn best* 'at best', *op zijn meest* 'at most'.

6. Phrasal lexical units

The notion 'word' is not coextensive with the notion 'lexical unit' since various types of phrasal constructs may function as lexical units. Classic examples are English AN phrases such as *red tape*, *blue cheese*, and *modern art* (Jackendoff 1997). It is often the case that what is expressed in one language by means of compounding is expressed in another, related one, by means of phrasal constructs, as is illustrated here for Dutch and German. German appears to have a preference for compounding, where Dutch uses phrases (Booij 2009):

(32)

Dutch AN phrase	*German AN compound*	*gloss*
bijzonder-e zitting	Sonder-sitzung	'special session'
gebruikt-e batterijen	Alt-batterien	'used batteries'
geheim-e nummer	Geheim-nummer	'secret number'
mobiel-e telefoon	Mobil-telefon	'mobile phone'
nieuw-e auto	Neu-wagen	'new car'

The phrasal nature of the Dutch constructs is revealed by the overt inflectional ending on the prenominal adjective. Both types of constructs are lexicalized in the sense that they belong to the lexical convention of the language involved. Hence, the lexicon must contain phrasal schemas, and is thus to be conceived as a 'constructicon'.

An interesting class of phrasal lexical constructs is formed by particle verbs, which are featured by, among many other languages, Hungarian (33), English (34), and German (35):

(33)   a.   Péter tegnap ki-ment az erdöbe

        Peter yesterday out-went the forest.into

        'Yesterday, Peter went into the forest'

        b.   Péter tegnap ment ki az erdöbe

        Peter yesterday went out the forest.into

        'Yesterday, Peter went into the forest'   (Kiefer and Honti 2003: 142)

(34)   a.   John looked up the information

        b.   John looked the information up

(35)   a.   dass Hans seine Mutter an-ruft

        that Hans his mother at-calls

        'that Hans phones up his mother'

        b.   Hans ruft seine Mutter an

        Hans calls his mother at

        'Hans phones up his mother'

There is an extensive discussion in the linguistic literature as how to analyze particle verbs: are they words (and hence a case of morphology), or are they phrasal constructs, and hence to be accounted for by syntax (Booij 2010: Chapter 5, Los et al. 2011)? Their word-like status relates to the observation that they often have an idiosyncratic meaning and can feed word formation; on the other hand they are separable in some syntactic contexts. This is illustrated here by means of the Dutch particle verb *aan-vallen* 'lit. to at-fall, to attack': it has derivatives like *aan-vall-er* 'attacker', and it is split in root clauses:

(36)   a.   dat Hans zijn vijand aan-valt

        that Hans his enemy at-falls

        'that Hans attacks his enemy'

        b.   Hans valt zijn vijand aan

        Hans falls his enemy at

        'Hans attacks his enemy'

Particles are also used as adpositions or as adverbs. As particles, they may exhibit a specific meaning, tied to the particle construction. Particle verb formation is an alternative to creating complex verbs by means of prefixation. In English, for instance, far more complex predicates are coined by means of particle verb formation than by prefixation. Hence, there is competition

between these two processes, which receives a natural account if they are both accounted for by constructional schemas that form part of the same lexicon / constructicon. Compare the use of the Dutch adpositions / adverbs *door*, *om ,onder, over* and *voor* as a particle and as a prefix:

(37)   *particle verb*   *prefixed verb*

dóor-boren 'to go on drilling'   door-bóren 'to perforate'

óm-blazen 'to blow down'   om-blázen 'to blow around'

ónder-gaan 'to go down'   onder-gáan 'to undergo'

óver-komen 'to come over'   over-kómen 'to happen to'

vóor-komen 'to occur'   voor-kómen 'to prevent'

These minimal pairs differ in meaning, in the location of main stress, and in their separability (the particles are separated from the verbs in root clauses, unlike the prefixes). Even though the particles have a lexicalized meaning which is not the same as that of the corresponding adposition, their use is at the same time productive. For instance, the particle *door* expresses continuative aspect, and can be used productively to coin new particle verbs with such an aspectual meaning. The prefix *door-*, on the other hand, expresses that the action denoted by the verb goes completely through the object of the action. Hence, we may assume the following two constructional schemas for *door*, one for particle verbs, with the syntactic status of being a verbal projection (V'), and one for prefixed verbs (V):

(38)   a. $[[door]_P V_j]_{V'k} \leftrightarrow [continue\ SEM_j]_k$

         b. $[[door]_P V_j]_{Vk} \leftrightarrow [SEM_j\ completely\ through\ object]_k$

These schemas are constructional idioms since one position is lexically fixed, whereas the slot for the verb is open. Thus, it is expressed that these lexicalized meanings of *door* are productive in specific structural configurations.

Particles may change into prefixes. There are verbs that were particle verbs in Middle Dutch, but became prefixed verbs in Modern Dutch, sometimes with a concomitant bleaching of the meaning of the preverbal element. Middle Dutch *over-bruggen* 'to bridge', for instance, is a particle verb, with the literal meaning of 'putting a bridge across', whereas in modern Dutch is is a prefixed, inseparable verb, with the more abstract meaning of 'reconcile'. However, the particle verb system is remarkably stable, and particles can also have a more abstract, bleached meaning.[7]

Particle verbs, even though they are not morphological constructs, thus support the model of Construction Morphology outlined above since this model enables us to express the commonalities of particle verbs and prefixed verbs without obliterating their formal differences.

8. Conclusions

In CxG complex words can be seen as constructs at the word level, instantiating morphological constructions. These constructions are specified by schemas that express systematic form-meaning correspondences. Constructional schemas form part of a hierarchical lexicon, with different layers of abstraction, and with individual complex words at the lowest level of abstraction. This conception of morphology enables us to make generalizations about subclasses of complex words, and to specify holistic properties of morphological constructions. In Construction Morphology, we can also specify systematic paradigmatic relationships between sets of complex words and sets of inflectional forms. We need such relationships in order to account for paradigmatic word formation, and for systematic patterns in inflectional paradigms.

In Construction Morphology, morphology and syntax relate in various ways. Syntactic constructions may carry specific morphological markers, periphrastic forms may fill the cells of paradigms of words, and morphological and syntactic constructs may both function as names of entities.

These findings confirm the insight of CxG that the lexicon is to be reinterpreted as the constructicon, a structured and hierarchically ordered array of constructions and constructs with phrasal or word status.

Notes

1. Exceptions to this semantic characterization are *honourable* 'must be honoured' and *despicable* 'must be despised'.
2. For a similar constructional analysis of reduplication, but with extension to reduplication of phrases, see Ghomeshi et al. (2004).
3. *Suru*-compounds are probably not morphological compounds, but syntactic compounds in which the verbal noun is Chomsky-adjoined to a V^0, forming a complex V^0. See Booij (2010: Chapter 4) for a discussion of this issue.

4. The idea of schemas and correspondence relation between schemas is by no means a new proposal. One can find it in publications such as Jackendoff (1975), Bybee (1988), and Bochner (1993). The point here is that morphological schemas are an important building block of Construction Morphology.

5. The English facts and the theoretical issues are well presented and discussed in Rosenbach (2002).

6. Cf. Booij (2010: Chapter 9) for a detailed analysis of this Dutch construction, a comparison with the English constructions, and a number of other cases of construction-dependent morphology.

7. Cf. Blom and Booij (2003), Blom (2004, 2005*a,b*), Los et al. (2011) and Booij (2010: Chapter 5) for detailed studies of particle verbs and more extensive argumentation.

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