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Language use and the architecture of grammar: a Construction Morphology perspective

This article motivates a usage–based account of morphological knowledge, and its place in the architecture of grammar. I–language, the abstract linguistic competence, and E–language, that is, actual language use, stand in a dialogic relationship. Morphology must be usage–based in order to understand the knowledge and creation of complex words. Construction Morphology is a theory about the place of morphology in the architecture of grammar that assumes a hierarchical lexicon, with various degrees of schematicity that do justice to actual language use in the domain of word formation. Since there are productive phrasal lexical constructions as well, and word formation may be based on paradigmatic relationships with such phrasal lexical units, there is no sharp divide between lexicon and grammar, although the formal distinction between syntactic and morphological constructs must be preserved. Arguments are given for second order schemas. They represent a multi–dimensional network of relationships between linguistic constructional schemas, both morphological and syntactic ones. The model of Construction Morphology is shown to allow for the graceful integration of findings concerning lexical knowledge in various subdomains of linguistics such as language acquisition, change, and processing.

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1. Intro: Why usage–based morphology?

Linguists try to identify the nature and structure of the knowledge that underlies the actual use of language in production and perception. The traditional way of speaking about this underlying knowledge is by making a distinction between competence and performance. This distinction has been articulated in the tradition of generative grammar as the distinction between I(nternal)–language and E(xternalized)–language (Chomsky 1986). I–language is the system of knowledge that resides in the speakers' brains, and which underlies their linguistic performance. E–language is the language as encountered in the world. Chomsky has taken the position that the real object of

linguistics is I–language, and that E–language is an epiphenomenon, not the primary object of linguistic research. In usage–based approaches to language, on the other hand, E–language is considered to be a serious object of research as well, without denying that a distinction should be made between actual language use and the competence that underlies it. The issue is discussed in detail by Taylor (2012), who points out that there is a dialogic relation between I–language and E–language that we should not neglect. The content of I–language cannot be based on intuitions only, but should also be determined on the basis of E–language. "A person's I–language [...] is the product of her exposure to a set of E–language events; her I–language is as it is because of the properties of the E–language which triggered its acquisition. Conversely, the language that a speaker produces [...] reflects her current I–language; E–language has the properties that it has in virtue of the I–language of its speakers" (Taylor 2012: 8–9).

Below, I will present some observations and arguments in favour of this dialogic view of the relation between I–language and E–language in the domain of morphology. An example of this dialogic relationship from the domain of morphology is that the word formation processes of a language often differ in their degree of productivity, a form of knowledge that speakers need in order to use morphology appropriately. The degree of productivity can only be discovered on the basis of specific frequency patterns in actual language use (E–language), in particular the number of new types of a certain type of complex words and the number of hapaxes of that type. The discovery of word formation schemas and subschemas also requires access to E–language data.

The traditional generative starting point is that the grammar defines the notion 'possible sentence of language L'. Similarly, the morphological module of the grammar is supposed to define the notion 'possible word of language L': "The simplest task of a morphology, the least we demand of it, is the enumeration of the class of possible words of a language" (Aronoff 1976: 17–18). In this view, the architecture of the grammar is seen as a set of rule components, plus a lexicon in which the morphemes of a language are stored, with a specification of their properties. The lexicon is seen as the repository of the unlawful. "The lexicon is really an appendix of the grammar, a list of basic irregularities" (Bloomfield 1935: 274). This view of the architecture of grammar has been challenged in various ways, culminating in the view defended in Jackendoff (2002) that there is no strict division between lexicon and grammar, a view that we will support in the sections below. This latter view reflects the idea that E–language is the basis on which we come up with a model of I–language. A second important insight of Jackendoff's seminal work is the detailed discussion of the notion of Parallel Architecture: the grammar specifies the systematic relationship between the form and the meaning of linguistic expressions. The formal level comprises the phonological level and the morphosyntactic level, and the meaning level comprises the semantic and the pragmatic level (cf. section 2).

Let me now give some examples of the dialogic relationship between I–language and E–language in the domain of morphology.

194

The first example is the observation that word formation processes may apply to existing complex words, including their idiosyncratic properties that recur in the derived words (Booij 1977). This implies that complex words must be listed in the lexicon, and that word formation processes must have access to this information. The existence and idiosyncrasies of conventionalized complex words are typically facts of E–language. For instance, the German derived nominal *Wohn–ung* 'house', with the shape of an action noun in *–ung,* is lexicalized, as it does not denote the action of *wohnen* 'to live', but the location of this activity. This idiosyncratic meaning recurs in the compound *Mietwohnung* 'rental house', the result of applying compounding to the lexicalized complex word *Wohnung*. This example thus shows that E–language facts affect the way in which abstract rules or schemas of word formation (a component of I–language) apply.

