Tiago Timponi Torrent, Ely Edison da Silva Matos and Natália Sathler Sigiliano (eds.)

Construction Grammar across Borders

BENJAMINS CURRENT TOPICS

122

Construction Grammar across Borders

Benjamins Current Topics

Special issues of established journals tend to circulate within the orbit of the subscribers of those journals. For the Benjamins Current Topics series a number of special issues of various journals have been selected containing salient topics of research with the aim of finding new audiences for topically interesting material, bringing such material to a wider readership in book format.

For an overview of all books published in this series, please see
benjamins.com/catalog/bct

Volume 122

Construction Grammar across Borders
Edited by Tiago Timponi Torrent, Ely Edison da Silva Matos
and Natália Sathler Sigiliano

These materials were previously published in *Constructions and Frames* 12:1 (2020).

Construction Grammar across Borders

Edited by

Tiago Timponi Torrent
Ely Edison da Silva Matos
Natália Sathler Sigiliano
Federal University of Juiz de Fora

John Benjamins Publishing Company

Amsterdam / Philadelphia

Table of contents

Construction grammar across borders[*]

Tiago Timponi Torrent, Ely Edison da Silva Matos and
Natália Sathler Sigiliano
Federal University of Juiz de Fora

1. Introduction

More than thirty years ago, in the unpublished textbook "On grammatical constructions", more precisely in the version of January 1989, Fillmore, one of the founding fathers of construction grammar, defined the then newly created field in terms of both insistence and effort:[1]

> what is different about construction grammar consists in the insistence on seeing specific grammatical patterns as serving given semantic (and often pragmatic) purposes, and in the effort to construct a uniform theory capable of presenting both the simplest and most general aspects of language and the large world of complex grammatical structures that appear to make up the majority of the grammatical resources that we find in daily use. (Fillmore, 1989: 7)

Since then, this effort has evolved into not one, but a collection of construction grammars. Nonetheless, the founding aspects differentiating them all from other non-constructionist theories remain the same as the ones stated by Fillmore – see, among others, Östman & Fried (2005), Goldberg (2006: Chapter 10), and all the chapters in Hoffmann & Trousdale (2013) for excellent discussions of the different approaches.

In October 2016, such an insistence brought together about 250 researchers from all over the world to Juiz de Fora, Brazil, for the 9th International Conference on Construction Grammar (ICCG).[2] Held every two years, ICCG is the main forum for the presentation and discussion of research in construction grammar.

---

1. The course book for the Linguistics 120 graduate division course at the University of California, Berkeley had other enhanced versions, written collaboratively by Charles Fillmore and Paul Kay.

2. http://www.ufjf.br/iccg9

That year, ICCG had as its theme the title of this introductory chapter: Construction grammar across borders. The idea was to emphasize not only the crossing of the geographic border between hemispheres – ICCG9 was the first one to be held on the South side of the globe – but mainly that of disciplinary borders. Therefore, from the theme sessions to the invited speakers, whose keynotes gave rise to the chapters in this volume, ICCG9 focused on the interplay of construction grammar with related fields and approaches, such as cognitive grammar and collostructional analyses, and with other disciplines in linguistics, such as language change, language pedagogy, and natural language understanding.

This is not to say in any way, however, that ICCG9 organizers – and co-authors in this introduction – do not recognize that the crossing of borders is constitutive of construction grammar. After all, as can be understood from the Fillmore quotation that opens this text, construction grammars have always disregarded borders, e.g. between core and non-core grammar. In a way, this is one of the features that make this approach to language so keen on engaging with other fields of linguistics. Because it has the commitment to use the same apparatus for describing any kind of language phenomenon, it is both comprehensive and flexible enough to accommodate different research questions, data, and methods.

The chapters in this volume comprise an interesting sample of the kinds of interrelations that the insistence and effort of those who followed in the steps of Fillmore – and also Kay, Lakoff, and the other pioneers of constructional analysis – make possible.

2.   Interrelations and applications of construction grammar

There are five chapters in this volume, one for each of the keynote lectures of ICCG9. Although they are not exact transcriptions of the lectures – some are more directly connected to their spoken variant, some were more loosely inspired by them – readers who want to have access to them can find the video recordings of all five at the Plenaries page on the ICCG9 website.[3]

The first chapter, "Trees, Assemblies, Chains, and Windows" by **Ronald Langacker**, starts with his recollection of "Fillmore asking whether grammar was better described using constituency trees or dependency trees". The chapter is Langacker's answer to this question. Instead of choosing one of them and advocating in favor of it, Langacker engages in a deep discussion of the incompleteness of both to capture all the relevant aspects of language. He then presents the notion of assemblies and, throughout the chapter and also the history of Cognitive Gram-

---

3.   http://www.ufjf.br/iccg9/home/plenary-speakers/

mar (Langacker 1987, 1997, 2008), indicates the interrelations between them and constructions. Langacker defines an assembly as a set of correspondence connections between symbolic structures. Such structures are form-meaning pairings – constructions – which, according to the author, makes the two 'CGs' – cognitive and construction grammars – "agree in regarding constructions as the primary objects of description, with regularities residing in schematic constructions (as opposed to 'rules')". Langacker's analyses of diverse examples together with a highly visual and detailed discussion of assemblies, makes for a didactic explanation of the cognitive grammar framework, providing construction grammarians interested in discussing the cognitive grounding of grammar and in the interface between the two CGs with a set of possible paths to be followed.

Also promoting a dialogue between related approaches to language, **Thomas Herbst** authors the second chapter in this volume, "Constructions, generalizations, and the unpredictability of language: Moving towards colloconstruction grammar". Herbst discusses the unpredictability of language and argues in favor of an items-in-constructions approach. In such an approach, instead of looking at items as being slot fillers in a construction and, therefore, being shaped by form and meaning constraints imposed by it, Herbst proposes two complementary metrics, IT$\in$CX$_1$ and IT$\ni$CX$_2$ – or, in Schmid's (2000) terms, attraction and reliance. The first functions as an indication of how frequent a given item is in a construction, when compared to other items filling the same slot; the second, as an indication of how frequently a given item is associated with a given construction as opposed to other constructions in the language. By applying these metrics to different usage cases – the ditransitive, the possible-to-do, and the clear-that constructions – Herbst crosses the item-construction border, by proposing that the representation of constructions incorporates information traditionally associated with collostructional analysis (Stephanowitsch 2013), so as to provide a more adequate account, which he describes as a high-quality photograph of a moving train, of the unpredictability of language.

The next three chapters propose applications of construction grammar in the domains of language change, language pedagogy, and natural language understanding, each of them adopting a particular constructionist approach.

Martin Hilpert and **Samuel Burgeoise** continue the profitable two-decade-long dialogue between historical linguistics and construction grammar – see, among others, Traugott & Trousdale (2013) and Barðdal et al. (2015) for an overview of work in diachronic construction grammar – by highlighting the contributions of a third party to this conversation: (inter)subjectification (Traugott 2010). Their chapter, "Intersubjectification in constructional change: From confrontation to solidarity in the *sarcastic much?* construction", uses web-based corpus data (Davies 2013) to analyze the emergence of various uses of the *sarcastic*

much? pattern with different intersubjective functions. This development is accounted for as a case of constructional change and is used as a case study to explore how intersubjectification and the dialogic nature of language can be accommodated in a constructional theory of language change.

Sabine De Knop, in the chapter "From construction grammar to embodied construction practice", tackles another application of construction grammar: that of approaching foreign language teaching from a constructionist perspective. The author joins a large group of linguists from different parts of the globe who propose teaching methods based on the ideas and models developed by different constructionists; see, for example, De Knop & Gilquin (2016) for a collection of chapters on different applications of construction grammar to language pedagogy. De Knop's chapter in this volume uses constructions featuring the polysemic German preposition *bis* as a case study. She points out that the equivalence mismatches between the patterns with *bis* and their counterparts in French make its learning difficult for students when based in a purely lexical approach. De Knop then proposes that larger meaningful sequences of words – that is, constructs – can be used for the abstraction of meaningful schematic templates – constructions – organized in a structured inventory. Morevorer, she recognizes the importance of embodiment for learning and suggests a collection of interactive activities to be used in L2 classrooms.

Also adopting an embodied perspective on grammar – see Bergen & Chang (2013) for an introduction to embodied construction grammar (ECG) – **Jerome Feldman**'s chapter closes this volume, presenting an application of construction grammar also pursued by Fillmore in his later research (Fillmore et al. 2012): that of building computational resources for natural language understanding. In his chapter "Advances in embodied construction grammar", Feldman presents an endeavor that has been carried out for decades at the International Computer Science Institute, building on the Berkeley cognitive linguistics tradition. ECG is a formalism for linguistic analysis designed specifically for integration into a simulation-based model of language understanding. Through ECG, conceptual representations are constrained to be grounded in the body's perceptual and motor systems, and to parameterize mental simulations using those systems. By considering ECG an explicitly interdisciplinary approach, with deep links to computation, neuroscience, and cognitive science, the author shows the recent emphasis on tools created to facilitate applications in language technology such as human-robot interaction.

3.   Conclusion

The five chapters just presented, although very diverse, represent only a fraction of the outcomes of Fillmore's foundational insistence. Construction grammar keeps crossing the boundaries to tackle different types of language phenomena, different interrelations with other theoretical and methodological backgrounds, and different applications to the most diverse areas of human activity. The rich array of conference papers – not only in the following ICCGs, but also in cognitive, functional, computational, and applied linguistics conferences – and publications in the field, to which this volume will be joined, are a testimony to the success of the effort pursued by those who keep insisting on "seeing specific grammatical patterns as serving given semantic (and often pragmatic) purposes".

Juiz de Fora, 2022.

Acknowledgements

References

Barðdal, J., Smirnova, E., Sommerer, L., & Gildea, S. (Eds.) (2015). *Diachronic construction grammar*. Amsterdam: John Benjamins. https://doi.org/10.1075/cal.18

Bergen, B., & Chang, N. (2013). Embodied construction grammar. In T. Hoffmann & G. Trousdale (Eds.), *The Oxford handbook of construction grammar* (pp. 168–190). New York: Oxford University Press.

Davies, M. (2013). Corpus of global web-based English: 1.9 billion words from speakers in 20countries (GloWbE). Available online at http://corpus.byu.edu/glowbe

De Knop, S., & Gilquin, G. (Eds.) (2016). *Applied construction grammar.* Berlin: Walter de Gruyter. https://doi.org/10.1515/9783110458268

Fillmore, C. J. (1989). *On grammatical constructions.* Berkeley, CA: University of California, Berkeley.

Fillmore, C. J., Lee-Goldman, R. R., & Rhomieux, R. (2012). The FrameNet constructicon. In H. C. Boas & I. Sag (Eds.), *Sign-based construction grammar* (pp. 309–371). Stanford: CSLI Publications.

Goldberg, A. (2006). *Constructions at work: The nature of generalization in language.* New York: Oxford University Press.

Hoffmann, T., & Trousdale, G. (Eds.) (2013). *The Oxford handbook of construction grammar.* New York: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195396683.001.0001

Langacker, R. W. (1987). *Foundations of Cognitive Grammar, vol. 1, Theoretical prerequisites.* Stanford: Stanford University Press.

Langacker, R. W. (1997). Constituency, dependency, and conceptual grouping. *Cognitive Linguistics*, 8, 1–32. https://doi.org/10.1515/cogl.1997.8.1.1

Langacker, R. W. (2008). *Cognitive Grammar: A basic introduction.* New York: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195331967.001.0001

Östman, J-O., & Fried, M. (Eds.) (2005). *Construction grammars: Cognitive grounding and theoretical extensions.* Amsterdam: John Benjamins. https://doi.org/10.1075/cal.3

Schmid, H. (2000). *English abstract nouns as conceptual shells. From corpus to cognition.* Berlin/New York: Mouton de Gruyter. https://doi.org/10.1515/9783110808704

Stephanowitsch, A. (2013). Collostructional analysis. In T. Hoffmann & G. Trousdale (Eds.), *The Oxford handbook of construction grammar* (pp. 290–306). New York: Oxford University Press.

Traugott, E. Closs. (2010). Revisiting subjectification and intersubjectification. In K. Davidse, L. Vandelanotte, & H. Cuyckens (Eds.), *Subjectification, intersubjectification, and grammaticalization* (pp. 27–70). Berlin: De Gruyter Mouton.

Traugott, E. Closs, & Trousdale, G. (2013). *Constructionalization and constructional changes.* Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199679898.001.0001

Trees, assemblies, chains, and windows[*]

Ronald W. Langacker
University of California San Diego

For describing grammatical organization, metaphors based on a variety of source domains – including trees, networks, chains, paths, and windows – all appear to have some validity. In Cognitive Grammar, they pertain to facets of assemblies, where semantic and phonological structures are connected by relations of symbolization, composition, and categorization. Assemblies have a temporal dimension; consisting in sequenced processing activity that runs concurrently on different time scales, they involve both seriality and hierarchy. In their hierarchical aspect, they are comparable to constituency trees, and in their connections, to dependency trees. Assembly elements, which can be characterized at any level of specificity, are connected in both syntagmatic and paradigmatic relations. A person's linguistic ability comprises a vast assembly of conventional units, a portion of which are activated as part of the transient assembly constituting a particular expression. Lexicon and grammar effect the implementation of semantic functions – affective, interactive, descriptive, and discursive – which emerge with varying degrees of salience depending on their symbolization by segmental, prosodic, and other means. Assemblies thus make possible a unified approach to processing, structure, function, and use.

Keywords: constituency, dependency, function, processing, symbolization

1.   Introduction

Many years ago, I recall Chuck Fillmore asking whether grammar was better described using **constituency** trees or **dependency** trees. I did not have a definite answer because my own representations assumed constituency but were more elaborate than simple trees, incorporating factors related to dependency. In any case, his question raised the fundamental issue of whether grammatical structure

---

can in fact be characterized (in large measure, at least) using a single representational format based on a single factor. The tacit assumption that it can is both gratuitous and very dubious. If the metaphor of **trees** seems to capture something valid, so do metaphors with other source domains, including **networks, chains, paths** of access, and processing **windows**. The real problem, I suggest, is not to choose among them, but to effect their integration as facets of a comprehensive model. This is the role of **assemblies** in Cognitive Grammar (CG).

2.   Constituency in Cognitive Grammar

In its original formulation (Langacker 1987), CG inherited from generative syntax the notion that grammatical structure was basically hierarchical. It did not, however, posit phrase trees (or phrase-structure rules) but, rather, configurations of **symbolic structures** (form-meaning pairings) described by **constructions** specifying part-whole relationships. As the framework developed, it was recognized that constituency is variable and non-essential (Langacker 1997). Hierarchical organization is now regarded as just one facet of assemblies.

From the standpoint of CG, phrase trees have no autonomous existence but represent the artificial combination of disparate factors. 'Linear order' is really just the temporal order of phonological expression. Given that grammatical categories have conceptual characterizations, syntactic category labels are merely abbreviations for their schematic meanings. And rather than being a specifically grammatical phenomenon, hierarchical organization is a general feature of cognition. In the CG alternative, these different aspects of phrase trees were seen as inhering in symbolic configurations and the constructions comprising them. A particular sort of construction, corresponding to the **classical constituency** of phrase trees, was taken as being prototypical, or **canonical** (Langacker 1988, 2009a: Chapter 1). But as the term implies, canonical constructions are not the only kind.

In a canonical construction, two **component** symbolic structures are integrated to form a **composite** symbolic structure. Component and composite structures are thus related as parts to a larger whole. **Constituency** arises because the composite structure in one construction can function in turn as a component structure in another construction, resulting in a hierarchical arrangement of part-whole relations. An example is given in Figure 1: the nominal expression *ugly cat with fleas*.[1] At the lower level of organization, the components *ugly* and *cat* are integrated to form the composite expression *ugly cat*; likewise, the components

---

1.   For diagrammatic convenience, I will use nested boxes instead of trees. These notations are of course equivalent.

with and *fleas* are integrated to form the composite expression *with fleas*. At the higher level of organization, the components *ugly cat* and *with fleas* combine to form *ugly cat with fleas*, the overall composite structure.

At a given level, the **integration** of component structures is based on **correspondences** (shown as dotted lines), whereby particular facets of the two components are identified with one another. They are equated in the sense of corresponding to the same facet of the composite structure; composition thus effects their **unification**. So rather than being separate and discrete (like building blocks), the 'parts' reside in overlapping facets of a unified whole. There is both **semantic** and **phonological** integration, the former being **symbolized** by the latter. Phonological integration is typically a matter of components being juxtaposed in a particular temporal sequence; e.g. the fact that *ugly* modifies *cat* is symbolized by its placement directly before it. Semantic integration normally hinges on correspondences between elements accorded **focal prominence**, of which there are two main kinds: **profiling** (conceptual **reference**), and in a profiled **relationship**, the focusing of central **participants**, referred to in CG as **trajector** (tr) and **landmark** (lm). In Figure 1, *cat* and *fleas* profile types of **things** (in an abstract sense), *with* profiles a two-participant relationship, and *ugly* the relation of a property being ascribed to its single participant. Integration then hinges on correspondences equating the profile of *cat* with the trajector of *ugly*, and that of *fleas* with the landmark of *with*.
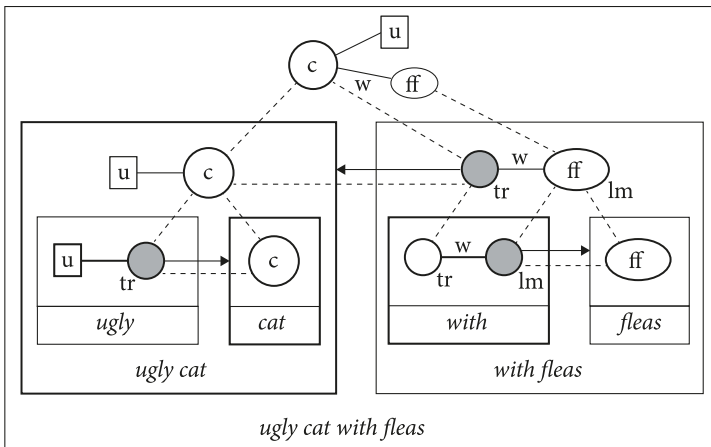
Figure 1. The compositional structure of *ugly cat with fleas*

In a typical construction, one component contains a salient but schematic substructure corresponding to the profile of the other component, which specifies it in finer-grained detail; this elaborative relation is represented by an arrow, and the

shading indicates the **elaboration site** (or **e-site**). Thus *cat* elaborates the trajector of *ugly*, and *fleas* elaborates the landmark of *with*. It is also typical for the composite structure to inherit its profile from one of the two components; enclosed in a heavy-line box, this component is referred to as the **profile determinant**. Since *ugly cat* designates the cat, and *with fleas* the relationship of accompaniment, *cat* and *with* are profile determinants at the lower level. The expression exhibits constituency because these two composite structures function as component structures at another level of organization. At this higher level, *ugly cat* combines with the prepositional phrase based on a correspondence between the former's profile and the latter's trajector. *Ugly cat* being the profile determinant at this level, the full expression refers to the cat.

Let me briefly note some advantages of this basic descriptive framework. For one thing, it is highly **restrictive**, positing only semantic, phonological, and symbolic structures – the minimum needed for language to serve its communicative function. It also affords a **unified** account of lexicon, morphology, and syntax, all of which are symbolic in nature, consisting in form-meaning pairings of different sizes and varying degrees of specificity; in this, of course, it accords with basic tenets of construction grammar. In particular, they agree in regarding **constructions** as the primary objects of description, with regularities residing in schematic constructions (as opposed to 'rules'). In the CG account, these **constructional schemas** emerge from occurring expressions by the reinforcement of recurring commonalities. So apart from the degree of specificity, abstracted patterns are directly analogous to instantiating expressions, residing in configurations of semantic and phonological structures connected by relations of symbolization, composition, and categorization. Moreover, the relation between constructional schemas and instantiating expressions is of the same basic sort – elaboration, specification in finer-grained detail – as the relation between an e-site and a component structure. The framework thus offers a unified account of **syntagmatic** and **paradigmatic** relations (Langacker 2008: § 6.2.2).

The framework thus accommodates constituency without the dubious move of positing trees as autonomous formal objects. Instead of point-like nodes, constituents are symbolic structures with both semantic and phonological content, their hierarchical arrangement consisting in part-whole relations. Because they are all connected by correspondences, I speak of an **assembly** of symbolic structures. A key point is that constituency per se is not essential for grammar, which depends more fundamentally on the **conceptual content** of elements and the specific nature of their **connections**. Note, for example, that the sequence *ugly cat with fleas* is basically equivalent grammatically whether the constituency is ((*ugly cat*) (*with fleas*)), ((*ugly*) (*cat*) (*with fleas*)), or even ((*ugly*) (*cat with fleas*)). All that really matters is that, within the full assembly, the trajectors of the adjective

and the prepositional phrase correspond to the profile of the noun, which is inherited as the profile of the overall expression. The alternate groupings then result in the same composite semantic structure with the cat as conceptual referent.

Grammatical relationships are analyzed in CG as having a conceptual basis. **Subject** and **object** are, respectively, characterized as nominal expressions which elaborate the trajector and the landmark of a profiled relationship. So in Figure 1, *fleas* functions as the object of *with*, and *ugly cat* as its subject (although this term is normally reserved for clausal trajectors). Since grammatical category depends on profiling, an expression's **head** – the element that determines its category (Zwicky 1985; Hudson 1987) – is the one that functions as profile determinant. *Cat* and *with* are thus heads at the lower level in Figure 1, and regardless of constituency, *cat* functions as head in the overall expression. The traditional notions **complement** and **modifier** are also straightforwardly characterized: a complement is a component that **elaborates** a salient substructure within the head, whereas a modifier is a component a salient substructure of which is **elaborated by** the head. So in Figure 1, *fleas* is a complement of *with*, while *ugly* is a modifier with respect to *cat*. And in the full expression *ugly cat with fleas*, both the adjective and the prepositional phrase are modifiers, since their trajectors are elaborated by the nominal head.

Complement vs. modifier thus hinges on the **direction of elaboration** vis-à-vis the head, as sketched in Figure 2a–b. Importantly, this is not an all-or-nothing affair since elaboration is a matter of degree depending on the salience of the elaboration site (Langacker 2008: § 7.3.3). In *She tossed it on the desk*, for example, the complement status of *it* is more clear-cut than that of *on the desk*, because the former elaborates the landmark of *toss* (a focal participant) and the latter just an implied resultant location. There are cases like *go away angry*, where *angry* is neither a complement nor a modifier since neither component elaborates a salient substructure of the other. There are also cases where each component spells out some facet of the other, e.g. *a friend of Julie*, where the head noun specifies the trajector of the prepositional phrase, which in turn spells out the *friend* relationship (Langacker 1999: Chapter 3). Hence the *of*-phrase is both a modifier with respect to *friend* and (to a lesser extent) a complement. The seamless account it affords of such differences is a major advantage of viewing grammar as assemblies of meaningful structures rather than phrase trees with point-like nodes.

One can also explain the ambivalence of **grounding elements**, notably determiners, in regard to complement vs. modifier. In a phrase like *these pears*, for example, there is precedent both for saying that *these* modifies *pears*, and also for viewing *pears* as a complement of *these*. A grounding element specifies the epistemic status of the nominal referent vis-à-vis the **ground** (G), i.e. the interlocutors, their interaction, and the immediate circumstances. Grammatical behavior
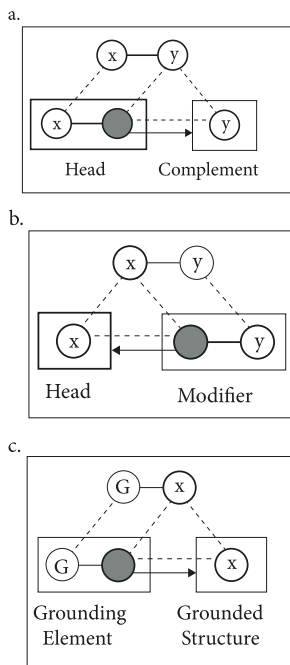
Figure 2. Assemblies for head-complement, modifier-head, and grounding structures

indicates that it profiles the referent, making this the 'onstage' focus of attention, with the epistemic assessment inhering in the 'offstage' ground and grounding relationship (Langacker 2002). Sketched in Figure 2c, this analysis implies that a grounding element and the grounded structure have corresponding profiles, both of which correspond to the composite structure profile, the overall nominal referent. In context, therefore, a grounding element often stands alone with the same import as a fully specified nominal (e.g. *these* in lieu of *these pears*). For the same reason, either component can be thought of as the head – since both profiles correspond to the composite structure profile, the choice is arbitrary. So, depending on whether *these* or *pears* is taken to be the head, the other component qualifies, respectively, as a complement or a modifier.

So, while constituency is readily handled in this framework, it is neither fundamental nor essential nor sufficient. It is worth briefly noting various problems that arise in describing grammar exclusively in terms of rigid constituency hierarchies. They are avoided by positing assemblies rather than trees.

First, with limited exceptions, there is no real consensus about constituency (e.g. not all linguists would agree that *ugly cat* is a constituent in *ugly cat with fleas*). It often seems variable and even indeterminate. If not arbitrary, the choice is commonly based on descriptive or theoretical preconceptions.

A long-recognized problem is **discontinuity** in the manifestation of groupings with evident structural significance, as in the case of 'extraposed' relative clauses, such as (1).

(1)   **The letter** just arrived **that you were expecting**.

Not all grammatically significant differences are plausibly represented by alternate constituency hierarchies. Consider **restrictive** vs. **non**-**restrictive** modifiers. In the case of relative clauses, the prosodic distinction between them is generally described in terms of the relative being a constituent of the nominal, or external to it: (*the boys* (*who are clever*)) vs. (*the boys*), (*who are clever*). However, this option is not available with adjectives, which are internal to the nominal under either interpretation: *the clever boys* can either refer to the boys as a group, all of whom are clever, or just to the subset who exhibit this property.

It sometimes happens that an expression, in a single use, has to be analyzed in multiple, incommensurate ways, as in (2). The matrix clause (with *spread*) implies that the mass noun *mulch* is the nominal head, so that *several bags of* functions as a complex quantifier: ((*several bags of*) **mulch**). At the same time, however, the relative clause (with *stacked*) implies that *bags* is the head: ((*several*) (**bags**) (*of mulch*)).

(2)   I spread **several bags of mulch** that were stacked in the shed.

Moreover, not every construction is compositional. For example, constraints on the relative position of a **pronoun** and its **antecedent** take the form of **constructional schemas** providing positive descriptions of conventionally established patterns (van Hoek 1995, 1997a, 1997b). Being non-adjacent, the two elements do not combine to form a distinct composite structure and are not a grammatical constituent in any usual sense.

Seriality competes with hierarchy as a basic mode of grammatical organization. A clause-external topic construction, as in (3), is most reasonably analyzed in this fashion. I see no basis for positing a distinct composite structure with a single overall profile – taken as a whole, the expression is neither nominal nor clausal. Rather, it involves a sequence of profiles in successive **processing windows**.

(3)   My camera, I left it in the restaurant.

Finally, varied phenomena related to **discourse** – such as prosody, ellipsis, and information structure – are beyond the scope of standard constituency hierarchies but can nonetheless be recognized as integral parts of grammatical constructions.

3.   Constituency vs. dependency

I started by noting the issue of whether grammar is better described using **constituency trees**, as in generative grammar, or **dependency trees**, which have long been entertained as an alternative (e.g. Robinson 1970; Anderson 1971; Hudson 1984, 2010; Osborne & Gross 2012). The hierarchical organization of dependency trees is not a matter of composition (part-whole relations), but is based instead on the asymmetrical relationship between a **head** and its **dependents**. In Figure 3a, for example, *cat* is the global head, having three dependents (*that, ugly*, and *with*), and *with* a local head, having just one dependent (*fleas*). Absent are two basic features of trees like Figure 3b: grouping into constituents and grammatical category labels. This might be considered advantageous, since there is no consensus on either matter; the groupings and labels in Figure 3b are only one of many plausible alternatives.

a. Dependency tree

```
              cat
         ┌─────┼─────┐
       that  ugly  with
                    │
                  fleas
```

b. Constituency tree

```
                    NP
          ┌──────────┴──────────┐
        DET                     N
         │            ┌─────────┴─────────┐
         │            N                   PP
         │       ┌────┴────┐         ┌─────┴─────┐
         │      ADJ        N         P          NP
         │       │         │         │           │
         │       │         │         │           N
         │       │         │         │           │
       that    ugly       cat      with        fleas
```

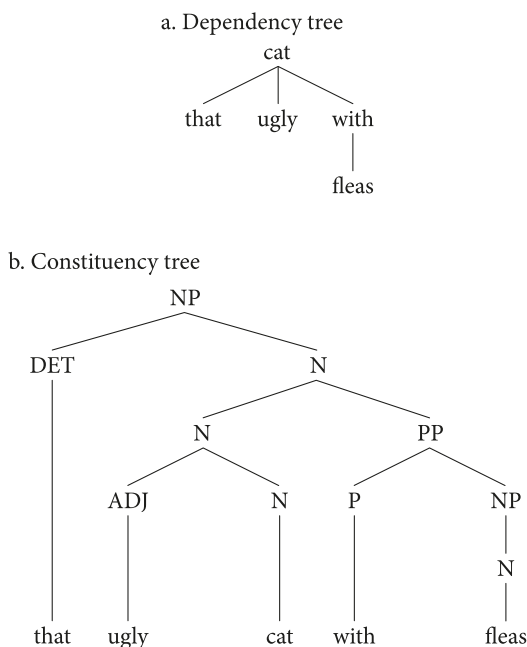**Figure 3.** Dependency- vs. constituency-based representations of *that ugly cat with fleas*

For the sake of comparison, the equivalent CG assembly is sketched in Figure 4, which includes the structure in Figure 1 as one component. A main point is that even when they represent constituency, assemblies incorporate the essential features of dependency trees: the notions **head** and **dependent**. The former is

basically a matter of **profile determinance**, the latter of **correspondences** indicating conceptual overlap.[2]
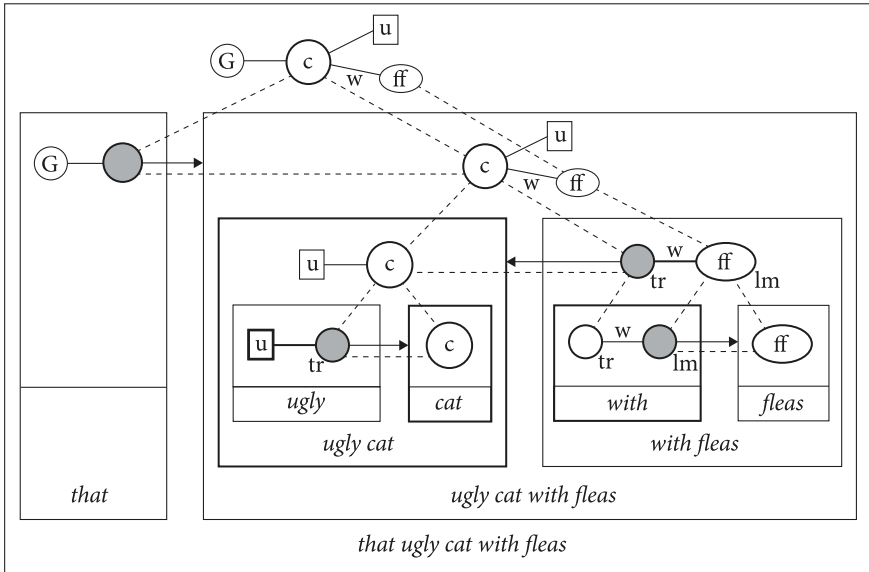

Figure 4. Assembly-based representation of *that ugly cat with fleas*

The term **head** is used in several ways. It sometimes indicates the element that contributes the most substantial semantic content; in the phrase *with fleas*, for instance, *fleas* can be identified as the **lexical head**. But for our purposes, a head can be characterized as an element which determines the **grammatical category** of a larger expression containing it; and since an expression's category is determined by its profile, this element is the **profile determinant**. This kind of head – a **grammatical head** – can be found at multiple levels of organization representing expressions of different sizes. Assuming the constituency in Figure 4, *with* is the grammatical head in the phrase *with fleas*, and *cat* in the phrase *ugly cat*. At a higher level of organization, *ugly cat* imposes its profile (inherited from *cat*) on the composite expression *ugly cat with fleas*. Globally, for the nominal as a whole,

---

2. The fact that diagrams like Figures 3a and 4 are strikingly different is not necessarily indicative of any incompatibility in the basic descriptive claims being made. The difference is largely a matter of CG diagrams being more inclusive: beyond the head-dependent relations, they are explicit in regard to constituency, temporal order, relevant aspects of conceptual structure, and the specific details of dependency (direction of elaboration, which particular conceptual substructures and elements correspond to). But since no representation covers everything, the decision of how much to show in a single diagram is not per se a theoretical difference.

either *that* or *cat* can be thought of as the head, since their profiles correspond to one another and to the overall nominal referent (cf. Figure 2c). At this level, *cat* functions as both grammatical and lexical head (whereas *fleas* functions only locally as a lexical head).

The basic notation for dependency trees makes no distinction between **complements** and **modifiers** – both are referred to as **dependents**.[3] In Figure 3a, the modifier *ugly* is connected to its head, *cat*, in the same way that the complement *fleas* is connected to *with*. The complement/modifier distinction is however significant for grammar, e.g. it has a role in constraints on the relative position of pronouns and their antecedents (van Hoek 1995, 1997b). In the finer-grained characterization offered by CG assemblies, the difference shows up as **direction of elaboration**: a complement elaborates some facet of the head, while the head elaborates some facet of a modifier (Figure 2a–b).[4]

While head-dependent relations are immanent in CG diagrams like Figure 4, it might be objected that they are not sufficiently perspicuous. Absent, in particular, is any direct indication of **catenae** – or **chains** – which Osborne & Gross (2012) have argued to be of central importance to grammar. Roughly and informally, a chain is any continuous set of nodes in a dependency tree. In Figure 3a, for instance, *that cat with fleas* constitutes a chain, since the elements are all connected by a continuous path of dependency links (it is not, however, a grammatical constituent). On the other hand, *ugly fleas* is not a chain because the path connecting them goes through intervening nodes. As an example of their significance, it is claimed that idioms are stored as chains. We see in Figure 5a that the lexical content of *step on X's toes* forms a chain but is not a grammatical constituent. It is further claimed that the elided material of ellipsis is always a chain. In Figure 5b, we see once more that the elided *sent a package* is a chain but not a constituent.

This is not the place for a detailed examination of either the proposed analyses or the general descriptive framework. Accepting that chains have a significant role in grammar, I will merely consider their status in CG. An essential point is that assemblies are multifaceted, comprising cross-cutting groupings based on many different factors. A diagram is necessarily selective in what it shows, the choice depending on one's objectives, and diagrams that look very different may be equally valid, representing alternate 'takes' on the same assembly. The reason

---

3. This is not the same as the CG notion of **dependence**, which contrasts with **autonomy** (Langacker 1987: § 8.3). Roughly speaking, an autonomous structure is self-contained, while a dependent structure requires the support of another for its full manifestation. In this sense a modifier is dependent on its head, but the head is dependent on a complement.

4. In their dependency trees, Osborne & Gross (2012) distinguish modifiers by means of an arrow pointing to the head, mirroring the elaborative arrow in CG.
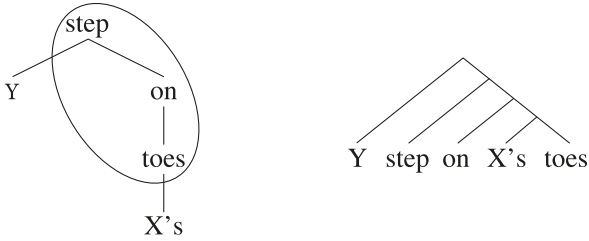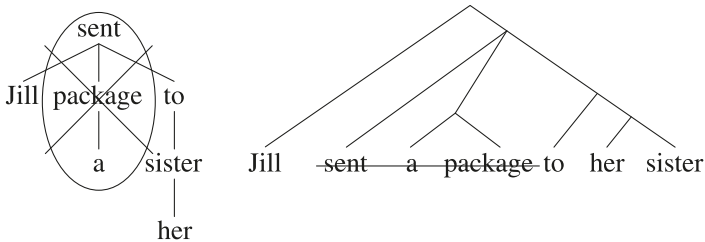
a. Idiom: *step on X's toes*

b. Ellipsis: *[Jack sent a package to his mother, and] Jill to her sister.*

Figure 5. Examples of chains

chains are not evident in diagrams like Figure 4 is that they represent constituency and thus incorporate composite structures at each level. But in the CG account, constituency is neither fundamental nor essential. If we factor it out, leaving only the lowest-level elements, their correspondences, and their status as a local or global head (profile determinant), the resulting structure is equivalent to a dependency tree.

Starting from Figure 4, we obtain Figure 6 through the following procedure: (i) eliminate all composite structures; (ii) connect the remaining elements by direct correspondences – in some cases replacing the chain of correspondences effecting their connection in Figure 4; and (iii) retain the information that *cat* is the global head (the overall nominal referent, profiled by the expression as a whole). It is readily seen that Figure 6 is equivalent to Figure 3a apart from its greater detail.

I emphasize that Figures 4 and 6 are simply different partial views of the same assembly. Focusing on dependency does not require any modification of the CG framework, as the limited role of constituency has long been recognized (Langacker 1997).[5]

---

5. Admittedly, it was not so clearly recognized in the early years of CG, when a basic objective was to articulate a viable alternative to generative grammar.
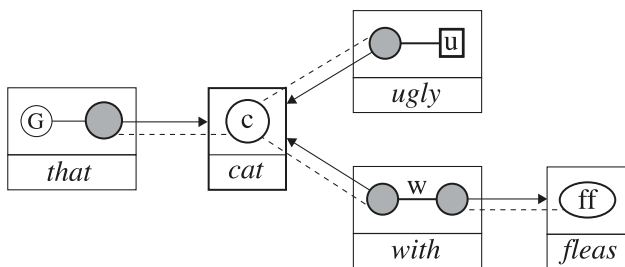
Figure 6. Alternative assembly-based representation of *that ugly cats with fleas*

4.   Assemblies

There is no point in debating the issue of constituency vs. dependency, since each has a major role in grammar. The problem is rather to find a coherent, natural, and unified way of dealing with them both. In the CG account, they both inhere in **assemblies**. We must therefore consider the nature of assemblies and their application to linguistic structure.

4.1   Connections

The most basic notion of structure is simply that **entities** (or **elements**) are **connected** in a certain way. For language viewed as a mental phenomenon, these entities consist in **organized processing activity** – ultimately, patterns of neural activation. Elements have the potential to be connected if they co-occur in some **processing window** – the box in Figure 7b – characterized by temporal proximity (on some time scale) as well as the configuration of the neural substrate.[6] Connection is a matter of entities influencing or interacting with one another, as opposed to being isolated, unrelated occurrences. Basic means of connection are: (i) **overlap** in the constitutive activity of elements; (ii) **association**, such that one structure tends to activate another; and (iii) connecting **operations** (e.g. comparison, categorization, assessment of relative position in some field). Any set of connected elements constitutes an **assembly**. By intent, this notion is maximally flexible and general – a convenient way of referring to any sort of organization or structure. Saying that linguistic structure resides in assemblies is merely a basis for discussion, not per se a substantive claim.

Crucially, connection effects the **grouping** of constitutive entities to produce a **new** entity representing a **higher level of organization**. A grouping is always more than the sum of the grouped elements, if only by virtue of their being connected

---

6. Conversely, a processing window can be defined in terms of the potential for connection.

in a certain way. The dashed lines in Figure 7b indicate that a grouping has the potential to function as a **single entity** in further, higher-order connections. Realization of this potential, as in 7c, reinforces its status as an element; i.e. the grouping has **structural significance**, as opposed to being a transient phenomenon of no consequence. When this happens at multiple levels, as in 7d, the result is **hierarchical organization**.

Once a grouping is established, it is likely to participate as a whole in further connections, as in 7e. But since its component elements still exist, they too can be accessed for this purpose. In this case, as seen in 7f, the direct connection of an entity with a subpart mediates its connection with the larger whole. The resulting configuration is no longer strictly hierarchical, as the higher-level grouping (which may only be implicit) comprises cross-cutting groupings at the lower level. We have already encountered linguistic examples. An extraposed relative combines with the matrix clause via a connection with a nominal component: (*the letter* just arrived) (*that you were expecting*). And with a non-restrictive adjective, the grounding element forms a grouping with just a portion of the grounded structure: (*the*) (clever *boys*).

(a) Isolated elements	(b) Connection (grouping)	(c) Higher-level connection	(d) Hierarchical organization

(e) Connection via whole	(f) Connection via subpart

(g) Simple connection	(h) Serial organization	(i) Emergent properties	(j) Constituency
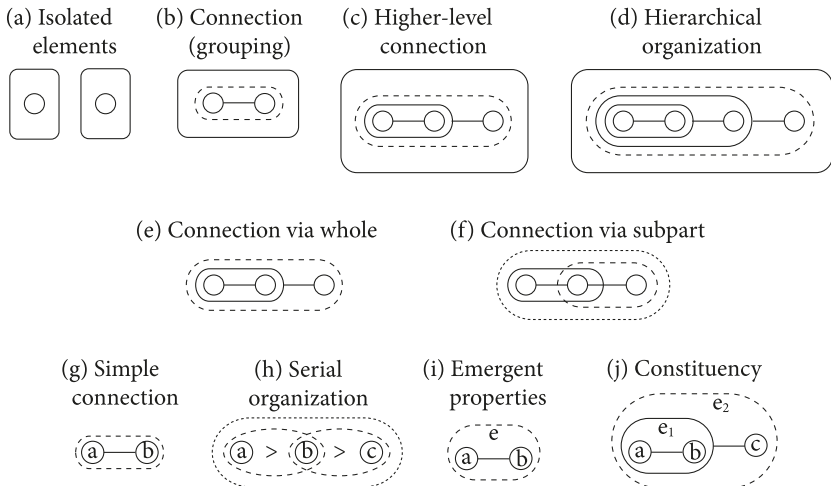
Figure 7. Elements and their connections

I am distinguishing three notions that tend to be confounded: **grouping, hierarchy**, and **constituency**. Any connection effects a **grouping**, irrespective of whether its potential for participation in further connections is ever exploited. In the simplest case, the connected elements are basically unaffected, and so except for the very fact of being connected, the grouping is just the sum of its parts. A basic form-meaning pairing, e.g. [[CAT]-[cat]], approximates this situation. I speak of

hierarchy when groupings function as wholes in further connections and do so at multiple levels. It can thus be contrasted with **seriality**, sketched in Figure 7h, where wedges (>) indicate temporal ordering. With seriality, the global organization is chain-like, involving overlap rather than inclusion. Its main feature is that elements are accessed sequentially, each prompting the next one in the series. These transitions are connecting operations, and the transient groupings they define are themselves connected via subparts – the elements that successive groupings have in common. An example is the chain of path expressions like the one in (4), where each city named functions as point of origin for the next path segment.

(4)   She drove **from San Diego / to Dallas / to Chicago / to New York.**

As I am using the terms, **constituency** involves more than just hierarchy. It further implies that the whole is substantially more than the sum of its parts: it has **emergent properties**, given as 'e' in Figure 7i–j. A minimal and typical departure from simple connections is for the component elements to adapt to one another (e.g. *red* when it collocates with *hair*). An emergent feature of canonical constructions is that the composite expression has a single overall profile, imposed by one component – the profile determinant – at the expense of the other (thus *red hair* designates the hair, not the color). Often the composite whole incorporates content not supplied by either component (e.g. the specialized application of *catcher* to baseball). It may be that the composite expression is construed metaphorically (such as *bottleneck*) or metonymically, as in *pickpocket* (a case of ACTIVITY FOR PERSON). The emergence of a distinct composite whole is most evident when the emergent properties are responsible for a higher-level connection. An example is *clever pickpocket*, where the compositional relationship hinges on a correspondence between the adjectival trajector and the nominal profile – which, however, is not inherited from either *pick* or *pocket*, but only emerges within the whole.