A second example of the interaction between I–language and E–language in the domain of morphology is the phenomenon of degrees of productivity. Not all possible words (as defined by I–language) can be actualized easily. Some processes are marginally or semi–productive, and this is a kind of knowledge that language users possess and have intuitions about, based on their experience with actual language use such as the occurrence of hapaxes (Baayen 1992; 2009), and it has also to do with the register used (Plag et al. 1999). The actual application of a morphological process may also be hampered by blocking effects, the existence of synonymous words in the conventional lexicon of the language that impedes the coinage of a new complex word with the same meaning (Rainer 2013). Note that we cannot interpret blocking as a component of I–language, since there is no absolute blocking principle, but only a tendency, because the coinage of synonymous complex words cannot be excluded absolutely. For instance, the noun *stabil–ity* does not block the formation of *stable–ness* as a well–formed word even though these words are synonyms.

Thirdly, lexical creativity may be based on paradigmatic relationships between existing complex words instead of being a matter of concatenation of words and affixes. For instance, the following German compounds on the right are based on the compounds on the left with the same right constituent, a case of analogical word formation. Specific unpredictable meaning components of the compounds on the left recur in those on the right:

(1) Heim–weh 'homesickness' – Raus–weh 'out–sickness, desire to be out of one's home'
Antritts–vorlesung 'inaugural lecture' – Abtritts–vorlesung 'farewell lecture'
Hand–werker 'manual labourer, who uses his hands to make a living' –
Mund–werker 'oral labourer, who uses his mouth to make a living'
(Vater 2010)

The dialogic relationship between I–language and E–language also implies that we must avoid the rule–list fallacy (Langacker 1987): there is no logical contradiction between the existence of a productive process (expressed as a

rule or a schema) and the storage of the outputs of that process. This applies both to morphology and to syntax. An example from syntax is that English has a productive schema for the formation of NPs of the form A+N. Yet, we store lots of these NPs in our lexical memory, as they are conventionalized names, for instance *yellow fever, mental lexicon, hard disk*, and *red tape* (Jackendoff 2002), and often with some specific unpredictable meaning.

The dialogic relationship between I–language and E–language is taken seriously in usage–based approaches. There is a wealth of arguments of the usage–based approach to the analysis of language which I cannot review here in any detail. The principal tenets of the usage–based approach can be summarized as follows (Bybee 2006; 2010; 2013; Bybee & Beckner 2010):

(2) – language acquisition and behaviour is governed by domain–general processes (categorization, chunking, rich memory storage, analogy, cross–modal association);
– language is shaped by its communicative function;
– there is a central role of memory (frequency, repetition effects);
– there is place for gradience and variation;
– language structure is shaped by evolution and history;
– language change is (also) due to activities of adult language users;
– language is (also) a cultural object.

The hypothesized general design features of language that underlie this approach are the following three (Beekhuizen et al. 2013):

(3) a. experience: storage effects, frequency, conventionalization;
b. heterogeneity; both concrete language constructs and schemas of various degrees of abstraction; small pieces and big pieces are stored;
c. redundancy: predictable information may be stored.

An important criterion of adequacy for linguistic modeling, that is, a meta–condition on models of the architecture of grammar is the criterion of 'graceful integration' (Jackendoff 2011). Graceful integration means that the model of grammar that one assumes should allow for the incorporation of, or be in harmony with the findings in related subdomains such as language acquisition research, historical linguistics and psycholinguistics. My claim will be that the framework of Construction Morphology, as outlined in Booij (2010), provides a model of morphological knowledge that allows for graceful integration.

As to language acquisition: word formation patterns are acquired on the basis of sets of paradigmatically related sets of words in one's mental lexicon and are thus constructed through exposure to E–language. For instance, the discovery by English speakers of an abstract word formation schema for deverbal nouns in *–er* starts with the lexical storage of a number of such nouns such as those listed in (4). The language acquirer will then be able to construct an abstract pattern by observing the systematic correlation between form and meaning of these nouns in *–er*. In other words, before the process

196

is there, we have individual instantiations of the process that we come across in E–language and might store in our lexical memory.

(4) eat   eat–er
     sing   sing–er
     walk   walk–er

Once, the pattern has been discovered, new nouns such as *acquirer*, *sky-per*, and *e–mailer* can be coined. This way of interpreting the acquisition of morphological competence predicts correctly that morphological knowledge grows with the growth of one's lexicon. Word formation processes in English that have a lot of instantiations, such as compounding, conversion, and dever-bal nouns in *–er* are acquired earlier than word formation processes whose instantiations are acquired later (Clark 2003 [2009, 2nd ed.]).

As to the domain of language processing: E–language properties such as frequency affect language processing and have implications for the storage of lexical knowledge. Even fully regular complex words can be stored in the mental lexicon since they exhibit frequency effects as well (Baayen et al. 2003). Note that the storage of complex words does not imply that their internal morphological structure is no longer accessible (Clahsen & Neubauer 2010).