The distinction between seriality and constituency is anything but sharp. Most phenomena involve both modes of organization to some degree. Both are evident in canonical constructions, as in Figure 4. These give rise to constituency as component structures combine to form composite structures at successive levels. But they also include the basic features of seriality: temporal sequencing; and connection via a subpart, as one component specifies a prominent substructure of the other (its elaboration site). The degree of approximation to an unmixed instance of either mode depends on the relative salience of these factors. The main aspects of seriality are sequential access to the lowest-level elements, connected by overlap in pairwise fashion. With constituency, greater importance attaches to the composite whole, evoked as such for higher-level purposes.

Assemblies are not equivalent to either of two basic organizational schemes commonly recognized in linguistic theory and description: they are neither **trees** nor (simple) **networks.** They are much more flexible and variable than the strictly hierarchical tree structures traditionally assumed for grammatical constituency. A main reason is that the same elements are often grouped simultaneously, and equally validly, in alternate ways. In phonology, for example, there are cross-cutting groupings based on symbolic vs. purely phonological considerations: *((tulip)(s))* vs. *((tu)(lips)).* In expressions like (1), a clausal grouping (*the letter just arrived*) cross-cuts the nominal relative clause construction (*the letter that you were expecting*). Moreover, not every construction is compositional or involves the emergence of a distinct composite structure. Some examples are pronoun-antecedent and topic-comment relations, as well as serial constructions like a chain of path expressions. Finally, the assemblies posited in CG include **schemas** and their categorization of instantiating structures (one kind of connection).

Nor is an assembly equivalent to a **network**, by which I mean a simple, 'flat' network like the map of a subway system. For one thing, elements and connections vary in their degree of **entrenchment,** i.e. the extent to which they constitute established, well-rehearsed cognitive 'routines'. Also, a network per se is **static**, its nodes and links being all in place at any one moment, whereas assemblies are inherently **dynamic**, consisting of patterns of activity taking place through time. Another difference is that the nodes of a simple network are **discrete**, separate from one another despite their connection; by contrast, the connection of assembly elements typically involves some kind of **overlap**. A final point is that a network is a 'flat' structure, all nodes being on the same level. Crucially, however, assembly elements represent different **levels of organization**: by virtue of being connected, elements constitute a higher-order element with the potential to participate in further connections.

4.2   Temporal dimension

Language consists in **organized activity** – it is something that **happens** – so the temporal dimension is fundamental. This activity is describable at different levels, ranging from the firing of neurons to the interactive events comprising a discourse. Its organization is what we recognize as linguistic structure. As characterized here, structure resides in **assemblies** of connected **elements**. These too are patterns of **activity** and thus have a temporal dimension.

Patterns of activity become **entrenched** to varying degrees (Langacker 2017). A well-entrenched pattern (easily activated and executed) is referred to as a **unit**. Within limits, a unit is **stable** through time – a matter of latent potential; but once activated, its execution is inherently **dynamic.** A person's linguistic capacity resides in a vast array of units, and to the extent that the patterns involved are

conventional in a speech community, they represent that person's grasp of the language variety in question.

This array of units constitutes an **assembly**. It comprises **semantic** and **phonological** units (in the broadest sense) as well as **symbolic** units (form-meaning pairings) consisting in their association. Besides symbolic association, assembly elements are connected by overlap and (as a special case) by categorization. The **integration** of structures – their participation in **syntagmatic** relations – is based on overlap (shown in diagrams by correspondence lines). Categorization, the basis for **paradigmatic** relations, includes the immanence of a schema in its instantiations (full overlap) and the connections (involving partial overlap) between a prototype and its extensions. These varied aspects of language structure are thus treated in a unified manner, as they all inhere in assemblies.

If the full array of units is a (more or less) stable assembly, the much smaller array of structures active in a particular expression represents a **transient** assembly. The connected elements include both activated units and additional structures induced by their co-activation in the context of use (e.g. a novel composite structure resulting from the integration of components in accordance with a constructional schema). A matter of execution (not just latent potential), an assembly of this sort is necessarily **dynamic**, requiring a span of **processing time** for its occurrence. It thus has a **time course**, comprising the specifics of its temporal manifestation. Despite a certain amount of flexibility (e.g. in terms of absolute duration), an expression's actual time course is an aspect of its import.

The full array of units is only **relatively** stable. Depending on frequency of activation, a unit is further entrenched, suffers decay, or is simply maintained. Units are always activated in some context, to which they adapt, giving rise to variants that may themselves be entrenched as units. Moreover, structures tend to coalesce as complex units when connected via co-activation as parts of occurring expressions. Since it resides in actual or potential activity, a person's linguistic repertoire is never static and every instance of use is unique in its fine-grained details. Still, we can reasonably speak of 'structure' because the repertoire has enough stability that the activity is highly organized.

Processing activity runs concurrently on different **time scales**. On a given time scale, it occurs in **windows** of a certain rough duration – spans of time in which connections can be made and structures can emerge. Clearly, windows of very different duration figure in the coordination of articulatory gestures, the apprehension of a complex sentence, and the planning of a discourse. Processing windows are often marked **prosodically**. In (4), for example, successive phases of the journey are presented in windows delimited by slight hesitations (/). Concurrent processing on multiple time scales provides the basis for **hierarchy**. It emerges when groupings effected in windows on one time scale function as single elements in further groupings on a larger time scale. Thus in Figure 1, *ugly* and

cat appear in successive windows on a small time scale, as do *with* and *fleas*; but on a larger time scale, in windows of longer duration, the successive elements are the composite expressions *ugly cat* and *with fleas*, taken as wholes: [(*ugly*)(*cat*)] / [(*with*)(*fleas*)]. The presumed constituency reflects this prosodic organization.

An essential point is that an expression's time course is far more complex than a single linear sequence. In particular, it does not reduce to word order (or more generally, to phonological sequencing). This is not to deny that the order of words is a major factor: they necessarily occur in a certain sequence and through symbolic association, their meanings are accessed in the same sequence. But as one departure from strict linearity, this coordinated activation of phonological and semantic structures happens concurrently at multiple levels, involving structures of different sizes, e.g. morphemes, phrases, and clauses. Internally, the semantic pole of a morpheme has its own time course, being a conception that unfolds through time in a certain manner (on a small time scale, largely below the level of conscious awareness). However, its time course is not driven by symbolization because (by definition) it is subsymbolic: only as a whole does the meaning participate in a symbolic relationship. Moreover, not all semantic processing is tied to immediate phonological expression. Our apprehension of what is currently being said is informed by both remembrance of what has gone before and anticipation of what is to come. Also, many aspects of linguistic meaning derive from the context and are not expressed at all.

In short, while order of symbolization always induces a sequence of mental access, it is not the only basis for it. Nor is a single sequence exhaustive of the processing activity comprising an expression's structure. Included in any such assembly are conceptual and structural relationships which constitute **natural paths** of access, in that a particular temporal ordering would seem to be an essential aspect of their neural or psychological implementation. Among the many examples are a sequence of causation (Croft 1991), the stages of a journey, a scalar ranking (Israel 2011), a chain of successively embedded complement clauses, a topic-comment relationship, or more generally, any conception of ordering or directionality (Langacker 1990: Chapter 5). While these tend to co-align with the order of phonological expression, the activation of component elements is not limited to the precise time and sequence of their symbolization. For instance, despite the additional processing cost it is quite possible to describe a spatial path in reverse order, by first naming the destination: *She drove to New York from Chicago*. We can reasonably suppose that its full apprehension requires a reconceptualization whereby mental access accords with the natural path from source to goal (Langacker 2005).[7]

---

7. Note the infelicity of **the natural path to goal from source*.

4.3   Functions

Language is **organized activity** aimed at fulfilling certain **functions**. In global terms, this is a matter of **symbolic expression** serving the function of **communicative interaction**. A given instance of this activity – in which a particular expression serves a specific function – is a **usage event**. In local terms, every linguistic element fulfills a function consisting in its contribution to such events.

The organization of language activity is what we refer to as **linguistic structure**. Because this activity always serves a function, a structural element cannot be fully characterized in isolation: its higher-level function must also be considered (Harder 2010). Indeed, the CG position is that, in the last analysis, structure and function are non-distinct. Given that structure is **activity for a purpose**, a functional characterization is **part of** a structural description, not something done in addition to it. Structure and function represent alternate perspectives on the same symbolic assemblies.

Language structure has now been characterized in several ways: as organized (or the organization of) processing activity; as entities connected in a certain way; and as being non-distinct from function. The first two descriptions are easily reconciled, as both connection and the entities connected consist in processing activity. The non-distinctness of structure and function follows from the additional specification that connection establishes a **grouping** with the potential to function as a single entity for higher-level purposes. When that potential is exploited, the grouping achieves a measure of structural significance, indicated by the heavy-line circle in Figure 8. The **function** of this single entity is simply its place in the higher-level structure. Having a function and being a structurally significant element are thus equivalent on this account. For a particular element, a full structural description encompasses both its internal organization (the configuration of constitutive entities) and its participation in higher-level groupings and connections. The latter constitutes its functional characterization.
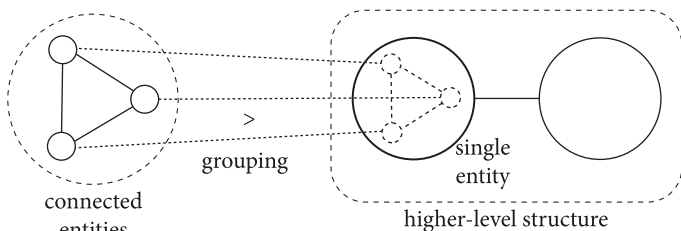
Figure 8. Grouping of connected entities into a single entity

We can therefore speak of functions in regard to any kind of linguistic element at any level of organization. For instance, a **vowel** is characterized both **intrinsically**, as a pulse of sonority with a certain quality, and **extrinsically** – in functional terms – by its role as syllabic nucleus. Semantically, the notion TREE includes the referent's role in more elaborate conceptions like BRANCH, LOG, and FOREST. The form and meaning of a lexeme (its phonological and semantic poles) function respectively as **symbolizing** and **symbolized** elements. Moreover, its full characterization includes its role in larger symbolic assemblies, both specific and schematic (e.g. *try hard, try again, don't even try, try to* v, *try* v *-ing*). Expressions have semantic functions pertaining to different **dimensions** (or **axes**) of usage events: **affective** (e.g. *Wow!*), **interactive** (*Hi!*), **descriptive** (*try*), and **discursive** (e.g. a topic marker). We can also speak of the function of elements in a construction (e.g. component structure, composite structure, profile determinant).

As means of symbolic expression, lexicon and grammar effect the implementation of semantic functions. An appropriate utterance of *Hi!*, for example, constitutes the enactment of one facet of a conventional social routine. The expression *tree* has the intersubjective function of focusing the interlocutors' joint attention on a particular **type** of thing (its profile), usually as part of the higher-level function of NOMINAL REFERENCE, i.e. referring to an **instance** of that type (e.g. *that tree*). By specifying relational participants, nominals contribute to the function of CLAUSAL REFERENCE: describing an **occurrence** (event or situation) and indicating its **epistemic status** vis-à-vis the interlocutors and their conception of reality.[8] A substantial proportion of grammar is devoted to implementing these two discursive functions. Nominals and clauses provide the basis for discourse by letting the interlocutors momentarily direct attention to what is taken to be the 'same' entity – a thing or an occurrence – out of all those we are capable of conceiving (our 'mental universe').

Alternate conventional means of fulfilling a certain function thereby constitute a **system** of opposing elements. For instance, the vowel system of a language represents the set of established alternatives for the function SYLLABIC NUCLEUS. Systemic organization is an integral part of assemblies (an aspect of paradigmatic structure). Consider the phonological assembly in Figure 9a, comprising a set of syllabic structures characterized at different levels of specificity. Various linguistic notions can all be seen as inhering in this assembly, depending on which structures and connections we choose to examine. Among the assembly elements are particular vowels as well as the schema representing their reinforced commonality, both characterized in terms of their intrinsic properties. Also included are particular vowels viewed from the standpoint of their function as syllabic nucleus.

---

8. In English, this is done by tense and the grammaticized modals.

The schema for such structures, depicted in 9e, amounts to a general description of the phonological function SYLLABIC NUCLEUS. The assembly further indicates that the vowels are **connected** to one another by virtue of all elaborating the vowel schema.[9] This effects their **grouping** as members of a **category**, based on both intrinsic properties and their common function as syllabic nucleus.
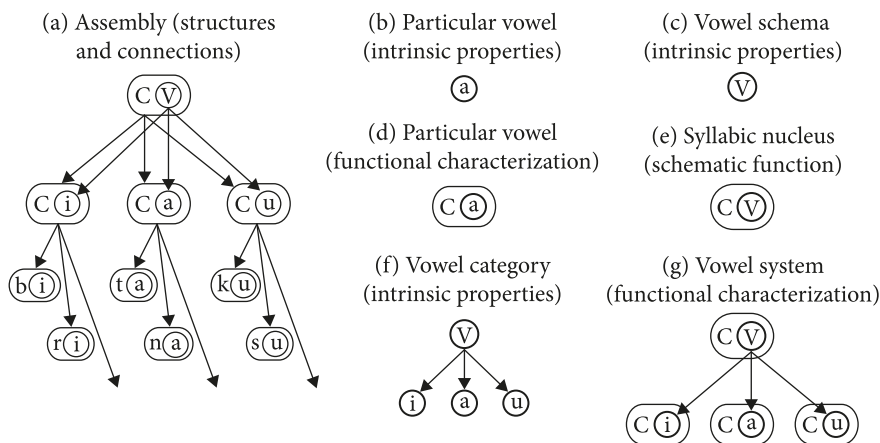

**Figure 9.** Phonological assembly and linguistic notions inhering in it

On this account, **systemic organization** is not distinct from **categorization**: it is categorization based on **extrinsic** factors, i.e. function rather than internal structure. **Categorization** is thus a unifying notion. Equivalently, we can frame the unification in terms of **function**: an element's **internal structure** is the function it serves **intrinsically**, rather than as part of a larger configuration.[10] The general point is that a unified account is envisaged in which **structure, function, systems, categorization**, and **constructions** represent different perspectives on the same vast assembly.

It is helpful in this regard to view a function as a **task** that needs to be accomplished. Often there are alternate ways of accomplishing a task; if they are different enough, we can refer to these as **strategies**. And usually a task decomposes into subtasks, those into sub-subtasks, and so on. For a given function (F), two kinds of **subfunctions** can be distinguished, as seen in Figure 10: **alternative** subfunctions are **mutually exclusive** ways of fulfilling it, whereas **component** sub-

---

9. This is actually a kind of **overlap**, as schemas are **immanent** in their instantiations.

10. Since elements have no clear boundaries, the distinction between intrinsic and extrinsic factors is anything but sharp. This can be seen as another aspect of unification.

functions fulfill it **jointly**.[11] The function of NOMINAL REFERENCE, for example, has **alternative** subfunctions representing the strategies of UNIQUE REFERENCE and NON-UNIQUE REFERENCE. Canonically, the former is implemented by proper names, and the latter by the combination of a determiner and a lexical noun, which, respectively, implement the **component** subfunctions of GROUNDING and TYPE SPECIFICATION. Their joint fulfillment of the referential function is effected by the DETERMINER + NOUN **construction** and constitutes its schematic meaning.

a. Alternative subfunctions

b. Component subfunctions

c.
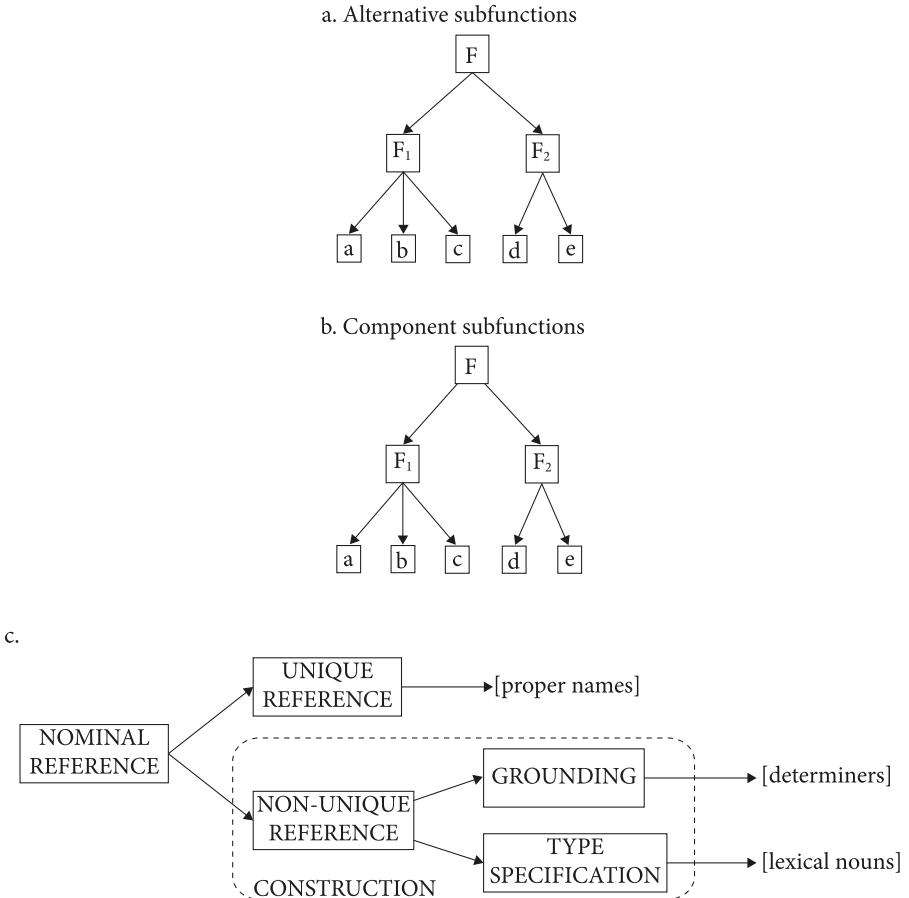
Figure 10. Alternative and component subfunctions

---

11. The distinguishing notation is a matter of whether or not the arrows leading from F coincide at their origin.

Alternative and component subfunctions correspond to **paradigmatic** and **syntagmatic** relationships. When they represent different strategies, like UNIQUE and NON-UNIQUE REFERENCE, alternative subfunctions decompose into very different component subfunctions, and these are reflected in distinct structural configurations. In terms of overt grammatical structure, nominals as a class are quite disparate, e.g. *Jennifer, that elephant, we, politicians, the very rich, those with children, for him to be so stubborn, that global warming is a hoax*. The only thing common to them all is the global function of NOMINAL REFERENCE. In short, semantic function is more fundamental and more consistent than structural implementation.

5.   Architecture

Linguistic structure resides in a vast **assembly** of conventional units, some of which are **activated** in the context of a **usage event**. The resulting expression is a **transient** assembly comprising these active units as well as the structures induced by their co-activation. The elements of an assembly are **connected** by relations of **symbolization, integration**, and **categorization**. The association of **semantic** and **phonological** structures gives rise to **symbolic** structures. Through integration (based on overlap), structures of any sort are assembled into successively larger ones; these are **syntagmatic** relations. Categorization – connections between schemas and their instantiations, or prototypes and their extensions – is the basis for **paradigmatic** relations. A central claim of CG is that lexicon, morphology, syntax, and even discourse form a continuum fully describable in these terms.

This claim presupposes a maximally inclusive characterization of semantic and phonological structures. Discussions of language structure usually start with – and tend to be limited to – relatively salient content of the sort represented in Figure 6: **descriptive** content at the semantic pole, and **segmental** content at the **phonological** pole. But as shown in Figure 11, these are merely the substantive core of semantic and phonological structure. They are augmented at each pole by elements that generally lack sufficient heft to occur independently. Prime examples are **prosody** and **information structure**. Having little substance of their own, these are **supervenient** on the segmental and descriptive content of other elements. A case in point is the **informational focus** being marked in English by **unreduced stress**, e.g. *She* MAY *really* LIKE *the job*. These are matters of **prominence**, which is not something that occurs in isolation; instead, they supervene on *may* and *like*, being manifested via their descriptive and segmental content. Under broad definitions, moreover, phonology incorporates other modes of expression

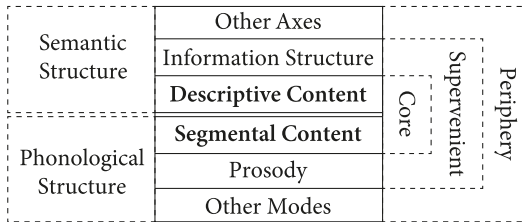(notably gesture), while semantics includes the import of non-descriptive elements (e.g. affective *Wow!*).

Semantic Structure	Other Axes	Core	Supervenient	Periphery
	Information Structure			
	Descriptive Content			
Phonological Structure	**Segmental Content**			
	Prosody			
	Other Modes			

**Figure 11.** Linguistic structure

Linguistic expressions are never self-contained. They presuppose a **conceptual substrate** of indefinite extent, including background knowledge and apprehension of the context. Since expressions emerge from this substrate and depend on it for their coherence and interpretation, any specific boundary would be arbitrary. Indeed, relation to relevant facets of the substrate is regarded in CG as part of an expression's linguistic meaning (Langacker 2008: § 2.1.3).

Through discourse, the interlocutors negotiate a description of certain aspects of their mental universe. The term **descriptive target** (DT) will indicate the portion of this universe that a particular expression (or stretch of discourse) pertains to. Although the target is a conceptual structure, not per se a linguistic one, it is unavoidably shaped to a non-trivial extent by habitual linguistic practice as well as anticipation of the coming expression. Accordingly, Figure 12a represents the descriptive target (pre-shaped to some extent) that eventuates in the nominal expression *that ugly cat with fleas.*[12]

The configuration in 12b represents the intention of referring to the cat, which is thus the onstage **focus of attention**, being apprehended from the ground (G) by the offstage interlocutors. It is by virtue of this **referential function** that the cat is grounded and profiled by the nominal as a whole. The nominal's **descriptive** organization, sketched in 12c [= Figure 6], is effected by the **lexical coding** of selected content, as well as **grammatical constructions**, which are responsible for dependencies. Shown in 12d are aspects of the nominal's **discursive** organization: temporal sequencing (>), and packaging into processing windows on different time scales. While these are determined to some extent by the descriptive constructions employed, their specifications are supplemented – if not overridden –

---

12. Alternatively, it results from the expression's apprehension. I believe, however, that the matter is largely comparable for the speaker and hearer, who proceed in tandem through a discourse and simulate one another's experience.
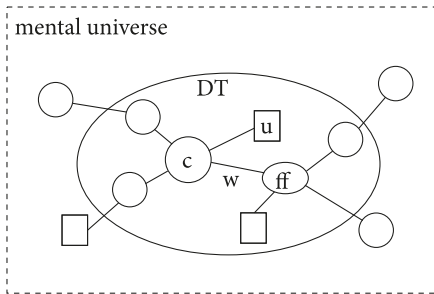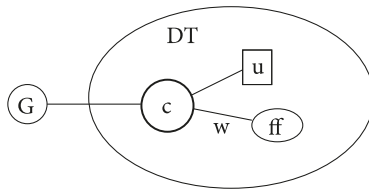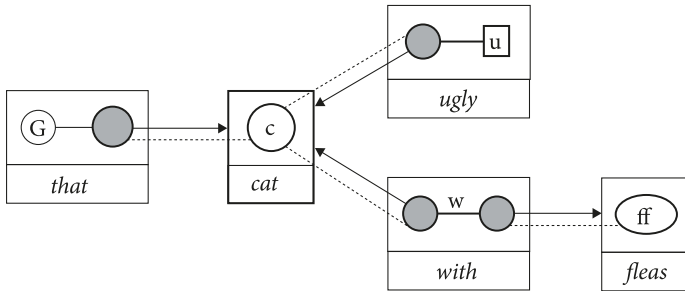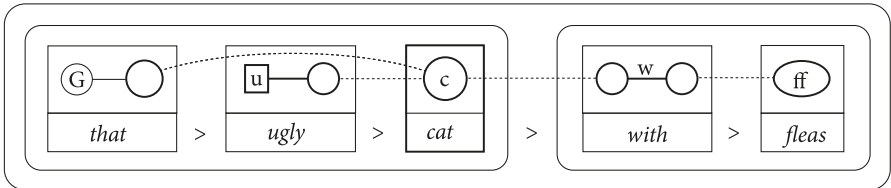
Figure 12. Descriptive target, referential function, descriptive and discursive organizations for *that ugly cat with fleas*

by more narrowly discursive factors. The diagram represents a typical rendition of the nominal, involving two prosodic groupings: (*that ugly cat*) (*with fleas*).

In CG, which envisages a unified account of structure, processing, and discourse (Langacker 2016b), relation to the descriptive target is an integral part of an expression's linguistic meaning, and this in turn is part of its structure. Its indissociability from DT is especially evident in the case of pronominal anaphora. The **coreference** of a pronoun and its antecedent is commonly indicated by referential indices:

(5)   Alice kicked the dog_i. It_i barked.

In CG diagrams, it shows up as a correspondence line. But these are just notations. Their actual import – what it means for two nominals to be coreferential – is that their referents project to the same entity in DT. In Figure 13a, the two sentences appear in successive processing windows on one time scale, and in a single window (scope of awareness) on a larger time scale. The sentences project to overlapping portions of DT and effect its descriptive coding; their composite semantic structures are not distinct from DT (as might be suggested by the diagram), but merely reflect its linguistic construal. In particular, the entities profiled by *the dog* (d) and by the neuter (n) pronoun *it* are both coincident with the dog that figures in DT, hence with one another. Taken as a whole, this discourse sequence has a linguistic meaning comprising everything in the larger window.

Being connected via overlap, this sequence of sentences constitutes a **grouping**. It is not, however, a grammatical **constituent** in the classical sense. In particular, there is no basis for positing a composite semantic structure that subsumes their content and – as an emergent property – imposes a single overall profile; it is not the case that, taken as a whole, the sequence refers to either the kicking or the barking. While this sequence does indeed have a coherent overall interpretation, this integrated conception is not the **product** of linguistic coding but rather the **substrate** supporting it: the relevant facets of DT (those in the larger scope of awareness). The linguistic organization is **serial** rather than hierarchical – apart from their being accessed (iconically) in successive processing windows, the meaning of the whole is basically just equivalent to the meanings of its parts. By virtue of being connected, these parts represent a **transient assembly**, and like any such assembly it has a **time course**. On the time scale of sentences, the time course is quite evident because the series of elements appear in windows of fairly long duration.

To be more precise, we can distinguish two aspects of processing windows: their **temporal** aspect, as a time span in which processing occurs; and their **substantive** aspect, as the content active during that time span. So in 13b, where T is processing time, W_1 and W_2 are successive temporal windows, each associated
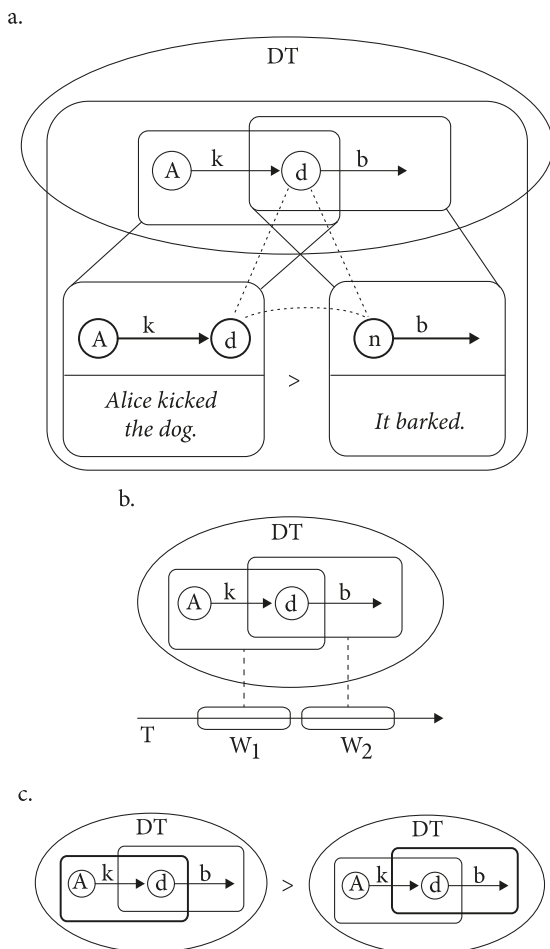
a.

b.

c.

Figure 13. Descriptive target and processing windows for (5)

with a portion of DT representing the content accessed for linguistic coding during that interval. The **current** temporal window is a facet of the ground: the **time of speaking**, during which an expression is apprehended by the interlocutors. From moment to moment, the current window hosts a shifting array of content which, being active at that moment, constitutes the immediate locus of attention.[13] In its substantive aspect, the current window can thus be described metaphorically as a **moving window of attention** (Langacker 2012). As shown in 13c, it moves through DT until this is deemed to have been 'covered' sufficiently.

---

13. This **locus** of attention is referred to in CG as the **immediate scope**, the profile being the specific **focus** of attention within it. Since activation is a matter of degree, additional content figures in an expression's meaning, comprising the **maximal scope** of awareness.

For many purposes, the moving window metaphor is more perspicuous than the standard compositional metaphor of building a whole out of smaller parts. This is especially so given that not all constructions are compositional, notably the family of constructions specifying the relative positions of a pronoun and its antecedent (van Hoek 1997b). One member of this family – instantiated by Figure 13a – is the constructional schema in Figure 14a. Rather than combining the nominal and the pronoun to form a composite expression, it simply describes the conventional pattern of a nominal and a coreferring pronoun occurring in successive clauses. In terms of the moving window metaphor, it is a matter of overlap: the nominal referent appears in the window at one moment and remains active at the next, as the window continues its journey through DT.
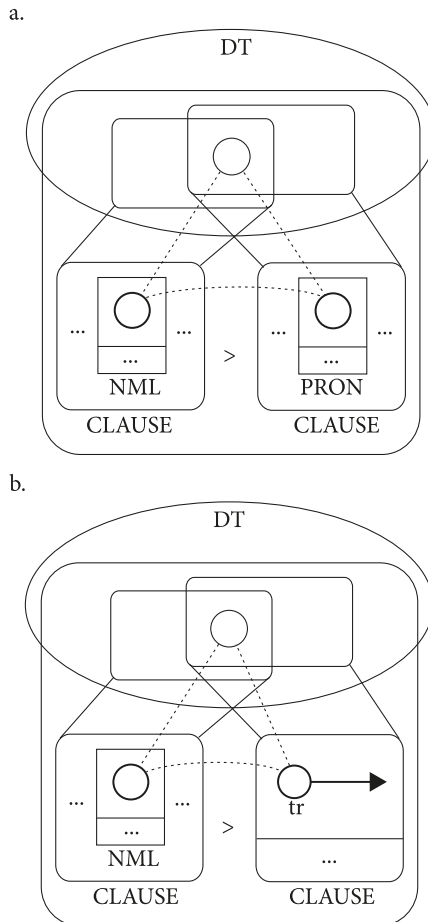
Figure 14. Discourse constructions exemplified in (5) and (6b)

Pronominal anaphora can be regarded as a **discourse construction**. As formulated, however, the schema applies whether the clauses are separate sentences, as in Figure 13a, or parts of the same sentence, e.g. (6a). The notion 'sentence' has no privileged status in CG (Langacker 2008: 482–483), nor is there any specific place where grammar stops and discourse begins – both consist in assemblies, where grammatical and discursive organization are not just intertwined but ultimately indissociable.

(6) a. When Alice kicked the dog, it barked.
     b. Alice kicked the dog. Barked.

Showing this quite clearly are discourse sequences like (6b). Though ill-formed in English, sequences like this are perfectly normal in many languages. On the assumption that a sentence is defined grammatically as having a subject, these have sometimes been analyzed in terms of a 'zero subject' (or more generally, 'zero anaphora'). But as noted by Li (1997), they are better seen as reflecting the efficient, conventional strategy of leaving a salient discourse referent unexpressed unless there is reason to make it explicit. In the present approach, the pattern is straightforwardly characterized as the discourse construction in Figure 14b. It differs only slightly from 14a: the referent of the antecedent is not identified with that of an overt pronoun, but with the schematic trajector of the profiled clausal occurrence.

The seemingly problematic nature of subjectless sentences is just a consequence of viewing grammar in terms of overt form rather than semantic functions, and viewing sentences in isolation rather than in the context of the ongoing discourse. They pose no problem in a unified account of grammar and discourse as assemblies of meaningful structures.

6.   Descriptive and discursive organization

CG represents the antithesis of decomposing language into discrete, encapsulated 'modules' or 'components' (Fodor 1983). However, unification and integration are not the same as homogeneity and the absence of organization. Linguistic structure reflects the interplay of semantic functions, all contributing to the global function of communicative interaction through symbolic expression. We can arrange these functions in several broad categories based on their locus in the symbolic interactions constituting usage events. For this I use the term **axes**: a function pertains to the **affective** (or **individual**), **interactive, descriptive**, or **discursive** axis. While a given structural element has a **primary** function along one axis, it usually has

some import with respect to others as well. This is one reason for positing dimensions of organization rather than separate components.

Another reason is that the axes are neither clearly delineated nor really distinct. Rather, each presupposes – and thus in a sense incorporates – its predecessor. Interaction presupposes individuals (the locus of affect). Description is a particular kind of interactive activity. And discourse includes a series of descriptive interactions. Consider a demonstrative, e.g. *this*. While I regard it as being primarily descriptive, ultimately the label makes no difference because its full characterization includes functions with respect to all four axes. It serves the **descriptive** function of identifying the nominal referent. The basis for identification is **individual**: proximity to the speaker, which is closely bound up with **affect** (Janssen 1995). Moreover, identification is an **interactive** process aimed at achieving coordinated mental reference (joint attention). And the means of identification is determined by **discursive** factors; using a demonstrative (as opposed, say, to the definite article) responds to the need for the referent to be 'singled out' (Kirsner 1993).

Here we will focus on the interaction of descriptive and discursive functions. The descriptive axis comprises the relation between the **ground** (G) – the 'offstage' locus of the interlocutors and their interaction – and the 'onstage' target of description. Their connection is established by **grounding elements**, which specify the relationship between G and a nominal or clausal referent (the profiled thing or occurrence). Whereas **grounding** pertains to the referent's **epistemic status**, the **grounded structure** effects its **description**.

Along the **descriptive** axis, *the ugly cat* has the grammatical and functional organization sketched in Figure 15. The assemblies are the same in most respects whether the adjective is interpreted restrictively, as in 15a, or non-restrictively, as in 15b. In each case, they represent a nominal (NML) in which *cat* functions as the **head** (H) and *ugly* as a **modifier** (MDF). Together they constitute the **grounded structure** (GRD), with *the* as the **grounding element** (GR). The import of the definite article is that only one instance of the relevant type (t) is currently accessible to both interlocutors. On the restrictive interpretation, the type in question is *ugly cat*: the head noun makes a basic type description (T), which the adjective elaborates to yield the higher-order type description T′. The schematic type evoked by the article is a kind of e-site, and an arrow indicates that T′, rather than T, fulfills this function. Because the adjective helps specify the relevant type, the referential function (REF) is implemented by the nominal as a whole. But since the article has little content, the descriptive function (DESCR) is limited to the grounded structure.

With the non-restrictive interpretation, the functional organization is slightly different in that the adjective is not invoked for the referential function. The
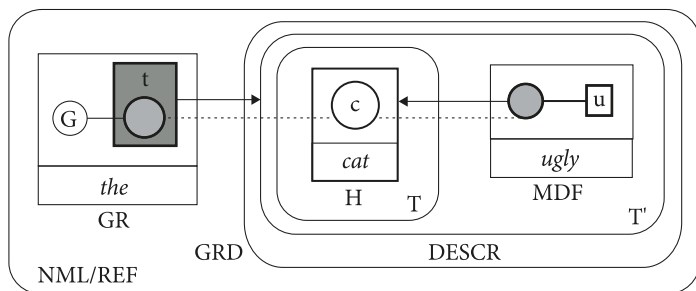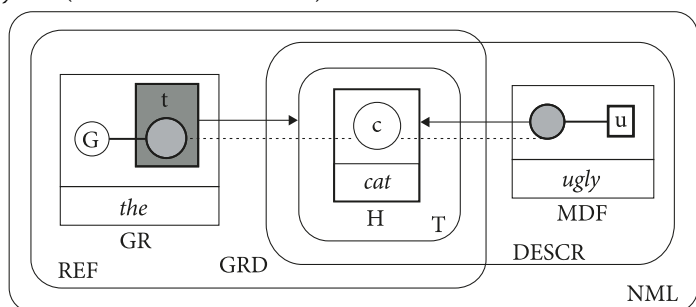
a. *the UGLY CAT* (restrictive modifier)

b. *the ugly CAT* (non-restrictive modifier)

Figure 15. Restrictive and non-restrictive readings of *ugly*

relevant type is just *cat*, and while the property *ugly* serves to characterize the cat, implicitly defining a higher-order type, this is not exploited for the purpose of identification.[14] As a consequence, the functions of reference and description are served by groupings that cross-cut one another. Despite this difference, however, the expressions in Figure 15a-b have the same basic grammatical structure in terms of traditional notions like determiner, head, and modifier.

Belonging to the discursive axis are functions relating to **speech management** (e.g. turn taking), the **connection** of clauses or sentences, **information structure, order of presentation**, and the **packaging** of content. Rather than describing a situation (DT), discursive structures pertain to linguistic expression per se: how descriptive elements relate to one another in a cohesive and coherent discourse. Hence they are **supervenient** on descriptive content, effecting its organization at each pole. Semantically, their import resides in how – given a basic description of the target – this content is accessed and presented. At the phonological pole, dis-

---

14. Being inessential to the nominal's referential function, the adjective tends to be reduced in stress.

cursive organization tends to be symbolized by temporal sequence and prosody (accent, intonation, rhythmic grouping), which organize the segmental content of descriptive elements. An example was given earlier in Figure 12, where diagram 12c represents the descriptive content of *that ugly cat with fleas*, and 12d shows the discursive organization effected by ordering and prosodic grouping.

Presented in Figure 16 are some main descriptive and discursive groupings for the expression in (7). They are given separately for the sake of readability, even though, being facets of the same assembly, they could be conflated in a single diagram. Descriptively, the modal *may* functions as a grounding element (GR), with the remainder (GRD) serving to describe the schematic process it profiles; together they implement the function of CLAUSAL REFERENCE (REF). The head (H) is the lexical verb *like*, which specifies the basic type of the grounded occurrence. The adverbial modifier (MDF), *really*, situates this occurrence with respect to a scale of intensity. The nominals *she* and *the job* are complements (COMPL) of *like*; they are its subject and object by virtue of elaborating its trajector and landmark (primary and secondary focal participants). Also, since *like* specifies the schematic process grounded by *may, she* can be characterized as the trajector of the latter as well as the former.

(7)   //She MAY / really LIKE / the job.//

Discursively, elements are presented in processing windows on several time scales. On the smallest time scale, the expression comprises an ordered series of words (W). On the largest time scale, it occupies a window of the sort that Chafe calls an **intonation unit** and I refer to as an **attentional frame** (Chafe 1987, 1994; Langacker 2001): a prosodically delimited, 'clause-sized' window containing the amount of information readily attended to at any one time. In between are prosodic groupings corresponding to notions like **foot** or **phonological phrase**. These tend to coincide with, and serve to highlight, groupings that are natural from the conceptual standpoint; most obviously, *the job* constitutes a nominal, and *really like* a head-modifier relation. Moreover, *she may* represents a functional grouping that I call the EXISTENTIAL CORE of a finite clause: it offers a succinct schematic preview of the clause as a whole (Langacker 2015).[15] Cross-cutting these prosodic groupings is the traditional division into SUBJECT and PREDICATE, characteristic of **categorical** (as opposed to **thetic**) judgments (Kuroda 1972). Finally, *may* and *like* function jointly as INFORMATIONAL FOCUS, marked by unreduced stress. In this focus construction, the accentual prominence of these elements symbolizes their semantic prominence as the new or significant information.

---

15.   The existential core can therefore function as a clausal anaphor, e.g. **A:** *She may really like the job.* **B:** *Yes, she may.*

a. Descriptive functions
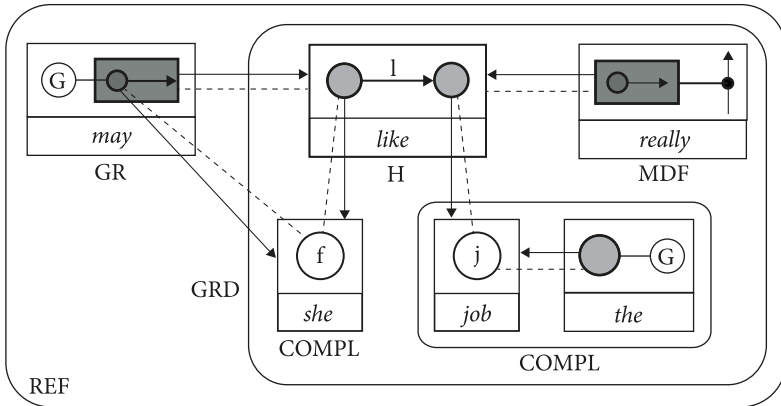
b. Discursive functions
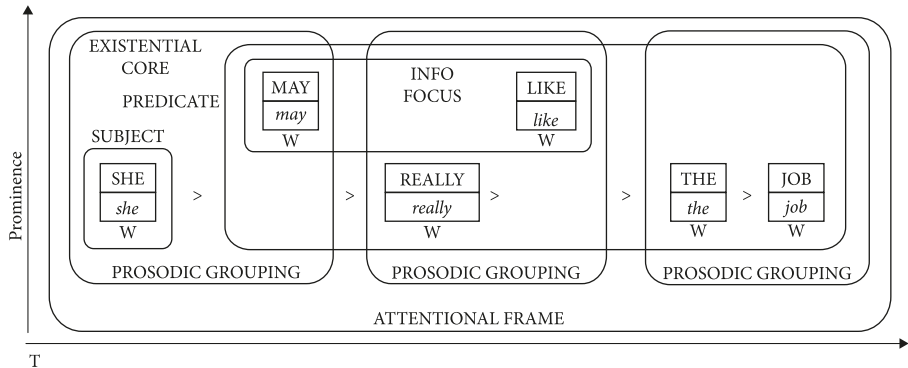
Figure 16. Descriptive and discursive groupings for (7)

7.   From connection to constituent

A single representational format, like phrase trees or dependency trees, is insufficient for a full account of grammatical structure. From the CG standpoint the problem is not to decide on a single representation, but to map out the full array of functions and groupings for a given expression. As a practical matter, these are too many and too varied to be accommodated in any one diagram or analysis – hence the division of labor in Figure 16. And since any actual characterization is highly selective, seemingly inconsistent descriptions may simply amount to different 'takes' on the same overall assembly.

The characterization in Figure 16 includes different kinds of connections and functional groupings.[16] It does not show constituents in the classical sense. I have emphasized that constituency is neither fundamental nor essential, and as such is variable and often indeterminate. There is no consensus about constituents because analyses are based on different considerations suggesting groupings that are often non-congruent. For instance, the standard grouping into SUBJECT and PREDICATE (NP + VP) reflects the notion of categorical judgment, but a stronger case can be made – on both descriptive and discursive grounds – for the cross-cutting grouping referred to here as the existential core. Prosody is a factor in positing constituents, which often coincide with prosodic groupings, e.g. *the job* in (7); but this is only a tendency – the tripartite grouping in (7) does not correspond to any standard constituency analysis.