Various types of morphological change require a theory of the lexicon in which the lexicon contains both regular and irregular complex words, and the schemas that they instantiate. In addition, phrasal constructions that function as lexical units must also be stored. Such phrasal constructions may develop into morphological constructions. In Germanic languages, for example, particle verbs, which have a phrasal structure, lead to the emergence of prefixed verbs. This is illustrated by the English prefix *out–* as in *out–rank* and *out–perform* that derives from the particle *out*. This change from particles to prefixes is further discussed in Los et al. (2012).

Another type of morphological change is the rise of affixes from compound constituents that have acquired a bound meaning in the course of time. For instance, the German prefix *Haupt–* 'main' derives from the word *Haupt* (now archaic) 'head', used as the first constituent of compounds. This implies the assumption of a specific subschema for *Haupt*–compounds in German, in which the meaning 'main' is specified. Thus language change requires the as-sumption of subschemas for compounding, a basic assumption of Construction Morphology (Booij & Hüning 2014; Hüning & Booij 2014).

The discussion so far has shown that there is a strong relation between the idea of usage–based grammar and the theoretical framework of Construc-tion Grammar. This idea is summarized in Bybee (2013):

(5) "The basic premise of Usage–based Theory is that experience with
     language creates and impacts the cognitive representations for language"
     (Bybee 2013: 49).
     "Constructions, with their direct pairing of form to meaning without
     intermediate structures, are particularly appropriate for usage–based
     models" (Bybee 2013: 51).

In the next section I will give a brief outline of the tenets of Construction Morphology, and argue that this framework is in line with the meta–theoretical considerations of this section.

2. Construction Morphology: the model

The basic idea of Construction Morphology is that word formation patterns can be seen as abstract constructional schemas that generalize over sets of existing complex words with a systematic correlation between form and meaning. This is illustrated here for the English deverbal agent nouns mentioned above:

(6) $<[[x]_{Vi} \, er]_{Nj} \leftrightarrow [\text{Agent of SEM}_i]_j>$

In this constructional schema it is specified by means of co–indexation how the formal parts on the left of the double arrow contribute to the meaning of such words as specified on the right of the arrow. The verbal base and its meaning (SEM) carry the same index i. The meaning of the structure as a whole is indexed as j. Note that the suffix carries no meaning of its own, it is only through combination with a verbal base that it evokes the specified meaning of agent of the event expressed by the verb. The angled brackets demarcate a constructional schema. The presence of the variable x on the left indicates that this is an empty slot that can be filled in by all sorts of verbs (for ease and clarity of exposition, I ignore various complications in the use of these deverbal nouns (Booij 1986; Booij & Lieber 2004).

The form of constructional schemas comprises two sublevels: the phonological level and the morphosyntactic level. The meaning side comprises conceptual level, and pragmatic and discourse properties (Booij 2010; Croft 2001).

The ingredients of Construction Morphology can be summarized as follows:

(7) – both individual complex words and abstract generalizing schemas are
   part of the lexicon;
 – schemas instead of rules;
 – a hierarchical lexicon with layers of subgeneralizations;
 – paradigmatic relations between (sets of) complex words can be
   expressed as second order schemas (schemas of schemas), and are used
   for coining new words;
 – constructional (holistic) meanings can be accounted for.

Morphological constructional schemas such as (6) fulfill two roles. First, they have the role of motivation with respect to existing complex words. Motivation is the reduction of the degree of arbitrariness between form and meaning of lexical units'. This is formalized by a theory of the lexicon in which complex words inherit properties from their dominating schemas (note that this presupposes accessibility of internal morphological structure of stored

198

words) (Booij, in press). The second role is that of a 'recipe' for the coinage of new complex words.

Constructional schemas can account for holistic meanings of word formation patterns. For instance, the process of total reduplication (morphological doubling) is used in Malay to express plurality:

(8) ana 'child'   ana–ana 'children'
     rumah 'house'   rumah–rumah 'houses'

This plural meaning cannot be derived from one of its constituents, it is the copying configuration itself that is correlated with the plural meaning. This is expressed by the following schema:

(9) $<[N_i \; N_i]_{Nj} \leftrightarrow [PLUR \; [SEM_i]]_j>$

in which PLUR stands for the semantic operator of plurality.

A second example of a holistic property is the formation of words for cardinal numerals in Dutch. The same combination of numerals expresses either multiplication or addition, depending on the order in which the numerals appear:

(10) zes–honderd 'six–hundred, 600'   = multiplication 6 x 100
      honderd–zes 'hundred–six, 106'   = addition 100 + 6

That is, the order of lower and higher order digits determines the semantic value of the construction (Booij 2010).