Groupings equivalent to standard constituents do occur, as reflected in assemblies like Figure 4. But while they are real, classical constituents are **emergent** rather than fundamental, hence variable and inconsistent. Their emergence is contingent on other factors and a matter of degree. It depends on the salience and coherence of both the conceptual grouping and its phonological symbolization. At the semantic pole, a grouping's emergence is favored by intrinsic cognitive salience, by being self-contained and well-delineated, by absence of competition from alternative groupings, and by functioning as a whole in further connections. One such connection is **symbolization**, an extrinsic source of prominence commensurate in extent with that of the associated phonological structures. In terms of their own prominence (or symbolizing 'strength'), these can be ranked as follows: segmental content > prosody > temporal adjacency (without prosodic grouping) > mere co-occurrence in a temporal window (without adjacency).

In accordance with these factors, the most consistent, clear-cut constituents are **nominals** and **finite clauses** (e.g. *that ugly cat with fleas*; *the job*; *she may really like the job*), where a contiguous, prosodically reinforced descriptive grouping serves the fundamental discourse function of nominal or clausal reference. But even these are subject to the interplay of competing factors. A well-known case is the separation of a relative clause from the noun it modifies. As shown in Figure 17b, this represents a departure from the canonical arrangement in Figure 17a, where the nominals and clauses are classical constituents. This alternation reflects a competition between the function of nominal reference and the

---

16. The labels indicating functions are purely heuristic. Recall that functions are inherent in a full structural description, not something that has to be specified separately. Even without the labels, for instance, the relation of *like* and *really* as HEAD and MODIFIER is evident from their semantic descriptions and the connection between them.
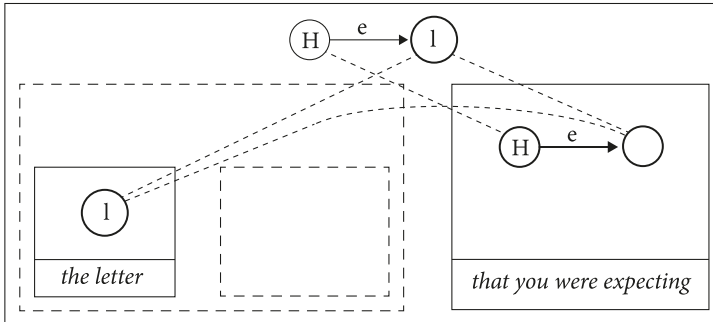
discursive function of introducing a new discourse participant by announcing its arrival on the scene. Only one of these can take the form of a classical constituent, being symbolized by a contiguous phonological sequence and reinforced by prosodic grouping. This reinforcement serves to highlight the conception resulting from the co-activation of grouped elements. The two expressions thus give rise to different intermediate-level composite structures with a measure of salience: *the letter that you were expecting* vs. *the letter just arrived*. However, the overall composite structure is the same with either hierarchical arrangement.
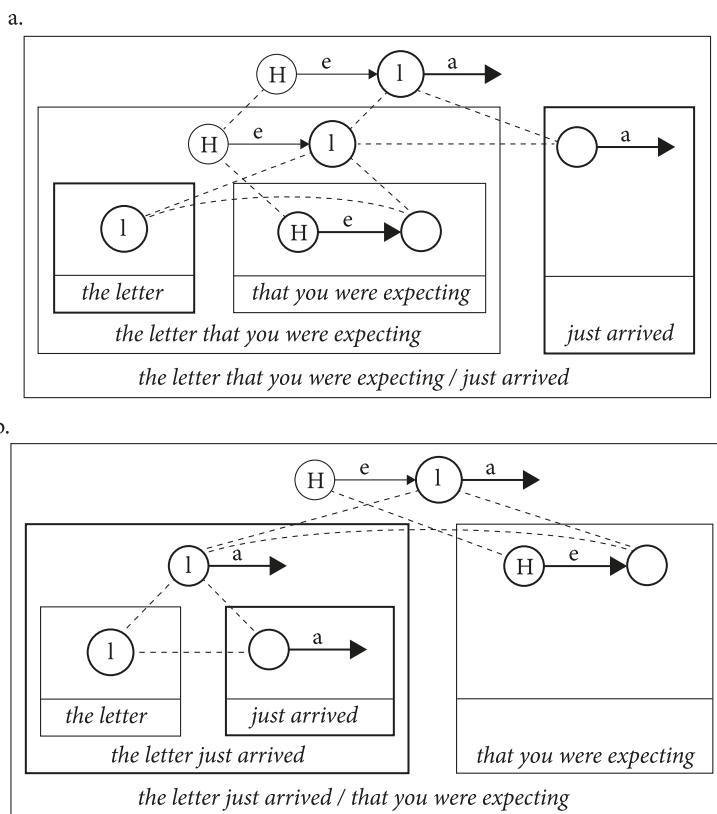
Figure 17. Representations for different relativization strategies

If they do not form a constituent, can the head and the relative still be recognized as a nominal? They certainly form a nominal from the standpoint of semantic function: they jointly fulfill the function of nominal reference and the content of the relative ensures the contextual uniqueness marked by the definite article (Figure 15). But does this functional grouping involve a composite conception equivalent to that of the subject in Figure 17a? It is not implausible to suppose that

it does. If so, however, it has lesser salience because it is not directly symbolized or reinforced by an independently observable phonological grouping. To the extent that it emerges, it does not represent an addition to the structure in Figure 17b, for it is **immanent** in that assembly. We can make it 'visible' by ignoring the event of arriving. If this is 'faded out' of the picture, as in Figure 18, the remaining structure is equivalent to the subject nominal in Figure 17a.

Figure 18. Representation of Figure 17b with the arrival event faded out

Besides the function of introducing a new participant, the grouping in Figure 17b is motivated by a discursive factor that falls under the rubric of **packaging**: both ease of processing and a stylistic sense of balance favor the presentation of content in 'chunks' of roughly equal size. This alternative not only avoids the imbalance of Figure 17a [17] but has the further processing advantage of postponing the 'heavy lifting' of a relative clause. In either case, the prosodic grouping reinforces temporal adjacency as a basis for constituency. The emergence of a composite conception is both abetted and symbolized by its content being expressed in a single processing window. So while the sentences have the same lower-level elements (*the letter*; *just arrived*; *that you were expecting*) and the same overall composite structure, they have different intermediate-level composite structures: *the letter that you were expecting* vs. *the letter just arrived*. These alternate **compositional paths** are taken in CG as representing slightly different conceptual experiences, hence slightly different meanings.

   While the alternate groupings in Figure 17 correlate with a difference in word order, prosodic distinctions are commonplace even with the same order of presentation. Consider once more the case of nominal reference to a certain unattractive, vermin-ridden feline: *that ugly cat with fleas*. Irrespective of prosody, its descriptive organization includes the semantic functions indicated in Figure 19a,

---

17. Observe that the omission of *just*, by increasing the imbalance, renders the sentence less felicitous: *?The letter that you were expecting arrived.*

as well as the temporal sequencing effecting their grammatical implementation. Depending on various factors, this structure can be rendered prosodically in different ways. One option for prosodic grouping reflects the functional organization into GROUNDING VS. GROUNDED STRUCTURE: (*that*) / ((*ugly cat*) (*with fleas*)). Though a bit marginal owing to the size imbalance, this does accord with some usual assumptions about constituency; specifically, it suggests and tends to reinforce the hierarchical arrangement in Figures 3b and 4.
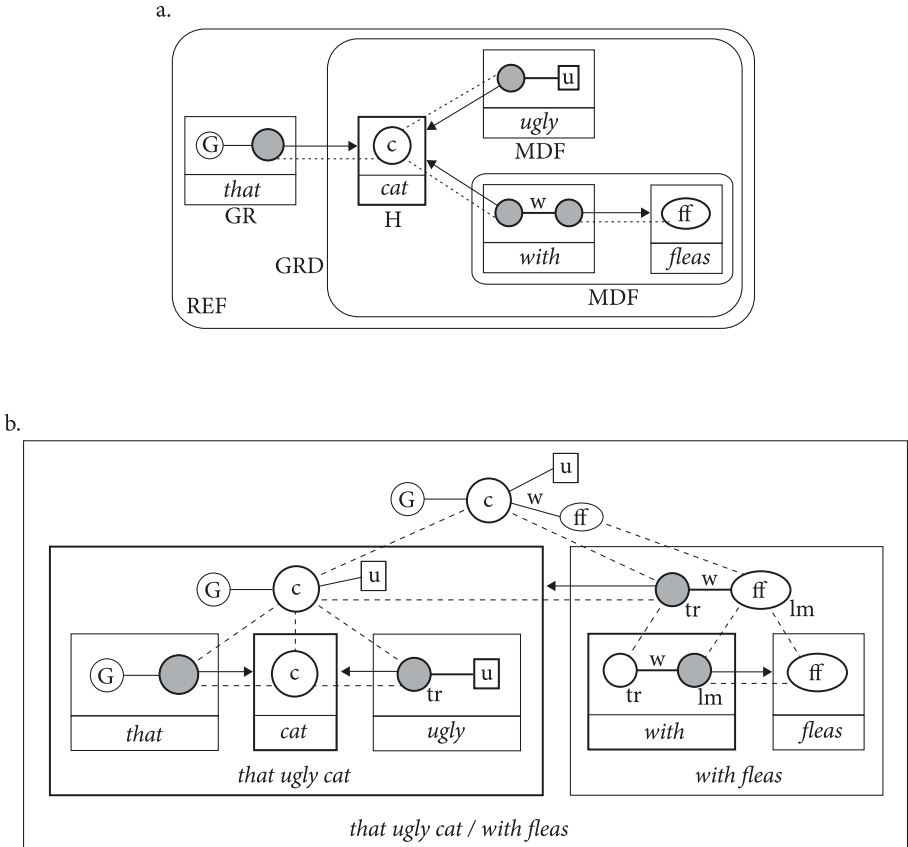
Figure 19.   Semantic functions and constituency groupings for *that ugly cat with fleas*

More natural, however, is the more balanced prosodic packaging of Figure 12d: ((*that*) (*ugly*) (*cat*)) / (*with fleas*). This suggests and encourages the alternative constituency in Figure 19b, which is not at all standard because it cross-cuts the descriptive groupings of Figure 19a. But granted that constituency is variable, there is no reason to reject it. Being conceptually coherent, and having a definite

overall profile, why should *that ugly cat* not emerge as an intermediate-level composite structure? This is just an expected consequence of these elements co-occurring (to the exclusion of the prepositional phrase) in the same processing window.[18]

In Figure 17, the alternative grouping schemes involve both prosody and word order. In Figure 19b, only prosody gives overt indication of the groupings. A further possibility, suggested by the very nature of assemblies, is that a difference in functional organization not have any phonological manifestation. A key feature of assemblies is that the same elements are grouped simultaneously in alternate ways, reflecting different functions. Moreover, semantic functions and the conceptual groupings they induce are inherent aspects of assemblies irrespective of how or whether they are symbolized. There is thus the potential, even without any overt difference, for multiple grouping schemes to co-exist as part of alternate strategies for implementing the same general function.

A case in point is the productive pattern of quantification exemplified by expressions like *several bags of mulch*. As noted earlier, they are ambivalent as to whether the first or the second noun functions as head in the sense of designating the overall nominal referent. Indeed, a nominal can exhibit both interpretations in a single use. In (8a) [= (2)], the nominal is understood as referring to the mulch in the matrix clause (*I spread several bags of mulch*) and to the bags in the relative clause (*that were stacked in the shed*). This is largely just a matter of emphasis, and since there is no real conceptual inconsistency, speakers have no problem entertaining both construals – if not simultaneously, at least in close succession.[19] But under either interpretation, grammatical evidence of the sort in (8b–d) points to the constituency being ((*several bags*) (*of mulch*)), and not ((*several bags of*) *mulch*), as would be expected if *several bags of* were a quantifier (Langacker 2009a: Chapter 3).

(8) a. I spread **several bags of mulch** that were stacked in the shed.
     b. A. How much mulch did you spread?
         B. Several bags (*of).
     c. I spread a lot – at least several bags – of mulch.
     d. *I spread a lot of – at least several bags – mulch.

---

18. This alternate constituency obscures but does not eliminate the linguistic significance of *ugly cat with fleas*, which is still the grounded structure. This functional grouping is just less salient because it is symbolized only weakly, by phonological contiguity without prosodic reinforcement.

19. It represents a general pattern of metonymic shift involving initial absolute quantifiers (Langacker 2016a).

In the two analyses, the same basic elements are connected (directly or indirectly) by the same correspondences. Shown at the top in Figure 20 is the organization indicated by grammatical behavior: *of mulch* forms a constituent functioning as a modifier to *bags*, the head noun grounded by *several*.[20] Represented at the bottom is the alternative analysis where, via a natural metonymy, the expression is construed as referring to the mulch. Since *mulch* is then the head, the remainder assumes the function of a complex quantifier.
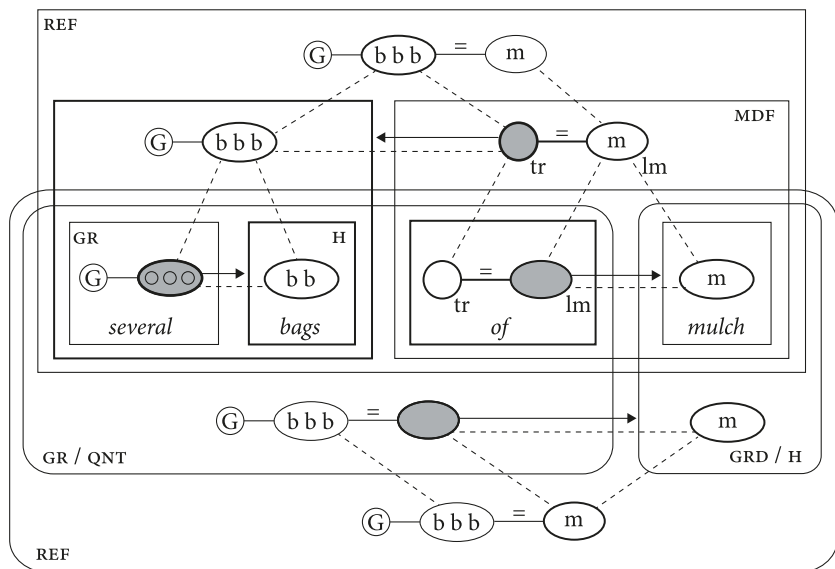
Figure 20. Alternative analyses for *several bags of mulch*

A situation of this sort – with co-existing schemes of functional organization, either of which can be invoked for a given purpose – is unproblematic (and not unexpected) in the present framework. Because the flexibility it affords can be quite useful, e.g. in (8a), it may well be able to endure for long periods. We observe in (8c–d) that this dual analysis persists with *a lot of*, which (in contrast to *several bags of*) is a frequent, well-entrenched unit with definite quantifying function. The alternate grouping based on this function has no doubt figured in the grammaticization resulting in the single-word variant *alotta*, which is encroaching on *many* and *much* as a core member of the English quantifier system (*alotta mulch*; ?*much mulch*).

---

20. An oval represents a mass (plural or continuous). For *of*, the symbol '=' indicates that the trajector and landmark are **co-extensive** (Langacker 2016a).

8.   Seriality

The transient assembly representing an expression is neither static nor self-contained but consists in organized, contextually grounded activity. As such, its linguistic import includes both its time course – how it unfolds through time – and the supporting conceptual substrate. It is therefore quite natural that many aspects of language structure are usefully conceived in terms of a moving window of attention that progresses through DT.

Consider a chain of successively embedded complements, as in (9). This embedding is generally assumed to be syntactic, a matter of each clause being a grammatical constituent of its predecessor, as indicated by the bracketing in (9a). However, prosody suggests that the organization is not hierarchical but basically serial, as in (9b); the clauses correspond to the prosodically delimited processing windows referred to as **intonation units** (Chafe 1987, 1994) or **attentional frames** (Langacker 2001). The discrepancy between the presumed grammatical structure and the observed prosodic structure is sometimes handled by invoking special theoretical devices (e.g. the 'phonological readjustment rules' proposed in Chomsky & Halle 1968). But nothing special is required in the present framework, where the constituency in (9a) need not be posited in the first place (Langacker 2009a: Chapter 11).

(9) a.   [Amy says [Bob thinks [Chris believes [Doris left]]]]
     b.   // Amy says // Bob thinks // Chris believes // Doris left //

To be sure, a description based on classical constituency is quite possible in CG, as shown in Figure 21. The verbs *say, think*, and *believe* introduce **mental spaces** (Fauconnier 1985) with schematic propositions as their content. Each of these is an e-site specified by the structure that follows, which functions as complement to the verbal head. At successive levels, composition gives rise to composite structures of progressively greater complexity, one aspect of which is the hierarchical arrangement of mental spaces: the believing figures in what is thought, and the thinking in what is said.

It is doubtful, however, that the constituency in Figure 21 actually emerges (at least with any degree of cognitive salience). In view of the prosody, it seems implausible that each composite semantic structure would be invoked as a self-contained whole with a single overall profile. Does one really want to say that the entire sequence represents a conceptual grouping that specifically singles out the act of saying as its referent? Or that *Bob thinks Chris believes Doris left* is psychologically real in the sense of functioning individually, as a composite whole, at any level of processing?
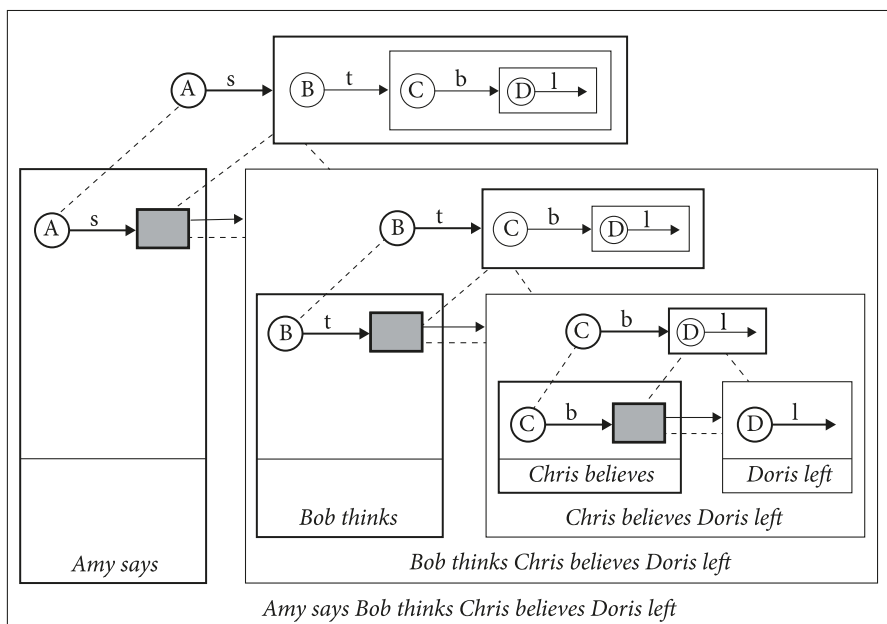
Figure 21. Constituency-based representation for (9)

From the CG perspective, there is no need to posit either the higher-level constituents or their composite semantic structures. A perfectly viable analysis results when the seriality suggested by prosodic grouping is simply taken at face value, as in Figure 22. The hierarchical organization usually ascribed to syntax may just be conceptual, residing in the layering of mental spaces (represented by nested rectangles). And instead of arising via semantic composition, as in Figure 21, this layering is an inherent aspect of DT: the nesting of mental spaces is central to the target of description.

Grammatically, the sentence comprises a series of clauses appearing in separate processing windows, each representing a portion of DT. It thus defines a moving window of attention that progresses in orderly fashion through the mental space configuration. While each clause is construed in relation to its predecessor (still active to some degree), the expression's coherence does not require the emergence of an overarching composite structure with a single profile – it is coherent because it provides a path of access to the integrated conception functioning as descriptive target. Moreover, since processing runs concurrently on different time scales, the expression's predominant seriality does not preclude a global apprehension of its organization and function. The dashed lines in Figure 22 indicate the requisite scope of awareness (a window on a larger time scale).
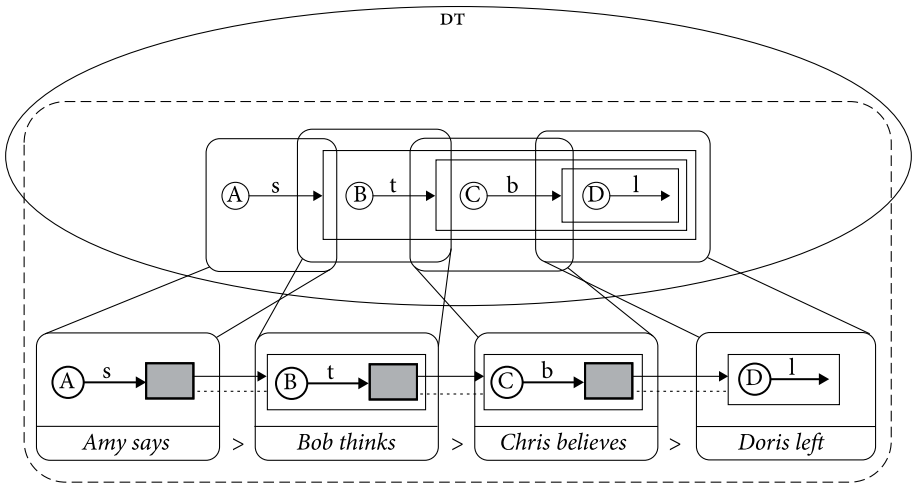
Figure 22. Seriality-based representation for (9)

In general, describing complex expressions is not a matter of choosing between a tree-like structure and a series of windows. Constituency and seriality are neither sharply distinct nor mutually exclusive, but modes of organization observable in the same assembly, their emergence and salience being matters of degree. A final set of examples will offer brief illustration.

Suppose the descriptive target is a particular journey: that of a female (f) driving from San Diego to New York via Dallas and Chicago. The many ways of describing it represent alternate construals imposed by linguistic coding on the same conceived occurrence. Here we consider some options afforded by the selection of content and prosodic packaging. The sentence in Figure 23a, naming all the locations, comprises several prosodic groupings: *She drove from San Diego / to Dallas / to Chicago / to New York*. Other options involve only partial path descriptions (cf. Talmy 1996). In 23b, *She drove to New York*, only the destination is made explicit. And 23c, which omits the intermediate stages, has two main alternatives for prosodic grouping: *She drove / from San Diego to New York* vs. *She drove from San Diego / to New York*.

The simplest case, with only the destination being specified, is presented in Figure 24. It is a straightforward instance of constituency, as the rhythmic grouping ((*she drove*) (*to New York*)) combines with adjacency to symbolize clearly apprehended composite conceptions, one describing a motion event and the other its path. At the higher level of organization, the schematic path evoked by *she drove* – the head at this level – functions as an elaboration site (shaded rectangle) specified by the prepositional phrase, which is thus a complement. This structure represents the canonical situation where prosodic packaging aligns with,

a. She drove from San Diego / to Dallas / to Chicago / to New York
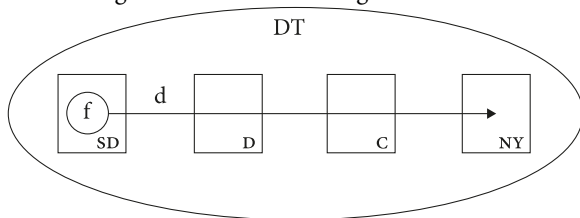
b. She drove to New York
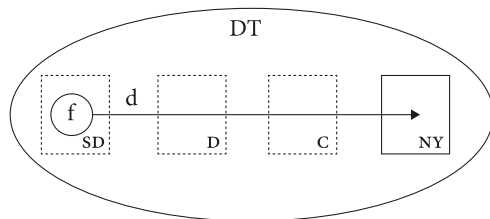
c. She drove / from San Diego to New York. OR She drove from San Diego / to New York
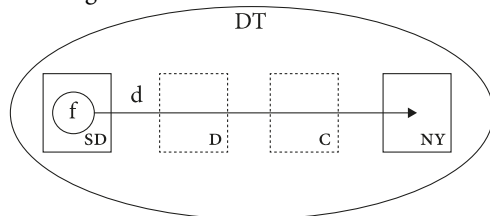
Figure 23. Coding options afforded by construal of a motion event

and thereby reinforces, basic grammatical organization. Their prototypical co-alignment is a facet of the sanctioning constructional schemas.

The structure in Figure 25 represents a slight departure from canonical constituency, in that the complex path expression emerges less clearly as a constituent.[21] The sequence *from San Diego to New York* is salient and significant: a prosodically reinforced conceptual grouping which, taken as a whole, fulfills the semantic function of describing the path evoked by *she drove*. But compared to this other component, it is not a constituent in the strong sense of there being a clearly distinct composite conception with emergent properties. While it does have an overall profile – a path with specified origin and destination – neither

---

21. The diagram is simplified by omitting the internal structure of *she drove* and the prepositional phrases.
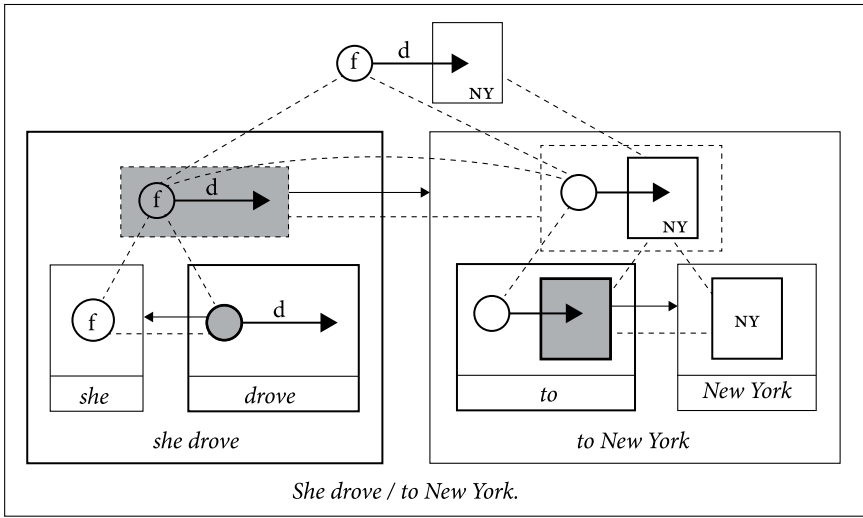
Figure 24. Representation for *She drove to New York*

component functions as a local head (profile determinant), imposing its own profile on the whole. For all intents and purposes, the composite profile is equivalent to the component structure profiles, residing in their serial access. Hence the path sequence deviates from seriality only by virtue of being packaged prosodically as a grouping parallel to the constituent *she drove*.
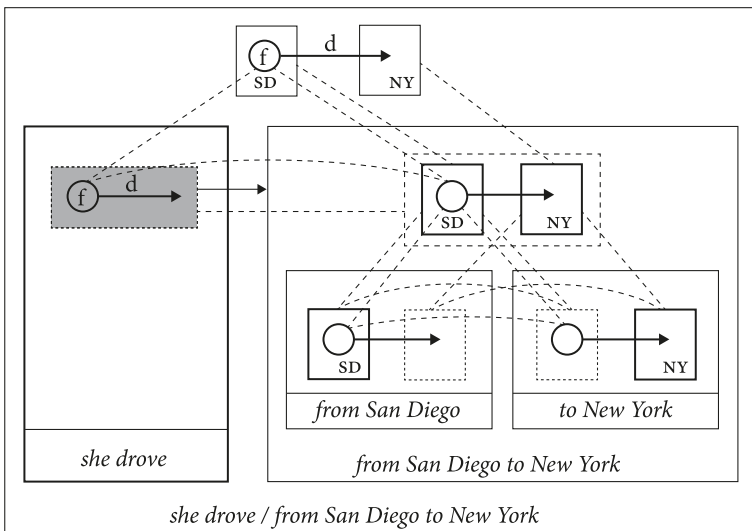
Figure 25. Representation for *She drove / from San Diego to New York*

This prosodic packaging is the only overt difference between Figures 25 and 26: *She drove / from San Diego to New York* vs. *She drove from San Diego / to New York*. It has the consequence, however, that the path sequence no longer coheres as a quasi-constituent. Instead, prosody reinforces adjacency to induce the emergence of the constituent *She drove from San Diego*. What, then, is the status of the *to*-phrase? In terms of standard analyses based on strict constituency, it is left as a kind of orphan. In terms of CG assemblies, it can perfectly well be regarded as a complement to the higher-level head *She drove from San Diego*, for it specifies the destination path this invokes but leaves schematic. Equivalently, but more perspicuously, we can say that the sequence *from San Diego to New York* represents a serial structure that cross-cuts the hierarchically organized *She drove from San Diego*.[22] Viewed in this manner, as in Figure 26, it is a matter of degree whether we recognize an overall composite structure, in a single window on a larger time scale, or a sequence of structures (each with its own profile) in successive smaller windows. Given that assemblies have a time course, the import in either case is that an initial, partial event description undergoes subsequent elaboration, thereby implementing the general function of event reference within an inclusive scope of awareness.
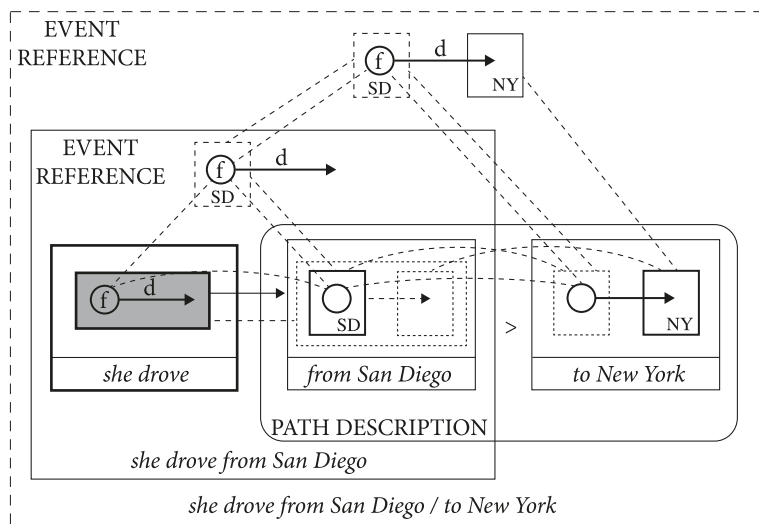
Figure 26. Representation for *She drove from San Diego / to New York*

---

22. This is a case of **connection via a subpart** (Figure 7f). The discontinuous relative clause construction (Figure 17b) is also describable in these terms (Langacker 2009b, 2014).

With a longer path sequence, as in Figure 27, seriality becomes more salient: *She drove from San Diego / to Dallas / to Chicago / to New York.* The number of processing windows, each representing the current locus of attention, makes quite doubtful the emergence of an overarching composite structure with a single overall profile. Nor is there any need to posit one. As in Figure 22, the apparent seriality can simply be taken at face value. Instead of being organized hierarchically, the expression comprises a succession of structures, each with its own profile, connected in chain-like fashion. It is therefore a **grouping** but not a **constituent** in the classical sense. Though not coded linguistically as a simultaneously accessible whole, the content expressed may still be apprehended as such in its role as descriptive target. In any case, the predominantly serial access occurs in a global scope of awareness encompassing both the target conception and its linguistic coding with the semantic function of referring to an event.
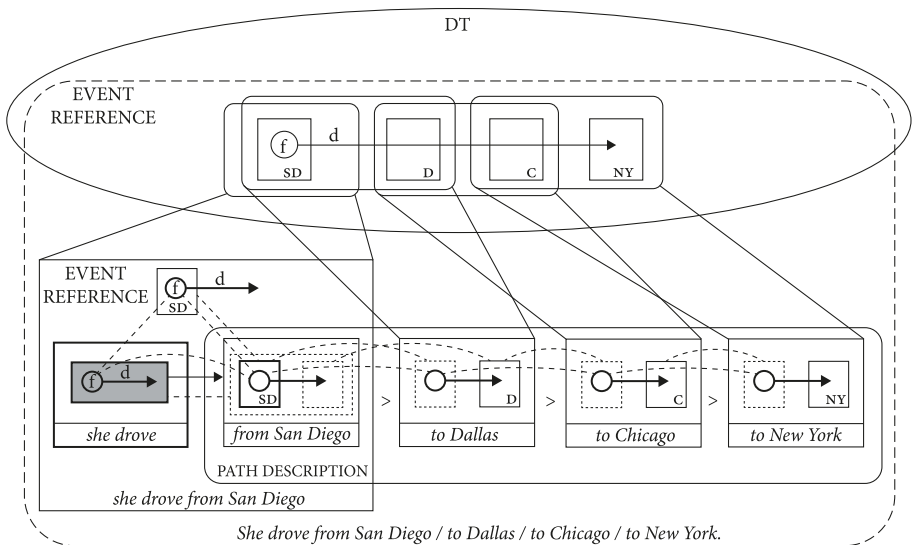
Figure 27. Representation for *She drove from San Diego / to Dallas / to Chicago / to New York*

9.   Conclusion

Grammar is too complex and multifaceted to be characterized by using a single representational format based on a single factor. It is not a matter of choosing between constituency and dependency, or between a tree and a series of windows. Seemingly very different representations, each telling part of the story, can be regarded as alternate takes on the same assembly. Flexible because they are

grounded in elemental notions (connection, grouping, patterns of activity), assemblies make possible a unified approach to processing, structure, use, and function. One aspect of this unification is the proposal – a central tenet of CG – that lexicon, morphology, syntax, and even discourse form a continuum residing in assemblies of symbolic structures.

As for semantics, CG posits neither a semantic 'component' nor self-contained semantic representations. Instead of being separate or independent, an expression's linguistic meaning is just the conceptual aspect of its dynamic linguistic coding, apprehended in relation to the substrate and the target of description. It is, in short, the semantic pole of the assemblies constituting language structure. As such, it consists in organized processing activity which, despite being open-ended and less than fully determinate, is subject to principled analysis and precise description. Semantic structure is not distinct from lexicon and grammar, but inheres in them, their function being the evocation, structuring, and symbolization of conceptual content.

References

Anderson, J. M. (1971). *The grammar of case: Towards a localistic theory*. Cambridge: Cambridge University Press.

Chafe, W. (1987). Cognitive constraints on information flow. In R. S. Tomlin (Ed.), *Coherence and grounding in discourse* (pp. 21–51). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/tsl.11.03cha

Chafe, W. (1994). *Discourse, consciousness, and time: The flow and displacement of conscious experience in speaking and writing*. Chicago and London: University of Chicago Press.

Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York: Harper & Row.

Croft, W. A. (1991). *Syntactic categories and grammatical relations: The cognitive organization of information*. Chicago: University of Chicago Press.

Fauconnier, G. (1985). *Mental spaces: Aspects of meaning construction in natural language*. Cambridge, MA and London: MIT Press/Bradford.

Fodor, J. A. (1983). *The modularity of mind*. Cambridge, MA and London: MIT Press/Bradford. https://doi.org/10.7551/mitpress/4737.001.0001

Harder, P. (2010). *Meaning in mind and society: A functional contribution to the social turn in cognitive linguistics*. Berlin and New York: Mouton De Gruyter. https://doi.org/10.1515/9783110216059

Hudson, R. A. (1984). *Word Grammar*. Oxford: Basil Blackwell.

Hudson, R. A. (1987). Zwicky on heads. *Journal of Linguistics*, 23, 109–132. https://doi.org/10.1017/S0022226700011051

Hudson, R. A. (2010). *An introduction to Word Grammar*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511781964

Israel, M. (2011). *The grammar of polarity: Pragmatics, sensitivity, and the logic of scales*. New York: Cambridge University Press. https://doi.org/10.1017/CBO9780511975288

Janssen, T.A.J.M. (1995). Deixis from a cognitive point of view. In E. Contini-Morava & B.S. Goldberg (Eds.), *Meaning as explanation: Advances in linguistic sign theory* (pp. 245–270). Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110907575.245

Kirsner, R.S. (1993). From meaning to message in two theories: Cognitive and Saussurean views of the Modern Dutch demonstratives. In R.A. Geiger & B. Rudzka-Ostyn (Eds.), *Conceptualizations and mental processing in language* (pp. 81–114). Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110857108.81

Kuroda, S.-Y. (1972). The categorical and the thetic judgment. *Foundations of Language*, 9, 153–185.

Langacker, R.W. (1987). *Foundations of Cognitive Grammar, vol. 1, Theoretical prerequisites*. Stanford: Stanford University Press.

Langacker, R.W. (1988). The nature of grammatical valence. In B. Rudzka-Ostyn (Ed.), *Topics in cognitive linguistics* (pp. 91–125). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/cilt.50.05lan

Langacker, R.W. (1990). *Concept, image, and symbol: The cognitive basis of grammar*. Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110857733

Langacker, R.W. (1997). Constituency, dependency, and conceptual grouping. *Cognitive Linguistics*, 8, 1–32. https://doi.org/10.1515/cogl.1997.8.1.1

Langacker, R.W. (1999). *Grammar and conceptualization*. Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110800524

Langacker, R.W. (2001). Discourse in Cognitive Grammar. *Cognitive Linguistics*, 12, 143–188. https://doi.org/10.1515/cogl.12.2.143

Langacker, R.W. (2002). Deixis and subjectivity. In F. Brisard (Ed.), *Grounding: The epistemic footing of deixis and reference* (pp. 1–28). Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110899801.1

Langacker, R.W. (2005). Dynamicity, fictivity, and scanning: The imaginative basis of logic and linguistic meaning. In D. Pecher & R.A. Zwaan (Eds.), *Grounding cognition: The role of perception and action in memory, language and thinking* (pp. 164–197). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511499968.008

Langacker, R.W. (2008). *Cognitive Grammar: A basic introduction*. New York: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195331967.001.0001

Langacker, R.W. (2009a). *Investigations in Cognitive Grammar*. Berlin and New York: Mouton de Gruyter. https://doi.org/10.1515/9783110214369

Langacker, R.W. (2009b). Metonymic grammar. In K.-U. Panther, L.L. Thornburg, & A. Barcelona (Eds.), *Metonymy and metaphor in grammar* (pp. 45–71). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/hcp.25.04lan

Langacker, R.W. (2012). Elliptic coordination. *Cognitive Linguistics*, 23, 555–599. https://doi.org/10.1515/cog-2012-0017

Langacker, R.W. (2014). Subordination in a dynamic account of grammar. In L. Visapää, J. Kalliokoski, & H. Sorva (Eds.), *Contexts of subordination. Cognitive, typological and discourse perspectives* (pp. 17–72). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/pbns.249.02lan

Langacker, R.W. (2015). How to build an English clause. *Journal of Foreign Language Teaching and Applied Linguistics*, 2(2), 1–45. https://doi.org/10.14706/JFLTAL15121

Langacker, R.W. (2016a). Nominal grounding and English quantifiers. *Cognitive Linguistic Studies*, 3 , 1–31. https://doi.org/10.1075/cogls.3.1.01lan

Langacker, R. W. (2016b). Toward an integrated view of structure, processing, and discourse. In G. Drożdż (Ed.), *Studies in lexicogrammar: Theory and applications* (pp. 23–53). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/hcp.54.02lan

Langacker, R. W. (2017). Entrenchment in Cognitive Grammar. In H.-J. Schmid (Ed.), *Entrenchment and the psychology of language learning: How we reorganize and adapt linguistic knowledge* (pp. 39–56). Berlin: De Gruyter Mouton. https://doi.org/10.1037/15969-003

Li, C. N. (1997). On zero anaphora. In J. Bybee, J. Haiman, & S. A. Thompson (Eds.), *Essays on language function and language type dedicated to T. Givón* (pp. 275–300). Amsterdam and Philadelphia: John Benjamins. https://doi.org/10.1075/z.82.17li

Osborne, T., & Gross, T. (2012). Constructions are catenae: Construction grammar meets dependency grammar. *Cognitive Linguistics*, 23, 165–216. https://doi.org/10.1515/cog-2012-0006

Robinson, J. J. (1970). Dependency structures and transformational rules. *Language*, 46, 259–285. https://doi.org/10.2307/412278

Talmy, L. (1996). The windowing of attention in language. In M. Shibatani & S. Thompson (Eds.), *Grammatical constructions: Their form and meaning* (pp. 235–287). Oxford: Oxford University Press.

van Hoek, K. (1995). Conceptual reference points: A Cognitive Grammar account of pronominal anaphora constraints. *Language*, 71, 310–340. https://doi.org/10.2307/416165

van Hoek, K. (1997a). *Anaphora and conceptual structure.* Chicago and London: University of Chicago Press.

van Hoek, K. (1997b). Backwards anaphora as a constructional category. *Functions of Language*, 4, 47–82.

Zwicky, A. M. (1985). Heads. *Journal of Linguistics*, 21, 1–29. https://doi.org/10.1017/S0022226700010008

Constructions, generalizations, and the unpredictability of language[*]

Thomas Herbst

Friedrich-Alexander-Universität Erlangen-Nürnberg

Attempts at predicting syntactic behavior from semantic or other generalizations are often unsatisfactory. It is argued that the notion of competition as used by Goldberg (2019) can serve as an explanation for unpredictability in language because established formulations that are preferred over others automatically distort the collocational profiles of verbs in argument structure constructions. As a consequence of this, an approach of seeing items as items-in-constructions (and not as elements attracted to them) is argued for. It is then shown how this items-in-constructions view can be applied to designing models of reference constructicons and mental constructicons.

Keywords: construction grammar, ditransitive, generalization, itemrelatedness/item-specificity, pre-emption, unpredictability

> The principle of **naturalness** maintains that language – when properly analyzed – is by and large reasonable and understandable in view of its semiological and interactive functions, as well as its biological, cognitive, and sociocultural grounding. Cognitive and functional linguists find that virtually everything in language is **motivated** in such terms (even if very little is strictly **predictable**).
> Ronald W. Langacker (2008: 14)

1. Usage-based constructionist linguistics

In 2020, we know much more about language than we did fifty years ago. This is due to insights gained through the possibility of analyzing linguistic data at a scale unavailable to, and probably unimaginable for, previous generations of

---

linguists, and to a deeper understanding of processes of learning, memory, and the workings of the brain. At present, the study of language has reached a point where different strands of research – corpus linguistics, first and second language acquisition, foreign language linguistics, diachronic linguistics, cognitive and neurolinguistics, and related disciplines such as psychology and even clinical neurology – find it fruitful to take notice of one another and to co-operate on designing a model of language that can accommodate key insights of the various research paradigms. The view of language that has emerged or is emerging on this basis is usually referred to as usage-based linguistics, cognitive linguistics, or construction grammar. The basic positions of scholars working in this framework, which, it has to be said, is only one of several research paradigms pursued in present-day linguistics, have been stated so often that they need not be repeated here (e.g., Fischer & Stefanowitsch 2006; Hilpert 2008: 11–17; Beckner et al. 2009; also Croft & Cruse 2004; Ungerer & Schmid 2006; Hoffmann & Trousdale 2013: Herbst 2018a; Hilpert 2020).

One central element of the constructionist framework is the notion of schematic construction and this chapter attempts to shed some light on the question of how we can determine which lexical items can occur in the slots of particular constructions. This involves a discussion of the character and the status of generalizations in language, the role of item-specific and item-related knowledge and developing a form of representation of constructions that does justice both to generalized or generalizable types of knowledge and knowledge related to particular lexical items.

2.   A note on the nature of item-specificity and generalization

The wish to generalize seems to be an inherent part of the human character and as such, of the character of linguists. The motive behind this is quite obvious: a statement about the use of the present perfect or about the difference in meaning between the ditransitive and the prepositional *to*-construction is likely to have more impact than an analysis of the uses of one particular verb in the language. Also, of course, generalizations are more efficient than descriptions of single phenomena.

In a way, this reflects the relationship between grammarians or syntacticians on the one hand, and lexicographers on the other. Grammar is concerned with general statements about a language; models of grammar may even attempt to be elegant and/or universal, whereas the analysis of lexis and phraseology is bound to be perceived as rather messy (and by some even as peripheral). As a result,

syntacticians may accuse lexicographers of getting lost in item-specific facts and not seeing the overall general picture and lexicographers may be keen to question generalizations made by grammarians. Up to a point, this kind of controversy could simply be the result of a difference in perspective.

It is important to realize that generalization and item-specificity are not alternatives in an either-the-one-or-the-other sense, but that there is a kind of gradient ranging from the very item-specific on the one hand to absolute generalizations on the other. I would like to suggest a three-fold distinction between:

1.   item-specificity
2.   item-relatedness (partial generalization)
3.   absolute generalization

In a strict sense, item-specificity can be defined in such a way that it refers to a situation in which *a property x is held by exactly one item I_x* and by no other item (which, in mathematical set theory, is expressed by the symbol ∃!). An *absolute generalization* is one which holds for all members of an unambiguously defined class, for instance, saying that the plural form of all Dutch nouns ending in a single vowel (with the exception of *e*) is *'s* or that all nouns in German ending in the suffix *-chen* are neuter.

Item-specificity in the above-defined sense can, of course, be claimed for (depending on whether one allows for synonymy or not: most or all) lexical units of a language in that they are combinations of a particular meaning with a form (consisting of one or several words).[1] Other examples of item-specificity can be found in a number of areas:

1.   the correspondence of spelling and writing, where *do* (including *undo*) is the only case in which *-oes* is pronounced [ʌz] in English,
2.   morphology, where *be* is the only verb in the English language to have distinct forms for past tense singular and plural,
3.   valency, where *prefer* seems to be the only verb in English to occur in the pattern exemplified by (1) – NP V to INF than INF:

(1)   I think the president would prefer to switch than fight on campaign finance reform.   (COCA01S)[2]

---

1. For the term lexical unit, see Cruse (1986: 80).

2. Some examples are taken from COCA – The Corpus of Contemporary American English (Davies 2008), online at <http://corpus.byu.edu/coca/>

The in-between category of *item-relatedness* describes cases in which a property x is shared by a number of items but where these do not form a (clearly recognizable) class. This kind of relation is extremely common in English:

1. orthography → pronunciation:
   th- can correspond to: [Ө] *thin*, [ð] *this*, [t] *Thames*
2. pronunciation → orthography:
   [i:] can be spelled: ea (*sea*), ee (*see*), ey (*key*), ie (*field*)
3. morphology:
   negative prefixes: *un-* in *unable, in-* in *inaccurate, non-* in *non-existent* etc.
4. word formation:
   semantic relation of modifier and head: *children's menu, lunch menu, wine menu*
5. collocation:
   intensification: *severe gales, strong wind, heavy rain* etc.
6. valency / argument structure:
   see below

In each of these cases, a generalization is possible but it only holds for a restricted number of items.

Thus, there are two types of generalization – one which can be described as 'if X, then Y' (absolute generalization) and one which is of the kind 'if X, then possibly Y' (Herbst 2011a: 358). As with many categories, it may be appropriate to speak of a gradient ranging from item-specificity to absolute generalizations (Figure 1). There are several reasons for this. First of all, there may be disagreement amongst analyses as to what forms what I have called a 'clearly recognizable class'. More importantly, within the item-related category, there may well be differences between generalizations in terms of the number of items to which they apply, which may locate them closer to item-specificity or absolute generalizations within that category. Nevertheless, it is important to recognize the difference in character between the two types of generalizations, as will be shown below.
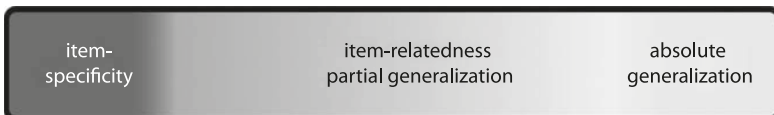
Figure 1. The gradient from item-specificity to absolute generalization

However, even these item-related generalizations can be of great value in the learning of constructions – quite simply once they have been arrived at, they restrict the number of possible options for interpretation. Even if a learner will not

be able to predict whether *th* is pronounced as [Ө], [ð], or [t] in a newly encountered word, they can deduce that it will not be [s], [x], [æ] etc.

3.   Factors determining the occurrence of items in constructions

3.1   The need to make sense

To attribute meaning not only to lexical material (such as words or multi-word units) but also to more abstract constructions is one of the key convictions of constructionist theories. In such a view, restrictions on the occurrence of a lexical construction in a particular syntactic construction should be accountable for in terms of semantic incompatibility or mismatch. And indeed, combining two constructions whose meanings are not compatible with each other is likely to have the following effect.

The utterance is considered by other speakers not to make sense, as in the case of (2a), where a verb expressing a state is used in the intransitive-motion construction, or (2b), in which a stative verb occurs in the imperative-'request/command' construction.

(2)   a. ??Climate change exists to Kyoto.
      b. ??Know the answer.

Speakers will attempt to 'make sense' of the utterance by finding an interpretation for either the lexical or the syntactic construction, or both, that makes the utterance meaningful – behavior that can be related directly to Grice's (1975) cooperative principle. So, today, one of Chomsky's (1957) famous examples, shown in (3), might be considered meaningful as a negative comment about some Green Party (although one would have to stretch one's imagination quite a bit to make sense of them *sleeping furiously*).

(3)   Colorless green ideas sleep furiously.

So, semantic compatibility in the sense that the resulting utterance should be interpretable as meaningful can be seen as a necessary condition for the combination of constructions in normal situations of communication and this as such is not particularly noteworthy. What is much more interesting is that the need to make sense is by no means a sufficient condition for an utterance to be acceptable or idiomatic, as has been shown by the analysis of numerous cases such as (4a–b) and (5a–d).

(4)   a.   Trump has never said to him that it's not part of his agenda.   (COCA16M)
      b.   [??]Trump has never said him that it's not part of his agenda.

(5)   a.   Trump told CNN that he is serious about his presidential run. (COCA15S)
      b.   [??]Trump told to CNN that he is serious about his presidential run.
      c.   … she'd tell everyone the story of this book…   (COCA13F)
      d.   … she told the story to everyone who came her way …   (COCA17F)

3.2   Semantics

There are numerous accounts that show that verbs, adjectives, and nouns that occur in particular syntactic patterns can often be grouped together into one or several semantic classes (e.g., Levin 1993;[3] Francis et al. 1996; and also Herbst 1983). Although Levin (1993: 5) claims that "verbs that fall into classes according to shared behavior would be expected to show shared meaning components", this is by no means always the case. Levin's (1993: 203) group "verbs of transfer of a message" comprises 17 verbs but in her description of the "dative alternation", Levin (1993: 45) lists only 11 of them as alternating verbs, whereas the other 6 are now included under "Primarily Latinate verbs belonging to some of the semantically plausible classes listed above". This proves the point that this semantically defined class does not allow predictions about syntactic behavior.[4]

---

3.   The fact is that Levin (1993) focuses on the description of so-called alternations. From the point of view of a description on the basis of e.g. valency theory, such an approach seems slightly problematic because it ignores all valency patterns which are not part of an alternation – and, as Goldberg (2002) points out, verbs that show one but not both constructions of the alternation. For different approaches towards alternations see Levin & Rappaport Hovav (2005: 196–193).

4.   In the light of corpus evidence, this must be treated with some caution. For instance, in her outline of the so-called dative alternation, the verb *drop* is listed under "Verbs of Putting with a Specified Direction" and this class is included under "Non-Alternating *to* Only" (Levin 1993: 46–47). However, there is corpus evidence for the following uses: *I'll drop her a line* …[COCA14F]; *So the mechanic dropped him a slice of pizza* [COCA92M]; *Their helpless parents flew above them, and maybe dropped them a bit of food* …[COCA14F]. Similarly, one finds corpus examples for some of the "Verbs of Fulfilling" listed by Levin (1993: 47) as not occurring in the ditransitive construction: *The president presented him a copy of a letter* …[COCA15N]; *She called the institute and left him a message.*[COCA15F]; *The eager-to-please staff is always ready to outfit you for snorkeling, issue you a bicycle or fishing gear* …[COCA03N]. It is obvious that for a number of reasons, corpus examples must not necessarily be taken as representing established language use. In other cases, not everybody might agree with the grammatical classification provided: Can appoint-verbs such as *consider* and *elect* be seen as representing "Non-alternating Double Object Only" (Levin 1993: 47), for instance?

Although Levin's (1993) study reveals many interesting features that members in semantically defined groups have in common with respect to the alternations the study is devoted to, one can also find remarkable differences between the verbs with respect to patterns outside these alternations, as, for example, within the small group of *want*-verbs (6 items) in Table 1.

Table 1. Differences in complementation between four *want* verbs of Levin's (1993: 194)

	NP	to_INF	V-ing	that_CL	NP to_INF
desire	+	+	−	+	+
fancy	+	−	+	(+)	−
need	+	+	+	−	+
want	+	+	+	−	+

Furthermore, as Faulhaber (2011) has shown, the fact that a semantically defined class can be established for the items occurring in a pattern does not necessarily mean that no items exist that answer the same semantic description but do not occur in the pattern in question.

Another indication of the fact that semantic classes certainly do not suffice to account for the occurrence of a verb in a syntactic pattern is that Levin's study does not only establish semantic classes of verbs occurring in a particular pattern, but occasionally also provides unlabeled lists of verbs that occur in a pattern but which cannot be subsumed under a semantic label, as in the case of "Non-Alternating Double Object Only":[5]

> accord, ask, bear, begrudge, bode, cost, deny, envy, flash (a glance), forbid, forgive, guarantee, issue (ticket, passport), refuse, save [also listed under "Bill Verbs"; TH], spare, strike (a blow), vouchsafe, wish, write (check)   (Levin 1993: 47)

Similarly, the *COBUILD Grammar Patterns* (Francis et al. 1996) also have a category 'verbs with other meanings'. Furthermore, some of the semantic groups only have one or two members – e.g. the '*help* group' (*help*), the '*imagine* group' (*imagine, picture*), and the '*risk* group' (*chance, risk*).[6]

---

5. It has to be said that some of these verbs (*deny, forbid, guarantee, write*) are listed in the Erlangen Valency Patternbank as occurring in the other pattern of the alternation as well; compare, e.g., *the U.S. military, in control of the international airport, had denied landing permission to relief flights from their countries.*COCA10N; *The statement urged nations of the coalition to continue their concerted action to deny safe haven to terrorists …*COCA03A; *Mr. Chairman, I guarantee that to you, too.* COCA98S; *Obamacare is guaranteeing health insurance to retirees who don't yet qualify for Medicare…* COCA13M.

6. Compare the *blame* alternation ("*blame* only") in Levin (1993: 69).

All in all, none of these studies can be interpreted to mean that (i) if an item has certain semantic characteristics it will automatically also occur in all of the constructions in which other items of the same group occur, or that (ii) all items occurring in a particular construction automatically fall under one or possibly several semantic groups of items.[7]

3.3   Further criteria: phonology and etymology

Two further criteria that have been suggested in the context of the English ditransitive construction also seem to allow partial generalizations only.

Ambridge & Lieven (2011: 260) claim, for instance, that verbs that can occur in the ditransitive construction "must be monosyllabic, or have stress on the first syllable (e.g. *The man suggested the woman the trip*)". However, of the 72 verbs belonging to the ditransitive construction in the Erlangen Valency Patternbank,[8] the great majority is indeed monosyllabic, but of the 13 verbs with more than one syllable, 11 have their stress on the second syllable: *afford, allow, award, concede, design, ensure/insure, forbid, guarantee, permit, prepare* and *refuse* plus four verbs listed by Goldberg (1995: 38): *bequeath, allocate, reserve, deny*. All of these verbs are attested in this construction in COCA, some, however, with very low frequency.[9]

Similarly, it has been argued that Latinate or "Latinate sounding verbs" (Goldberg 2019: 40) disprefer the ditransitive construction but both Levin (1993: 48) and Goldberg (2019) underscore the fact that this is a tendency and not an absolute restriction, i.e. a partial generalization.

3.4   Interim conclusion

In the light of the evidence discussed here and further research pointing in a similar direction, it would be difficult to argue that the question of which items can occur in a particular construction can always be accounted for in terms of absolute generalizations. Quite the contrary, it has been shown that despite existing correspondences between a verb's semantic properties and its syntactic behaviour, these correspondences are not strong enough to predict a verb's syntactic behaviour on the basis of its meaning or phonological or etymological properties

---

7.   Levin (1993: 22) explicitly states that not all of the lists provided for the various subclasses are exhaustive.

8.   72 verbs out of 92 listed under the pattern SUBJ V NP NP.

9.   There are 5 instances of *allocate* in COCA and around 10 for *concede, design*, and *forbid*.

(for English verbs, see especially Faulhaber 2011; Herbst 2009, 2011a; for English adjectives, Herbst 1983; and for Norwegian adjectives, Haugen 2012).

The situation is probably more adequately represented in terms of item-related knowledge as in (2) than in terms of absolute generalizations as in (1) in Figure 2, in which the boxes are meant to represent semantically or otherwise defined classes of items, which in the case of (1) all appear in the construction under analysis, whereas in the case of (2), this holds for only some of the members of the class.
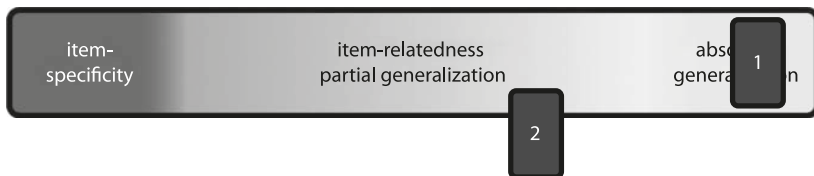
Figure 2. Semantically defined classes of items in constructions with (2) and without item-relatedness (1)

There is one important caveat that has to be added here. For the most part at least, the correspondences discussed above are not correspondences between lexical items and constructions in the construction grammar sense of the word. It is quite possible that we will find a higher degree of correspondence if we divide the formal patterns we have identified into a number of different constructions on the basis of their meaning.[10]

In fact, these findings are very much in line with approaches that argue in favor of low-level constructions (Hampe & Schönefeld 2006) such as the concept of mini-constructions (Boas 2003, 2011), "verb-class-specific and verb-specific constructions" (Croft 2003: 56–62, 2012: 378–383), or valency constructions (Herbst 2014a, 2014b). What they make very clear is that speakers must have knowledge of which lexical items can be used in constructional slots – this all the more so since language learners when possibly forming a generalization about a semantically defined class could not know whether it holds partially or absolutely.

---

10. This is one of the aims of a constructicon project for English pursued at the University of Erlangen-Nürnberg, see Herbst & Uhrig (2019).

4.   Pre-emption

4.1   Competition

Approaching the question of why a lexical construction may not appear with a particular argument structure construction – like *say her that*-clause or *tell to him that*-clause in (4) and (5) – from a slightly different angle, Goldberg (2019: 70) employs the concept of competition and says "what constrains productivity is the existence of an alternative formulation that conveys the intended meaning and is more accessible at the moment of speaking".[11]

The fact that a new expression will not be coined because a form with the same meaning already exists is well-known from word-formation, where it is usually referred to as blocking, and there is no reason at all why this mechanism should not be at work in the area of valency and argument structure as well (Herbst 1983: 318–333). In the usage-based framework, this is usually referred to as pre-emption (Tomasello 2003: 178–192). Goldberg (2019) sees the existence of an alternative form to express the same meaning as a prerequisite for statistical pre-emption to occur.

It is important to note that pre-emption is not something that has to happen, as is shown by the many verbs that occur both in the ditransitive or the prepositional *to*-construction, where it may sometimes be difficult to draw the line between the cases where both constructions express the 'same' meaning and where they do not – see (6a–b) and (7a–b).

(6) a.   … it may be fairest to give the last word to a prominent skeptic.
                                                                                (COCA15M)
     b.   … I'm giving you the last word on this …   (COCA05S)

(7) a.   President Trump is doing the things every day to give confidence to business owners and workers across America that things are getting done positively.   (COCA17S)
     b.   Using genetic information rather than just morphology gives scientists confidence in the diversity of what they're seeing.   (COCA09A)

Again, we can observe a similar phenomenon in word formation: *bravery – braveness, clarity – clearness, creativity – creativeness, expertise – expertness*. Similarly, in the area of morphology, we find such parallel forms in the case of a few English nouns with two fairly established plural forms such as *cacti* and *cactuses* or *indices* and *indexes*, for example.[12]

---

11. For a similar approach in the area of valency in terms of a Valency Realisation Principle, see Herbst (2011a, 2014).

12. Occurrences in COCA570: *cacti* 504, *cactuses* 135, *indexes* 1253, *indices* 1852.

4.2   Negative entrenchment

Another conceivable explanation for the unacceptability of certain forms is the idea of 'negative entrenchment' put forward by Stefanowitsch (2008).[13] Negative entrenchment, referred to as "conservatism via entrenchment" by Goldberg (2019: 77),[14] is based on the following consideration: if L1-learners have encountered an item I so and so many times and encountered a construction C so and so often, they will calculate how often they should have encountered the two together, and, if this is not the case at all, they will conclude that I cannot be used together with C. Stefanowitsch (2008: 520) points out on the basis of ICE-GB data and the Fisher-Yates exact test that:

> … if there were no particular relationship between *say* and the ditransitive construction, we would expect the combination to appear 44.52 times in the corpus… if we reject the hypothesis that there is a chance relationship between *say* and the ditransitive and assume instead that the non-occurrence of this combination is non-accidental, there is a chance of less than one in 5 quintillion that we are wrong.

5.   Items in constructions

5.1   Collostructions

Which items occur in a construction is thus an essential part of its characterization. One of the crucial differences between traditional (structuralist) descriptions in general reference grammars (such as CGEL) or dictionaries, especially valency and collocations dictionaries (such as the *Valency Dictionary of English* or the phenomenal two-volume *Oxford Dictionary of Current Idiomatic English*) and usage-based descriptions is that the latter are based on a cognitive framework and that, as a consequence, precise statements about frequency play a much greater role.

The approach of collostructional analysis developed by Stefanowitsch & Gries (2003; also Gries & Stefanowitsch 2004a, b) can be regarded as groundbreaking in this respect. Based on the overall frequency of an item and that of a construction in the corpus, collostructional analysis determines which items are 'attracted' to (more frequent than expected) or 'repelled' by a construction (less

---

13.   See also Stefanowitsch (2006).

14.   For a critical discussion of the concept of negative entrenchment, see Goldberg (2019: 123). See also Perek & Goldberg (2015).

frequent than expected). The top collexemes of the English ditransitive construction are given by Stefanowitsch & Gries (2003) as in Table 2.

Table 2. Collexemes of the English ditransitive construction (Stefanowitsch & Gries 2003:229) (based on ICE-GB)

Collexeme	Collostruction strength	Collexeme	Collostruction strength
give (461)	0	*allocate* (4)	2.91E-06
tell (128)	1.6E-127	*wish* (9)	3.11E-06
send (64)	7.26E-68	*accord* (3)	8.15E-06
offer (43)	3.31E-49	*pay* (13)	2.34E-05
show (49)	2.23E-33	*hand* (5)	3.01E-05
cost (20)	1.12E-22	*guarantee* (4)	4.72E-05
teach (15)	4.32E-16	*buy* (9)	6.35E-05
award (7)	1.36E-11	*assign* (3)	2.61E-04
allow (18)	1.12E-10	*charge* (4)	3.02E-04
lend (7)	2.85E-09	*cause* (8)	5.56E-04
deny (8)	4.5E-09	*ask* (12)	6.28E-04
owe (6)	2.67E-08	*afford* (4)	1.08E-03
promise (7)	3.23E-08	*cook* (3)	3.34E-03
earn (7)	2.13E-07	*spare* (2)	3.5E-03
grant (5)	1.33E-06	*drop* (3)	2.16E-02

Since the beginnings of collostructional analysis, a large number of studies have been carried out to investigate the interrelationship of items and constructions, some based on the Fisher-Yates exact test also employed in the original studies (Stefanowitsch & Gries 2003; Gries & Stefanowitsch 2004a, b) and others making use of other association measures.[15]

A different way of studying the relationship between items and constructions is based on raw frequency data – an approach developed by Schmid (2000) and employed by Herbst (2018b).[16] This has the advantage of providing two different kinds of measures, which are called attraction and reliance by Schmid (2000) and IT∈CX1 and IT∋CX2 (Herbst 2018b). The label IT∈CX stands for "items in construction" and is to underscore the view that the items are seen as an integral part of the construction (IT∋CX symbolizes the complementary perspective):[17]

IT∈CX1: the proportion of a particular item as opposed to other items occurring in the same slot of the construction: $ITE_aCX_A : ITE_{a-z}CX_A$,

IT∋CX2: the proportion of uses of a particular item in a construction as opposed to its use in other constructions: $ITE_aCX_A : ITE_aCX_{A-Z}$.

IT∈CX1 (attraction) thus gives an indication of *how important the items are for the construction*, whereas IT∋CX2 (reliance) indicates *how important the construction is for the item*. This approach thus looks at the phenomenon of the item/construction relationship from a different angle and is intended to provide an additional perspective.

Another directional measure, ΔP, was introduced into linguistic analysis by Ellis (2006: 11), who describes it as follows:

> ΔP is the probability of the outcome given the cue P(O|C) minus the probability of the outcome in the absence of the cue P(O|–C). When these are the same, when the outcome is just as likely when the cue is present as when it is not, there is no covariation between the two events and $\Delta P = 0$. ΔP approaches 1.0 as the presence of the cue increases the likelihood of the outcome and approaches – 1.0 as the cue decreases the chance of the outcome – a negative association.

Since ΔP seems to be particularly suitable for the analysis of cognitive issues including language learning (Ellis 2006; Ellis & Ferreira-Jr. 2009) or hesitation phenomena (Schneider 2018), it will be included in the analyses in the next sections.[18] However, ΔP and raw frequency analyses within an attraction/reliance approach differ in one important respect, namely, that ΔP, like collostructional analysis in its original form, forces one to make assumptions about the total number of constructions in a corpus, which is difficult to determine. That the raw frequency approach does not need to make any assumptions of this kind may be a point in its favor, which is why the results for both approaches will be provided in the analyses of the ditransitive construction and two impersonal adjective constructions that follow.[19]

---

grammatical patterns attract certain nouns and the nouns in turn depend to a variable extent on one or more patterns for their occurrence".

18. Compare also Gries (2013: 153): "Again, it might be useful to shift the focus onto directional measures, in particular directional measures that relate a mere transitional probability a/a+b to its counterpart c/c+d". Compare also Gries's (2015: 523) plea for using directional ΔP-values "in addition to whichever AM a user chose". Compare also Gries (2012).

19. Cf. Schneider's study (2018: 222) investigating collocation and hesitation: "In conclusion, I propose that future studies rely on several measures, both bi- and unidirectional, as a predictor's performance depends hugely on the POS it is applied to".

5.2   Items in the ditransitive construction

The following analysis is an attempt to provide a rough indication of the ITECX-values for the verbs occurring in the English ditransitive construction. It is based on the BNC[20] and makes use of the dependency-based treebank.info-tool developed by Proisl & Uhrig (2012).[21] It is obvious that in the light of the great number of automatic parsing problems (*She gave him a book* versus *She saw him this Monday*) and the theoretical problems outlined above, these figures and some of those given below must be treated with caution. Nevertheless, these approximations should be reliable enough to illustrate the scope of the different degrees of affinity between items and the ditransitive construction, as illustrated in Table 3.[22]

This analysis shows:

1.   More than 50% of all uses of the ditransitive construction in the BNC-sample analyzed contain the verb *give*, 75% are made up of a total of 7 verbs.
2.   Of the 130 verbs found in the ditransitive construction in the BNC-sample, 114 (87%) show an IT∈CX1 below 1.000%.[23]

---

20.   The British National Corpus. Distributed by Oxford University Computing Services on behalf of the BNC Consortium. http://www.natcorp.ox.ac.uk/.

21.   All non-verb results given for the ditransitive construction were discarded; all verb results were checked manually. This yielded more than 77,000 hits for the ditransitive construction (search: verb lemma, + indirect object, + direct object, – prepositional object). For all the verbs with less than 250 hits for the ditransitive construction, all corpus lines were looked at; for verbs with more than 250 treebank hits, a random sample of 200 was analyzed, in the case of the verb *give*, a random sample of 400. This resulted in a figure of 53,766 observed instances of the ditransitive construction with 97 verbs. In addition, verbs that are listed as ditransitive in the Erlangen Valency Patternbank, in *Grammar Patterns* (Francis et al. 1996), Goldberg (1995), and Mukherjee's (2005: 82) analysis of ICE-GB were searched for in the BNC, i.e. the verbs included in the *subject verb noun noun* patterns in the Patternbank and the Grammar Patterns and the "the basic form of ditransitive complementation" by Mukherjee (2005). Additionally, a verb lemma search "{verb/V} (him|her|you|me|us|them) (a|the|this)" produced further instances of verbs in the ditransitive construction (which for some reason or other had not been captured by the treebank.info-search). All of the verbs on the resulting list were then analyzed manually on the basis of all hits for the respective verb lemma in the BNC or samples between 1000 and 2000 hits (using the thinning function of CQP-web). On this basis, it will be assumed that the BNC contains a minimum of 70,000 instances of the ditransitive construction (not counting passives and *wh*-questions).

22.   For an account in terms of a family of ditransitive constructions, see Croft (2012).

23.   It must be understood that the sample of sentences analyzed from the BNC did not provide instances of ditransitive uses for all the 158 verbs investigated on the basis of the lists provided in the literature. For instance, the sample of 2000 sentences for *call* analyzed did not contain a single ditransitive use although such uses undoubtedly occur. In other cases, such uses were

3. 8 verbs (*give, tell, offer, send, teach, hand, owe,* and *lend*) rank among the top 20 in either score.
4. There is an overall correlation between IT∈CX1 and IT∍CX2-values of $r = 0{,}52$ and of IT∈CX1 and IT∍CX2 rankings of $r = 0{,}58$.

The most extraordinary fact about the English ditransitive construction that both Goldberg (2006) and Stefanowitsch & Gries (2003) have drawn attention to, namely its close association with the verb *give,* is also confirmed by this analysis. *Give* ranks first both in collostructional analysis and with respect to IT∈CX1 and with respect to IT∍CX2 comes second after *begrudge* (which, however, is rather rare).[24] However, a more detailed analysis of a sample of 400 BNC lines suggests that if one includes the passive, the IT∍CX2 value for *give* reaches 42.25%, to be followed by monotransitive uses (IT∍CX2 27.25%), and the trivalent construction with the preposition *to* (IT∍CX2 14.00%). In any case, these results provide further evidence for the close association of the verb *give* and the ditransitive construction.

Table 3. Top 30 items in the ditransitive construction according to IT∈CX1 values (attraction) and IT∍CX2 values (reliance)

IT∈CX1: top 30 of 158 ditransitive verbs in BNC				IT∍CX2: top 30 of 158 ditransitive verbs in BNC			
IT∈CX1 rank	lemma	IT∈CX1 value	IT∍CX2 rank	IT∍CX2 rank	lemma	IT∍CX2 value	IT∈CX1 rank
1	give	56.201%	2	1	begrudge	37.1%	72
2	tell	6.112%	18	2	give	31.3%	1
3	offer	3.892%	9	3	lend	17.7%	20
4	cost	2.350%	4	4	cost	16.6%	4
5	show	2.218%	34	5	owe	14.2%	17
6	bring	2.120%	27	6	hand	13.9%	16
7	send	2.067%	16	7	loan	11.6%	74
8	get	1.824%	68	8	envy	10.5%	57
9	do	1.532%	102	9	offer	9.5%	3
10	take	1.361%	74	10	pour	9.4%	25
11	buy	1.316%	25	11	net	8.8%	69
12	pay	1.279%	39	12	teach	8.4%	13

restricted to very special collocations such as *keep me a seat.* Thus, the list of 130 verbs taken as the basis of this investigation is certainly not complete.

24. 0.71 instances per million in BNC of *begrudge* as opposed to 1283.58 for *give*.

Table 3. *(continued)*

IT∈CX1: top 30 of 158 ditransitive verbs in BNC				IT∋CX2: top 30 of 158 ditransitive verbs in BNC			
IT∈CX1 rank	lemma	IT∈CX1 value	IT∋CX2 rank	IT∋CX2 rank	lemma	IT∋CX2 value	IT∈CX1 rank
13	teach	1.222%	12	13	spare	8.0%	39
14	allow	1.182%	36	14	fine	6.3%	48
15	ask	1.153%	46	15	grant	6.2%	22
16	hand	1.009%	6	16	send	6.0%	7
17	owe	0.893%	5	18	earn	6.0%	26
18	make	0.749%	100	17	tell	5.9%	2
19	wish	0.746%	30	19	bid	5.8%	45
20	lend	0.721%	3	20	accord	5.6%	56
21	cause	0.693%	40	21	award	5.4%	32
22	grant	0.594%	15	22	bequeath	4.6%	95
23	save	0.586%	28	23	mail	3.9%	98
24	find	0.545%	86	24	fetch	3.6%	51
25	pour	0.464%	10	25	buy	3.6%	11
26	earn	0.452%	17	26	guarantee	3.6%	40
27	leave	0.440%	76	27	bring	3.5%	6
28	build	0.388%	49	28	save	3.5%	23
29	sell	0.300%	54	29	wangle	3.4%	128
30	shoot	0.254%	41	30	wish	3.2%	19

5.3 Two adjective constructions

5.3.1 *The IT IS POSSIBLE TO DO construction*

The predominance of one particular item in a construction is not limited to the ditransitive, Ellis & Ferreira-Jr. (2009) draw attention to the role of *put* for the caused-motion construction in this context. In the NICE-OF-YOU construction – see (8a–b) and Figure 4, for instance, *nice* and *good* take a relatively similar share of the construction with IT∈CX1-values of 18% and 13%, respectively (Goldberg & Herbst, 2021):

(8) a. I was going to say it's nice of you to hold the umbrella until you stole it.
(COCA17S)

b. Nice of you to show up. (COCA17S)

The situation is similar for the related construction without PP(of), as in (9a–b):

The NICE-OF-YOU construction				
Evaluation of an ACTION carried out by an AGENT				
		Evaluation	AGENT	
	V	AdjP	PP(of)	
	BE would might	nice good stupid wrong sweet typical silly clever foolish thoughtful rude generous fair gracious presumptuous brave unfair wise selfish irresponsible smart characteristic great noble cruel naïve hypocritical thoughtless wonderful etc.		

Figure 3. Representation of the NICE-OF-YOU construction

(9) a. … the average reporter doesn't think it is possible to be unfair to Donald Trump …   (COCA16S)

   b. It's not easy to put this sort of thing in proper perspective.

(BNC GWB 698)

A BNC-based analysis of this construction, which I will refer to as the POSSIBLE TO DO construction,[25] produces the results given in Table 4.[26]

Table 4. The POSSIBLE TO DO construction: raw frequency values (IT∈CX1 IT∍CX2) and ΔP[27]

	n	Rank	IT∈CX1	Rank	IT∍CX2	Rank	ΔP forwd	Rank	ΔP backwd
possible	394	1	14.93%	10	1.17%	10	0.012	1	0.1465
difficult	299	2	11.33%	8	1.38%	8	0.014	2	0.1115
important	250	3	9.47%	22	0.65%	22	0.006	3	0.0915
easy	197	4	7.46%	13	1.02%	13	0.010	4	0.0730
necessary	190	5	7.20%	12	1.06%	12	0.010	5	0.0705
hard	148	6	5.61%	17	0.86%	17	0.008	6	0.0546
impossible	134	7	5.08%	6	1.97%	6	0.019	7	0.0502

25. *Possible* is the most frequent item in the construction.

26. A BNC query "it {be/V} * {*/A} to (_VVI|_VBI|_VDI|_VHI)" produced 31 533 hits, which were thinned to 3000. After eliminating cases such as … *it is both easy to read and hard to put down*[BNC A67 1344] and *I suppose it's too late to alter that now*[BNC AN8 1826], a total of 2 659 hits were analyzed. The table shows the results for a threshold level of 4.

27. The ΔP values were calculated against the number of 11 818 914 (all adjectives in the BNC), which is not totally unproblematic since the BNC list of adjectives includes words such as *this* and *that*.

Table 4. *(continued)*

	n	Rank	IT∈CX₁	Rank	IT∋CX₂	Rank	ΔP forwd	Rank	ΔP backwd
good	124	8	4.70%	58	0.10%	58	0.001	8	0.0364
interesting	55	9	2.08%	26	0.58%	26	0.006	9	0.0200
essential	41	10	1.55%	29	0.48%	29	0.005	10	0.0148
wrong	30	11	1.14%	43	0.21%	43	0.002	11	0.0102
reasonable	28	12	1.06%	30	0.46%	30	0.004	12	0.0101
fair	28	13	1.06%	34	0.33%	34	0.003	13	0.0099
nice	27	14	1.02%	44	0.21%	44	0.002	14	0.0091
useful	26	15	0.99%	40	0.26%	40	0.002	15	0.0090
safe	22	16	0.83%	36	0.29%	36	0.003	16	0.0077
tempting	19	17	0.72%	3	3.07%	3	0.030	17	0.0071
wise	19	18	0.72%	18	0.82%	18	0.008	18	0.0070
true	18	19	0.68%	57	0.10%	57	0.001	20	0.0053
agreeable	17	20	0.64%	2	4.33%	2	0.043	19	0.0064
great	17	21	0.64%	70	0.03%	70	0.000	67	0.0011
appropriate	15	22	0.57%	52	0.13%	52	0.001	23	0.0047
sufficient	14	23	0.53%	41	0.24%	41	0.002	21	0.0048
right	14	24	0.53%	68	0.04%	68	0.000	38	0.0024
convenient	13	25	0.49%	21	0.66%	21	0.006	22	0.0048
helpful	13	26	0.49%	31	0.42%	31	0.004	24	0.0047
usual	13	27	0.49%	47	0.18%	47	0.002	25	0.0043
natural	11	28	0.42%	63	0.08%	63	0.001	31	0.0030
desirable	10	29	0.38%	28	0.48%	28	0.005	26	0.0036
sensible	10	30	0.38%	33	0.37%	33	0.004	27	0.0036
surprising	10	31	0.38%	37	0.29%	37	0.003	28	0.0035
vital	10	32	0.38%	46	0.20%	46	0.002	29	0.0034
instructive	8	33	0.30%	4	2.70%	4	0.027	30	0.0030
preferable	8	34	0.30%	11	1.14%	11	0.011	32	0.0030
misleading	8	35	0.30%	23	0.64%	23	0.006	33	0.0029
as well	8	36	0.30%	45	0.20%	45	0.002	34	0.0027
rare	8	37	0.30%	48	0.16%	48	0.001	36	0.0026
common	8	38	0.30%	67	0.04%	67	0.000	58	0.0014
permissible	7	39	0.27%	5	2.03%	5	0.020	35	0.0026
customary	7	40	0.27%	15	0.88%	15	0.009	37	0.0026
lovely	7	41	0.27%	54	0.11%	54	0.001	41	0.0021
unusual	6	42	0.23%	50	0.15%	50	0.001	42	0.0019
unwise	6	43	0.23%	7	1.50%	7	0.015	39	0.0022
plausible	6	44	0.23%	20	0.76%	20	0.007	40	0.0022
cheap	6	45	0.23%	60	0.09%	60	0.001	51	0.0017
normal	6	46	0.23%	66	0.05%	66	0.000	63	0.0012
dangerous	5	47	0.19%	62	0.09%	62	0.001	59	0.0014

Table 4. *(continued)*

	n	Rank	IT∈CX₁	Rank	IT∋CX₂	Rank	ΔP forwd	Rank	ΔP backwd
entertaining	5	48	0.19%	25	0.60%	25	0.006	48	0.0018
exciting	5	49	0.19%	49	0.15%	49	0.001	53	0.0016
feasible	5	50	0.19%	24	0.61%	24	0.006	47	0.0018
fine	5	51	0.19%	69	0.03%	69	0.000	70	0.0007
fun	5	52	0.19%	35	0.30%	35	0.003	50	0.0018
heartening	5	53	0.19%	1	4.55%	1	0.045	43	0.0019
logical	5	54	0.19%	42	0.22%	42	0.002	52	0.0017
odd	5	55	0.19%	53	0.12%	53	0.001	54	0.0015
pointless	5	56	0.19%	14	0.94%	14	0.009	44	0.0018
uncommon	5	57	0.19%	19	0.76%	19	0.007	46	0.0018
unrealistic	5	58	0.19%	16	0.87%	16	0.008	45	0.0018
useless	5	59	0.19%	32	0.40%	32	0.004	49	0.0018
wonderful	5	60	0.19%	55	0.11%	55	0.001	55	0.0015
correct	4	61	0.15%	64	0.07%	64	0.000	68	0.0010
crucial	4	62	0.15%	59	0.09%	59	0.001	65	0.0011
funny	4	63	0.15%	61	0.09%	61	0.001	66	0.0011
imperative	4	64	0.15%	9	1.23%	9	0.012	56	0.0015
legitimate	4	65	0.15%	39	0.27%	39	0.002	61	0.0014
okay	4	66	0.15%	51	0.14%	51	0.001	62	0.0013
premature	4	67	0.15%	27	0.50%	27	0.005	57	0.0014
relevant	4	68	0.15%	65	0.05%	65	0.000	69	0.0008
simple	4	69	0.15%	71	0.03%	71	0.000	71	0.0002
valuable	4	70	0.15%	56	0.10%	56	0.001	64	0.0012
worthwhile	4	71	0.15%	38	0.28%	38	0.003	60	0.0014

It is interesting to observe that in the case of the POSSIBLE TO DO construction, strong correlations between the ranks for IT∈CX₁ and backward ΔP ($r = 0.91$) and those of IT∋CX₂ and ΔP ($r = 1.0$) can be observed.

5.3.2 *The CLEAR THAT construction*

Very similar points can be made with respect to another adjective construction, as in (10a–c).

(10) a.   … it is clear that climate change raises the probability of occurrence of negative events in other countries …   (COCA06A)

   b.   It's true that Trump wasn't the choice of most American voters.
                                        (COCA17N)

   c.   It's nice that she keeps in touch.   (COCA16F)

As shown in Table 5, again, there is not one adjective that would take the lion's share of all the occurrences of the construction and, again, we find a strong correlation between the ranks for IT∈CX1 and backward ΔP ($r=0.99$) and those of IT∋CX2 and ΔP ($r=1.0$).[28]

Table 5. The CLEAR THAT construction: Raw frequency values (IT∈CX1 IT∋CX2) and ΔP

	n	rank	IT∈CX1	rank	IT∋CX2	rank	ΔP forwd	rank	ΔP backwd
clear	1806	1	16.44%	11	7.74%	11	0.077	1	0.677
true	883	4	8.04%	16	4.97%	16	0.050	2	0.331
possible	880	5	8.01%	25	2.62%	25	0.026	3	0.328
important	864	6	7.86%	26	2.23%	26	0.022	4	0.322
likely	846	7	7.70%	21	3.76%	21	0.037	5	0.316
unlikely	555	8	5.05%	9	9.99%	9	0.100	6	0.208
obvious	473	9	4.31%	15	5.71%	15	0.057	7	0.177
essential	423	10	3.85%	17	4.90%	17	0.049	8	0.158
evident	260	11	2.37%	8	10.15%	8	0.101	11	0.098
vital	229	12	2.08%	18	4.55%	18	0.045	12	0.086
probable	223	13	2.03%	5	18.87%	5	0.188	13	0.084
interesting	191	14	1.74%	28	2.03%	28	0.020	14	0.071
significant	187	15	1.70%	30	1.56%	30	0.015	15	0.069
apparent	183	16	1.67%	22	3.51%	22	0.035	16	0.068
inevitable	181	17	1.65%	13	6.70%	13	0.067	17	0.068
ironic	101	19	0.92%	7	14.39%	7	0.144	18	0.038
arguable	99	20	0.90%	1	46.48%	1	0.465	19	0.037
unfortunate	98	21	0.89%	14	6.32%	14	0.063	20	0.037
plain	86	22	0.78%	24	3.04%	24	0.030	21	0.032
imperative	83	23	0.76%	3	25.54%	3	0.255	22	0.031
good	108	18	0.98%	41	0.09%	41	0.001	23	0.030
certain	81	24	0.74%	39	0.37%	39	0.004	24	0.029
noteworthy	75	25	0.68%	2	27.99%	2	0.280	25	0.028
surprising	75	26	0.68%	27	2.18%	27	0.022	26	0.028
notable	70	27	0.64%	19	4.46%	19	0.044	27	0.026
noticeable	69	28	0.63%	10	8.35%	10	0.083	28	0.026
natural	64	29	0.58%	38	0.46%	38	0.004	29	0.023
understandable	58	30	0.53%	12	7.00%	12	0.070	30	0.022
inconceivable	56	33	0.51%	4	21.96%	4	0.219	31	0.021

28.   BNC query: it {be/V} {*/A} that. Note that this only covers present and past tense uses and does not include sentences with premodified adjectives. The 11 260 hits were filtered manually to exclude non-impersonal *it*s etc.

Table 5. *(continued)*

	n	rank	IT∈CX₁	rank	IT∋CX₂	rank	ΔP forwd	rank	ΔP backwd
conceivable	56	32	0.51%	6	15.01%	6	0.150	32	0.021
appropriate	56	31	0.51%	37	0.50%	37	0.005	33	0.020
crucial	53	34	0.48%	34	1.20%	34	0.012	34	0.020
necessary	51	35	0.46%	40	0.29%	40	0.003	35	0.018
strange	48	36	0.44%	36	0.75%	36	0.007	36	0.018
remarkable	47	37	0.43%	32	1.36%	32	0.013	37	0.017
doubtful	46	38	0.42%	20	3.80%	20	0.038	38	0.017
sad	45	39	0.41%	33	1.30%	33	0.013	39	0.017
fortunate	42	40	0.38%	23	3.33%	23	0.033	40	0.016
desirable	40	41	0.36%	29	1.93%	29	0.019	41	0.015

5.3.3   *The POSSIBLE TO DO construction and the CLEAR THAT construction: semantics*

Semantically, the POSSIBLE TO DO construction and the CLEAR THAT construction share certain elements of meaning:

1. Like other impersonal adjective constructions (Goldberg & Herbst, 2021), the two constructions express evaluations by the speaker or evaluations ascribed by the speaker to a referent identifiable from the context, as in (11a–c):

(11) a.   The timber industry said it was necessary to reduce fires and improve forest health...   (COCA96N)
  b.   It shouldn't be surprising that climate change will produce some winners.
                                                                              (COCA97M)
  c.   It was strange, some participants said, to debate lynch mobs and helicopter gunship attacks beside a golf course near a pristine beach where Italian tourists were engaged in Slimnastics.   (COCA00N)

2. The evaluation expressed can be a quality judgment with respect to a state or an action, as in (12a–b):

(12) a.   It is nice to be back.   (COCA17S)
  b.   But it is nice that somebody pointed it out.   (COCA15S)

The fact that only the CLEAR THAT construction allows the realization of the subject argument of the verb of the subordinate clause explains important differences with respect to what it is that can be evaluated. This means that CLEAR THAT can be used to evaluate any kind of state, process, or action, whereas POSSIBLE TO DO is restricted to actions carried out by humans (or states humans are in). Thus sen-

tences such as (13a) or (13b) quite obviously cannot be used to refer to a lighthouse or the Eiffel Tower, but only to people:

(13) a.   It is nice to be by the sea.
      b.   It is great to be in Paris.