The idea of a hierarchical lexicon means that general schemas can dominate more specific schemas, which in the default case inherit their properties from the more general schemas, but may have additional properties, or properties that overrule the default properties (Booij, in press). An example is the subset of Dutch NA compounds in which the noun has acquired an evaluative meaning, and expresses a high degree of the property denoted by the head:

(11) bloed–geil 'blood–horny, very horny'
      bom–vol 'bomb–full, very full'
      stront–vervelend 'shit–boring, very boring'

The general schema for NA compounds will therefore dominate a subschema in which the meaning of the adjective is specified as having the meaning 'high degree of', and this subschema in its turn will dominate a number of subschemas in which the adjective slot is lexically specified as *bloed, bom, stront*, etc, as it is specific lexical items that can perform this role of intensifier, and some of these can be used for coining new adjectives of this semantic type.

Such subschemas are potential sources of affixes, as mentioned in section 1 for the German prefix *Haupt–* which derives from the word *Haupt* 'head',

and is used in compounds with the meaning 'main'. The noun *Haupt* itself has become obsolete or archaic (*Kopf* is used instead), but is used productively with the meaning 'main' in compounds:

(12) Haupt–person 'main character'
      Haupt–rolle 'main role'
      Haupt–sache 'main issue'
      Haupt–schalter 'main switch'

This is accounted for by the following subschema for German NN compounds:

(13) $< [[\text{Haupt}]_{Ni} \, [y]_{Nj}]_{Nk} \leftrightarrow [\text{main SEM}_j]_k >$

Another type of evidence for the reality of subschemas is formed by so–called constituent family effects. For instance, the choice of a linking morpheme in Dutch compounds is governed by the first constituent (Krott 2001), and the stress pattern of English compounds (main stress left or right) is determined by the nature of one of its constituents. For instance, compounds ending in *street* carry initial stress, but compounds in *avenue* final stress (*Wáshington Street* versus *Washington Ávenue* (Plag 2006). Hence, there is a *–street* family and an *–avenue* family.

Schemas are essential for a proper description of paradigmatic word formation, the mechanism by which a complex word is formed by means of affix replacement. Consider the following English complex nouns:

(14) alpin–ism   alpin–ist
      aut–ism   aut–ist
      solips–ism   solips–ist

The words on the left and the right are semantically related. For instance, the meaning of *alpinist* is 'someone involved in alpinism'. However, the word *alpinism* is not a subconstituent of the word *alpinist*. This asymmetry between form and meaning can be accounted for by a second order schema, in which two schemas are paradigmatically related, indicated by the symbol ≈.

(15) $< [x - \text{ism}]_i \leftrightarrow \text{SEM}_i > \approx < [x - \text{ist}]_j \leftrightarrow [\text{PERSON related to SEM}_i]_j >$

The necessity of second order schemas for allomorphy and inflectional patterns is argued for in (Kapatsinski 2013; Nesset 2008).

After this brief summary of some basic ideas of Construction Morphology (a more detailed discussion can be found in Booij (2010)), and what these ideas imply for our view of the architecture of grammar, I will now focus on another architectural issue, the relation between word formation and syntax.

200

3. The interaction of word formation and syntax

The interaction between syntax and word formation provides a window on the architecture of grammar. Word formation has access to syntax, because syntactic units can function as building blocks of complex words. Moreover, there may be a competition between the syntactic and the morphological creation of lexical units, which requires that these two modules of grammar can see each other, and that syntactic units with a lexical function are stored (Schlücker & Plag 2011).

Phrases as building blocks of complex words is a wide–spread phenomenon in English. Here are some examples:

(16) All–you–can–eat–buffet
      One-size–fits–all–education (*Boston Globe*, 6 March 2010)
      Stop–and–go–traffic (*Boston Globe*, 13 March 2010)
      The eat–your–spinach–approach to education (*Boston Globe*, 13 March 2010)
      Me–first driving attitude
      I understand the whole 'live it up, you're only in college once' thing
      (*Tufts Daily*, 7 April 2010)
      Run–of–the–mill blockbuster (*Tufts Daily*, 7 April 2010)
      Low–cost, no–frills cattle car flights (*NY Times*, 18 March 2010)

This shows that certain types of phrases can function as constituents of complex words. This does not mean that there is one generalized module for syntax and morphology. They must be kept separate because syntactic units behave differently from morphological units (Booij 2009). The morphological module (= the set of morphological constructional schemas) defines what kind of syntactic constituents can be used in word formation. All examples in (16) are nominal compounds of which the modifier position is filled by a phrase. The head position is reserved for words, because a phrase in head position would make the whole expression a phrase, by definition. Thus, for English nominal compounds we will assume a morphological subschema of the type $[\text{XP N}]_{\text{N}}$ in which XP stands for phrases and clauses.