3.   At the same time, the POSSIBLE TO DO construction allows for an interpretation in a kind of 'general truth' sense, which is not true in the same way of CLEAR THAT. A sentence such as (13a) can either be said with reference to somebody who actually is at the sea at the time referred to or to express a general opinion about what it is like to be at the sea.

4.   The evaluation expressed by the POSSIBLE TO DO construction can be an assessment of difficulty or feasibility (only POSSIBLE TO DO cxn), see (14):

(14)   You know, it is easy to respect the system when it gives you the right results.
                                                                    (COCA17S)

5.   The evaluation expressed in the CLEAR THAT construction can be an assessment of the probability of something, as in (15):

(15)   It is highly likely that interglacial sea levels are represented by marine terraces or raised beaches, but the levels associated with each interglacial are to some extent in dispute.   (BNC-GV0-1101)

6.   The evaluation expressed in the CLEAR THAT construction can be an assessment of the degree of certainty with which a statement can be made, as in (16):

(16)   Whatever the actual manifestation, it is clear that climate change raises the probability of occurrence of negative events in other countries...   (COCA06A)

We can thus state that the two constructions have different meanings, that both allow for a certain amount of polysemy, and that there is some degree of overlap between them. Note how lexical meaning and constructional meaning can interact in these two constructions, where (17a) is to be interpreted in terms of the existence of a possibility (in the sense of an ability), whereas (17b) is a prediction of what may happen in the future (in the sense of modality).

(17) a.   In less than a week, it is possible to test the DNA of infants suspected of having such intestinal insufficiency to detect a possible mutation of the Hoxd3 gene.   (COCA17M)
      b.   ... it is possible that the interest rate will be reset at a certain point during the lifetime.   (COCA17A)

Figure 4 is a very rough attempt at representing these semantic relations graphically. What it shows quite clearly is that this is a case that would lend itself to an analysis in terms of a family of constructions (Croft 2012).
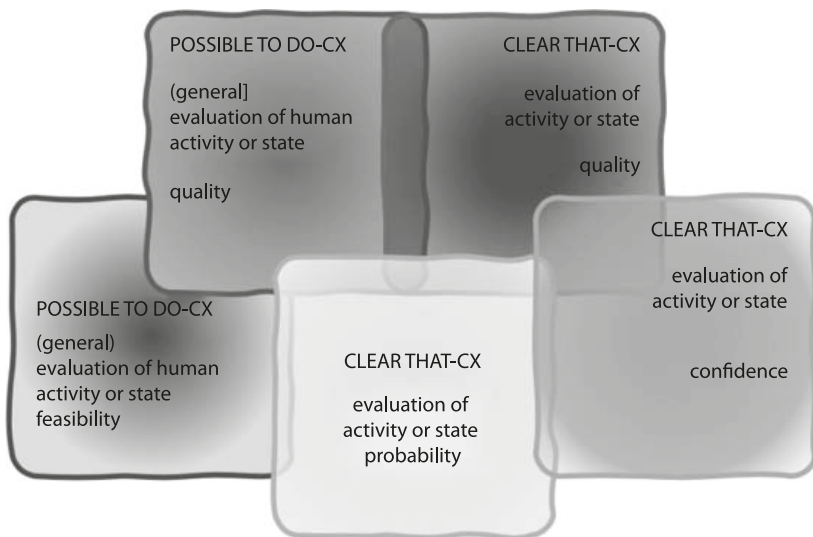
Figure 4. Meanings of the POSSIBLE TO DO and CLEAR THAT constructions

5.3.4 *Unpredictability*

The overlap in meaning between the two constructions accounts for the fact that most of the adjectives occurring in one of them are attested in the other as well. Furthermore, in the light of the semantic description provided above, it is also not surprising that some do not – there is not a single hit for [it BE probable to _v*] or [it * BE probable to _v*] in COCA. However, there are hardly any cases where the occurrence of an adjective in only one of the two constructions cannot be seen as being grounded in meaning differences between the two constructions.[29] COCA570 contains 40 hits for *unusual* in the CLEAR THAT construction but, interestingly, only 2 for *usual*, which are both negated (*not unusual*).

Nevertheless, the data provided in Tables 4 and 5 show that some adjectives show – to varying degrees – certain preferences, as summarized in Table 6.

---

29. Possible exceptions: COCA has 5 occurrences of *wise* but none for the considerably less frequent *unwise* and 2 for *worthwhile*. Given the low frequency of the adjectives in these constructions, it would seem wrong to draw any far-reaching conclusions from this.

Table 6. IT∋CX2 (reliance) values for selected adjectives on the basis of Tables 4 and 5

	Difficult to do cx	Clear that cx
appropriate	0.13%	0.50%
crucial	0.09%	1.20%
desirable	0.48%	1.93%
essential	0.48%	4.90%
good	0.10%	0.09%
imperative	1.23%	25.54%
important	0.65%	2.23%
interesting	0.58%	2.03%
natural	0.08%	0.46%
necessary	1.06%	0.29%
possible	1.17%	2.62%
surprising	0.29%	2.18%
true	0.10%	4.97%
vital	0.20%	4.55%

It is worth noting that some adjectives only (or almost exclusively) occur in the DIFFICULT TO DO construction when followed by a verb of perception or communication with a *that*-clause, which then forms the focus of the evaluation expressed, as in (18a–b):

(18) a. It is astonishing to see the enormous variety between the mares and the uniformity of the mule foals.   (BNC-B76-619)
      b. And it is true to say that, provided you do not suffer from any particular allergy or illness, a certain amount of food commonly considered to be 'bad' for you won't do you any harm at all.   (BNC-AYK-34)

What these case studies have shown is that constructions are determined in varying degrees by the items occurring in them. The following sections will explore how the relations between items and constructions can be applied in reference to constructions (section 6) and models of mental constructicons (section 7).

6.   Constructicographic applications

6.1   Constructicons

It is obvious that the ongoing research into the nature of constructional knowledge and into particular constructions in different languages contains far-reaching potential for foreign language teaching and other applied disciplines. It is thus not surprising that the field of applied construction grammar is developing into an important strand of research on foreign language teaching (De Knop & Gilquin 2017; De Knop, this volume). A parallel development is taking place in lexicography, where the idea of constructicography is being pursued by a number of cognitive linguists from all over the world. Many of these projects are linked to FrameNet (Boas et al. 2019): thus constructicons are being developed for a number of languages such as English (Lee-Goldman & Petruck 2018), German (Boas & Ziem 2018), Japanese (Ohara 2018), Brazilian Portuguese (Torrent et al. 2018), and Swedish (Lyngfelt et al. 2018), which in a way can be seen as a recent development within the FrameNet project. In addition, there are projects that are less directly linked to FrameNet such as a constructicon for Russian (Janda et al. 2018) and the Birmingham constructicon project for English (Patten & Perek 2019, 2022). Furthermore, there are constructicon projects that have no relation to FrameNet but which have arisen from the tradition of German valency lexicography. One such project is being pursued for German at the Institut für Deutsche Sprache in Mannheim (Zeschel & Proost, 2019) and there are first beginnings for a constructicon for foreign learners of English at Erlangen (Herbst 2017, 2018, forthc.).

In my view, to deserve the name, a constructicon must be designed as an all-inclusive electronic reference tool that comprises information about all types of constructions, ranging from lexical items to very abstract grammatical constructions. Only in this way can a constructicon put one of the central insights of cognitive linguistics into descriptive practice – namely that there is no strict dividing line between lexis and grammar.

6.2   Representing constructions in a constructicon

Since, as we have seen, analyzing constructions can involve making generalizations, which will often be partial generalizations, as well as describing which items occur in them, it would seem appropriate to represent both types of information in a constructicon entry. On the basis of the data presented in section 5.1, an entry for the ditransitive construction could take the form shown in Figure 5.

The ditransitive construction				
AGENT makes BENEFICIARY receive ÆFFECTED				
AGENT			BENEFICIARY	ÆFFECTED
A1= NP			A2= NP	A3= NP

GIVE

TELL

BRING COST OFFER SEND SHOW
ALLOW ASK BUY CAUSE COST DO
FIND GET GRANT HAND OWE LEND
MAKE PAY SAVE TAKE WISH
AFFORD AWARD BID BUILD DENY EARN FEED
FINE GAIN GUARANTEE LEAD LEAVE LOSE PASS
POUR PROMISE REFUSE SELL SERVE SET
SHOOT SPARE THROW WRITE
etc.

Type face indicates frequency (BNC).

*I can give you a hint.*_{COCA75}-**Can I give you a hug?**_{COCA17S}
*She told me a lot about their relationship.*_{...COCA17S}
*On Air Force One, the president told us a story he has never told before on television.*_{...COCA02S}
*…spare me the details if that's possible.*_{COCA14F}

Figure 5. Model of a constructicon entry for the ditransitive construction (compare Goldberg & Herbst 2021)

6.3   Indication of frequency

A comprehensive reference constructicon, which, it has to be said, at present only exists as a concept in the minds of a few constructicographers, will have to provide links from such entries for argument structure constructions to entries for the items that occur in them. In this respect, the advantages of bi-directional association measures come to bear because, quite obviously, the IT∋CX2 (reliance) or the corresponding forward ΔP-measures can be taken as the basis for designing lexical entries to indicate which constructions the lexical construction (in the sense of a lexical unit) occurs most frequently.[30] In the entry shown in Figure 5, the verbs are listed alphabetically within the frequency ranges indicated. It is perfectly clear that details of design (including determining the way that frequency will be indicated) will have to be adjusted to the intended user group.

Irrespective of how one assesses the effects of frequency with respect to the learning and storage of a construction and the role of generalizations and items,

---

30. For the advantages of directional measures to lexicography, see also Gries (2013: 152), who, however, refers to problems of lemmatization of multi-word units. The advantages of directional measures apply also to the treatment of collocations in dictionaries, which Hausmann has always characterized as an asymmetrical relation by insisting on the distinction between base and collocate, see e.g. Hausmann (1985).

collo-profiles will provide the user with a range of examples, which fulfills two purposes:

–   Collo-profiles indicate whether there is a 'path breaking' item (Goldberg 2006) for a particular construction, or whether there is no one single item that would characterize the construction.
–   By displaying a large number of items that occur in the construction, learners are provided with the lexicographical equivalent of skewed input, which also facilitates learning (Goldberg et al. 2004; Goldberg 2006; Madlener 2016).[31]

7.   The representation of constructions in the brain

7.1   The mental constructicon

It is perfectly clear that, for a variety of obvious reasons, a reference constructicon will never be or even attempt to be a mirror image of 'the' – or 'a' – mental constructicon, just as no one would regard a dictionary as a model of a particular person's mental lexicon.

When discussing the nature of a mental constructicon, it is important to be aware of the fact that while frequency is bound to be a very important factor, there is a large variety of other factors to be considered as well, as pointed out by Ellis & Ferreira-Jr.:

> Psychological analyses of the learning of constructions as form-meaning pairs is informed by the literature on the associative learning of cue – outcome contingencies where the usual determinants include: factors relating to the form such as frequency and salience; factors relating to the interpretation such as significance in the comprehension of the overall utterance, prototypicality, generality, redundancy, and surprise value; factors relating to the contingency of form and function; and factors relating to learner attention, such as automaticity, transfer, overshadowing, and blocking …   (Ellis & Ferreira-Jr. 2009: 188)

7.2   Slot fillers

Linguists may in fact be at a disadvantage when discussing language. If one spends a considerable amount of time thinking about language in terms of abstractions (such as constructions), there may be a danger of looking at sentences or the process of producing sentences from the point of view of these abstractions, i.e.

---

31. Compare also Cordes (2014) and further studies discussed by Madlener (2016).

top-down, even when one is perfectly convinced that speakers arrive at mental abstractions of this kind (to the extent that they do) as the result of a bottom-up process. This kind of possibly unavoidable shift of perspective may distort the picture, however.

This is why I think metaphors such as that of constructions attracting certain items, once firmly entrenched in the minds of the analysts, should be met with some skepticism or, though providing a very convenient way of capturing certain phenomena, should at least occasionally be provided with a note reminding us that this is not really what we think is happening. I am not sure whether the alternative I am proposing – namely to talk about **items in constructions** – is a real improvement, but what this is meant to convey is that the constructions we discuss are abstractions over many many usage events (all of which contain items).

Behrens (2011: 382) makes a rather similar statement when she says that children acquire the words of a language "in and with" the constructions in which they occur.[32] Dabrowska's (2009) discussion of word learning points very much in the same direction.[33] There is evidence to suggest that the processes of abstraction and generalization which no doubt take place do not necessarily involve the expectation that memory traces of particular instances do or must get replaced. Diessel (2016: 232) makes this very explicit: "I suggest therefore that adult grammar includes a level of cognitive organization at which verb-argument structure constructions are tied to particular verbs similar to verb-argument constructions in early child language".

A speaker's linguistic knowledge can, then, be seen as including a "large inventory of item-specific constructions" (Diessel 2016: 232) – or item-related constructions, using the distinction made in section 2 above. This view, and also Dabrowska's (2009) statement that "early constructions are, in effect, big words", raises another point with respect to the items-in-constructions view, namely, why it should be appropriate to separate the items from the constructions in the case of argument structure constructions, when we would be happy to take an end-product oriented view of word formation despite the fact that we can arrive at a

---

32. Cf. Behrens (2011: 382): "Kinder erwerben nicht die Wörter mit ihren Subkategorisierungs-eigenschaften, die dann bestimmen, an welchen syntaktischen Strukturen ein Wort partizipieren kann, sondern sie erwerben das Lexikon durch und in den Konstruktionen, in denen sie auftauchen." [Children do not acquire the words with their subcategorization properties/features, which then determine in which syntactic structures a word can participate, but they acquire the lexicon through and in the constructions in which they appear; translation TH].

33. See Dabrowska (2009): "... since early constructions are, in effect, big words (cf. Dąbrowska 2000, 2004), we would expect the same mental processes to be involved in their acquisition." See also Tomasello (2003) and Dabrowska & Lieven (2005).

schematic construction – [Adj -ness] – on the basis of *happiness, readiness, friendliness* etc.

What this means is that there are (at least!) two dimensions for envisaging argument structure constructions:

1. A horizontal dimension, which consists of (horizontal) layers of usage events, i.e. experienced usage events containing different lexical material that have become linked on the basis of recognized similarities between them (Figure 6).

Postman Pat brought her some green Wellingtons

I'm going to give my teddy a piece of apple

you could offer him a drink

bake me a cake

shall I give you a kiss

we can give the teddy something to eat

Figure 6. Layers of language experiences with the ditransitive construction. (All examples taken from the Thomas Corpus)

2. The vertical dimension comes into play when speakers/learners abstract over such language experiences by segmenting the utterances into constituents and arrive at a representation of a construction similar in principle to the constructicon entry in Figure 5.

Although, as we have seen, there is no reason to assume that the making of a generalization entails throwing overboard knowledge of detail, it is nevertheless rather implausible to assume that all usage events that a person experiences during their lifetime will be stored in memory – even if storage does not imply the possibility of retrieval. Goldberg's (2019) concept of "lossy memory traces" offers a very convincing solution to this problem:

> Moreover, memory for any experience is necessarily partially abstract insofar as experiences are not represented completely veridically. We can describe the representations of events as involving lossy compression, by which we mean simply that not *all* information is retained.   (Goldberg 2019: 15)

> … an initial encounter with a word can form a lossy structured representation that prioritizes what the word designates and includes various contextual aspects

> of the encounter that are perceived to be informative or relevant to the use of the word, which may include quite detailed information about form, meaning, and context. (Goldberg 2019: 16)

Nevertheless, the vertical perspective still raises a number of questions, in particular as far as the mental representation of the slots or, rather, the slot fillers is concerned. Although I very much agree with Diessel's (2016) insistence on the verbs that have been experienced in a construction being part of a speaker's knowledge of that construction, the issue remains how far we can take this:

1. If the slots are represented – entirely or in parts – through the verbs that have been experienced in (or as part of) the construction (i.e. the *items-in-construction* view), this presumably does not mean that all the items ever experienced by a speaker will be stored (lossy memory!). But which factors apart from frequency of exposure determine which items are not lost?
2. To what extent do small classes of verbs (or adjectives) – as discussed in Croft (2003, 2012) – play a role in the mental representation of slots?
3. Furthermore, if we take this a level further down and look at more specific, lexically specified valency constructions (Herbst 2014) – such as the ditransitive construction for *give* or the monotransitive construction with *buy* – for example, would we expect a similar kind of representation for the argument slots as we do for the verb slot of the general ditransitive construction? Or, alternatively, is there any reason not to?
4. In particular, this issue also concerns the issue of how the argument slots of verbs should be imagined to be represented in a model of the mental constructicon or described in a reference constructicon. In argument slots that express notions such as AGENT, RECIPIENT, or BENEFICIARY, one typically finds personal pronouns and names, but also nouns referring to professions or positions. It is tempting to think that these are obvious candidates for compression in lossy memory, but, depending on the verb, the difference between first, second, and third person uses may be relevant, as may the difference between *he* and *she* or any of the other factors.

8.   The role of competition and the unpredictability paradox

Valuable as all the statistics about associations between constructions of various kinds no doubt are, it is clear that they are not the whole story – simply because what they do is give us a better understanding of what it is we have to explain, but they do not provide any explanation as such. Quite clearly, what really matters

is something that computational methods are not (yet) in a position to provide a satisfactory account of, namely, the associations between the meanings speakers intend to express and the expressions they use in order to do this.

According to exemplar theory and other usage-based models (Bybee 2010; Goldberg 2019), children learn about these associations by processing the input they receive. Hearing a sentence such as (19), which is taken from a child language corpus (CHILDES, MacWhinney 2000), for example, children will be able to deduce that both the ditransitive and the *to*-prepositional construction can be used to express the same communicative intention:

(19)   … would you like to read dolly a bedtime story like I read one to you?
(CHILDES:Thomas2_02_18)

Further language experience will then enrich their knowledge of these constructions with respect to a large number of factors such as in which contexts the constructions are used, with which kinds of complements (e.g. pronominal vs. long NPs) they tend to occur, and with which verbs the constructions are used, etc.[34]

This latter aspect is rather crucial with respect to how children learn what not to say and relates to Goldberg's (2019: 82) notion of competition:[35]

> We can assume that if a listener expects to witness *disappear* used causatively (*The magician disappeared the rabbit*), but instead hears the periphrastic causative (*The magician made the rabbit disappear*), the periphrastic form will be strengthened and the causative version will be incrementally weakened. This predicts that a construction that is in competition will be weakened in a particular type of context, whenever another form "wins" (is used) in that type of context. If a competing construction is *not* even partially activated, there will be no suppression. This effect allows us to fine-tune our expectations as we gain experience. Because error-driven learning and RIF [retrieval-induced forgetting] are domain-general mechanisms, no special process is required to account for their effects in language.

With respect to the above discussion, what is important to notice is that competition between expressions is not restricted to particular types of constructions (or alternations). In fact, there is a wide range of phenomena that can be described in terms of competition that gives rise to pre-emption:

34. Basically, this entails all the factors elicited by Bresnan & Ford (2010). See also Uhrig (2015).

35. Note that competition is also central to MacWhinney's (2005, 2014) connectionist model.

1. Items can occur in only one of two (or some of several) constructions which serve the same (or a similar) communicative purpose, e.g. *explain, say, disappear*; but also *kindness, bravery*.
2. In combination with particular slot fillers, verbs may occur (predominantly) in only one of two argument structure constructions which serve the same (or a similar) communicative purpose: *give someone a chance – ??give a chance to someone.*
3. Collocation in the sense that it is used in foreign language research (Hausmann 1984) is a classic example of competition, in which one or several slot fillers tend to strongly prefer or even pre-empt others (e.g. *heavy smoker/??strong smoker, schlechtes Gewissen* [literally *bad conscience*], *?schuldiges Gewissen* [literally: *guilty conscience*]).[36]

Competition between expressions also occurs across traditional linguistic categories:

1. Light verb constructions can pre-empt the use of the single verb with equivalent meaning, as in *X made a favorable impression (on Y)* vs. *X impressed me favorably.*
2. There can be competition between collocations and compounds. For instance, in German, the existence of *Sandstrand* tends to block *sandiger Strand* as a general non-technical label, whereas in English the collocation *sandy beach* pre-empts the use of *sandbeach* for the same communicative purpose (Herbst 2011b).[37]
3. In highly formalized situations, established expressions may pre-empt the use of other expressions, e.g. *Enjoy (your meal), ??Good appetite!* (but *bon appetit!*), *??Eat tastily/deliciously!*

This list of possible areas of competition between constructions, to which other types can surely be added, contains generalizations of the partial type identified in section 2, which means that in these cases competition can, but need not necessarily result in the pre-emption of one or several expressions (and, of course, one has to allow for both gradience in terms of strong preference to pre-emption and the fact that established use of one expression may result in the other expression developing a new sense).

---

36. The ? refers to acceptability in present-day German.

37. Interestingly, the existence of the one form can result in the other form acquiring a special meaning – for instance, *sandbeach* is used with the technical meaning that appears in German in collocations such as *feinsandige Strände* etc.

But when competition does happen, it will quite obviously affect the internal consistency of the set of fillers of a constructional slot. This is one explanation for the fact that many of the generalizations in terms of semantic classes discussed in section 3 don't work 100% and for the unpredictability of language (the unpredictability of what is established or possible in a language; not, of course, in terms of what a speaker is going to say next, which often shows a high degree of predictability – you might call this the *paradox of unpredictability* in language).

What this list of possible areas of competition – and especially the types cutting across categories – also shows is that the horizontal level of constructional storage may be extremely relevant to the representation and processing of language in the brain.

9.   The undemocratic nature of language: lack of choice

For usage-based linguists and many others, language is not a matter of knowing words and their meanings on the one hand and rules of grammar on the other. If it were, we could be perfectly happy with the little text in (20):

(20)   Last year, I drove to Amsterdam with my 18-year-old son. He had just passed the driving-license examination and was fully happy to do all the driving. I said him he should be careful when parking into a narrow parking place next to a canal.

But, obviously, this text is not very likely to have been produced by a native speaker, although, as far as I can see, it does not contain any combination of words or words and more abstract constructions that would be ruled out on the basis of semantic incompatibility. Furthermore, all of the elements that native speakers might consider unusual or find disturbing in the text in (20) are perfectly 'normal' in German – at least, as far as one considers it legitimate to establish such correspondences between languages at all.

Irrespective of detail, the point I want to draw attention to here is quite simply this: *language is unpredictable.* This unpredictability can be accounted for in terms of de Saussure's (1916) notions of arbitrariness and conventionality, Coseriu's (1973) distinction between system and norm; it has given rise to Sinclair's establishing of the open-choice and the idiom principle and it forms a crucial element of much work on phraseology (Hausmann 1984; Pawley & Syder 1983; Dąbrowska 2014; Herbst 2015), and has been recognized as a central characteristic of language in cognitive grammar. On the other hand, this has not been given sufficient credit in all models of linguistic theory; in fact, Langacker (2008: 13) deplores precisely that when he lists the following among "the prevalent

features of modern linguistic thought and practice": "(…) the notion that **absolute predictability** ought to be the norm, so that anything which fails to achieve it is held to be of little interest …".

The unpredictability of language arises from the fact that, per se, there very often is more than one conceivable way of expressing a particular meaning in a particular language, but this does not mean that they would all be equally acceptable. If we regard the social dimension of language and accept Goldberg's (2019: 94) view that "we aim to conform to our speech community", the reason for certain forms not being used frequently lies in the fact that, to a certain extent at least, speakers' behavior is driven by social norms:

> … we consider creative uses "wrong" when there exists a conventional alternative way to express the same message, because we view language normatively: we consider there to be "right" ways to use our language.　　　(Goldberg 2019: 60)

The consequence of this attitude is that there is no need for us as linguists to despair if we cannot find a linguistic (semantic or otherwise) reason when trying to account for the 'unacceptability' or 'non-establishedness' of a certain combination of constructions – quite simply, because there does not necessarily have to be a reason for it.

Coming back to the little text in (20), is it sensible to ask why in English we speak of a *driving test* (and not of a *Führerscheinprüfung* 'driving license test' as in German), that in English you do not *park,* but *pull, steer*, or *back into a parking space*, whereas German has the word *einparken*. Can we really expect to find a reason why *fully happy* is not an established collocation in English or why it is odd to say *I drove to Amsterdam* when I was not actually sitting behind the steering wheel but *we drove* would be perfectly possible to describe the same situation?

To ask these questions is like asking why words of closely related languages that can be traced back to the same root should have come to have different meanings today; just think of English *town*, Dutch *tuin* 'garden', and German *Zaun* 'fence' or of *silly* versus *salig* and *selig* 'blessed' in Dutch and German. Or, to take it a little further, why do you see signs saying *No cycling* in Hyde Park and signs reading *Walk bikes on paths* in Central Park?

There can, of course, be no answer to these questions, at least, as long as we do not allow for historical accident to be a relevant factor. In a way, analyzing a language synchronically is like taking *one* high-quality photograph of a moving train (with a very short exposure time) and using it as the basis for determining its speed and direction. If we see language as a complex dynamic system (Beckner et al. 2009; Bybee 2010), we can never expect the emergent picture of language not to be messy in some way or another.

Acknowledgements

References

Ambridge, B., & Lieven, E. (2011). *Child language acquisition: Contrasting theoretical approaches*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511975073

Beckner, C., Blythe, R., Bybee, J., Christiansen, M. H., Croft, W., Ellis, N., Holland, J., Ke, J., Larsen-Freeman, D., & Schoenmann, T. (2009). Language is a complex-adaptive system: Position paper. *Language Learning* 55 (Supplement 1), 1–26.

Behrens, H. (2011). Grammatik und Lexikon im Spracherwerb: Konstruktionsprozesse. In S. Engelberg, A. Holler, & K. Proost (Eds.), *Sprachliches Wissen zwischen Lexikon und Grammatik* (pp. 375–396). Berlin & Boston: De Gruyter. https://doi.org/10.1515/9783110262339.375

Boas, H. C. (2003). *A constructional approach to resultatives*. Stanford: CSLI Publications.

Boas, H. C. (2011). Zum Abstraktionsgrad von Resultativkonstruktionen. In S. Engelberg, A. Holler, & K. Proost (Eds.), *Sprachliches Wissen zwischen Lexikon und Grammatik* (pp. 37–69). Berlin & Boston: De Gruyter. https://doi.org/10.1515/9783110262339.37

Boas, H. C., Lyngfelt, B., & Torrent, T. T. (2019). Framing constructicography. *Lexicographica*, 35, 15–59. https://doi.org/10.1515/lex-2019-0002

Boas, H. C., & Ziem, A. (2018). Constructing a constructicon for German: Empirical, theoretical, and methodological issues. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.), *Constructicography: Constructicon development across languages* (pp. 183–228). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.07boa

Bresnan, J., & Ford, M. (2010). Predicting syntax: Processing dative constructions in American and Australian varieties of English. *Language*, 86, 168–213. https://doi.org/10.1353/lan.0.0189

Bybee, J. (2010). *Language, usage and cognition*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511750526

Chomsky, N. (1957). *Syntactic structures*. The Hague: Mouton. https://doi.org/10.1515/9783112316009

Cordes, A. (2014). *The role of frequency in children's learning of morphological constructions*. Tübingen: Narr.

Coseriu, E. (1973). *Probleme der strukturellen Semantik*. Tübingen: Narr.

Croft, W. (2003). Lexical rules vs. constructions: A false dichotomy. In H. Cuyckens, T. Berg, R. Dirven, & K. Panther (Eds.), *Motivation in language. Studies in honor of Günter Radden* (pp. 49–68). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cilt.243.07cro

Croft, W. (2012). *Verbs. Aspect and causal structure*. Oxford & New York: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199248582.001.0001

Croft, W., & Cruse, D. (2004). *Cognitive linguistics*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511803864

Cruse, D. (1986). *Lexical semantics*. Cambridge: Cambridge University Press.

Dąbrowska, E. (2000). From formula to schema: The acquisition of English questions. *Cognitive Linguistics*, 11, 83–102.

Dąbrowska, E. (2004). *Language, mind, and brain. Some psychological and neurological constraints on theories of grammar*. Edinburgh: Edinburgh University Press.

Dąbrowska, E. (2009). Words as constructions. In V. Evans & S. Pourcel (Eds.) *New Directions in Cognitive Linguistics* (pp. 201–223). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/hcp.24.16dab

Dąbrowska, E. (2014). Recycling utterances: A speaker's guide to sentence processing. *Cognitive Linguistics*, 25(4), 617–653. https://doi.org/10.1515/cog-2014-0057

Dąbrowska, E., & Lieven, E. (2005). Towards a lexically specific grammar of children's question constructions. *Cognitive Linguistics*, 16(3), 437–474. https://doi.org/10.1515/cogl.2005.16.3.437

Davies, M. (2008). COCA-The Corpus of Contemporary American English. Available at <http://corpus.byu.edu/coca/>

Diessel, H. (2016). Frequency and lexical specificity in grammar: A critical review. In H. Behrens & S. Pfänder (Eds.). *Experience counts: Frequency effects in language* (pp. 209–237). Berlin & Boston: de Gruyter. https://doi.org/10.1515/9783110346916-009

Ellis, N. (2006). Language acquisition as rational contingency learning. *Applied Linguistics*, 27(1), 1–24. https://doi.org/10.1093/applin/ami038

Ellis, N., & Ferreira-Junior, F. (2009). Constructions and their acquisition: Islands and the distinctiveness of their occupancy. *Annual Review of CognitiveLinguistics*, 7, 187–220.

Evert, S. (2005). The statistics of word cooccurrences: Word pairs and collocations. Dissertation, Institut für maschinelle Sprachverarbeitung, University of Stuttgart, URN urn:nbn:de:bsz:93-opus-23714

Evert, St. (2008). Corpora and collocations. In A. Lüdeling & M. Kytö (Eds.), *Corpus linguistics. An international handbook* (pp. 1212–1248). Berlin: Mouton de Gruyter.

Faulhaber, S. (2011). *Verb valency patterns: A challenge for semantics-based accounts*. Berlin & New York: de Gruyter Mouton. https://doi.org/10.1515/9783110240788

Fischer, K., & Stefanowitsch, A. (2006). Konstruktionsgrammatik: Ein Überblick. In K. Fischer & A. Stefanowitsch (Eds.). *Konstruktionsgrammatik. Von der Anwendung zur Theorie* (pp. 3–17). Tübingen: Stauffenburg.

Francis, G., Hunston, S., & Manning, E. (1996). *Collins Cobuild grammar patterns 1: Verbs*. London: Harper Collins.

Goldberg, A. (1995). *Constructions: A construction grammar approach to argument structure*. Chicago: Chicago University Press.

Goldberg, A. (2002). Surface generalizations: An alternative to alternations. *Cognitive Linguistics*, 13–4, 327–356. https://doi.org/10.1515/cogl.2002.022

Goldberg, A. (2006). *Constructions at work*. Oxford & New York: Oxford University Press.

Goldberg, A. (2019). *Explain me this: Creativity, competition, and the partial productivity of constructions*. Princeton: Princeton University Press.

Goldberg, A., Devin, M., & Sethuranam, N. (2004). Learning argument structure generalizations. *Cognitive Linguistics*, 14, 289–316. https://doi.org/10.1515/cogl.2004.011

Goldberg, A. E., & Herbst, T. (2021). The NICE-OF-YOU construction and its fragments. *Linguistics*, 59(1), 285–318. https://doi.org/10.1515/ling-2020-0274

Grice, H. P. (1975). Logic and conversation. In P. Cole & J.L. Morgan (Eds.), *Syntax and semantics, vol. 3, Speech acts* (pp. 41–58). New York: Academic Press.

Gries, S. (2012). Frequencies, probabilities, association measures in usage-/exemplar-based linguistics: Some necessary clarifications. *Studies in Language*, 36(3), 477–510. https://doi.org/10.1075/sl.36.3.02gri

Gries, S. (2013). 50-something years of work on collocations. What is or should be next … *International Journal of Corpus Linguistics*, 18(1), 137–165. https://doi.org/10.1075/ijcl.18.1.09gri

Gries, S. (2015). More (old and new) misunderstandings of collostructional analysis: On Schmid and Küchenhoff (2013). *Cognitive Linguistics*, 26(3), 505–536. https://doi.org/10.1515/cog-2014-0092

Gries, S., & Stefanowitsch, A. (2004a). Extending collostructional analysis: A corpus-based perspective on 'alternations'. *International Journal of Corpus Linguistics*, 9(1), 97–129. https://doi.org/10.1075/ijcl.9.1.06gri

Gries, S., & Stefanowitsch, A. (2004b). Co-varying collexemes in the *into*-causative. In M. Achard & S. Kemmer (Eds.). *Language, culture, and mind* (pp. 225–236). Stanford: CSLI.

Hampe, B., & Schönefeld, D. (2006). Syntactic leaps or lexical variation? – More on 'creative syntax'. In S. Gries & A. Stefanowitsch (Eds.), *Corpora in cognitive linguistics. Corpus-based approaches to syntax and lexis* (pp. 127–157). Berlin: Mouton de Gruyter.

Haugen, T.A. (2012). *Polyvalent adjectives in Norwegian: Aspects of their semantics and complementation patterns*. Oslo: University of Oslo.

Hausmann, F-J. (1984). Wortschatzlernen ist Kollokationslernen. *Praxis des neusprachlichen Unterrichts*, 31, 395–406.

Herbst, T. (1983). *Untersuchungen zur Valenz englischer Adjektive und ihrer Nominalisierungen*. Tübingen: Narr.

Herbst, T. (2009). Valency: Item-specificity and idiom principle. In U. Römer & R. Schulze (Eds.), *Exploring the lexis-grammar interface* (pp. 49–68). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/scl.35.05her

Herbst, T. (2011a). The status of generalisations: Valency and argument structure constructions. *Zeitschriftfür Anglistik und Amerikanistik*, 59(4), 347–367. https://doi.org/10.1515/zaa-2011-0406

Herbst, T. (2011b). *Choosing sandy beaches*– collocations, probabemes, and the idiom principle. In T. Herbst, S. Faulhaber, & P. Uhrig (Ed.), *The phraseological view of language. A tribute to John Sinclair* (pp. 27–57). Berlin & Boston: Mouton De Gruyter. https://doi.org/10.1515/9783110257014.27

Herbst, T. (2014a). The valency approach to argument structure constructions. In T. Herbst, H. Schmid, & S. Faulhaber (Eds.), *Constructions, collocations, patterns* (pp. 159–207). Berlin & New York: Mouton de Gruyter. https://doi.org/10.1515/9783110356854.167

Herbst, T. (2014b). Idiosyncrasies and generalizations: Argument structure, semantic roles, and the valency realization principle. In M. Hilpert & S. Flach (Eds.), *Yearbook of the German Cognitive Linguistics Association, Jahrbuchder Deutschen Gesellschaft für Kognitive Linguistik*, Vol. II. (pp. 253–289). Berlin, München, & Boston: Mouton de Gruyter. https://doi.org/10.1515/gcla-2014-0015

Herbst, T. (2015). Why construction grammar catches the worm and corpus data can drive you crazy: Accounting for idiomatic and non-idiomatic idiomaticity. *Journal of Social Sciences*, 11 (3), 91–110. https://doi.org/10.3844/jssp.2015.91.110

Herbst, T. (2017). Wörterbuch wargestern: Programm für ein unifiziertes Konstruktikon. In S. Schierholz et al. (Eds.), *Wörterbuchforschung und Lexikographie* (pp. 169–206). Berlin & Boston: de Gruyter.

Herbst, T. (2018a). Die menschliche Sprache – ein Netzwerk von Konstruktionen? In R. Freiburg (Ed.), *Sprachwelten* (pp. 105–147). Erlangen: FAU University Press.

Herbst, T. (2018b). Is language a collostructicon? – A proposal for looking at collocations, valency, argument structure and other constructions. In P. Cantos-Gómez & M. Almela-Sánchez (Eds.), *Lexical collocation analysis: Advances and applications* (pp. 1–22). Cham: Springer. https://doi.org/10.1007/978-3-319-92582-0_1

Herbst, T. (forthcoming). Die Digitalisierung von Wortschatz und Grammatik – ein Konstruktikon für die Schule. In Ch. Bürgel, P. Gévaudan, & D. Siepmann (Eds.), Sprachwissenschaft und Fremdsprachendidaktik: Konstruktionen und Konstruktionslernen. Baltmannsweiler: Schneider.

Herbst, T., & Uhrig, P. (2019). Towards a valency and argument structure constructicon of English: Turning the valency patternbank into a constructicon. *Lexicographica*, 35, 171–188. https://doi.org/10.1515/lex-2019-0006

Hilpert, M. (2008). *Germanic future constructions: A usage-based approach to language change*. Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.7

Hilpert, M. (2020). Constructionist approaches. In B. Aarts, J. Bowie, & G. Popova (Eds.), *The Oxford handbook of English grammar* (pp. 106–123). Oxford: Oxford University Press.

Hoffmann, T., & Trousdale, G. (Eds.) (2013). *The Oxford handbook of construction grammar*. Oxford & New York: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195396683.001.0001

Janda, L.A., Lyashevskaya, O., Nesset, T., Rakhilina, E., & Tyers, F. M. (2018). A constructicon for Russian: Filling in the gaps. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.) *Constructicography: Constructicon development across languages* (pp. 165–181). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.06jan

Kilgariff, A. (2005). Language is never, ever, ever, random. *Corpus Linguistics and Linguistic Theory*, 1–2, 263–276. https://doi.org/10.1515/cllt.2005.1.2.263

Langacker, R. W. (2008). *Cognitive grammar: A basic introduction*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195331967.001.0001

Lee-Goldman, R., & Petruck, M. (2018). The FrameNet constructicon in action. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.), *Constructicography: Constructicon development across languages* (pp. 19–39). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.02lee

Levin, B. (1993). *English verb classes and alternations: A preliminary investigation*. Chicago & London: The University of Chicago Press.

Levin, B., & Rappaport Hovav, M. (2005). *Argument realization*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511610479

Lyngfelt, B. (2018). Introduction. Constructicons and constructicography. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.), *Constructicography: Constructicon development across languages* (pp. 1–18). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.01lyn

Lyngfelt, B., Bäckström, L., Borin, L., Ehrlemark, A., & Rydstedt, R. (2018). Constructicography at work: Theory meets practice in the Swedish constructicon. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.), *Constructicography: Constructicon development across languages* (pp. 41–106). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.03lyn

MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk.* Third Edition. Mahwah, NJ: Lawrence Erlbaum Associates.

MacWhinney, B. (2005). A unified model of language acquisition. In J. F. Kroll & A. M. B. De Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 49–67). Oxford: Oxford University Press.

MacWhinney, B. (2014). Item-based patterns in early syntactic development. In T. Herbst, H.-J. Schmid, & S. Faulhaber (Eds.), *Constructions, collocations, patterns* (pp. 25–61). Berlin & Boston: Mouton de Gruyter. https://doi.org/10.1515/9783110356854.33

Madlener, K. (2016). Input optimization. In H. Behrens & S. Pfänder (Eds.), *Experience counts: Frequency effects in language* (pp. 133–173). Berlin & Boston: de Gruyter. https://doi.org/10.1515/9783110346916-007

Mukherjee, J. (2005). *Anglistische Korpuslinguistik.* Berlin: Schmidt.

Ohara, K. (2018). Relations between frames and constructions. A proposal from the Japanese FrameNet constructicon. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.)., *Constructicography: Constructicon development across languages* (pp. 142–163). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.05oha

Patten, A., & Perek, F. (2019). Towards an English constructicon using patterns and frames. *International Journal of Corpus Linguistics*, 24, 356–386.

Patten, A., & Perek, F. (2022). Pedagogic applications of the English constructicon. In H. C. Boas (Ed.), *Pedagogic construction grammar: Data, methods, and applications* (pp. 179–215). Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110746723-007

Pawley, A., & Syder, F. H. (1983). Two puzzles for linguistic theory: Native like selection and native like fluency. In J. C. Richards & R. W. Schmidt (Eds.), *Language and communication* (pp. 191–225). London: Longman.

Pecina, P. (2010). Lexical association measures and collocation extraction. *Language Resources and Evaluation*, 44(1), 137–158. https://doi.org/10.1007/s10579-009-9101-4

Perek, F., & Goldberg, A. (2015). Generalizing beyond the input: The functions of the constructions matter. *Journal of Memory and Language*, 84, 108–127. https://doi.org/10.1016/j.jml.2015.04.006

Proisl, T. (2018). *The cooccurrence of linguistic structures.* Erlangen: FAU University Press. https://doi.org/10.25593/978-3-96147-201-7

Proisl, T., & Uhrig, P. (2012). Efficient dependency graph matching with the IMS Open Corpus Workbench. In N. Calzolari, K. Choukri, T. Declerck, M. Uğur Doğan, B. Maegaard, J. Mariani, J. Odijk, & S. Piperidis (Eds.), *Proceedings of the Eighth International Conference on Language Resources and Evaluation (LREC '12)* (pp. 2750–2756). Istanbul: European Language Resources Association. ELRA.

de Saussure, F. (1916). *Cours de linguistique générale*, C. Bally & A. Sechehaye (Eds.). Lausanne & Paris: Payot.

Schmid, H. (2000). *English abstract nouns as conceptual shells. From corpus to cognition.* Berlin & New York: Mouton de Gruyter. https://doi.org/10.1515/9783110808704

Schmid, H., & Küchenhoff, H. (2013). Collostructional analysis and other ways of measuring lexicogrammatical attraction: Theoretical premises, practical problems, and cognitive underpinnings. *Cognitive Linguistics*, 24(3), 531–577. https://doi.org/10.1515/cog-2013-0018

Schneider, U. (2018). ΔP as a measure of collocation strength. *Corpus Linguistics and Linguistic Theory*, 14(1), 1–26. https://doi.org/10.1515/cllt-2017-0036

Stefanowitsch, A., & Gries, S. (2003). Collostructions: Investigating the interaction between words and constructions. *International Journal of Corpus Linguistics*, 8(2), 209–243. https://doi.org/10.1075/ijcl.8.2.03ste

Stefanowitsch, A. (2006). Negative evidence and the raw frequency fallacy. *Corpus Linguistics and Linguistic Theory*, 2(1), 61–77. https://doi.org/10.1515/CLLT.2006.003

Stefanowitsch, A. (2008). Negative entrenchment: A usage-based approach to negative evidence. *Cognitive Linguistics*, 19(3), 513–531. https://doi.org/10.1515/COGL.2008.020

Tomasello, M. (2003). *Constructing a language*. Cambridge, Mass. & London: Harvard University Press.

Torrent, T. T., Matos, E., Lage, L., Laviola, A., Tavares, T., Almeida, V. G., & Sigiliano, N. (2018). Towards continuity between the lexicon and the constructicon in FrameNet Brasil. In B. Lyngfelt, L. Borin, K. Ohara, & T. T. Torrent (Eds.), *Constructicography: Constructicon development across languages* (pp. 107–140). Amsterdam & Philadelphia: John Benjamins. https://doi.org/10.1075/cal.22.04tor

Uhrig, P. (2015). Why the principle of no synonymy is overrated. *Zeitschriftfür Anglistik und Amerikanistik*, 63(3), 323–337. https://doi.org/10.1515/zaa-2015-0030

Ungerer, F., & Schmid, H. (2006). *An introduction to cognitive linguistics*. Harlow: Pearson-Longman.

Zeschel, A., & Proost, K. (2019). Grain size issues in constructicon building – and how to address them. *Lexicographica*, 35(1), 169–215. https://doi.org/10.1515/lex-2019-0005

Intersubjectification in constructional change[*]

Martin Hilpert and Samuel Bourgeois
Université de Neuchâtel

This chapter addresses constructional change in a dialogical construction that is illustrated by utterances such as *sarcastic much*?, which typically serve the purpose of an interactional challenge. Drawing on web-based corpus data, we argue that this construction is currently undergoing a process of change that expands its range of possible uses. Specifically, we observe the emergence of uses with a different intersubjective function, in which the writer does not aim for confrontation but is rather seeking the solidarity and alignment of the addressee. We offer an account of this development in terms of constructional change, and we use this case study to explore how intersubjectification and the dialogic nature of language can be accommodated more thoroughly in a constructional theory of language change.