Phrases can also function as the bases of certain types of derivation in English, witness the following examples with the suffix *–ism*:

(17) Short–term–ism (David Cameron, press conference, May 12, 2010) 'short term policy'.
      The know–it–all–ism of her ... (*American Pastoral*, p. 254)

Conversion may apply to phrases as well, as illustrated by the noun (*a*) *hand–me–down*.

Note that the distinction between syntax and morphology can and should be preserved. Syntax defines the grammaticality of potential building blocks of morphology, and morphology defines which types of syntactic constituents it allows for.

201

A basic insight of Construction Grammar is that both phrasal and morphological constructs can function as lexical units, for instance as names for entities. In the case of phrasal lexical units we may find that a specific syntax is used, such as headline syntax (phrases without grammatical words) for the creation of names for functions / positions. This is illustrated by the following examples from job advertisements in Dutch newspapers:

(18) senior adviseur installatie–techniek 'senior adviser equipment technics'
        manager krediet–risico–management 'manager credit risk management'
        lid raad van commissarissen 'member board of supervisory directors'
        sector–manager infrastructuur 'sector manager infrastructure'
        hoofd communicatie 'head communication'
        adjunct–directeur artistieke zaken 'deputy director artistic affairs'

In these expressions the head noun is on the left (unlike in Dutch nominal compounds where the head is on the right), and this head noun is followed by a noun or noun phrase without determiners or adpositions). This headline syntax this deviates from the regular syntax of Dutch. The left–headed schema $[N_i \ N_j]_{Ni}$ and left–headed schemas with a phrasal complement are therefore to be listed in the grammar of Dutch as a syntactic schemas specially designed for creating NPs with the lexical function of denoting function names.

Another example of the phrasal construction of lexical units is that in many European languages NPs consisting of a bare adjective and a noun are used as conventionalized names for entities that have to be stored:

(19) English: AN Arabian horse, blue cheese, electrical outlet, modern art, natural childbirth;
        German: AN saure Sahne 'sour cream', saurer Regen 'acid rain', grüne Welle 'phased traffic lights';
        Italian: NA: febbre gialla 'yellow fever', natura morta 'still life'; AN: alta moda 'haute couture', mezza luna 'half moon';
        Spanish: NA: luna nueva 'new moon'; AN: media luna 'half moon';
        Greek: AN psixros polemos 'cold war', tritos kosmos 'Third World'.

These names reflect the NP syntax of the respective languages but have a restricted syntax since the adjective does not project an AP in which the A co–occurs with other words such as adverbs. For instance, if we modify *modern* in *modern art*, as in *very modern art*, we do not get the classificatory meaning of *modern art* anymore.

Therefore, the notion 'lexicon', traditionally conceived as the list of stored words, does not suffice, and must be seen as a constructicon, in which both morphological and syntactic units are stored, together with the schemas that they instantiate.

Note that phrases may be fully regular but yet must be stored as they are conventionalized expressions that may block the morphological expression of the same content. Such conventionalized phrases are referred to as prefabs,

and are illustrated in (20). The comparison between English and Dutch shows how convention plays a role in the use of such lexical phrases:

(20)   English   Dutch
   a.   strong tea / *mighty tea   sterke thee 'strong tea'
        weak tea / *feeble tea   slappe thee 'lit. slack tea'
   b.   a steady girlfriend   een vaste vriendin 'lit. a fixed girlfriend'
        a confirmed bachelor   een verstokte vrijgezel 'lit. a hardened
                                       bachelor'
        an eligible bachelor   een begerenswaardige vrijgezel 'lit. a
                                       desirable bachelor'

As predicted from the assumption that such phrases are stored, they show frequency effects (Arnon & Snider 2010; Snider & Arnon 2012; Taylor 2012).

The use of non–referential, generic bare nouns is a typical feature of [N P N] phrases used to create conventional names, as in:

(21) English: bird of prey, man of honour
      French: pomme de terre 'potato'
      German: Zimmer mit Aussicht 'room with a view', Haus mit Garten
      'house with a garden'
      Obst vom Markt / *Obst von dem Markt 'market fruit'

Another form of interaction between morphology and syntax is that of blocking effects between morphological and syntactic lexical units. This form of blocking finds a natural explanation in an architecture of grammar in which both words and conventionalized phrases are stored as lexical units. Blocking is the mechanism by which the coinage of a lexical unit is blocked by the existence of another lexical unit with the same function. The crucial observation is that an existing complex word may block the coinage of a phrasal lexical unit and vice versa, as illustrated here by some facts of Dutch:

(22) a. NN compound vorsten–huis 'monarch's house, dynasty' / AN phrase
          *vorstelijk huis
      b. NN compound: *konings–familie 'king–s–family, royal family' / AN
          phrase: koninklijke familie 'royal family'

In (22a) the compound blocks the coinage of a well–formed AN phrase with the same meaning. Inversely, in (22b) the compound *koningsfamilie* is a well–formed compound, but not coined due to the existence of an AN phrasal unit with the same meaning.

In sum, there is no sharp boundary between lexicon and grammar, because both complex words and phrasal lexical units can be stored, and generalizations concerning these two types of lexical units are expressed by morphological or syntactic schemas that dominate their individual instantiations.

203

4. Construction Morphology and pragmatics.

The meaning of a (morphological or syntactic) construction comprises more than its conceptual meaning. It may also have a specific pragmatic or discourse value. A well known example is the use of diminutive nouns to express endearment or negative evaluation, rather than objective size. A lesser know example is that of a specific use of past participles in Dutch, the so–called imperative use. Dutch past participles can be used as imperatives when used with the negative adverb *niet* 'not', or with certain particles:

(23) niet geklaagd! 'not complained, do not complain' / (*geklaagd! 'complain!'
     niet getreurd! 'not mourned, do not mourn' / *getreurd! 'mourn!'
     af–gemarcheerd! 'marched away, march away!'
     in–gepakt! 'lit. packed up, get lost!'
     in–gerukt! 'lit. left, leave!'
     op–gelet! 'lit. taken care, take care!'
     op–gedonderd! 'lit. up–thundered, get lost!'

When the base verb is simplex, a negative context such as the adverb *niet* is required. These simplex verbs express some negative emotion or behaviour. The sentence usually receives an adhortative interpretation. This imperative use of participles also applies to the participles of particle verbs, mainly with the particle *op*, but particle verbs with *af* en *in* are also possible. If there is such a particle, the presence of a negative adverb is excluded. This imperative use of participles of particle verbs is experienced as a pretty rude form of giving commands.

A detailed analysis of this participial imperative is given in Coussé & Oosterhof 2012. What we can learn from these facts for the topic of this article, the architecture of grammar, is that a morphological analysis of Dutch past participles is not complete once we have given an account of the form and regular meaning of these participles. A full account implies that we also assume an imperative construction with these past participles, with the formal and pragmatic properties specified as outlined above. It is also a case of what we may call construction–dependent morphology (Booij 2010), as this imperative use of the participle requires it to be the only word of the sentence apart from the negative adverb *niet*, or being combined with certain particles, and hence it depends on its occurrence in specific constructions.

Dutch infinitives can also be used as adhortatives or imperatives, but this imperative use of a particular verbal form applies to a much wider range of verbs:

(23) fietsen! 'cycle!'
     komen! 'come!'
     weg–wezen 'lit. away–be, get lost!'
     niet treuren! 'lit. not mourn, do not mourn!'
     op–letten! 'take care!'

204

These observations underline the insight that the grammar of natural languages has a parallel architecture, in which the systematic relationships between the forms and the meanings (including pragmatic meaning) of linguistic expressions is accounted for. The use of certain morphological forms may depend on their occurrence in specific constructions, and thus forms another argument for a constructional approach to morphology.

5. Second order schemas

As mentioned above, second order schemas are schemas of schemas in which two schemas are paradigmatically related. We need them to account for types of word formation in which an asymmetry between form and meaning is observed. Consider the following facts of Modern Greek, as discussed by Ralli (2013):

(24) Noun Phrase   psixros polemos 'cold war'
      Adjective   psixro–polem–ik–os 'cold–war–like'

      Noun Phrase   tritos kosmos 'third world'
      Adjective   trit–o–kosm–ik–os 'third–world–like'

The adjectives in (24) are semantically derived from the corresponding NPs. We know that they are NPs, not AN compounds, because they exhibit internal agreement: the adjective agrees in number and gender with the head noun, and hence these AN sequences must be phrases. However, these NPs do not form a subconstituent of the corresponding adjectives. The reason for this is the Bare Stem Constraint that holds for Modern Greek: "in order for a [A N] construction to become a derived item, the adjectival member must be a stem. This stem accepts only one inflectional suffix which 'closes' the structure. [...] in most cases, a compound marker –o appears between the adjectival constituent and the noun constituent" (Ralli 2013: 247). This means that Modern Greek has two parallel structures of the following form:

(25) a. $[A_i\text{–INFL } N_k\text{–INFL}]_{NP}$

     b. $[A_i\text{–o–}N_k\text{–ik–INFL}]_N$

Semantically (25a) is the basis of (25b), formally there is a paradigmatic relationship between an NP and a derived adjective expressed by a second order schema:

(26) $<[A_i\text{–INFL } N_j\text{–INFL}]_{NPk} \leftrightarrow SEM_k> \approx <[A_i\text{–o–}N_j\text{–ik–INFL}]_{Nm} \leftrightarrow [\text{Relating to } SEM_k]_m$

Thus we see that word formation may be based semantically on a systematic paradigmatic relationship with lexical phrases. This confirms two claims

205

presented earlier: syntax and morphology interact in the formation of complex words, and schemas are essential ingredients, as they make it possible to express generalizations by means of second order schemas.