Keywords: intersubjectification, constructional change, constructionalization, sarcasm, solidarity, alignment, GloWbE corpus

1. Introduction

It is a basic tenet of usage-based construction grammar (Goldberg 2006; Bybee 2010) that long-term linguistic changes originate from processes that are at work in actual communicative situations. While this notion has only been implicitly acknowledged in early constructional work, there is now research that focuses on interactional aspects of constructions (Deppermann 2011; Brône & Zima 2014; Imo 2015) and that has revealed phenomena that reflect the intersubjective, dialogical nature of constructions. Another strand of current research highlights the social dimension of constructions (Kristiansen 2008; Kristiansen & Geeraerts

2013; Ziem 2015; Hilpert 2017). So far, however, relatively little work on constructional change addresses either the dialogical nature of language or the social context in which a particular construction is used. This chapter focuses on these issues by discussing current developments in a pattern that will be called the *sarcastic much?* construction. The construction is illustrated in (1–2) with two examples from the GloWbE corpus (Davies 2013).

(1)   A.   And, Zython, I don't care what you fucking think – when you do think, that is. Shove off, punk.
       B.   Geeze, angry much? All I did was demonstrate why your points were wrong.

(2)   As a woman who loves baseball, I'm a little insulted by the suggestion that women won't read a book just because it has something to do with sports! Stereotype much?

The *sarcastic much?* construction typically conveys a critical or sarcastic meaning, often in response to an utterance by another (Liberman 2010; Adams 2014; Gutzmann & Henderson 2019). Furthermore, Adams (2014) links the construction to genres of computer-mediated communication, which often function to invoke both otherness and affiliation (Zappavigna 2012). The critical meaning of the construction is non-compositional, i.e. not fully derivable from the meaning of its parts. The construction always involves the adverb *much* at its right edge, in writing the adverb is typically followed by a question mark. Pragmatically, *sarcastic much?* does not constitute an interrogative speech act, but rather a verdictive speech act: a previous statement or behavior, often directly associated with the conversation partner, is being criticized. In the following, we will call this previous statement or behavior the antecedent of the construction. In example (1), writer B's use of *angry much?* amounts to the statement that writer A's comments were needlessly offensive. In example (2), the writer critiques a previous comment as drawing on a stereotype. The construction thus exemplifies what Brône & Zima (2014) call a dialogical unit. The *sarcastic much?* construction is a relatively recent phenomenon that is nonetheless well-documented in web-based corpora such as the GloWbE corpus (Davies 2013) and which thus affords a rare look at constructional change in real time. We will argue that *sarcastic much?* is currently on a trajectory towards a widening set of communicative contexts and dialogical functions, which is a development that we will interpret in terms of intersubjectification (Traugott 2010). Specifically, we observe newly emerging uses in which the construction serves to make self-deprecating and meta-textual comments, or even to brag about an achievement. Both of these functions are exemplified below. The examples illustrate different aspects of intersubjectivity. Example (4) makes a statement about the addressee, who might be jealous of the writer's holiday plans,

while example (3) uses self-deprecating humor to pre-empt a statement that the addressee might make about the writer.[1]

(3)   Still I kept at the classic literature because it was important to me that others respect my intelligence (damaged by high school much ?: -P). Naturally when I decided to write a novel, it came out as literary fiction.

(4)   We have a few fixed points: a dinner here, a soccer football game there. Christmas in southern Germany, New Year's in Paris (jealous much ?!). But apart from that it's all pretty wibbly-wobbly.

The main aim of this chapter is to show how developments such as these can be usefully incorporated into a constructional theory of language change. For this, we draw on concepts such as constructionalization (Traugott & Trousdale 2013) and constructional change (Hilpert 2013), and specifically the network structure of linguistic knowledge (Diessel 2015; Hilpert 2017, 2019).

The chapter is structured as follows. Section 2 motivates the constructional status of the *sarcastic much?* construction and discusses its formal and functional aspects in the light of previous research on the topic and other related work. Section 3 addresses gradience and constructional change in the *sarcastic much?* construction, focusing on four different issues. First, we will argue that there is intersective gradience (Aarts 2007) between the *sarcastic much?* construction and questions that may receive a positive or negative answer. While the two construction types show similarities on several structural levels, they will be shown to differ with regard to answerability and recoverability. Second, we will discuss semantic variation in the construction with regard to the element that is verbalized in the open slot that precedes the adverb *much*. Here we observe that the construction accommodates a widening set of elements, which are not restricted to inherently negative meanings, but which are currently branching out to other functions. Third, we investigate a gradual loss of an interactional constraint on the construction. Whereas the construction emerged in contexts that involved what we call a conversational antecedent, we observe new uses of the construction that no longer require such an antecedent. We discuss how the construction expands from clearly dialogical uses that react to a prior event or utterance to uses that can be the starting point of an interaction. Fourth, we track the changing intersubjective nature of the construction, with a special focus on the change from highly confrontational uses to examples in which the construction is produced to solicit alignment and solidarity. In section 4, we draw together our empirical observations and examine how they allow us to contextualize intersubjectification and constructional change. Section 5 offers a brief conclusion.

---

1.   We thank an anonymous reviewer for pointing us towards this distinction.

2.   Formal and functional characteristics of *sarcastic much?*

The following example, an excerpt from an episode of the TV series "Buffy the vampire slayer",[2] serves to illustrate the basic formal and functional characteristics of the *sarcastic much?* construction.

(5)   **BUFFY:** I'm sorry.

DAWN: You hurt my arm.

BUFFY: I know.

DAWN: Butthole.

BUFFY: Really sorry.

DAWN: I tell you I have this theory? It goes where you're the one who's not my sister. 'Cause mom adopted you from a shoebox full of baby howler monkeys and never told you 'cause it could hurt your delicate baby feelings.

BUFFY: That's your theory?

DAWN: Explains your fashion sense. And smell.

BUFFY: I'm sorry, okay?

DAWN: Broken record much?

BUFFY: You can't even take an apology. You always do that.

The interacting characters are Buffy and her sister Dawn. Dawn is upset with Buffy, who enters Dawn's room in order to apologize. She actually apologizes three times in this segment, but none of the apologies is followed by a positive acknowledgment on Dawn's part. In fact, after the third time, Dawn snaps at Buffy and produces the utterance *Broken record much?*, which instantiates the construction that we focus on here.

The idiosyncratic and non-compositional characteristics that make this pattern a construction (Goldberg 1995, 2006) are in plain sight. The utterance *Broken record much?* neither follows a canonical pattern of English syntax, nor does it have a meaning that could be derived from compositional principles. It is what Fillmore et al. (1988: 508) have called an extragrammatical idiom, in which familiar pieces are unfamiliarly arranged. As will be explored in more detail below, the meaning of the construction has both subjective and intersubjective aspects. Uses such as the one in (5) commit the speaker to a critical, even sarcastic, attitude,

---

2.   The episode has the title "No place like home", the example starts at 39:55. The example has been retrieved from the following website: [http://www.buffyworld.com/buffy/transcripts/083 _tran.html, date of access: 1.3.2018]

which means that the construction conveys subjective meaning.[3] Furthermore, the speaker's critical attitude is directed towards a contextual element that constitutes its target. Typically, this target is the conversation partner, or some action or entity that is associated with the conversation partner. The dynamics between the speaker and the attitudinal target constitutes the intersubjective component of the constructional meaning. Despite the fact that example (5) stems from carefully scripted and mediatized language use, it can be seen as a typical example in that it is produced in a dialogical setting, shows a prosody with terminal rise, conveys a strongly confrontational meaning towards the conversation partner, and exhibits the common formal variant of a bare nominal that is followed by *much*. Many examples of the *sarcastic much?* construction differ in one or more aspects from this prototype. As a first step towards exploring that variation, we will discuss the following example from spontaneously produced speech.[4] The context of the example is a video blog episode in which it is discussed how politicians need to be perceived as authentic, but at the same time have to appeal to the general public, for example by avoiding accessories that could be seen as overly luxurious.

(6)   When your job is to try to relate to people? You know, when your job is to try to come off as honest and … and forthcoming, and this is me, like I'm levelling with you and I'm gonna be your leader, uh-but in order for you to trust me, I have to be honest with you at who I am?
I just feel like it's … it's so disingenuous … to wear an everyman watch.
If we saw Donald Trump tomorrow, in Timberlands and and jeans, and a …
and a dirty white shirt, you know, and a G-Shock in a coal-mining town, we'd be like c'mon, y-you know really … Pander much, jerk-off?
You know, so … a-and… so that principle kind of stands.

The example pictures a counterfactual scenario in which Donald Trump dresses up as an industry worker in order to appeal to voters. The speaker views this as a hypocritical act and phrases his negative reaction with the expression *Pander much, jerk-off?*. Several aspects of this usage merit discussion. First of all, it is noteworthy that a dialogical, intersubjective construction is used in a situation that only has one speaker. The insult produced by the speaker is not directed at the audience, but rather at a fictional conversation partner who is not present and thus not able to either hear the challenge or to respond. What this shows is that the *sarcastic much?* construction can be used for the expression of critical

---

3. For a discussion of another English interrogative construction that has acquired a conventionalized meaning of sarcasm, see Michaelis & Feng (2015).

4. The example is taken from a YouTube video with the title "President Obama wore a Rolex Cellini. The utterance in example (6) occurs at 4:25. [https://www.youtube.com/watch?v=VPHwLl1-vP0&t=313s, date of access: 1.3.2018]

attitudes not only towards the hearer but in fact towards any contextually relevant idea. Another aspect that is worth noting is the syntactic behavior of *Pander much, jerk-off?*. Prosodically and syntactically, the construction stands on its own, that is, it is not embedded into a hypotactical structure. This corresponds to the earlier example of *Broken record much?*, in which the construction takes the role of a turn-construction unit in a dialogue. Another parallel between the two examples concerns the morpho-syntactic form of the initial element, which is a bare nominal in the first case and a non-inflected verb in the second. As will be discussed below, the absence of determiners and inflectional affixes is not a coincidence. In sum, then, the spontaneously produced example has several features in common with the dialogical example, but we already begin to see that the construction exhibits some gradience with regard to its formal and functional features. The following paragraphs will explore this variation in more detail. As a point of entry, Figure 1 offers a schematic view of the sequential structure of the construction. Optional components are shown in grey, obligatory ones in black.

Antecedent	Expressive	Addressee	Anaphoric	Pivot	Insult/Emoji
			Broken record	much?	
			Pander	much	jerk-off?
	Geeze,		angry	much?	
	Wow	Jersey …	bitter	much?	
			Damaged by high school	much?	:-P
	Oh my god,		up your own ass	much?	

Figure 1. Schematic structure of *sarcastic much?*

The *sarcastic much?* construction resembles pivot schemas that are well-known from constructional research on first language acquisition (Tomasello 2003). The pivot in this case is the adverb *much*, which is used in the construction with its meaning of 'a lot' or 'frequently'. This in itself is a canonical sense of *much* that is listed in most dictionaries of English.[5] In the context of *sarcastic much?*, however, that meaning is coerced into 'excessively', and a negative judgment is attached to it. Both Adams (2014:182) and Gutzmann & Henderson (2019:109) comment on this verdictive and evaluative nature of *sarcastic much?*. The semantic enrichment of *much* with verdictive meaning makes the *sarcastic much?* construction a case of subjectification in the sense of Traugott (2010:35), who defines this term in such a

---

5. For example see *OED Online*: Much, adv. B.1.h [http://www.oed.com/view/Entry/123133 ?rskey=kZAYIr&result=1&isAdvanced=false#eid, accessed 10.03.2018]

way that "meanings are recruited by the speaker to encode and regulate attitudes and beliefs". The critical attitude of the speaker would have emerged as a pragmatic implicature, but it has become conventionalized to such an extent that even uses of the construction that involve words with inherently positive meanings will take on a critical tone. For example, an utterance such as *Best friends much?* can be understood as a resentful remark, but not as a compliment. The GloWbE contains example (7) that further supports this observation.

(7)   I really have to ask this, what the hell is up with the heroine, Anastasia Steele? Why does she keep saying '*Oh my*' during sex? Come on, you're 21; never had sex, and you say '*Oh my*'? In this day and age? Really? And why does she have an inner goddess and a subconscious that wears (was it) winged shaped specs? Dumbledore much?

While the writer does not have anything critical to say about Dumbledore as a fictional character, the construction makes it clear that the writer is critical of presenting Anastasia Steele's inner self as a person who wears half-moon shaped spectacles in the style of Dumbledore. This critical meaning cannot be attached to any of the individual words, and so it is a non-compositional feature of the construction.

Gutzmann & Henderson (2019: 122) point out that the scalar meaning of adverbial *much* and the meaning of a critical attitude can be related to one another. They argue that an example such as *Rude much?* commits the speaker to the view that a behavior can be located on a scale of rudeness, where it exceeds an established normal value. As will be discussed in more detail below, this characterization accounts very well for many examples in our database. At the same time, we observe cases that call for a different analysis.

Moving on to the next element in the structural schema of *sarcastic much?*, the pivot of the construction is preceded by another obligatory component that we label here as the anaphoric judgment. The examples that have been discussed up to this point indicate that the speaker typically takes offence at an event or action, which is back-referenced in this part of the construction. As the examples in Figure 1 illustrate, this slot can accommodate different phrasal syntactic categories, including nominal, verbal, adjectival, and prepositional phrases. This variety is idiosyncratic: in canonical English syntax, combinations of nouns and adjectives with the scalar adverb *much*, such as **computer much* or **yellow much* do not occur. What explains these combinatorial possibilities in the construction is that the scalar meaning of *much* has, through subjectification, given way to a meaning that conveys a critical attitude in the context of the construction. Since *much* no longer encodes the scalar meaning 'a lot', the construction can feature elements as anaphoric judgments that are not inherently scalar, such as

broken record or *stereotype*, and also elements that are not inherently negative, such as *Dumbledore*. That said, our data from the GloWbE show a predominance of anaphoric judgments that are in fact negatively charged. Expressions such as *double standards, hypocritical, jealous, racist, angry*, and others vastly outnumber more neutral terms. This corroborates frequency counts from Adams (2014: 180), who lists the elements *jealous, pathetic, insane*, and *awkward* as typical adjectival uses.

Importantly, the syntactic variation in the anaphoric judgment slot does not indicate that the construction will accommodate anything. All of the following modifications of the examples above result in unacceptable utterances, as seen in (8).

(8) *A / The broken record much?
     *Panders / Pandered much, jerk-off?
     *Geeze, angrier / angriest / too angry much?
     *Could be damaged by high school much?
     *Up much?

Comparative adjectival forms (*angrier*) and excessives (*too angry*) cannot be used freely in the *sarcastic much?* construction, and also bare prepositions are unacceptable. These observations can be extended with regard to verb forms, which must not be inflected or modalized, and nominals, which must not have determiners. We argue that these restrictions have the same underlying motivation. What verbal inflections, modal auxiliaries, determiners, and comparative and superlative marking have in common is their participation in the English grounding system (Langacker 1987; Brisard 2002). As defined by Langacker (1987: 489), "[a]n entity is epistemically grounded if its location is specified relative to the speaker and hearer and their spheres of knowledge". Grounding elements thus serve to tie conceptual content to the actual speech situation that involves the speaker, the hearer, and their common context. Any such ties are prohibited in *sarcastic much?*, which indicates that the descriptor of the antecedent makes reference to generalizations, rather than specific situations. An utterance such as *Broken record much?* implies that the addressee's repetitive apologies are not just a gaffe, but rather a more general characteristic. Support for the notion that grounding predications cannot be used with *sarcastic much?* comes from the fact that uses with pronouns, demonstratives, or deictic adverbials are unacceptable, as is shown in (9).

(9) *She much?
     *That one much?
     *Yesterday much?

By contrast, inflections such as plural marking or adjectival modification do not pose a problem (*hypocrites much?, double standards much?*), since these markers are no grounding predications. Finally, also the unacceptability of bare prepositions finds an explanation with reference to grounding. An expression such as *up much?* would prompt the hearer to construct a spatial reference point for *up* in the speech situation, which amounts to grounding the utterance. In summary, the descriptor of the antecedent can take a variety of syntactic shapes, but it cannot involve grounding predications.

We now move on to a discussion of the antecedent of *sarcastic much?*. The examples above suggest that the construction back-references a previous statement or behavior that is open to criticism. In other words, the *sarcastic much?* construction is typically not used to start a conversation, but it rather occurs within the course of an ongoing interaction. Example (10) illustrates this.[6]

(10) "I take it back" he said. "I will be your anti-date. But that is all. So don't get any crazy ideas."
"Crazy ideas like what?"
"Like, don't get jealous when all the other girls at the party try to make out with me."
I scoffed. "Don't hold your breath, darling."
He paused. "Whoa. Did you just call me darling?"
"Um. Flatter yourself much?"

In the example, the first speaker produces several self-aggrandizing statements, which eventually prompt the second speaker to produce the utterance *Flatter yourself much?*. As in example (5) above (*broken record much?*), the speaker criticizes a behavior that is viewed as a general characteristic of the addressee. The dynamics between antecedent and anaphoric judgment motivate the fact that many authentic examples of the construction in the GloWbE involve an expressive or even the addressee's name before the anaphoric judgment, as shown in (11).

(11) Wow, rude much?
Get a grip, false equivalence much?
Christ, Dan, shit on your shoes much?
Jack, red herring much?
Nathan, bitter much?! It may time to see a shrink & let go of your anger.

---

6. The example is from the novel "The catastrophic history of you and me". The excerpt was retrieved from the following website: [https://books.google.ch/books?id=K3gMX0VxDKsC&printsec=frontcover&dq=The+Catastrophic+History+of+you+and+me&hl=fr&sa=X&ved=0ahUKEwi5rpqAp-HZAhWCCewKHTrHCNsQ6AEIKDAA#v=onepage&q=The%20Catastrophic%20History%20of%20you%20and%20me&f=false, date of access 10.3.2018]

Examples of this kind indicate that the target of criticism is typically a conversation partner. Meanwhile, other targets are possible, as can be concluded from examples (2) (*stereotype much?*) and (6) (*Pander much, jerk-off?*). We will return to the issue of gradience in the conversational antecedent in section 3.2 below.

As a last point concerning the formal characteristics of *sarcastic much?*, we still need to address the prosodic structure of the construction. Despite the fact that the construction has its natural habitat in written computer-mediated communication, there are regularities with regard to its use in speech. Figure 2 visualizes the pitch contours of examples (5) and (6). Both examples show a rise in intonation. It is interesting to note that in *Pander much, jerk-off?*, the rising intonation actually continues with the insult that follows the pivot, which motivates its status as part of the constructional unit. Gutzmann & Henderson (2019: 116) find rising intonational contours with other examples of the construction, and they remark that the rising prosody is connected to its discourse properties, as well as to the fact that in writing, the construction is typically used with a final question mark.
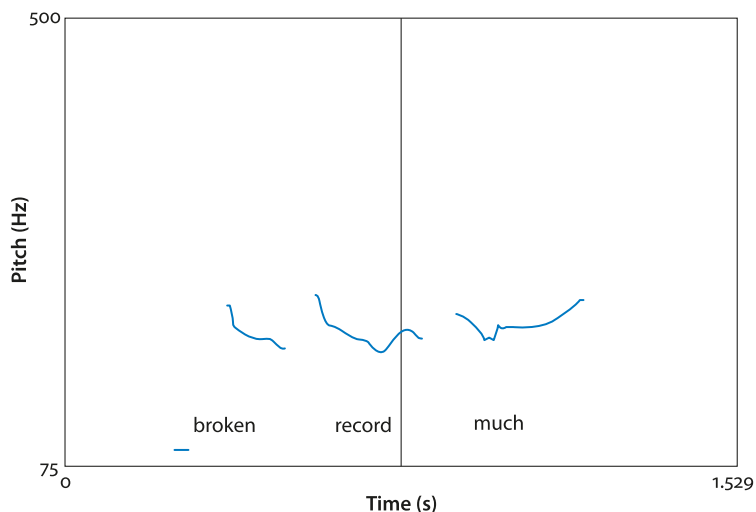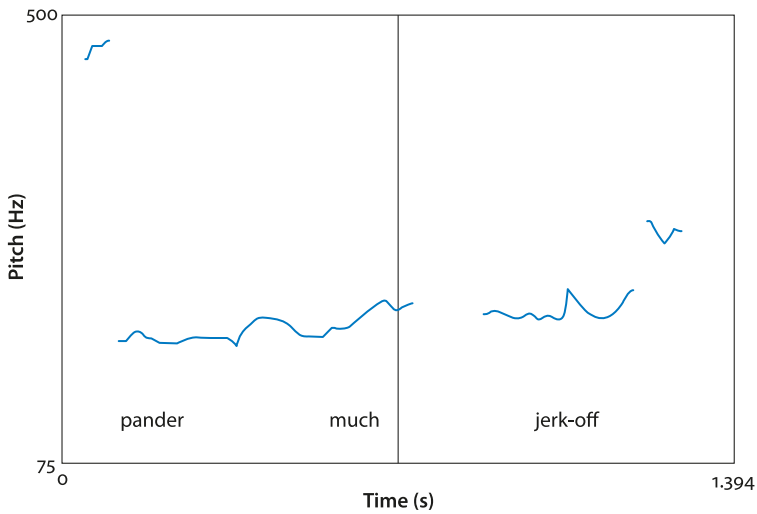
Figure 2. Prosodic contours of *sarcastic much?*

Summing up our observations about the formal and functional characteristics of *sarcastic much?*, we have proposed that the construction involves the pivot *much* and a preceding element that can take varying syntactic shapes and that anaphorically refers to an utterance or event that is viewed critically. Typically, and as argued by Gutzmann & Henderson (2019), the criticism targets an excess on a scale of conventional norms. This critical meaning has come about through subjectification and represents a holistic property of the construction. The obligatory elements of the construction can be preceded by expressives and the name of the addressee and they can be followed, optionally, by an insult. The peripheral elements of the construction are integrated with the obligatory elements under the same intonational contour, which exhibits a final rise.

3.   Gradience and constructional change in *sarcastic much?*

The preceding section has drawn a sketch of the *sarcastic much?* construction that has been focused on typical instances. This section will open up to the variation that can be observed in corpus data. Throughout the discussion, we will link variation and gradience to the question of how the current usage of the construction has emerged through constructional change.

3.1   Intersective gradience between questions and *sarcastic much?*

It is uncontroversial that typical uses of the *sarcastic much?* construction do not constitute requests for information (Gutzmann & Henderson 2019: 108) and yet, the construction shares a number of features with ordinary questions (Adams 2014: 178). This motivates a closer look into the mutual relation of *sarcastic much?* and interrogative speech acts. It will be argued that their relation is one of intersective gradience (Aarts 2007), so that both represent their own respective categories, which however show convergence with regard to a subset of their features (cf. Traugott & Trousdale 2010: 29).

A first piece of evidence that relates the two constructions lies in the fact that verbal examples of *sarcastic much?* show traits of the syntactic form and prosodic quality of ordinary questions. As has been argued above, verb forms in *sarcastic much?* are obligatorily non-finite. This is in line with the syntax of ordinary questions with either *do*-support (*Do you travel much?*) or subject-auxiliary inversion (*Will it change much?*). An account of *sarcastic much?* as deriving from elliptical questions would predict that *ing*-forms should be attested, since there are questions such as *Are you exercising much?*, and in fact the GloWbE contains examples of this kind – see (12).

(12)   Okay … projecting much?
       Seriously, sociopathic? Poisoning the well much?
       Enjoying your police state much?
       Get onto YouTube and have a look. Lacking the facts much?

Second, there are verbal examples that illustrate potential bridging contexts between ordinary requests for information and sarcastic commentary, as in (13).[7]

(13)   Procrastinate much? How 20 seconds could help keep you on task

Importantly, the news article from which this example is taken is not satirical but aims to offer practical advice to people who procrastinate too much. The lead-in is thus a bona fide question, which however has the full potential to be uttered as a criticism. We leave it open whether elliptical questions of this kind represent the origin of *sarcastic much?* or whether examples like (13) in fact exploit the existing formal similarities between the two construction types in order to create pragmatic ambiguity.

---

7. The example has been retrieved from the following website. [https://www.ctvnews.ca /procrastinate-much-how-20-seconds-could-help-keep-you-on-task-1.2544393, date of access: 2.3.2018]

A third point that *sarcastic much?* and ordinary questions have in common concerns their syntactic behavior. Gutzmann & Henderson (2019:112) observe that neither can occur in syntactically subordinate contexts and they argue that this behavior is due to similar pragmatic properties of the two construction types – see (14).

(14) *If broken record much, I'm going to leave.
      *I'm leaving, because broken record much?
      *I believe that broken record much?

This observation is in line with an observation by Lakoff (1987:476), who argues that "[o]nly speech act constructions that (directly or indirectly) convey statements can occur in performative subordinate clauses". Lakoff (1987:476) offers the examples in (15) as illustrations.

(15) I'm going to vote for Snurdley, because I maintain that he's the only honest
       candidate. (statement)
       I'm leaving, because isn't it a beautiful day? (statement)
      *I'm staying, because I order you to leave. (directive)
      *I'm leaving, because I ask you which girl pinched me. (directive)

Both *sarcastic much?* and questions are performative speech acts and neither has the primary function of making a statement, so that both should be ruled out in syntactically subordinate contexts.

Differences between *sarcastic much?* and questions concern the notions of answerability and recoverability. Whereas (non-rhetorical) questions are generally answerable, expressions such as *procrastinate much?* can be seen as borderline cases and examples such as *broken record much?* are clearly not answerable. With regard to recoverability, the data from the GloWbE show a continuum from examples that can be literally expanded into a full question to examples where such an expansion requires considerable interpretation. The examples in (16) illustrate this continuum, starting with the most literal expansion and ending with the most problematic one.

(16) Enjoying your police state much? Are you enjoying your police state much?
      Double standards much?   Do you have/adopt double standards much?
      Hormones much?   Am I influenced by my hormones much?
      Broken record much?   Do you repeat yourself much?
      Stupid Much?   You are stupid!

To summarize the points made in this section, *sarcastic much?* and questions share a number of features on several levels of structural organization, notably prosody, pragmatics, and syntax. Examples such as *procrastinate much?*, which

allow for a hybrid interpretation, suggest that the structural overlap is sufficiently strong for speakers to maintain links between the two construction types. Yet, the construction types show differences with regard to answerability and recoverability. Not all instances of *sarcastic much?* can be said to be elliptic since there are cases that cannot easily be expanded into an ordinary question.

3.2   Variation in the anaphoric judgment of *sarcastic much?*

Up to now in this chapter, we have restricted ourselves to discussing qualitative aspects of the examples we retrieved from the GloWbE. Table 1 below offers a quantitative perspective on our data and shows the most frequent elements that are found in the anaphoric judgment slot of the *sarcastic much?* construction.

Table 1. Frequencies of anaphoric judgment elements in *sarcastic much?*

Adjectives	n	Nouns	n	Verbs	n
jealous	30	hypocrite	15	project	7
bitter	19	double standards	13	overreact	6
paranoid	17	hypocrisy	11	generalize	5
desperate	10	troll	6	hate	3
angry	9	hidden agenda	5	read	3
excited	8	straw man	4	exaggerate	3
hypocritical	5	coincidence	4	obsess	3
creepy	5	stereotype	4	projecting	3
rude	5	partisan	4	fail	2
defensive	5	racist	4	judge	2

It is obvious that the construction is typically used with a negative semantic prosody. Nearly all of the items in Table 1 are inherently negative. Those elements that deviate from this tendency nonetheless convey highly critical meanings in the construction. A comment such as *Read much?* implies that the addressee does not read enough. In the data, we observe two different kinds of anaphoric judgment elements that are not inherently negative. The first of these is illustrated by elements such as *Dumbledore*, which features in example (7). As with *read*, there is nothing inherently negative about *Dumbledore* but the element evokes, and stands for, an antecedent that is viewed critically. Examples of this kind can thus be labeled metonymically negative. Example (17) below offers another illustration.

(17) It irks me the most when the characters are suppose[sic] to be Japanese but they have a Chinese cast (familiar much?) or when the film have [sic] German characters, they have an all-American cast muttering German here and there (familiar much?).

In this example, the writer takes issue with the representation of Japanese movie characters by Chinese actors and implies that this is commonly done. The adjective *familiar*, which by itself is not negative, thus combines with the construction to yield a non-compositional negative meaning.

Another type of anaphoric judgment that we need to distinguish is neither inherently negative, nor evoking a critical meaning. In examples (18–21), we see uses of the construction that serve other pragmatic functions. Examples (3) and (4) are repeated here for convenience as (18) and (19).

(18) Still I kept at the classic literature because it was important to me that others respect my intelligence (damaged by high school much ?: -P). Naturally when I decided to write a novel, it came out as literary fiction.

(19) We have a few fixed points: a dinner here, a soccer football game there. Christmas in southern Germany, New Year's in Paris (jealous much ?!). But apart from that it's all pretty wibbly-wobbly.

(20) Both my mom and sister gave me this book on the night I went into labor with Emmy. Oh my goodness … I read it and was crying my eyes out. (Hormones much???) But it is such a sweet book and would make a perfect gift to bring to the hospital for someone.

(21) I will be keeping you up to date in the run up to Fashion Week … and then will be slap bang in the middle of the action during the event so that I can give you all the behind the scenes gossip and an idea of what goes on during a Fashion Week Event! EXCITED MUCH?! :o)

These examples have three traits in common. First, all of them have been produced in monological settings, more specifically in the context of a blog entry. The text is thus directed at a readership that is not co-present in the speech situation. Second, the anaphoric judgment refers to the writer's own actions and not to someone else's. Third, in all examples, the *sarcastic much?* construction is orthographically off-set from the rest of the text, either through parentheses or capitals. This reflects the meta-textual function that these examples have. The respective authors comment on themselves; their comments range from self-reflection to self-deprecation and even mild bragging. Examples of this kind have, to the best of our knowledge, not been discussed by previous analyses of the construction. The examples above align with more canonical examples in that their antecedents are judged to be excessive on a scale that is contextually determined. For instance,

the writer of example (20) mocks herself for being overly tearful in response to a children's book. The distinction between inherently negative anaphoric judgments, metonymically negative ones, and meta-textual ones will be taken up again in section 3.4, in which we discuss the development of *sarcastic much?* towards an alignment-seeking function.

3.3   From dialogical to context-free

The examples of *sarcastic much?* that have been discussed up to now have in common the fact that the speaker or writer is reacting to an external event that we have termed the antecedent. The antecedent is framed by the construction as a behavior that is open to criticism or mockery. We have discussed different types of antecedent, including events that are associated with the addressee (i.e. making inappropriately rude comments), events that relate to a third party (pandering to potential voters), and events that pertain to the speaker or writer (crying over a children's book). We have argued that the presence of an antecedent in the prior linguistic context is a necessary and obligatory part of the construction. This argument could be challenged on the basis of examples of *sarcastic much?* that we present in this section. Contrary to what we have been arguing so far, the construction can be used to initiate a linguistic interaction, as is evidenced by uses of the construction in the headlines of blog posts, the titles of online forum discussions and YouTube videos, and even episode titles in TV series. The example in (22) is a microblog post that features, below the main text, photographs of an actress and a male athlete. The actress is wearing an evening gown; the athlete is shown with a bare torso.[8]

(22)   Title: Double standards much?
       Text: Both subjects are Mormon. One was villified [sic] for their choice of
                clothing (or lack thereof) on social media. The other one, [sic] was
                not given a second thought. Can you guess which is which?

The use of *sarcastic much?* in discussion-initiating contexts is parasitic on the typical, dialogical use in that it invites the reader to think of a possible antecedent. In the example above, the use of the construction is directly followed by a description of the antecedent and the visual material that prompted it. The construction is thus not dependent on a prior context, but it can invoke that prior context and make it relevant for discussion. The writer's critical attitude towards the antecedent is not expressed in the main text, but solely in the title.

---

8.   The example has been retrieved from the following website: [https://imgur.com/RBAXhPg, date of access: 8.3.2018].

Another example that works in this way is shown in (23) below, which consists of the title of a YouTube video and the first sentence that is spoken in the video.[9]

(23)   Title: Presumptuous much??
        Text: Hi! I always answer without listening to questions.

The video goes on to describe the narrator's presumptuous behavior in a self-deprecating way. This behavior does not have any prior relevance to the viewer of the video, who thus cannot know a priori what the title *Presumptuous much??* reacts to. Yet, the title succeeds in leading the viewer to expect that its antecedent will be revealed in the upcoming discourse. The expressions *Double standards much?* and *Presumptuous much?* fall squarely within the typical usage of the construction and are thus easily recognizable as critical reactions towards an offensive behavior. This makes them particularly suitable for uses that do not depend on a prior context, but that rather select and set up a new topic for discussion. Since these examples are not in need of a shared antecedent, we use the label context-free to describe them. An extreme context-free example, in which the construction is used in the episode title of a cartoon TV series, is shown below.[10]

(24)   Title: Evil ice cream man much?
        Text: An evil ice cream man, enraged that his family business has been driven to bankruptcy by customers' changing tastes in dessert [sic], makes a special ice cream that contains fero-acko and can freeze anyone or anything it touches.

The viewers of the episode do not have any prior knowledge of its contents, and so they can only infer from the title that someone will take offence at the behavior of an ice cream vendor. As in the previous example, the construction serves to spark curiosity about a topic rather than to provide a response to a known antecedent.

What these examples show is that the interpersonal dynamics of *sarcastic much?* has conventionalized to such a degree that writers can exploit it for rhetorical purposes. Traugott (2010: 35) defines markers of intersubjectivity as forms that "encode meanings centered on the addressee". We argue that context-free *sarcastic much?* conveys such intersubjective meaning. The addressee is prompted to look for an element in the discourse that could have led the writer to produce an instance of the *sarcastic much?* construction.

---

9.   The example has been retrieved from the following website: [https://www.youtube.com/watch?v=H3O1tcqVYuU&t=16s, date of access: 8.3.2018]

10.   The example has been retrieved from the following website: [http://totallyspies.wikia.com/wiki/Evil_Ice_Cream_Man_Much%3F, date of access: 8.3.2018]

3.4   From confrontation to solidarity

A second issue relating to the intersubjective nature of the *sarcastic much?* construction concerns the writer's attitude towards the addressee. As has been illustrated above, this attitude is quite often very critical. In our data, however, we observe uses with a different intersubjective function, in which the writer does not aim for confrontation but is seeking the solidarity and alignment of the addressee. Gutzmann & Henderson (2019) comment on this issue and offer the following (constructed) example as an illustration of how *sarcastic much?* can solicit the alignment of the hearer.

(25)   [A man across the street is yelling at a cab as it pulls away.]
     A: Angry, much?
     B: I know, right!?

In the words of Gutzmann & Henderson (2019:128), speaker B's response indicates "agreement with the first speaker, not just in truth-conditional terms […], but also in expressive terms, i.e., the use of the exclamative is expressively correct in the context". What is crucial here is that *sarcastic much?* is still used to express criticism, which however is directed at a third party, with the intention of prompting the agreement of an addressee. Speaker A in (25) solicits moral support from speaker B, who then provides it.

A real-life example of this type of intersubjective use of the construction has been presented in example (6) above, which is repeated as (26) here for convenience.

(26)   When your job is to try to relate to people? You know, when your job is to try
     to come off as honest and … and forthcoming, and this is me, like I'm levelling
     with you and I'm gonna be your leader, uh-but in order for you to trust me, I
     have to be honest with you at who I am?
     I just feel like it's … it's so disingenuous … to wear an everyman watch.
     If we saw Donald Trump tomorrow, in Timberlands and and jeans, and a …
     and a dirty white shirt, you know, and a G-Shock in a coal-mining town, we'd
     be like c'mon, y-you know really … Pander much, jerk-off?
     You know, so … a-and … so that principle kind of stands.

As in Gutzmann & Henderson's example, the speaker is not talking to the party that is criticized, but rather, he is talking to an audience. A closer look at the transcript reveals that in the lines leading up to *Pander much, jerk-off?*, the speaker switches from a first person singular perspective (*I just feel like*) to a first person plural perspective (*If we saw Donald Trump tomorrow, we'd be like*). This is in line

with the interpretation that the speaker invites the audience to become complicit in his critical assessment.

Based on this observation, we would like to take Gutzmann & Henderson's argument one step further. Once the intersubjective function of seeking alignment has been established as a conventionalized meaning of *sarcastic much?*, the subjective component of the speaker's critical attitude can actually fade from its meaning. The primary function here is the writer's attempt to connect with the addressee. Example (27), which is a comment on a YouTube video, offers an illustration of this.[11]

(27)

bleeddean1989 1 day ago
Steve Vai much? Lol

👍 3 👎 ❤ REPLY

Hide replies ⌃

Cameron Cooper 1 day ago
Oh yeah! ;)

👍 👎 REPLY

The video shows a musician playing a difficult piece on an electric guitar. The comment *Steve Vai much? Lol* points out that the playing is done in the style of Steve Vai, a well-known guitar player. The comment is actually a tightrope act between compliment ('You can play like Steve Vai') and mockery ('This is a poor attempt to sound like Steve Vai'), it could be understood as either. The second interpretation would be more in line with most examples that have been discussed in this chapter. Yet, the musician's reactions, i.e. liking the comment and adding a positive reply, make it clear that the first interpretation wins out. The commenter and the musician bond over their shared expertise.

Similar to (27), the examples in (18) to (21) that were presented above merit a second look in the context of the intersubjective function of alignment-seeking. Example (21) is repeated as (28) here for convenience.

(28)   I will be keeping you up to date in the run up to Fashion Week ... and then will be slap bang in the middle of the action during the event so that I can give you all the behind the scenes gossip and an idea of what goes on during a Fashion Week Event! EXCITED MUCH?! :o)

Given that the writer comments on herself, the construction could be construed as an act of self-deprecation here. What is more likely, however, is that the writer uses the construction as a means of engaging the audience, thereby making her own excitement more intersubjective.

---

11.   The example has been retrieved from the following website: [https://www.youtube.com/watch?v=GzszXr_7F4E, date of access: 8.3.2018]

To summarize this section, we observe examples of *sarcastic much?* that populate a continuum of different intersubjective functions, ranging from uses that express biting sarcasm to uses that prompt solidarity. How did the construction manage to evolve from one meaning to another that is completely opposed to the first? We argue that examples such as *Pander much, jerkoff?* in (28) serve as bridging contexts. In contexts where speaker and addressee bond over a criticism that is directed at a third party, the intersubjective function, i.e. solidarity between speaker and addressee, can hold sway over the formerly central subjective function, i.e. a negative attitude on the part of the speaker. Once solidarity is established as a conventional meaning, the construction can expand into contexts in which criticism is no longer at issue.

4.   Constructional change in *sarcastic much?*

This section will draw together our empirical observations from the previous sections and relate them to the notions of constructionalization and constructional change. Constructionalization, the emergence of new constructions in a constructional network, is defined as follows by Traugott & Trousdale (2013: 22): "Constructionalization is the creation of form$_{new}$-meaning$_{new}$ (combinations of) signs. It forms new type nodes, which have new syntax or morphology and new coded meaning, in the linguistic network of a population of speakers."

Based on the discussion in this chapter so far, it would seem that the *sarcastic much?* construction is a clear case of a new form-meaning pair that differs both with regard to morpho-syntax and with regard to meaning from other generalizations that exist in the grammar of English. What is less clear is at which point in its development the *sarcastic much?* construction can be said to have undergone constructionalization. Börjars et al. (2015: 27) point out that determining the moment at which a new form-meaning pair comes into being is more of a subjective choice than an objective discovery. The observation that a given linguistic unit differs in structure and meaning from another, pre-existing unit involves choosing that pre-existing unit as a reference for comparison. Hilpert (2018: 28) illustrates this point with the semantic and syntactic development of the English verb *confirm* and argues that processes of constructional change can yield the appearance of constructionalization, so that constructional change and constructionalization are rendered indistinguishable. To see whether and how the notions of constructional change and constructionalization can be applied to the development of *sarcastic much?*, the following paragraphs will sketch the steps that have given rise to the current observable usage of the construction.

The question whether expressions such as *angry much?* ultimately derive from full-fledged questions is not one that we will comment on in this chapter.

What we have pointed out is that *sarcastic much?* and questions share several functional and formal features, which motivates the idea that speakers entertain cognitive links between the two construction types. Ordinary questions can be elliptical and they can be used with the pragmatic function of challenging or teasing the addressee, so regardless of the actual historical development of *sarcastic much?*, a present-day speaker might parse the expression *angry much?* as an elliptical question, which would then not be a new construction but, rather, a construct that instantiates an existing generalization.

The moment at which *sarcastic much?* is demonstrably different from other existing constructions is when the critical attitude of the speaker has become a conventionalized part of its meaning pole. We have described this process above with reference to the notion of subjectification (Traugott 2010). Evidence for the idea that the speaker's critical attitude has become part of the constructional meaning is provided by expressions such as *Dumbledore much?*, which we have called metonymically negative. The words in such expressions are not inherently negative. The negative attitude is conveyed by means of the construction's noncompositional meaning. While examples of this kind clearly reflect an innovation, they do not allow the conclusion that constructionalization has occurred. In fact, Traugott & Trousdale (2013: 22) point out that "[f]ormal changes alone, and meaning changes alone cannot constitute constructionalization". This means that some formal change would need to be attested before it can be established that *sarcastic much?* has undergone constructionalization.

A development that in our view qualifies as a formal change is the process that we have described in section 3.3 above, namely, the emergence of examples that do not react to an antecedent in the prior context but that set up a topic for discussion. We referred to this change as a development from dialogical to context-free uses of the construction. Importantly, this change is not a change in the morphosyntactic or phonological structure of an utterance such as *double standards much?*, and so it might not be regarded as a formal change if a narrow sense of that term is adopted. However, if we seriously engage with the proposal to make construction grammar more sensitive to dialogical structure (Brône & Zima 2014; Imo 2015), it would seem that this is an innovation that alters the formal side of the construction. If this change is viewed as pertaining to language form, we would now be in a position to assert that constructionalization has taken place.

Another substantial change in the meaning of *sarcastic much?* that we have discussed reflects its progressive intersubjectification (Traugott 2010), specifically its development towards uses with an alignment-seeking function. We have argued that the subjectified meaning of a critical attitude can recede in such contexts. In Traugott and Trousdale's framework, this development could be seen as a post-constructionalization change (2013: 27). However, we note that

alignment-seeking uses of the construction only occur in response to antecedents in the prior context. In other words, if it cannot be established that confrontational *angry much?* is a new construction and if that same expression can be used in a new context to seek alignment with the addressee, then we might be simply dealing with a chain of two sequential meaning shifts.

These observations give further weight to the argument of Börjars et al. (2015), who discuss the difficulty of selecting the appropriate reference point for a subsequent analysis of constructionalization. The problems of distinguishing between constructionalization and constructional change are compounded when the observable changes concern different aspects of the construction, so that some innovations occur in mutual isolation of each other. In the case of *sarcastic much?*, the emergence of context-free uses and the emergence of alignment-seeking uses illustrate such different developments.

5.   Concluding remarks

Construction Grammar has been challenged to pay more attention to dialogical structures. Aiming to address this challenge, this chapter has offered a qualitative corpus-based analysis of the *sarcastic much?* construction. We have discussed the formal and functional characteristics of the construction with the specific goal of analyzing its usage with regard to subjectivity and intersubjectivity. Data from the GloWbE indicate that changes are underway that can be analyzed in terms of intersubjectification (Traugott 2010). The construction has been extended from confrontational uses, which have been documented in the literature (Liberman 2010; Adams 2014; Gutzmann & Henderson 2019), to uses that we call alignment-seeking.

The wider implications of our study relate to the question of how changes in dialogical characteristics of linguistic units should be accounted for in Diachronic Construction Grammar. Traditionally, the focus of studies in Diachronic Construction Grammar lies on changes in form and meaning. The importance of interpersonal meanings has been recognized for a long time, notably in Systemic Functional Linguistics (Halliday & Matthiessen 2004), from which important lessons have been incorporated into constructional research. With regard to form, the focus in most studies is still firmly on morphosyntax. A broader perspective, which includes aspects of interaction under the umbrella of linguistic form, has been called for in order to incorporate aspects such as multimodality, prosody, and interactional routines (Imo 2015). Phenomena such as the development of *sarcastic much?* can only be fully understood if these aspects are taken into account. There are many more constructions that deserve to be studied with

regard to their interactional specificities. Given the wide availability of dialogical data through video recordings or computer-mediated communication, studying these constructions on a larger scale has become a realistic objective that construction grammar should take on squarely in the years to come.

References

Aarts, B. (2007). *Syntactic gradience: The nature of grammatical indeterminacy*. Oxford, UK: Oxford University Press.

Adams, M. (2014). Slang in new media. A case study. In J. Coleman (Ed.), *Global English slang. Methodologies and perspectives* (pp. 175–186). London: Routledge.

Börjars, K., Vincent, N., & Walkden, G. (2015). On constructing a theory of grammatical change. *Transactions of the Philological Society*, 113(3), 363–382. https://doi.org/10.1111/1467-968X.12068

Brisard, F. (Ed.) (2002). *Grounding. The epistemic footing of deixis and reference*. Berlin: Mouton De Gruyter. https://doi.org/10.1515/9783110899801

Brône, G., & Zima, E. (2014). Towards a dialogic construction grammar. A corpus-based approach to ad hoc routines and resonance activation. *Cognitive Linguistics*, 25(3), 457–495. https://doi.org/10.1515/cog-2014-0027

Bybee, J.L. (2010). *Language, usage, and cognition*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511750526

Davies, M. (2013). *Corpus of global web-based English: 1.9 billion words from speakers in 20 countries (GloWbE)*. Available online at http://corpus.byu.edu/glowbe/

Deppermann, A. (2011). Konstruktionsgrammatik und Interaktionale Linguistik: Affinitäten, Komplementaritäten und Diskrepanzen. In A. Lasch & A. Ziem (Eds.), *Konstruktionsgrammatik III. Aktuelle Fragen und Lösungsansätze* (pp. 205–238). Tübingen: Stauffenburg.

Diessel, H. (2015). Usage-based construction grammar. In E. Dabrowska & D. Divjak (Eds.), *Handbook of cognitivelinguistics* (pp. 295–321). Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110292022-015

Fillmore, C.J., Kay, P., & O'Connor, M.C. (1988). Regularity and idiomaticity in grammatical constructions: The case of Let alone. *Language*, 64(3), 501–538. https://doi.org/10.2307/414531

Goldberg, A. (1995). *Constructions: A construction grammar approach to argument structure*. Chicago: University of Chicago Press.

Goldberg, A. (2006). *Constructions at work: The nature of generalization in language*. Oxford: Oxford University Press.

Gutzmann, D., & Henderson, R. (2019). Expressive updates, much? *Language*, 95(1), 107–135. https://doi.org/10.1353/lan.2019.0014

Halliday, M.A.K., & Matthiessen, C. (2004). *An introduction to functional grammar*. 3rd ed. London: Hodder Arnold.

Hilpert, M. (2013). *Constructional change in English: Developments in allomorphy, word-formation, and syntax*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139004206

Hilpert, M. (2017). Historical sociolinguistics and construction grammar: From mutual challenges to mutual benefits. In T. Säily, A. Nurmi, M. Palander-Collin, & A. Auer (Eds.), *Exploring future paths for historical sociolinguistics* (pp. 217–237). Amsterdam: John Benjamins. https://doi.org/10.1075/ahs.7.09hil

Hilpert, M. (2018). Three open questions in diachronic construction grammar. In E. Coussé, P. Andersson, & J. Olofsson (Eds.), *Grammaticalization meets construction grammar* (pp. 21–39). Amsterdam: John Benjamins. https://doi.org/10.1075/cal.21.c2

Hilpert, M. (2019). *Construction grammar and its application to English.* 2nd edition. Edinburgh: Edinburgh University Press.

Imo, W. (2015). Interactional construction grammar. *Linguistics Vanguard*, 1(1), 69–78. https://doi.org/10.1515/lingvan-2015-0008

Kristiansen, G. (2008). Style-shifting and shifting styles: A socio-cognitive approach to lectal variation. In G. Kristiansen & R. Dirven (Eds.), *Cognitive sociolinguistics. Language variation, cultural models, social systems* (pp. 45–90). Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110199154.1.45

Kristiansen, G., & Geeraerts, D. (2013). Contexts and usage in cognitive sociolinguistics. *Journal of Pragmatics*, 52, 1–4. https://doi.org/10.1016/j.pragma.2012.12.017

Lakoff, G. (1987). *Women, fire, and dangerous things. What categories reveal about the mind.* Chicago: University of Chicago Press. https://doi.org/10.7208/chicago/9780226471013.001.0001

Langacker, R. W. (1987). *Foundations of Cognitive Grammar: Theoretical prerequisites.* Vol. 1. Stanford: Stanford University Press.

Liberman, M. (2010). X much. <http://languagelog.ldc.upenn.edu/nll/?p=2836>, date of access: 8.3.2018]

Michaelis, L. A., & Feng, H. (2015). What is this, sarcastic syntax? *Constructions and Frames*, 7, 148–180. https://doi.org/10.1075/cf.7.2.01mic

Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition.* Cambridge, MA: Harvard University Press.

Traugott, E. Closs. (2010). Revisiting subjectification and intersubjectification. In K. Davidse, L. Vandelanotte, & H. Cuyckens (Eds.), *Subjectification, intersubjectification, and grammaticalization* (pp. 27–70). Berlin: De Gruyter Mouton.

Traugott, E. Closs, & Trousdale, G. (2010). Gradience, gradualness, and grammaticalization – how do they intersect? In E. Closs Traugott & G. Trousdale (Eds.), *Gradience, gradualness, and grammaticalization* (pp. 19–44). Amsterdam: John Benjamins. https://doi.org/10.1075/tsl.90.04tra

Traugott, E. Closs, & Trousdale, G. (2013). *Constructionalization and constructional changes.* Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199679898.001.0001

Zappavigna, M. (2012). *Discourse of Twitter and social media.* London: Continuum International Publishing Group.

Ziem, A. (2015). Probleme und Desiderata einer Social Construction Grammar. In A. Ziem & A. Lasch (Eds.), *Konstruktionsgrammatik IV. Konstruktionenalssoziale Konventionen und kognitiveRoutinen* (pp. 1–22). Tübingen: Stauffenburg.

From construction grammar to embodied construction practice[*]

Sabine De Knop
Université Saint-Louis Bruxelles

In recent years, foreign language pedagogy has recognized the need to focus on larger meaningful sequences of words and on communicative goals. Construction grammar (CxG) has a number of assets to address these issues. First, with the postulate of meaningful schematic templates, CxG makes it possible to establish a structured inventory of abstract constructions. In this chapter, this is illustrated by the inventory of German constructions with the preposition *bis* 'up to, until'. Second, constructions, having a certain degree of schematicity, are particularly suitable to be practiced as whole sequences. Interactive activities based on 'embodied teaching and learning' can help foster the entrenchment of constructions.

Keywords: applications of construction grammar, foreign language teaching, foreign language learning, construction practice, embodiment, German preposition *bis* 'up to/until'

1. The learning of patterns

The focus on larger sequences in foreign language teaching (FLT) has a long tradition. Already in 1945, Fries, and later his student Lado (1957), drew on insights from behaviorist psychology with its stimulus-response model to develop an innovative teaching method based on the learning of so-called 'patterns'. This new approach was motivated by the need of American troops being sent to Europe in World War II to learn foreign languages very quickly in order to be able to communicate with the Europeans in basic terms. Before the behaviorist turn, foreign language learning (FLL) mainly consisted in the acquisition of vocabulary lists and grammar rules with some examples detached from their

---

[*] An earlier version of this article was published as part of a special issue in *Constructions and Frames* 12(1). https://doi.org/10.1075/cf.00037.kno

communicative setting. FLT often focused on translation exercises. Lado & Fries' (1961) 'English pattern practice' has to be understood as a reaction to the translation approach. The practice of patterns was supported by the parallel development of technical appliances. It took place in language laboratories and therefore has also been known as the 'audiolingual method'. Lado and Fries' approach aimed at habit formation with drills of so-called 'language patterns'. These were defined as "the significant framework[s] of the sentence" (Lado & Fries 1961: xv) with lexical elements conceived as slot-fillers. To give an example, in a simple question pattern with the verb *do*, like e.g. *Do you see the train?*, the lexeme *train* should be replaced by *ship, car*, or *truck*. With the repetition of the pattern and the substitution of lexemes, learners were expected to practice and internalize the new patterns. Accordingly, the structure of the English language was conceived in terms of word classes in which lexemes could be substituted in the same paradigm. The idea behind this method was that learning could be influenced by "inducing the correct behaviour" (Politzer 1961: 2).

After the initial enthusiasm for this new method and the innovative environment in language laboratories, Lado and Fries' approach was soon criticized. Central to the pattern practice was the idea of a mechanical process of "habit formation" (Ellis 1990: 27), simply based on repetition and substitution. "For learning to be effective habits had to become automatic" (Ellis 1990: 23). But the major critique was that "[i]t is entirely possible to teach the major patterns of a foreign language without letting the student know what he is saying" (Politzer 1961: 19). As a consequence of this approach, learners did not link patterns to a specific meaning and were not able to produce sentences, let alone to interact with each other in a productive way. Moreover, the patterns they learned were often non-authentic sentences detached from their communicative setting (compare also Nunan 1991; Savignon 2000). The audiolingual method further developed and focused on error (Corder 1967) and contrastive analysis (among others with Wardhaugh 1970), with the aim to identify the patterns which were likely to cause learning difficulties (Ellis 1990: 25).

And yet, Lado and Fries' focus on larger sequences has inspired FLT and numerous new studies elaborated on their insights. Vocabulary learning became conceived as 'collocation learning' (Hausmann 1984), that is the learning of habitual larger sequences. Wong-Fillmore's (1976) was the first study to have demonstrated that prefabricated patterns play a major role in the acquisition of English as a foreign language by young Spanish-speaking children. Since then, several studies have dealt with the role of larger sequences in FLT or FLL, with a different terminology. Nattinger & DeCarrico (1992: 114) describe the advantage for FLT and FLL of so-called 'lexical phrases': they are learned as a whole and because they are embedded in communicative situations they can be memorized and then retrieved more easily. This offers learners the possibility to interact with other par-

ticipants in communication. With more advanced learners, lexical phrases can be segmented into smaller meaningful units. With the next step, one can "introduce the students to controlled variation in these basic phrases with the help of simple substitution drills, which would demonstrate that the chunks learnt previously were not invariable routines but were instead patterns with open slots" (Nattinger & DeCarrico 1992: 117). This approach is in line with Lado and Fries' view and with Pawley & Syder's (1983) earlier insight about the knowledge of a language:

> Fluent and idiomatic control of a language rests to a considerable extent on knowledge of a body of 'sentence stems' which are 'institutionalized' or 'lexicalized'. A lexicalized sentence stem is a unit of clause length or longer whose grammatical form and lexical content is wholly or largely fixed. [...] In the store of familiar collocations there are expressions for a wide range of familiar concepts and speech acts, and the speaker is able to retrieve these as wholes or as automatic chains from the long-term memory.   (Pawley & Syder 1983: 191–192)

Wray (2002: 192) prefers the term 'formulaic language', she goes one step further when she claims that "success in second language is heavily dependent on the ability to learn sequences". Handwerker (2008) and Handwerker & Madlener (2006) stress the need to teach in 'chunks'. In section 3.3 we propose some concrete ideas to implement this.

The advent of construction grammar (CxG) brought new perspectives with the concept of 'construction' and its application to FLT and FLL – see, among others, Ellis & Cadierno (2009), Ellis & Ferreira-Jr. (2009a, 2009b), or Robinson & Ellis (2008). Most studies are based on Goldberg's model (1995, 2006), which defines constructions as conventional form-meaning mappings with different degrees of abstractness and open slots which have to be filled. In that sense, constructions differ substantially from the patterns defined by Lado & Fries (1961) as they have a meaning of their own, even at a more abstract level. Instantiations of constructions are linked to more abstract constructions by semantic inheritance links, i.e. polysemy, metaphor, part-of- or instance-of-relation. To assume that languages consist of meaningful constructions constitutes a useful asset for the teaching and learning of foreign structures. Learners can infer the meaning of new constructional instantiations from their knowledge of the meaning of the abstract constructions. The present contribution aims at illustrating and showing how the CxG model can foster FLT and FLL. To do so, it describes an application field in German which constitutes a challenge for foreign learners (section 2). First, it focuses on examples of constructions with the German preposition *bis* 'up to/until', which have been collected in the core corpora of the Digitales Wörterbuch der Deutschen Sprache (DWDS) and the Deutsches Referenzkorpus (DeReKo) of the Institut für Deutsche Sprache (IDS) in Mannheim. But having learned some patterns or constructions does not guarantee that learners are able to use them

in a productive way. Practice is needed. Section 3 deals with the design of some interactive activities for construction practice. Cognitive linguistics claims that concepts and conceptualizations are the result of embodiment. It is surprising that FLT has not much exploited this insight for the development of a more adequate teaching methodology. We aim to fill this gap in the third section. Finally, section 4 draws some conclusions and summarizes how CxG and cognitive linguistics (CL) views on embodiment turn out to be complementary frameworks for fostering FLT.

2.   Assets of construction grammar for FLT/FLL

As discussed in Gilquin & De Knop (2016: 5), several studies – see Baicchi (2013), Bencini & Goldberg (2000), Gries & Wulff (2005, 2009), Liang (2002), Valenzuela Manzanares & Rojo López (2008) – have shown that "learners from different mother tongue (L1) backgrounds and different proficiency levels have some mental representation of various constructions, just like native speakers". In the volume by De Knop & Gilquin (2016), some chapters demonstrate that learners indeed do have constructions in the foreign language (L2) (Baicchi 2016; De Knop & Mollica 2016) but that their knowledge of the L1 constructions can function as an obstacle when learning the foreign language (Della Putta 2016). In the present contribution, we do not want to discuss this claim in more detail but we focus more on the added value of CxG for teaching methodology by way of exemplification with German constructions with the preposition *bis* 'up to/until'.

2.1   Syntactic variety of German constructions with *bis*

The use of prepositions in a foreign language often constitutes a challenge for learners. In spite of a similar meaning in L1 and L2, they can differ in the underlying conceptualization and the categories they reflect. In their contrastive study on lexicalization patterns in English and Korean, Choi & Bowerman (1991) show how similar prepositions in both languages are distributed differently in similar contexts in L1 and L2 (see also Bowerman's 1996 cross-linguistic analysis of spatial prepositions in English, Spanish, Dutch, and Finnish). This observation also applies to the German preposition *bis* 'up to/until' and its counterparts in other languages. To start with, let us look at a few examples.

(1)   *Wir fahren bis   Paris.*
       we drive up.to Paris
       'We drive to Paris.'

(2) *Bitte   laufe bis   dorthin und nicht weiter!*
     please run   up.to there   and not   farther
     'Please do not run farther than that point!'

(3) *Es hat bis   heute nur geregnet!*
     it   has up.to today only rained
     'It has rained till today.'

(4) *Wir fahren bis   an den See.*
     we   drive   up.to at the lake
     'We drive up to the lake.'

(5) *Das Auto ist bis   in   den See gefahren.*
     the car   is up.to into the sea driven
     'The car has driven into the sea.'

(6) *Sie   fahren bis   an den See hinunter.*
     they drive   up.to at the lake downwards
     'They drive down to the lake.'

(7) *Sie   laufen bis   an den See hinauf.*
     they run   up.to at the lake upwards.'
     'They run up to the lake.'

These few examples illustrate a small sample of the syntactic variety and the combinatorial possibilities of the preposition *bis*. It can be used with a proper noun (1), an adverb (2) and (3), or with a nominal phrase introduced by a second preposition [PREP2], in examples (4) – (7). Sometimes, there is also a further pronominal adverb accompanying the prepositional phrase, e.g. *hinunter* 'downwards' in (6) or *hinauf* 'upwards' in (7). [PREP2] can be omitted if the noun in the nominal phrase is used without an article, i.e. when it is a proper noun, as illustrated in (1). The examples express the idea of a spatial or temporal stretch up to a limit with the implicit viewpoint of the speaker. The second preposition after *bis* expresses an additional orientational dimension, its selection depends on the conceptualization determined by the noun in the prepositional group. There are many possibilities: *bis an die Grenze* '(lit.) up to at the border', *bis ins Wasser* '(lit.) up into the water', *bis über den Kopf* '(lit.) up to over the head', *bis unter das Dach* '(lit.) up to under the roof', *bis hinter den Horizont* '(lit.) up to behind the horizon'), *bis zum Gartentor* '(lit.) up to the garden gate'.[1] The variety constitutes

---

1. As said before, the examples have been collected in the core corpora of the Digitales Wörterbuch der deutschen Sprache (DWDS) or in the DeReKo corpora of the Institut für Deutsche Sprache (IDS, Cosmas II) in Mannheim. If no reference is quoted, the examples come from the author's personal collection. Their correctness and use have been checked with native speakers.

a challenge for foreign language learners, especially when their mother tongue is not so differentiated, as can be seen from the translation of the above examples into English, for instance. Because the examples are form-meaning mappings, consisting of a prepositional phrase which expresses the meaning of spatial or temporal motion, they can best be described as constructions in the constructionist sense (see, among others, Goldberg 1995, 2006). In her first book (1995), Goldberg quotes non-compositionality as one of the defining conditions for considering a specific structure to be a construction. In her later study (2006), she revisits this principle and discusses the property of frequency. This means that constructions can also be compositional as soon as they are frequent enough. A quick look at corpus data brings to the fore the observation that this structure is frequent. On 31 October 2017, we looked up the preposition *bis* in the core corpora (press articles, scientific works, fiction, etc.) of the Digitales Wörterbuch der Deutschen Sprache (DWDS) for the time between 1900 and 1999 and we got 52 573 hits of a construction with this preposition followed by another preposition. As a result, we can claim that the prepositional phrase under study has the status of a construction.

The advantage of a study of structures with *bis* in terms of constructions consists in the possibility to define an abstract construction with its own meaning, which can have many instantiations linked to each other by so-called inheritance links. We will deal with these links in more detail in the following sections.

2.2   Semantic variety of German constructions with *bis*

The above list of examples illustrates different possible semantic uses of the construction introduced by the preposition *bis*. The most current one is spatial in nature, as e.g. examples (1), (2), or (4) – (7). But spatial motion is not the only meaning which can be conveyed by constructions with *bis*. Temporal meaning is also quite common, as in the following examples:

(8) *Große Spieler sitzen spät bis   in   die Nacht.*
great   players sit   late until into the night
'Great players sit till late at night.'   (Cosmas II: Ioo/DEZ.75273)

(9) *In Wien   tanzt   man gewöhnlich bis   zu Ostern*, *also bis   in   den April*
in Vienna dances one   usually   until to Easter i.e. until into the April
hinein.[2]   (DWDS)
within
'In Vienna, one dances usually until Easter, i.e. until April.'

---

2. *Hinein* is a pronominal adverb, see examples (6) and (7).

In its temporal use, *bis* can also simply combine with an adverb:

(10) *Bis bald!*
till soon
'See you soon!'

(11) *Bis später!*
till later
'See you later!'

The use of *bis* to express the temporal meaning 'until' is grounded in the metaphorical extension TIME IS SPACE (Evans 2003; Radden 2003). For Goldberg (1995, 2006), instantiations of constructions are linked to the abstract construction or to each other by so-called inheritance links. These include metaphorical extensions, polysemy, part-of relations, which correspond to metonymical extensions, or instantiation-of relations. As a consequence, examples with *bis* instantiating temporal semantics are linked to the abstract construction expressing spatial motion by metaphor. In this case, Goldberg (1995, 2006) postulates one and the same construction.

In the same way, instantiations with *bis* expressing fictive or subjective motion resulting from mental scanning are also linked to the abstract construction with *bis* by metaphorical extension:

(12) *Ich werde dich lieben bis in den Tod.* (DWDS)
I will you love until into the death
'I will love you even beyond the grave.'

(13) *Die Älteren sind motiviert bis unter die Haarspitzen.*
the elder are motivated up.to under the hair.ends.'
'The elderly are motivated right down to the tips of their hair.'
(Cosmas II: M02/FEB.10642)

(14) *Er ist konservativ bis in die Knochen.* (DWDS)
he is conservative up.to into the bones
'He is conservative to the core.'

Compared with the first set of examples (1) – (7) above, these instantiations are non-compositional constructions as their meaning is not simply the result of their constituents' meaning, they express intensity. The semantic extension is based on the conceptual metaphor ABSTRACT STATE IS LOCATION/MOTION. As can be observed with (13) or (14), often a body-part is used for the expression of a limit which is motivated by an anthropocentric view.

In combination with a prepositional phrase introduced by *auf* as [PREP2], the construction with *bis* can express opposite meanings, namely completion, total

inclusion vs. restriction or exclusion. Some examples for both categories are given in (15) – (18).

(15)   *Bis   auf einen haben alle Bewährungsstrafen   erhalten.*
        up.to on one   have   all   suspended.sentences received
        'Except for one, everybody received suspended sentences.'
<div align="right">(Cosmas II: RHZ00/JAN.07520)</div>

(16)   *…so dass alle bis   auf zwei lachten, statt   zu singen.*
        …so that all   up.to on two   laughed instead of sing
        '…so that all except two laughed instead of singing.'
<div align="right">(Cosmas II: K00/JAN.04437)</div>

(17)   *…ist der Saal   bis   auf den letzten Platz gefüllt.*
        …is the room up.to on the last   seat   filled
        '… the room is filled up to the last seat.'   (Cosmas II: A00/JAN.03295)

(18)   *Wir haben den Fleck bis   auf die letzte Spur entfernt.*
        we   have   the spot up.to on the last   trace cleared
        'We have cleared the spot down to the last trace.' (Cosmas II: A00/JAN.00484)

The construction with *bis auf* is polysemous as it can convey two different meanings. The disambiguation of both example categories can take place with the collexemes appearing with the prepositions. In (15) and (16), a numeral is used after *bis auf*, namely, *einen* 'one' (in the accusative case for the direct object) in (15), or *zwei* 'two' in (16).[3] Further in the sentence, the full-set quantifier (Radden & Dirven 2007: 121) *alle* 'all' is used to designate the group which is being restricted by the small subset expressed by the prepositional phrase introduced by *bis auf.* The last two examples do not express quantification but the meaning of a total inclusion or completion. The semantically relevant collexemes for the recognition of this sense are, e.g., *letzt* 'last' in (17) or (18).

2.3   Complex constructions with *bis* and directional adverbs

In the introductory list of examples above, two instantiations of more complex constructions with *bis* were quoted. For the sake of clarity, we repeat them here:

(19)   *Sie   fahren bis   an den See hinunter.*
        they   drive   up.to at the lake downwards
        'They drive down to the lake.'

---

3. In these examples, *einen* is a numeral and not an indefinite article, which can have the same form.

(20) *Sie   laufen bis   an den See hinauf.*
      they run   up.to at the lake upwards
      'They run up to the lake.'

The prepositional phrase introduced by *bis* has a more complex structure, as it contains a directional adverb as a postposition after the noun: *hinunter* 'downwards' or *hinauf* 'upwards'. Here, too, we are confronted with a large variety of possible directional adverbs, e.g. *heran, hinaus, hinein, hinweg*, etc., as illustrated below:

(21) *…schafften es die Knaben bis   auf den Sitz hinauf.*   (Cosmas II: A00/JAN.)
      …managed it the boys   up.to on the seat upwards
      '… the boys managed to get up to the seat.'

(22) *Getanzt wurde bis   in die Morgenstunden hinein.*
      danced was   until in the morning.hours within
      'People danced till the morning.'   (Cosmas II: A00/APR.26150)

(23) *…Handelsplatz für Textilien mit Beziehungen bis   über Europa hinaus*
      …trading.center for textiles   with connections up.to over Europe outwards
      'trading center for textiles with connections farther than Europe'
                                                          (Cosmas II: A00/APRI.26755)

The first part of the directional adverb expresses the vantage point of the speaker, either away from him/her (*hin*) or towards him/her (*her*). The second constituent of the directional adverb can duplicate [PREP2], in this case the semantics of the motion stretch is reinforced:

(24) *ein herrlicher Wanderweg bis   auf den Berg   hinauf*
      a   wonderful hiking.path up.to on the mountain on
      'a wonderful hiking path on the mountain'
                                                  (www.peterkamin.de/Harz/harz.htm)

(25) *Die Häuser reichen bis   ans   Wasser heran.*   (DWDS Kernkorpus)
      the houses stretch up.to at.the water   at
      'The houses go up to the water.'

In some cases, the directional adverb is composed of a preposition which differs from [PREP2], the postposition expresses the completion of a motion path, as illustrated in the above example (23) or in (26) below:

(23) *…Handelsplatz für Textilien mit Beziehungen bis   über Europa hinaus*
      …trading.center for textiles   with connections up.to over Europe outwards
      'trading center for textiles with connections farther than Europe'
                                                          (Cosmas II: A00/APRI.26755)

(26) *Sie will   auf ihn warten bis über den Tod   hinaus.*
      she wants on him wait   till over the death outside
      'She wants to wait for him forever, even beyond the grave.'

<div align="right">(Cosmas II: A01/AUG.24164)</div>

The noun in the prepositional phrase does not express the goal of motion, but one step on the path towards a goal.

Finally, the directional adverb can bring some complementary information or express some additional motion, for example as follows:

(27) *Am häufigsten   bringt das Wetter in der Winterzeit bei uns gegen   Ende*
      the most.frequently brings the weather in the winter.time at us   around end
      November erstmals Schnee bis   an den See hinunter,...
      November first   snow   up.to at the lake downwards...
      'Often in the winter, the weather brings the first snow down to the lake around the end of November.'   (Cosmas II: A00/MAR.16690)

In this complex example, one can imagine the speaker standing on a hill and looking down at the lake, saying that snow falls down to the lake. The expression of a complex event in this German example is realized mainly with so-called satellites like prepositions (*bis, an*) and the directional adverb composed of *hin* for the vantage point and *unter* for the motion downwards. By contrast, the following example is also possible, it expresses the opposite perspective:

(28) *Sie   laufen bis   an den See hinauf.*
      they run   up.to at the lake upwards
      'They run up to the lake.'

These examples illustrate the flexibility of the German language in motion expressions with prepositions, the large semantic and syntactic variety with the preposition *bis* and the need to focus on larger sequences for their interpretation. This applies more particularly to temporal and metaphorical instantiations which are non-compositional.

2.4 Morpho-syntactic description of German constructions with *bis*

Before we close the descriptive section on German constructions with the preposition *bis*, we want to deal with the morpho-syntax of the examples under discussion. The motivation for the description of morpho-syntactic aspects results from two observations: (i) German is a strongly inflectional language (Thieroff & Vogel 2011) with the use of cases for the different functions in sentences or phrases. This allows clear semantic distinctions. (ii) From the L2 learning perspective, the selection of cases is difficult. This applies particularly to German constructions with

the preposition *bis*. Grammar books of German or articles on German prepositions do not always deal with this difficulty – see, among others, the description on the use of prepositions in Carstensen (2000), Grießhaber (2009), or Lutzeier (1995). But when they do, they either offer rather vague information about the case to be used after *bis* (Klein 1991), or, even worse, the wrong explanations. For instance, the Duden-Grammatik (Eisenberg et al. 2009) claims that the selection of the right case is dependent on [PREP2], which is simply not true – as we show hereunder. A useful overview of the uses of *bis* can be found in Schröder (1986) or in Schmitz (1964). Although useful, these books do not explain the relationship and the motivation between the different uses of the preposition *bis*.

The selection of the proper case after *bis* and [PREP2] is grounded in the conceptual and semantic variety. Most prepositions after *bis* are the so-called 'two-way prepositions' (Serra-Borneto 1997; Smith 1995), which are used either with the dative or the accusative case. The selection of the proper case "must, at least partly, be due to constructional regularities which do not follow from the grammatical (formal and semantic) features of the prepositions alone" (Willems 2011: 329). Former studies have tried to explain the difference between both cases with concepts like dynamic event (which would justify the accusative case) vs. stative event (with the dative case) (see Carroll 2000; Draye 1996). Willems (2011), Rys et al. (2014), and Willems et al. (2018) do not find the dichotomy 'dynamic' vs. 'stative' adequate to explain the motivation behind the selection of the accusative vs. dative. Inspired by Paul's (1916–1920) grammar book and by Leys' (1989, 1995) studies, Willems (2011: 351) suggests to use their terminology, claiming that the accusative is used "when a spatial relationship to an object is being established", whereas the dative is preferred for an already established, existing relationship. The preposition *bis* implies a concrete, fictive or metaphorical path or a stretch and an incipient motion along this path towards a goal. As can be observed, in most examples with *bis*, the accusative is used:

(29) *Das Auto ist bis   in   den See gefahren.*
      the car   is up.to into the sea driven
      'The car has driven into the sea.'

(30) *Sie begleitete   die Mädchen bis   an die Tür   und blieb   dort,…*
      she accompanied the girls   up.to at the door and stayed there
      'She accompanied the girls to the door and stayed there,…'

                                              (Cosmas II: RHZ03/FEB.03426)

Interestingly, even in temporal[4] or metaphorical expressions the accusative case prevails:

(31) *Ich werde dich lieben bis   in   den Tod.*   (DWDS)
       I   will   love you   until into the death.'
       'I will love you forever, even beyond the grave.'

(32) *Die Älteren sind motiviert bis   unter die Haarspitzen.*
       the elder   are motivated up.to under the hair.ends
       'The elderly are motivated right down to the tips of their hair.'
                                                   (Cosmas II:M02/FEB.10642)

The expression of a stretch, a path towards a goal depends on the semantics of *bis* and not on the two-way preposition after it. Hence, the claim made in the Duden-grammar book must be revisited.

    The accusative case is also required in examples with a verb expressing stative localization or even immobility, which again provides evidence for the decisive role of the semantics of *bis*:

(33) *Ich werde dich lieben bis in   den Tod.*   (DWDS Kernkorpus)
       I   will   love you   till into the death
       'I will love you forever, even beyond the grave.'

(34) *Die Wut   steht   ihm   bis   über den Kopf.*   (DWDS Kernkorpus)
       the anger stands to.him up.to over the head
       'The anger grows over his head.'

(35) *Er ist konservativ bis   in die Knochen.*   (DWDS Kernkorpus)
       he is conservative up.to in the bones
       'He is conservative to the core.'

These examples seem to be characterized by a semantic contradiction between the stative verb and the dynamic prepositional phrase. Serra-Borneto (1997: 192) justifies the use of the accusative in a similar example: *Das Wasser reicht ihm bis über die Schenkel* 'the water reaches up to his thighs' (lit. 'the water reaches to him up to over the thighs$_{ACC}$') and claims that "you can imagine the eyes of the speaker following a trajectory from the ground up to the thighs and beyond them". This process of mental scanning has been described as "subjective motion" by Langacker (1987: 171). Here, too, it becomes clear that it is important to transcend the limited morphosyntactic frame of the examples and to analyze larger structures as

---

4. There is one restriction, though. In combination with [PREP2] *vor* 'before', the dative case is used, which is understandable as a retrospective process being expressed, and not a stretch towards a goal. E.g. *Bis vor kurzem* $_{DAT}$ *hatte er Schmerzen* 'He was in pain until recently.'.

well as their semantics. How this can be achieved with foreign language learners is the topic of the next section.

3.   Pedagogical issues and teaching strategies

The preceding sections have presented and illustrated the large variety of possible constructions and instantiations with the preposition *bis*. In this section, we first want to point to possible difficulties encountered by L2 learners with this construction and then propose some strategies which can foster the learning of this construction and its instantiations.

3.1   The learning of constructions – a challenging enterprise

Constructions with *bis* instantiate preferred lexicalization patterns in German. From a typological point of view, German has been described as belonging to 'satellite-framed languages' (Talmy 2000), which favor so-called satellites for the expression of the path of motion. Satellites can be prepositions or particles, e.g. *bis auf* and *hinauf* in the following example:[5]

(36)   *Das Motorrad   fährt   bis   auf den Berg   hinauf.*
the motorcycle drives up.to on the mountain upwards
'The motorcycle drives on the mountain.'

Satellite-framed languages are also known to focus on the manner of motion (Iwata 2002, 2008). The basic, prototypical meaning conveyed by the prepositional satellite *bis* is the stretch along a path and towards a goal; [PREP2] and the pronominal adverb often express the manner of motion – as we can tell e.g. from (36) above. By contrast, Romance languages like French or Spanish belong to so-called 'verb-framed languages', which express the path of motion in the main verb. The manner of motion is either not explicitly expressed or, if it is, with an adverb or a gerund. Consequently, an authentic translation of (36) above into French would be:

(36′)   *La moto monte sur la montagne (en roulant),*
lit. 'The motorcycle goes up/climbs on the mountain (by riding).'

---

5. Recently, a discussion about the nature of satellites has taken place. Whereas Talmy (2000) also includes prepositions in the class of satellites, Ibarretxe-Antuñano (2017) and Filipovic & Ibarretxe-Antuñano (2015) suggest discarding prepositions. Because prepositions combined with morpho-syntactic cases in German contribute to the expression of a motion path towards a goal, we will consider them to be satellites as well.

The verb *monte* simply expresses a movement upwards (= the path), whereas the manner of motion is expressed with the gerund *en roulant*. But the manner would probably not be expressed at all in the French example, as it is obvious that the motorcycle is riding. Of course, French also has a corresponding verb for German *fahren* which is *rouler* but it cannot be combined with satellites to express the path and manner of motion. The German pronominal adverb *hinauf*, which reinforces the semantics of the path and manner of motion is not expressed in French. Several cross-linguistic empirical studies – among others by Bowerman (1996), Choi & Bowerman (1991), Slobin (1996, 2000) – have shown that "speakers of satellite-framed languages represent manner and directed motion as a single conceptual event, while users of verb-framed languages build mental images of physical scenes with minimal focus on the manner of movement" (Pavlenko 2005: 442). The translation process between German and French corresponds to a so-called 'conceptualization transfer', i.e. a "[t]ransfer arising from cross-linguistic differences in the ways L2 users process conceptual knowledge and form temporary representations in their working memory" (Jarvis 2007: 53). As a consequence, one can expect foreign language learners belonging to a different language background to experience more difficulties with the learning of German motion expressions (Jarvis & Pavlenko 2008). For French-speaking learners of German, this means more specifically that they have to become aware (i) of the differences in the lexicalization patterns in German, which expresses the path of motion with satellites which can even lead to verbless constructions like verbless directives (De Knop & Mollica 2019), e.g. *auf den Berg hinauf!* (lit.) 'upon the mountain upwards!', and (ii) that the expression of the manner of motion is a salient conceptual dimension in German – see also De Knop (2016) or Flecken et al. (2015). A further difficulty results from the need to select the correct case form in this specific construction, either the dative or the accusative.

3.2   Generalization and scaffolding

A first step toward facilitating the learning of foreign constructions consists in awareness-raising exercises that bring to light the differences between the mother tongue and German. This implies describing the different constructional instantiations as we did in section 2. But in order to learn a foreign language properly, learners must also be able to abstract and generalize, which in CxG terms means recognizing abstract constructions and their possible instantiations. Experimental evidence (for an overview, see Gries 2003) has shown that speakers generalize starting from the exemplars with which they are confronted and that they recognize a prototype among these exemplars. This also applies to constructions (Goldberg 2006). In the examples with *bis*, the prototypical meaning is that

of a stretch, which is mostly realized with concrete spatial expressions. In cognitive linguistics, spatial senses are generally assumed to be more central than non-spatial ones (Taylor 2008:50; Lakoff 1987). The advantage of postulating a prototypical abstract construction resides in the possibility for the learner to reconstruct the meaning of new instances if s/he knows the meaning of the abstract construction. In Goldberg's (1995, 2006) construction-based framework, constructions and their instantiations are organized in a structured inventory called the constructicon, and connections between the prototype and other exemplars of the same construction are motivated by so-called inheritance links. As we saw before, temporal and metaphorical structures with the preposition *bis* instantiate specific conceptual metaphors and hence are linked to the spatial prototype by metaphor and instance-of-relations. It is advisable to start with the teaching of the prototypes as the most general and stable exemplars and to introduce the metaphorical extensions later. Through the organization of the constructions and their instantiations around a prototype and the definition of inheritance links, there is no further need to talk about exceptions to the rules.

But teachers of foreign languages will agree that the learning procedure is a complex enterprise and that simply providing learners with L2's constructional templates does not guarantee that they will be able to produce instantiations of constructions in a communicative way: "Teaching does not automatically convert into learning, as many teachers erroneously believe. Therefore the focus of the language teaching design must not be on the teaching, but on how the learning might happen" (Weideman 2016:130).

To be able to generalize, learners need to be confronted with much practice, i.e. with large amounts of instantiations (Holme 2010). But seeing the limited learning context and time, this seems to be difficult. As stressed by Herbst (2016), because of the smaller amount of input encountered by learners, "generalizations are arguably more difficult to make in L2 acquisition" (Gilquin & De Knop 2016:11).

> Teaching, therefore, should compensate for this low exposure and implement strategies that encourage learners to generalize (Holme 2010:126). This could involve the repeated exposure to – and noticing of – various instantiations of a construction in different contexts, through the use of texts that "recycle new tokens of previously taught constructions" (Holme 2010:127).
>
> (Gilquin & De Knop 2016:7)

But this "scaffolding" strategy (Gilquin & De Knop 2016:7) is not the only possibility. Starting from the premise that learners should be provided "with user-friendly versions of the generalizations that they should ultimately arrive at" (Gilquin & De Knop 2016:12), especially the ones contrasting with their L1, Ruiz

de Mendoza Ibáñez & Agustín Llach (2016) propose some pedagogical interventions based, among other things, on an inferential activity and construction-based meaning composition.

The lack of time is not the only difficulty in the teaching and learning process. Constructions in the native language can also function as 'obstacles' to L2 learning – just as different categorizations can do (see Boers et al. 2010: 5). That is why Della Putta (2016) suggests some strategies for 'unlearning' L1 constructions in order to discourage negative transfer phenomena. He distinguishes between (i) transcodification activities (from images to language and vice versa), which aim at explaining the embodied nature of some constructions and making them "cognitively accessible to learners" (Della Putta 2016: 258); (ii) interactive strategies that should help students notice the ungrammaticality of some patterns; and finally, (iii) input-manipulation activities that should be organized with the aim to give learners the positive evidence of what should be used in a specific language (Della Putta 2016: 258).

In the transcodification activities, Della Putta is already referring to the "embodied nature" of some constructions (Della Putta 2016: 258). Inspired by previous research about embodiment, our study wants to propose a complementary approach which starts from insights gained in cognitive linguistics about conceptual categories and their expressions as the result of embodied processes (Lakoff 1987). As already claimed by Ellis & Cadierno (2009: 111), constructions are the fundamental units of language acquisition and they reflect the most direct embodiment of learners' communicative intentions. This insight can be exploited for a more efficient teaching methodology.

3.3   First studies on embodiment

Evidence for embodiment in language comes from neurolinguistics. Feldman & Narayanan (2004: 389) claim that "[...] all understanding involves simulating or enacting the appropriate embodied experience. When asked to grasp, we enact it. When hearing or reading about grasping, we simulate grasping or watching someone grasp".

The conceptual understanding of an utterance implies the internal activation of embodied schemas (Bergen & Chang 2005: 2). For Lakoff & Johnson (1999: 22), "human concepts are not just reflections of an external reality, but [...] they are crucially shaped by our bodies and brains, especially by our sensorimotor system". Rathunde (2009: 71) even claims that it is "through our bodily perceptions, movements, emotions, and feelings that meaning becomes possible". Coming back to the examples discussed before, it becomes clear that constructions with *bis* express an embodied orientation, i.e. of the speaker towards the event, towards

the goal, the path of motion, etc. The difficulty when learning a foreign language results from the fact that learners have the L1 categorization in mind and have not made the 'embodied' experience with L2 concepts as children. Achard (2008: 449) notices that

> [t]he pedagogical challenge of teaching construal consists in placing students in situations where native speakers are the most likely to exercise a specific choice, so that they can make the same choices the natives make, and enjoy the same flexibility of expression.

Consequently, it is only justified to ground FLT in embodiment to make up for the missing experience between foreign concepts and L2 patterns.

In a paper called *Constructionism: A new opportunity for elementary science education* (1986), Piaget's student Papert pointed to the possibility to foster the learning process with active acting. Constructionism assumes that knowledge should be 'constructed' by learners and not only transmitted to them. This implies that learners should build or manipulate concrete artefacts while learning, so that the learning procedure becomes more successful. In spite of the fact that Papert's interest focuses on computer skills with children (Papert 1980), this idea can inspire FLT and FLL. Constructionism in Papert's sense has its origin in developmental psychology and should not be confounded with the constructionist approach advocated by the CxG model, which interests us more particularly.

It comes as a surprise that cognitive linguistics insights about embodiment have not been better exploited in FLT/FLL. In our Western world, teaching methodology is very much disembodied (Rathunde 2009). Still, we can quote some first tentative studies which focus on embodiment to foster FLL. Embodiment can take many forms: bodily engagement, visualization with pictures, gesturing, enactment; for a general overview, see Skulmowski & Rey (2018). Asher (1982) developed the 'total physical response' and proposed interactive activities essentially based on motion in the class-room for more effective language learning. Students are invited to react to verbal input in a physical way. Asher could achieve some good results, as it allows reducing student inhibitions and anxiety. The 'smal LAB learning' method developed by Birchfield (2015) can aid reading comprehension in young children through (imagined) activity. It is kinesthetic, i.e. based on the full-body interactivity in physical space, it is also collaborative, as it is face-to-face teaching and learning; and, finally, it is multimodal, i.e. based on the experience of seeing, hearing, and touching.[6] For Rathunde (2009: 73), it is important to "find ways to put the body back into the mind and create more embodied educational environments". This can be achieved through the inte-

---

6. < http://smallablearning.com/embodied-learning>

gration of nature into foreign language pedagogy. Lapaire (2013) and Lapaire & Etcheto (2010) teach English grammar with dancing movements. This presents the advantage of emphasizing "a holistic process, including body-based feelings and perceptions" (Rathunde 2009: 77). In spite of their inspiring insights, these studies are still in their fledgling stages and have not been further extended or exploited. The following section makes some further suggestions for embodied teaching methodology.

3.4   Embodied construction practice

This section deals with the question of what embodied construction practice can look like. There are many possibilities to create exercises based on embodiment. To do so, we look again at the illustrative field of constructions with *bis* discussed above and see how teachers can proceed very concretely. But first, we want to express a caveat about this method. Exercises based on embodiment are mostly possible with concrete expressions, which represent actions or processes which can be performed. Not all patterns can be represented in an embodied way, the more abstract the expressions, the more difficult it becomes.

3.4.1   *Interactive exercises with bodily engagement*

One possibility consists in exploiting own body for an interactive practice. Constructions with *bis* in their more concrete spatial meanings are very suitable for such exercises. Teachers can express a few examples of patterns with *bis* and ask learners to perform what they hear. E.g.,

(37)   *Peter geht bis   an die Tür   und öffnet sie mit dem Schlüssel.*
Peter goes up.to at the door and opens it   with the key
'Peter goes to the door and opens it with the key.'