6. Psycho– and neuro–linguistic evidence

The criterion of graceful integration requires us to consider whether the proposed architecture of grammar is in line with findings in the domain of psycholinguistics and neurolinguistics. A model with a rich lexicon, with massive storage of complex words and phrasal lexical units, is certainly what is required given what psycholinguistics has revealed about lexical storage (Taylor 2012). At the same time, we know that languages users are able to extract abstract patterns from sets of data, which justifies the assumption of abstract constructional schemas. For reasons of space, I will briefly discuss here only two psychological aspects of morphology here, the issue of analogy versus schema, and the neurolinguistic evidence for the storage of morphological and phrasal units in the lexicon.

6.1. Analogy or schema?

A recurrent theme in the discussions of the feasibility of schemas and subschemas for the expression of linguistic generalizations is the question to what extent the formation of new complex words should be seen as a case of analogy, or as a case of the application of abstract schemas. In the latter case a new complex word is formed through the unification of an abstract schema (with one or more variables) and concrete lexical items that fill in the variable position. A general discussion of this issue can be found in Arndt–Lappe (to appear). There are clear cases in which the mechanism involved is that of analogy, because a specific complex word has functions as the model word for the new coining. This applies, for instance, to the examples from German given in (1). However, it may also be the case that sets of similar words play a role as a model for the formation of a new complex word, and thus a new abstract constructional schema may emerge. This is what Hilpert (2013) observes with respect to the emergence of a general constructional schema *not give an NP*, based on expressions like *not give a damn*.

(27) "Repeated analogical extensions may over time lead to the emergence of a general schema *not give a NP*, which invites further additions to the range of expressions occurring in this now partly schematic idiom" (Hilpert 2013: 471).

Since abstract schemas, one discovered by the language user, will continue to be linked to concrete instantiations of these schemas, there is no hard–and–fast distinction between analogy and abstract schemas:

206

(28) A schematic slot in a construction might consists of all the items that have occurred in that slot (as predicted by an exemplar model), or it might be considered a set of abstract semantic features that constrains the slot, as usually proposed" (Bybee 2013: 57).

Moreover, there may be subschemas in between abstract schemas and lexical instantiations, as argued for in detail in Booij (2010). These subschemas are more concrete. In particular, in the case of constructional idioms in which one or more parts of the schema is lexically fixed, the pattern is closer to analogy. An example of a constructional idiom is the following Dutch compound construction with the noun *hoofd* 'head' in first position, in which this word carries the meaning 'main':

(29) $<[[\text{hoofd}]_{Ni} \ [\text{x}]_{Nj}]_{Nk} \leftrightarrow [\text{main SEM}_j]_k>$

This idiom is instantiated by compounds such as *hoofd–bezwaar* 'main objection' and *hoofd–gerecht* 'main course'. The transition from analogical word formation to word formation according to a constructional idiom is obviously a gradual one. One may consider a constructional idiom as the definition of a set of words that allows for analogical word formation. More generally, there is a gradual distinction between analogical word formation and word formation by means of abstract schemas. In fact, as pointed out by an anonymous reviewer, any word formation pattern, even the most productive and regular ones, may be subject to analogy. This can be seen in the pressure exerted by single complex words or small sets of words over other members of their morphological family, a fact which is, for instance, encoded in the notion of 'leader word' put forth by Rainer (2003).

We should also note that language users may differ in the degree to which they have abstracted schematic patterns from sets of complex words in their lexical memory.

In short, there are various levels of schematicity in usage–based approaches: micro–, meso– and macro–constructions (Barδdal et al. 2011; Traugott 2008). This also relates to productivity, as pointed out by Jóhanna Barδdal (Barδdal 2008; 2011) […] who has claimed that the productivity of abstract constructions can be seen as an inverse correlation of type frequency and semantic coherence, with highly abstract macro–constructions only arising if the underlying meso–constructions have a high type of frequency and a high degree of variance in semantic distribution" (Hoffmann 2013: 315).

6.2. Neurolinguistic evidence for storage of words and phrasal lexemes

The claims about the architecture of the grammar proposed so far are supported by neurolinguistic evidence. In recent work Pulvermüller and colleagues found evidence for both the storage of both word sequences (prefabs, particle verbs, etc.) and the abstract schemas that generalize over sets of similar word sequences: "Recurrent word sequences and more abstract con-

structions generalizing over such specific sequences are also stored in the brain, possibly by processes distinct from word storage [...]" (Pulvermüller et al. 2013: 414). They also conclude that phrasal verbs (= particle verbs) seem best analyzed as word–like stored items, but also that the distinction between syntactic and morphological units must be preserved, as also pointed out in section 3: "word–level units ('lexical items'), which can consist of more than one grammatical word [...] are very different things, in neuromechanistic terms, from above word level units" (Pulvermüller et al. 2013: 415). Pulvermüller et al. (2013) come to the following conclusion as to the distinction between phrasal units and morphological units:

(29) "[...] although the brain correlates of syntactic constructions can range from medium–level to highly abstract (thereby supporting in part the lexicon–syntax continuum tenet), and in spite of the existence of certain multi–word lexical items, we would warn against a total abolition of a lexicon–syntax distinction, as words and (even common) syntactic sequences of words trigger different, in fact opposite brain responses [...]" (Pulvermüller et al. 2013: 415).

Recall that we saw in section 3 that, even though syntax and word formation interact in various ways, this does not imply that we should give up the formal distinction between morphological units and syntactic ones. This is also the motivation behind the assumption of a principle of Lexical Integrity which demarcates words from phrasal constructs (Booij 2009). Thus, the architecture of the grammar as envisaged in construction grammar approaches is in accordance with the criterion of 'graceful integration' for models of linguistic competence discussed in section 1.

Finally, let me point out that these findings are also in line with recent general models of language processing based on neurolinguistic evidence. The basic idea is that language processing requires three different neurological components: Memory, Unification, and Control (Baggio & Hagoort 2011; Hagoort 2005). Memory takes care of our storage of lexical information (both word–level and syntactic units), unification is the combination of schemas and lexical expressions to create new utterances, and Control stands for the monitoring function which is essential for proper language processing.

(30) "[...] the left interior frontal cortex recruits lexical information, mainly stored in temporal lobe structures that are known to be involved in lexical processing, and unifies them into overall representations that are multiword units" (Hagoort 2005: 419).

In sum, psycholinguistic and neurolinguistic findings are in line with a view of the architecture of the grammar in which both morphological and syntactic schemas, together with their instantiations, are stored and used in language processing.

208

7. Conclusions

Let me now summarize the conclusions of this paper which provided a bird's eye view of the motivation behind a usage–based approach to linguistic competence, and in particular of the nature of morphological knowledge, and its place in the architecture of grammar.

First, we have seen that I–language and E–language stand in a dialogic relationship. Morphology must be usage–based in order to understand and explain the nature of lexical knowledge, in particular the knowledge and creation of complex words.

Secondly we have seen that the Construction Morphology model of a hierarchical lexicon with various degrees of schematicity can do justice to actual language use in the domain of word formation.

A third conclusion concerns the relationship between morphology and syntax: since there are productive phrasal lexical constructions, and word formation may be based on paradigmatic relationships with such phrasal lexical units, there is no sharp divide between lexicon and grammar, but the formal distinction between syntactic and morphological constructs must be preserved.

The use of schemas opens up the possibility of having second order schemas as well, and these second order schemas account for a multi–dimensional network of relationships between linguistic constructional schemas, both morphological and syntactic ones.

Finally, Construction Morphology allows for the graceful integration of findings in various related subdomains of linguistics such as acquisition, change, and processing.

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209

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210

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211

Jezična uporaba i ustroj gramatike: perspektiva konstrukcijske morfologije

Ovaj rad potiče uporabno utemeljen opis morfološkog znanja i njegova mjesta u ustroju gramatike. I-jezik, apstraktna jezična kompetencija, i E-jezik, tj. stvarna uporaba jezika stoje u dijaloškom odnosu. Morfologija mora biti uporabno utemeljena kako bi dobila uvid u znanje i stvaranje složenih riječi. Konstrukcijska morfologija teorija je o mjestu morfologije u ustroju gramatike koja pretpostavlja hijerarhijski leksikon s različitim stupnjevima shematičnosti koji vjerno odražavaju stvarnu jezičnu uporabu na području tvorbe riječi. Budući da postoje i produktivne frazalne leksičke konstrukcije i da tvorba riječi može biti temeljena na paradigmatskim odnosima s takvim frazalnim leksičkim jedinicama, ne postoji stroga podjela između leksikona i gramatike iako se mora održati formalna podjela između sintaktičkih i morfoloških konstrukata.

U radu se izlažu argumenti za sheme drugog reda. One čine višedimenzionalnu mrežu odnosa između jezičnih te morfoloških i sintaktičkih konstrukcijskih shema. Pokazuje se kako model konstrukcijske morfologije omogućava integraciju spoznaja o leksičkom znanju u različitim potpodručjima lingvistike kao što su usvajanje jezika, jezična promjena i jezično procesiranje.

Key words: competence, performance, lexical knowledge, Construction Morphology, Construction Grammar

Ključne riječi: jezična kompetencija, jezična uporaba, leksičko znanje, konstrukcijska morfologija, konstrukcijska gramatika

212