(38)   *Maria streckt   sich   bis   an die Tischecke.*
Maria stretches herself up.to at the table.corner
'Maria stretches herself to the table corner.'

The class-room is an ideal place to perform such examples. The teacher may also bring some objects which can be moved by the learners and with which learners can represent "scenarios or lifelike situations" (Di Pietro 1987: 3). For sentence (37) for instance, a key could be provided.

3.4.2   *Exercises with pictures*

Another possibility for embodied exercises consists in the use of pictures or images. The internet is a treasure trove of pictures which can be used during the lessons. In the above study of constructions with the preposition *bis* it became

obvious that often a body part is being used to express a certain limit. A complex construction with a free dative[7] referring to a human being can be practiced as a fill-in exercise with different body-parts:

(39)   *Das Wasser steht   dem   Mann <u>bis</u> …*
       the water   stands to.the man   up.to
       'The man has water up to…'

If necessary, the teacher can first introduce the different terms for body parts in German. Then, s/he can show different pictures representing the situation depicted in (39) and s/he can invite students to fill in the missing body-part. Here are some concrete pictures taken from the internet:

(source: faz.net)

(39a)   *Das Wasser steht   dem   Mann <u>bis</u>   an die <u>Knie</u> .*
        the water   stands to.the man   up.to at the knees
        'The man stands in the water up to his knees.'

(source: zoonar.de)

(39b)   *Das Wasser steht   dem   Mann <u>bis</u>   <u>an die Taille/bis</u>   <u>an die Brust</u> .*
        the water   stands to.the man   up.to at the waist/up.to at the breast
        'The man stands in the water up to his waist/to his chest.'

---

7. The term 'free dative' refers to a complement which does not belong to the verb valency, it is not an argument of the verb *stehen*.

(source: lustigerblog.fungesteuert.com)

(39c)   *Das Wasser steht   dem   Hund* <u>*bis*</u>   <u>*an*</u> <u>*den*</u> <u>*Hals*</u>/<u>*bis*</u>   <u>*an*</u> <u>*das*</u> <u>*Kinn*</u> .
the water   stands to.the dog   up.to at the neck/up.to at the chin
'The dog stands in the water up to his neck.'

(source: zoonar.de)

(39d)   *Das Wasser steht   dem   Mann* <u>*bis*</u>   <u>*an*</u> <u>*die*</u> <u>*Nase*</u>/<u>*bis*</u>   <u>*an*</u> <u>*die*</u> <u>*Augen*</u>/<u>*bis*</u> <u>*an*</u>
the water   stands to.the man   up.to at the nose/up.to at the eyes/up.to at
<u>*die*</u> <u>*Stirn*</u>.
the forehead
'The man stands in the water up to his nose/his eyes/his forehead.'

A side-effect of this approach is the possibility to learn the second preposition after *bis* (e.g. in (39a) *an* 'at'), the foreign terms for body-parts, but also to understand the use of the dative case for the indirect object and the accusative after the second preposition for the expression of dynamic subjective motion. These exercises make it possible to repeat the instantiations of the same construction but with different lexemes after *bis*. If the same construction is being practiced with a certain frequency – even with different lexemes – some generalization is possible and it can become entrenched with the learners (see Ellis 2009). Ellis & Cadierno (2009: 118) claim that "frequency of exposure promotes learning".

As an alternative, Handwerker & Madlener (2006) suggest to work with film sequences and animations for the learning of chunks, they propose a three-step procedure: (i) presentation of film sequences and animations with a large offer of chunks; (ii) a reduced and simplified series of chunks (without particles, adjuncts, …) are presented in parallel in a photo series that can be used to check the use or meaning of the chunk; and (iii) concrete explanations of the specific chunk in (ii). This three-step procedure should be accompanied by many exercises.

Before we close this section, we want to express some reservations about the results of this methodology. Although the embodied methodology sounds promising – as we can tell from our teaching practice with French-speaking students of German in Belgium – it has not been empirically tested yet and we cannot report on positive results attesting to the efficiency of this method. Still, an embodied methodology presents some assets which cannot be denied:

i.   The teaching lessons become livelier and more active, they lead to more inter-active learning in a natural setting.
ii. Learners who actively use the internet and social networks which ally shorter verbal messages with pictures or visual materials are better motivated when they are presented with stimulating pictures and materials.
iii. Nowadays, for teachers to find proper materials like pictures or videos is not so time-consuming with the internet (see pictures above) and many teachers are happy to develop personalized ideas to implement in the curriculum.

Embodied teaching sessions can also be based on a scaffolding methodology which allows to introduce and practice new aspects starting from already known structures or events.

4.   Conclusions and future perspectives

It is clear that not all constructions can be taught according to the embodied perspective. Constructions need to have a certain degree of concreteness to be suitable for embodied learning. This is mainly the case with basic constructions. But even more abstract constructions grounded in metaphorical or metonymical extension are often based on embodiment and can be explained with some embodied processes – see, among others, Boers (2011) and Boers & Demecheleer (1998). The small sample of constructions we have discussed constitutes a good starting point for an extension to further constructions and for exemplifying the differences between L1 and L2 constructions. Progressively, learners "should be able to build networks of constructions that will help them store constructions

more efficiently in their mental constructicon and retrieve the information more rapidly" (Gilquin & De Knop 2016: 7). Teachers play a major role in this process, as they should provide learners with "a stock of prefabricated units in order to improve their communication skills" (Gonzalez Rey 2013: 7), that is, a list of basic relevant constructions in German which learners would need at several stages of proficiency. Providing such a list is a future challenge for linguists, teachers, and manual designers.

Another important issue for future research would be to test the embodied methodology and to measure the results with learners.[8] As suggested by an anonymous reviewer, with the simple description of the embodied teaching methodology, it is not yet clear whether this approach is more efficient than traditional techniques and whether the preparation of materials for this methodology – which can be time-consuming – is worth doing. Future research which focuses on further empirical studies, which include testing and the development of proper exercises, will show the added value of this new methodology.

Acknowledgements

References

Achard, M. (2008). Teaching construal: Cognitive pedagogical grammar. In P. Robinson & N. Ellis (Eds), *Handbook of cognitive linguistics and second language acquisition* (pp. 432–456). Mahwah, NJ: Lawrence Erlbaum Associates.

Asher, J. J. (1982). *Learning another language through actions. The complete teacher's guidebook.* Los Gatos, CA: Sky Oaks Productions.

Baicchi, A. (2013). The ontological status of constructions in the mind of Italian University learners of English: Psycholinguistic evidence from a sentence-sorting experiment. In L. Di Michele (Ed.), *Regenerating community, territory, voices* (pp. 26–32). Napoli: Liguori.

Baicchi, A. (2016). The role of syntax and semantics in constructional priming. Experimental evidence from Italian university learners of English through a sentence-elicitation task. In S. De Knop & G. Gilquin (Eds.), *Applied construction grammar* (pp. 211–236). Berlin/Boston: de Gruyter. https://doi.org/10.1515/9783110458268-009

Bencini, G., & Goldberg, A. E. (2000). The contribution of argument structure constructions to sentence meaning. *Journal of Memory and Language*, 43, 640–651. https://doi.org/10.1006/jmla.2000.2757

---

8.   I thank the anonymous reviewer for pointing out this reservation.

Bergen, B., & Chang, N. (2005). Embodied construction grammar in simulation-based language understanding. In J-O. Östman & M. Fried (Eds.), *Construction grammars: Cognitive grounding and theoretical extensions* (pp. 147–190). Amsterdam/Philadelphia: John Benjamins. https://doi.org/10.1075/cal.3.08ber

Birchfield, D. (2015). *Embodied learning: Origins and implications*. Available at: <https://www.youtube.com/watch?v=YzahyTMq8u4>

Boers, F. (2011). Cognitive semantic ways of teaching figurative phrases. *Annual Review of Cognitive Linguistics*, 9(1), 227–261. https://doi.org/10.1075/rcl.9.1.11boe

Boers, F., & Demecheleer, M. (1998). A cognitive semantic approach to teaching prepositions. *English Language Teaching Journal*, 53, 197–204. https://doi.org/10.1093/elt/52.3.197

Boers, F., De Rycker, A., & De Knop, S. (2010). Fostering language teaching efficiency through cognitive linguistics: Introduction. In S. De Knop, F. Boers, & A. de Rycker (Eds.), *Fostering language teaching efficiency through CL* (pp. 1–27). Berlin/New York: Mouton de Gruyter. https://doi.org/10.1515/9783110245837.1

Bowerman, M. (1996). Learning how to structure space for language: A cross-linguistic perspective. In P. Bloom, M.A. Peterson, L. Nadel, & M.F. Garrett (Eds.), *Language and space* (pp. 385–436). Cambridge, Mass./London: The MIT Press.

Carroll, M. (2000). Representing path in language production in English and German: Alternative perspectives on Figure and Ground. In C. Habel & C. von Stutterheim (Eds.), *Räumliche Konzepte und sprachliche Strukturen* (pp. 97–118). Tübingen: Niemeyer. https://doi.org/10.1515/9783110952162.97

Carstensen, K. (2000). Räumliche Mikroperspektivierung und die Semantik lokaler Präpositionen. In C. Habel & C. von Stutterheim (Eds.). *Räumliche Konzepte und Sprachliche Strukturen* (pp. 237–260). Tübingen: Niemeyer. https://doi.org/10.1515/9783110952162.237

Choi, S., & Bowerman, M. (1991). Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition*, 41, 83–121. https://doi.org/10.1016/0010-0277(91)90033-Z

Corder, S. P. (1967). The significance of learners' errors. *International Review of Applied Linguistics*, 5, 160–170. https://doi.org/10.1515/iral.1967.5.1-4.161

De Knop, S. (2016). German causative events with placement verbs. *Lege Artis. Language yesterday, today, tomorrow*, 1(2), 75–115. https://doi.org/10.1515/lart-2016-0002

De Knop, S., & Gilquin, G. (Eds.) (2016). *Applied construction grammar*. Berlin/Boston: de Gruyter. https://doi.org/10.1515/9783110458268

De Knop, S., & Mollica, F. (2016). A construction-based analysis of German ditransitive phraseologisms for language pedagogy. In S. De Knop & G. Gilquin (Eds.), *Applied construction grammar* (pp. 53–88). Berlin: de Gruyter. https://doi.org/10.1515/9783110458268-004

De Knop, S., & Mollica, F. (2019). Verblose Direktiva als Konstruktionen: ein kontrastiver Vergleich zwischen Deutsch, Französisch und Italienisch. In J. Erfurt & S. De Knop (Eds.), *Konstruktionsgrammatik und Mehrsprachigkeit* (pp. 127–148). Universität Duisburg-Essen: Universitätsverlag Rhein-Ruhr OHG.

Della Putta, P. (2016). Do we also need to unlearn constructions? The case of constructional negative transfer from Spanish to Italian and its pedagogical implications. In S. De Knop & G. Gilquin (Eds.), *Applied construction grammar* (pp. 237–267). Berlin/Boston: de Gruyter. https://doi.org/10.1515/9783110458268-010

Di Pietro, R. J. (1987). *Strategic interaction: Learning languages through scenarios*. Cambridge: Cambridge University Press.

Draye, L. (1996). The German dative. In W. Van Belle & W. Van Langendonck (Eds.), *The dative: Descriptive studies*. Vol. 1 (pp. 155–215). Amsterdam/Philadelphia: John Benjamins. https://doi.org/10.1075/cagral.2.09dra

Eisenberg, P. et al. (2009). *Duden – Die Grammatik*. Mannheim; Wien; Zürich: Dudenverlag.

Ellis, N. C. (2009). Optimizing the input: Frequency and sampling in usage-based and form-focused learning. In M. H. Long & C. J. Doughty (Eds.), *Handbook of language teaching* (pp. 139–158). London: Blackwell Publishing Company. https://doi.org/10.1002/9781444315783.ch9

Ellis, N. C., & Cadierno, T. (2009). Constructing a second language. Introduction to the special section. *Annual Review of Cognitive Linguistics*, 7, 1–139. https://doi.org/10.1075/arcl.7.05ell

Ellis, N. C., & Ferreira-Jr., F. (2009a). Construction learning as a function of frequency, frequency distribution, and function. *The Modern Language Journal*, 93(3), 370–385. https://doi.org/10.1111/j.1540-4781.2009.00896.x

Ellis, N. C., & Ferreira-Jr., F. (2009b). Constructions and their acquisition. Islands and the distinctiveness of their occupancy. *Annual Review of Cognitive Linguistics*, 7, 187–220. https://doi.org/10.1075/arcl.7.08ell

Ellis, R. (1990). *Instructed second language acquisition. Learning in the classroom*. Oxford: Basil Blackwell.

Evans, V. (2003). *The structure of time*. Amsterdam/Philadelphia: John Benjamins.

Feldman, J., & Narayanan, S. (2004). Embodied meaning in a neural theory of language. *Brain and Language*, 89, 385–392. https://doi.org/10.1016/S0093-934X(03)00355-9

Filipovic, L. & Ibarretxe-Antuñano, I. (2015): Motion. In: E. Dabrowska & D. Divjak (Eds.), *Mouton Handbook of Cognitive Linguistics* (pp. 526–545). Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110292022-026

Flecken, M., Carroll, M., Weimar, K., & Von Stutterheim, C. (2015). Driving along the road or heading for the village? Conceptual differences underlying motion event encoding in French, German, and French–German L2 users. *The Modern Language Journal*, 99, 100–122. https://doi.org/10.1111/j.1540-4781.2015.12181.x

Fries, C. C. (1945). *Teaching and learning English as a foreign language*. Ann Arbor, Michigan: University of Michigan Press.

Gilquin, G., & De Knop, S. (2016). Exploring L2 constructionist approaches. In S. De Knop & G. Gilquin (Eds.), *Applied construction grammar* (pp. 3–17). Berlin/Boston: de Gruyter.

Goldberg, A. (1995). *Constructions. A construction grammar approach to argument structure*. Chicago: University of Chicago Press.

Goldberg, A. (2006). *Constructions at work: The nature of generalization in language*. Oxford: Oxford University Press.

González Rey, M. I. (2013). Presentation: Phraseodidactics, an applied field of phraseology. In M. I. González Rey (Ed.), *Phraseodidactic studies on German as a foreign language / Phraseodidaktische Studien zu Deutsch als Fremdsprache* (pp. 7–10). Hamburg: Dr. Kovac.

Gries, S. Th. (2003). Towards a corpus-based identification of prototypical instances of constructions. *Annual Review of Cognitive Linguistics*, 1, 1–27. https://doi.org/10.1075/arcl.1.02gri

Gries, S. Th., & Wulff, S. (2005). Do foreign language learners also have constructions? Evidence from priming, sorting, and corpora. *Annual Review of Cognitive Linguistics*, 3, 182–200. https://doi.org/10.1075/arcl.3.10gri

Gries, S. Th., & Wulff, S. (2009). Psycholinguistic and corpus-linguistic evidence for L2 constructions. *Annual Review of Cognitive Linguistics*, 7, 163–186. https://doi.org/10.1075/arcl.7.07gri

Grießhaber, W. (2009). Präposition. In L. Hoffmann (Ed.), *Handbuch der Deutschen Wortarten* (pp. 629–656). Berlin/New York: Walter de Gruyter.

Handwerker, B. (2008). ʹChunksʹ und Konstruktionen – Zur Integration von lern-theoretischem und grammatischem Ansatz. *Estudios Filológicos Alemanes*, 15, 49–64.

Handwerker, B., & Madlener, K. (2006). Multimedia-Chunks für Deutsch als Fremdsprache. Ein Lernmodul zur Entwicklung lexikalisch-grammatischer Kompetenz. In A. Hahn & F. Klippel (Eds.), *Sprachen Schaffen Chancen* (pp. 199–206). München: Oldenbourgs.

Hausmann, F. J. (1984). Wortschatzlernen ist Kollokationslernen. *Praxis des neusprachlichen Unterrichts*, 31, 395–406.

Herbst, T. (2016). Foreign language learning is construction learning – what else? Moving towards pedagogical construction grammar. In S. De Knop & G. Gilquin (Eds.), *Applied construction grammar* (pp. 21–52). Berlin/Boston: de Gruyter. https://doi.org/10.1515/9783110458268-003

Holme, R. (2010). Construction grammars: Towards a pedagogical model. *AILA Review*, 23, 115–133. https://doi.org/10.1075/aila.23.07hol

Ibarretxe-Antuñano, I. (2017). Introduction. Motion and semantic typology: A hot old topic with exciting caveats. In: I. Ibarretxe-Antuñano (Eds.), *Motion and Space across Languages* (pp. 13–36). Amsterdam: John Benjamins. https://doi.org/10.1075/hcp.59.02iba

Iwata, S. (2002). Does manner count or not? Manner-of-motion verbs revisited. *Linguistics*, 40(1), 239–292. https://doi.org/10.1515/ling.2002.008

Iwata, S. (2008). *Locative alternation: A lexical-constructional approach*. Amsterdam/Philadelphia: John Benjamins. https://doi.org/10.1075/cal.6

Jarvis, S. (2007). Theoretical and methodological issues in the investigation of conceptual transfer. *Vigo International Journal of Applied Linguistics*, 4, 43–71.

Jarvis, S., & Pavlenko, A. (2008). *Crosslinguistic influence in language and cognition*. New York/London: Routledge. https://doi.org/10.4324/9780203935927

Klein, W. (1991). Raumausdrücke. *Linguistische Berichte*, 132, 77–114.

Lado, R. (1957). *Linguistics across cultures*. Ann Arbor: University of Michigan Press.

Lado, R., & Fries, C. C. (1961). *English pattern practices*. Michigan: The University of Michigan Press.

Lakoff, G. (1987). *Women, fire, and dangerous things*. Chicago: University of Chicago Press. https://doi.org/10.7208/chicago/9780226471013.001.0001

Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. New York: Basic Books.

Langacker, R. (1987). *Foundations of Cognitive Grammar*. Vol. 1. Stanford, California: Stanford University Press.

Lapaire, J.-R. (2013). Gestualité cogrammaticale: de l'action corporelle spontanée aux postures de travail métagestuel guidé. *Maybe* et le balancement épistémique en anglais. *Langages*, 192 (4), 57–72. https://doi.org/10.3917/lang.192.0057

Lapaire, J.-R., & Etcheto, P. (2010). Postures, manipulations, déambulations: comprendre la grammaire anglaise autrement. *La nouvelle revue de l'adaptation et de la scolarisation*, 49(1), 45–58. https://doi.org/10.3917/nras.049.0045

Leys, O. (1989). Aspekt und Rektion räumlicher Präpositionen. *Deutsche Sprache*, 17, 97–113.

Leys, O. (1995). Dativ und Akkusativ in der deutschen Sprache der Gegenwart. *Leuvense Bijdragen*, 84, 39–62.

Liang, J. (2002). How do Chinese EFL learners construct sentence meaning: Verb-centered or construction-based? M.A. thesis, Guangdong University of Foreign Studies.

Lutzeier, P. R. (1995). Von der Wortbedeutung zur Satzbedeutung: Überlegungen zum Beitrag der Präpositionen. In I. Pohl (Ed.), *Semantik von Wort, Satz und Text: Beiträge des Kolloquiums "Semantik von Wort, Satz und Text" in Rostock (1994)* (pp. 171–189). Frankfurt a. M.: Peter Langs.

Nattinger, J. R., & DeCarrico, J. S. (1992). *Lexical phrases and language teaching*. Oxford: Oxford University Press.

Nunan, D. (1991). Communicative tasks and the language curriculum. *Tesol Quarterly*, 25(2), 279–295. https://doi.org/10.2307/3587464

Papert, S. (1980). *Mindstorms: Kinder, Computer und neues Lernen*. New York: Basic books.

Papert, S. (1986). *Constructionism: A new opportunity for elementary science education*. Cambridge, MA: Massachusetts Institute of Technology.

Paul, H. (1916–1920). *Deutsche Grammatik*. Halle: Max Niemeyer.

Pavlenko, A. (2005). Bilingualism and thought. In J. F. Kroll & A. M. B. de Groot (Eds.), *Handbook of bilingualism: Psycholinguistic approaches* (pp. 433–453). Oxford: Oxford University Press.

Pawley, A., & Syder, F. (1983). Two puzzles for linguistic theory: Nativelike selection and nativelike fluency. In J. C. Richards & R. W. Schmidt (Eds.), *Language and communication* (pp. 191–226). New York: Longman.

Politzer, R. L. (1961). The impact of linguistics on language teaching: Past, present and future. *Modern Language Journal*, 48(3), 146–151.

Radden, G. (2003). The metaphor TIME AS SPACE across languages. In N. Baumgarten, C. Böttger, M. Motz, & J. Probst (Eds.), *Übersetzen, Interkulturelle Kommunikation, Spracherwerb und Sprachvermittlung – das Leben mit mehreren Sprachen. Festschrift für Juliane House zum 60. Geburtstag. Zeitschrift für Interkulturellen Fremdsprachenunterricht*, 8(2/3), 226–239.

Radden, G., & Dirven, R. (2007). *Cognitive English grammar*. Amsterdam/Philadelphia: John Benjamins. https://doi.org/10.1075/clip.2

Rathunde, K. (2009). Nature and embodied education. *The journal of developmental processes*, 4 (1), 70–80.

Rys, J., Willems, K., & De Cuypere, L. (2014). Akkusativ und Dativ nach Wechselpräpositionen im Deutschen. Eine Korpusanalyse von 'versinken', 'versenken', 'einsinken' und 'einsenken in'. In I. Doval & B. Lübke (Eds.), *Raumlinguistik und Sprachkontrast: neue Beiträge zu spatialen Relationen im Deutschen, Englischen und Spanischen* (pp. 217–234). München: Iudicium.

Robinson, P., & Ellis, N. (2008). *Handbook of cognitive linguistics and second language acquisition*. London: Routledge. https://doi.org/10.4324/9780203938560

Ruiz de Mendoza Ibáñez, F. J., & Agustín Llach, M. P. (2016). Cognitive pedagogical grammar and meaning construction in L2. In De Knop, S. & Gilquin, G. (Eds.), *Applied construction grammar* (pp. 151–184). Berlin/Boston: de Gruyter. https://doi.org/10.1515/9783110458268-007

Savignon, S. J. (2000). Communicative language teaching. In M. Byram (Ed.), *Routledge encyclopedia of language teaching and learning* (pp. 125–129). London: Routledge.

Schmitz, W. (1964). *Der Gebrauch deutscher Präpositionen*. München: Hueber Verlag.

Schröder, J. (1986). *Lexikon deutscher Präpositionen*. Leipzig: VEB Verlag.

Serra-Borneto, C. (1997). Two-way prepositions in German: Image and constraints. In M. Verspoor, K. D. Lee, & E. Sweetser (Eds.), *Lexical and syntactical constructions and the construction of meaning* (pp. 187–204). Amsterdam: John Benjamins. https://doi.org/10.1075/cilt.150.15ser

Skulmowski, A., & Rey, G. D. (2018). Embodied learning: introducing a taxonomy based on bodily engagement and task integration. *Cognitive Research: Principles and Implications*, 3(6), 1–10. https://doi.org/10.1186/s41235-018-0092-9

Slobin, D. (1996). From "*thought and language" to "thinking for speaking*". In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70–96). Cambridge, U.K.: Cambridge University Press.

Slobin, D. (2000). Verbalized events: A dynamic approach to linguistic relativity and determinism. In S. Niemeier & R. Dirven (Eds.), *Evidence for linguistic relativity* (pp. 107–138). Amsterdam: John Benjamins. https://doi.org/10.1075/cilt.198.10slo

Smith, M. B. (1995). Semantic motivation vs. arbitrariness in grammar: Toward a more general account of the DAT/ACC contrast with two-way prepositions. In I. Rauch & G. F. Carr (Eds.), *Insights in Germanic linguistics: Methodology and transition* (pp. 293–323). Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110810868.293

Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MA: MIT Press.

Taylor, J. (2008). Prototypes in cognitive linguistics. In P. Robinson & N. Ellis (Eds.), *Handbook of cognitive linguistics and second language acquisition* (pp. 39–65). London: Routledge.

Thieroff, R., & Vogel, P. M. (2011). *Flexion*. Heidelberg: Winter.

Valenzuela Manzanares, J., & Rojo López, A. M. (2008). What can language learners tell us about constructions? In S. De Knop & T. de Rycker (Eds.), *Cognitive approaches to pedagogical grammar: A volume in honour of René Dirven* (pp. 197–230). Berlin/New York: Mouton de Gruyter.

Wardhaugh, R. (1970). The contrastive analysis hypothesis. *TESOL Quarterly*, 4(2), 123–130. https://doi.org/10.2307/3586182

Weideman, A. (2016). *Responsible aesign in Applied linguistics: Theory and practice*. Heidelberg: Springer Verlag.

Willems, K. (2011). The semantics of variable case marking (accusative/dative) after two-way prepositions in German locative constructions. Towards a constructionist approach. *Indogermanische Forschungen*, 116, 324–366. https://doi.org/10.1515/9783110239485.324

Willems, K., Rys, J., & De Cuypere, L. (2018). Case alternation in argument structure constructions with prepositional phrases. A case study in corpus-based constructional analysis. In H. C. Boas & A. Ziem (Eds.), *Constructional approaches to argument atructure in German* (pp. 85–130)s. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110457155-003

Wong-Fillmore, L. (1976). *The second time around*. Stanford, CA: Stanford University Press.

Wray, A. (2002). *Formulaic language and the lexicon*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511519772

Advances in Embodied Construction Grammar[*]

Jerome A. Feldman

International Computer Science Institute | University of California Berkeley

This chapter describes the continuing goals and present status of the ICSI/UC Berkeley efforts on Embodied Construction Grammar (ECG). ECG is semantics-based formalism grounded in cognitive linguistics. ECG is the most explicitly inter-disciplinary of the construction grammars with deep links to computation, neuroscience, and cognitive science. Work continues on core cognitive, computational, and linguistic issues, including aspects of the mind/body problem. Much of the recent emphasis has been on applications and on tools to facilitate new applications. Extensive documentation plus downloadable systems and grammars can be found at the ECG Homepage.[1]

Keywords: embodiment, semantics, best fit, construction, compositionality, robotics, workbench, framework

1.   Introduction

Natural language is perhaps the most characteristic and remarkable human capacity. Historically and up to the present, there have been a very wide variety of approaches to describing natural languages, how they are learned, used, and how they evolve. Much of the current activity in natural language processing (NLP) focuses on computational techniques to produce practical systems and products, but the fundamental scientific questions remain and are being studied as part of natural language understanding (NLU).

Embodied Construction Grammar (ECG) is an ongoing NLU endeavor that arose around forty years ago from the synthesis of neural computation with

---

[*] An earlier version of this article was published as part of a special issue in *Constructions and Frames* 12(1). https://doi.org/10.1075/cf.00038.fel

[1]   <https://github.com/icsi-berkeley/ecg_homepage>

the UC Berkeley cognitive linguistics tradition. Fillmore's seminal work on both semantic frames and grammatical constructions was already developed. A good introduction to his work can be found in the journal *Constructions and Frames* (2013). George Lakoff, Eve Sweetser, Len Talmy, and their students had an established research program based on embodied meaning (Petruck 2016, Lakoff 1987) as opposed to formal logic semantics. The early ECG efforts on embodiment focused on core meaning, its relation to other mental functions, and on neural (connectionist) models linking to neuroscience, rather than on grammar.

The project was called the Neural Theory of Language (NTL) and was based on computational models of the learning of language from examples of simple scene descriptions. A summary of this first phase appeared as Feldman et al. 1996. This included research like Regier (2002), Goldberg (1995), Narayanan (1999a), and Lakoff (1987) that has continuing influence.

The NTL/ECG effort continues to evolve but the core goal remains the same – relating language and its mental and communication functions to its embodied realization as an aspect of Unified Cognitive Science (Newell 1994). Recent activity has included some system and development work and there now is a GitHub site to track the development. The site includes extensive background and a variety of tutorials on different aspects of the system. It is the primary evolving source of ECG information and will be cited as such in various specific sections of this article. In addition to these diverse components, the GitHub release includes code and documentation of various grammars and complete systems (products) as well as for the ECG2 Framework (Figure 8) that ties it all together. There is a good description of the overall system design in Eppe et al. (2016a).

Several of the scientific issues raised in the initial effort continue to reappear in the ongoing ECG-related developments. The central idea that language meaning is continuous with other aspects of mental activity (embodiment) is consistent with a long tradition including Darwin and the American Pragmatists (Feldman 2006). However, we were confronted with the fact that basic mind/body problem was and remains mysterious. Recent work suggests that there is an inherent inconsistency between first person subjective experience and any proposed theory of neural computation (Feldman 2017). This finding does not seem to directly affect the basic work on ECG but does make strong suggestions on the more general project of the Science of Mind (Feldman 2018).

Around the year 2001, it became clear that the NTL effort was constrained by the lack of a scalable theory of grammar. The obvious approach was to use a version of Fillmore's construction grammar (Fillmore et al. 2003), which formalized the crucial notion that a grammatical construction needed to be treated as a <form, meaning> pair. Fillmore's construction grammar was under active development by our friends and colleagues at the International Computer Science Institute (ICSI) and UC Berkeley and they were making excellent progress. How-

ever, there were two deep barriers to combining the two projects and these have never been fully resolved. There is a long and continuing tradition in linguistics of formalizing meaning (semantics) in terms of truth conditions and mathematical logic and Fillmore's project followed that. There is a multifaceted interchange on the relation between ECG and traditional concerns of logical semantics following Feldman (2010). Even to this day, many linguists focus on logical semantics but this enterprise has little current overlap with the construction grammar efforts discussed in the present volume.

The other barrier to uniting the two Berkeley-based constructional efforts is perhaps even more fundamental and also persists as a profound contrast between ECG and Sign Based Construction Grammar (SBCG), a combination of Berkeley and Stanford approaches. In a recent magisterial overview of SBCG, Michaelis (2017) states: "The SBCG constructionist program does, however, fall within generative grammar in the historically broader sense of aiming to provide a fully explicit account of the sentences of each language under study." So, the two Berkeley-based construction grammar projects study many of the same phenomena with very different goals – SBCG focuses on the traditional linguistic-internal problem of specifying the *form* of natural languages while ECG is mainly concerned with the *meaning* of constructions as a component of unified cognitive science.

The first published version of ECG was Bergen et al. (2004) but at that time there were still major unresolved issues. The most important question concerned a formalism for the semantic pole of the <form, meaning> pair, the core of construction grammar. It was obvious that formal predicate logic would not work for our embodied meaning, but not at all clear what should take its place. There was (and is) an active interest in formalization of action and procedures in computer science and we explored many possibilities. As is often the case, two doctoral students (David Bailey and Srini Narayanan), through articulating their thesis topics, showed the way. They pioneered the use of Petri Nets[2] in the NLU, a widely used action-based formalism for modeling interacting processes in various branches of computer science. Computationally, ECG encodes actions and events as active representations called X-nets, which are extensions to Stochastic Petri nets (Narayanan 1999b).

Petri nets (Figure 1) are a simple but powerful formalism. The primitive action is the propagation of a token (black dot) from a place (circle) through a transition (rectangle) to one or more successor places. In Figure 1, the two marked input places on the left show that the prerequisites for walking are satisfied. The iterate transition specifies that this X-net repeatedly activates an embedded

---

2. <https://en.wikipedia.org/wiki/Petri_net>

(hexagonal) X-net. The iteration terminates when the goal (top circle) is reached; this, then, causes an inhibition of the start transition.

The basic idea of active representation based on X-nets has become a cornerstone of later ECG theory and applications. In addition, it has led to a widely referenced formalization of the linguistic aspect, which models the shape of events (Narayanan 1999b). For example, the difference between *he walked* and *he was walking* is aspectual. In the model of Figure 1, the token in the "ongoing" place captures the meaning 'was walking', which is called progressive aspect.
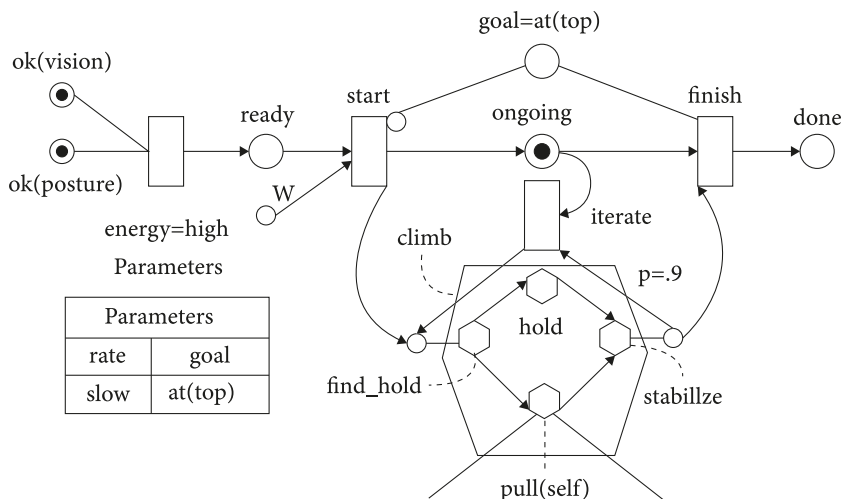
Figure 1. An X-net encoding walking

X-nets are fine-grained action and event generative representations that are used for visual recognition, monitoring, and control as well as for language understanding and inference (Narayanan 1999a). The implementation of full support for dynamic X-nets remains challenging.

2.   The basics of embodied construction grammar

In developing ECG, we built on decades of research in cognitive linguistics, neuroscience, and developmental psychology that identifies a basic, relatively restricted set of 'primitive' concepts that provide the conceptual framework for describing and understanding events. These more primitive elements include topological relations and image-schematic structures such as bounded regions, paths, contact, verticality, and proximity, as well as various kinds of basic processes (e.g. motion, action, change) and causal relations (e.g. causation, prevention, enablement). In ECG, we formalized these basic concepts as *schemas*,

gestalt-like structures that include participant roles and role relations. Individual schemas are defined within a larger lattice of schemas and schemas for complex concepts are defined as compositions of schemas for more elementary concepts.

Another key primitive in ECG grammars are formalized *constructions*. Each construction specifies the relation between some meaning (represented using schemas) and the form by which that meaning is expressed. Constructions provide a means for specifying how language *composes* more elementary concepts into more complex ones. The meaning of an individual construction can specify how the meanings of its parts (e.g. individual words) are combined with one another. The Oxford Handbook of Computational Linguistics chapter (Feldman et al. 2009) remains the best description of the motivations and mechanisms of ECG. There are some minor notational differences from the current ECG2 formalism but this should cause no difficulty.
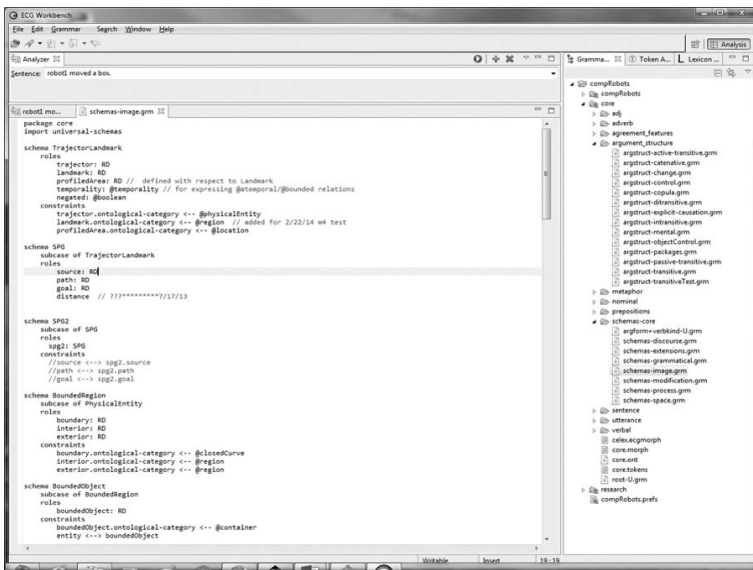
Figure 2. Screen shot of ECG2 core schema and construction lattices

Figure 2 shows a screen shot of some example schemas of the ECG2 Core grammar and a fragment of the construction lattice as well. The GitHub site[3] provides full access to all this and more. The long narrow window on the right of the screen contains an expanded standard eclipse tree structure for the core grammar with two nodes (argument_structures and schemas_core).

The first expansion involves the argument_structure constructions. These were proposed in Goldberg (1995) as fundamental to construction grammars

---

3. <https://github.com/icsi-berkeley/ecg_homepage>

in general. They include traditional notions like active, passive, transitive, and intransitive and technical constructions like control and copula. There are also some more cognitively oriented schemas such as change and mental constructions. The example in the top sentence box of Figure 2 – "robot1 moved a box" is an active-transitive construction.

The other expansion in the screen, in the right column, is schemas_core. There are eight subfolders, each of which has a complex collection of schemas. The folder highlighted in gray, schemas-image, contains most of the traditional image schemas of cognitive linguistics, in ECG form. Because this folder was selected, the large window on the left displays detailed descriptions of the first few key core schemas, described next.

The TRAJECTORLANDMARK schema plays a central role in the theory (including metaphors) and in practice. In addition to the conventional trajectory and landmark roles, profiled area, negation, and temporality are expressed in this schema. Temporality marks the difference between temporal and bounded relations as in Spanish *ser* and *estar*. A closely related schema, SPG, captures the canonical source-path-goal relation. The SPG2 schema is a computational hack that supports the analysis of a chain of SPG relations. In general, ECG2 grammar and systems rely on a wide range of linguistic and computational mechanisms.

For a full sentence, the meanings of all the constructions instantiated in that sentence are combined (unified) to produce a specification of the meaning of the sentence as a whole (Figure 3). A sentence such as our example *The red block moved* describes a 'self-motion' event, with meaning represented as a composition of schemas for causation, motion, and containment, shown in the large window. The notation marks schemas with a circled **S** and constructions with a circled **C**. The top level meaning of this sentence is an EVENTDESCRIPTOR schema. This schema includes three nested constructs: DECLARATIVE-S, BAREINTRANSITIVE, and SELFMOTIONTYPE. The other main construction is the standard DETERMINERPLUSKERNEL that is used to model simple noun phrases. Figure 3 also conveys the specifications of which entities are filling which roles in this event (e.g. Boxed 11 is a1, an internal label for the thing that is moving, and also the MODIFIEDTHING in the PROPERTYMODIFIERSCHEMA). The result is a Semantic Specification (SemSpec), which plays a key role in our applications. We will see additional SemSpecs in later sections.

During the early years of ECG development, the same basic formalism as shown above was used for a wide range of tasks related to embodied language and thought. In this effort, the ECG formalism was extended to support the following functions:

1. A formalism for capturing the shared grammar of a language community.
2. A precise notation for technical linguistic work.
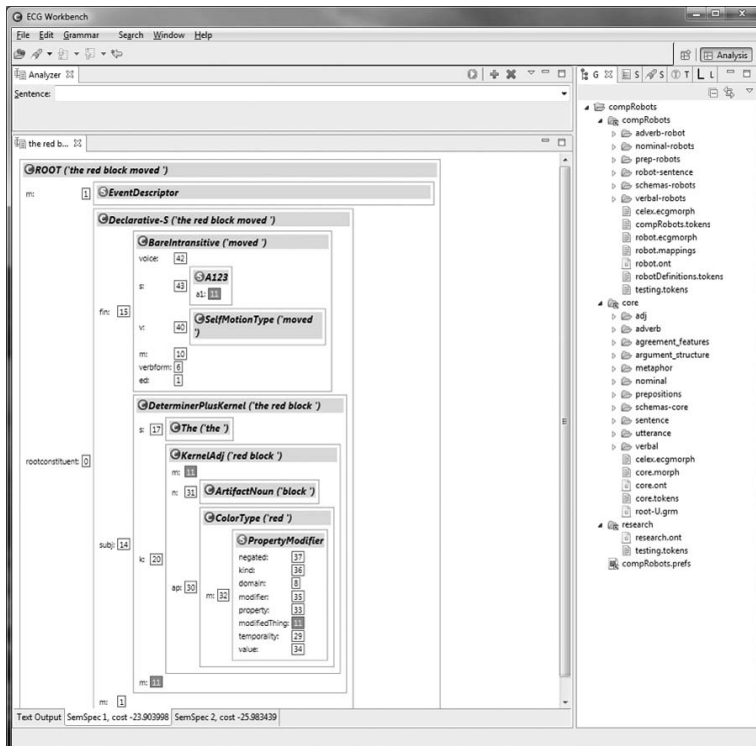
Figure 3. A segment of a semantic specification (SemSpec)

3. An implemented specification for grammar testing.
4. A front end for applications involving deep semantics.
5. A high-level description for neural and behavioral experiments.
6. A basis for theories and models of language learning.

The technical content, but not the history, of this stage of development is contained in the textbook by Feldman (2006). The book includes descriptions of dissertations in cognitive science, computer science, and linguistics. It also contains a brief description of the second generation of systems that try to learn construction grammars from example inputs in context (Chang & Mok 2006). Some of the key insights of this period (e.g. simulation semantics) are still used as foundations for the current work (Bergen 2014; Eppe et al. 2016b).

3. Implementation

Early on in the project, it became clear that we would need powerful computational tools to specify and evaluate ECG treatments of important phenomena.

For a number of theoretical and computational reasons, we based our analyzer (parser) on the idea of constrained best fit (Figure 4). As mentioned, ECG *constructions* are form-meaning pairs, where the meaning pole is an ECG skeletal schema, along with additional bindings and constraints. The implemented analyzer (Bryant 2008), while very important, is not part of the theory. However, the notion of integrated *best-fit analysis* is central. Grammatical analysis inherently involves determining the collection of construction instances (a.k.a. constructs) and bindings that best match an utterance in context. For ECG, the best match must include factors for the semantic and contextual fit as well as the standard constituent structure form fit (Mok & Bryant 2006). As with schemas, there is a subcase lattice over ECG constructions, which helps in organizing the compositional structure of a grammar.

Constrained best fit in nature		
	Inanimate	Animate
physics	lowest energy state	
chemistry	molecular fit	
biology		fitness, expected utility
vision		threats, friends
language		errors, neural theory
society, politics		framing, compromise

Figure 4. Constrained best fit as a general principle

In addition, the meaning pole of an ECG construction specifies what modifications to the currently evolving SemSpec are sanctioned when that construction is included in the best-fit analysis. These modifications can include *evoking* additional skeletal schemas and also constraining and linking schema roles.

At this point, the theoretical foundations of ECG were in place but the tools and infrastructure were inadequate for tackling problems of scale and complexity.

Two new tools were then introduced: an analyzer and the workbench. The analyses are produced by a system called the constructional analyzer (Bryant 2008). Constructional analysis is the process of best-fit interpreting an utterance in context using constructions. The analyzer maps an utterance onto an instantiated set of ECG constructions and semantic schemas. The design of the system is informed by the fields of construction grammar/functional linguistics, natural language processing, and psycholinguistics, and the constructional analyzer is a cognitive model of language interpretation within the tradition of unified cognitive science and NTL.

The power of the analyzer comes from combining constructions with best-fit processing; best-fit constructional analysis is a process in which decisions about how to interpret an utterance are conditioned on syntactic, semantic, and con-

textual information. Because constructions provide explicit constraints between form, meaning, and context, they are well suited to a semantic best-fit approach (Narayanan & Jurafsky 1998).

The best-fit metric computes the conditional likelihood of an interpretation given the grammar and the utterance and is implemented as a factored probabilistic model over syntax and semantics. The syntactic factor incorporates construction-specific preferences about constituent expression/omission and the kinds of constructional fillers preferred by each constituent. The semantic factor scores a SemSpec in terms of the fit between roles and fillers.

The constructional analyzer uses a psychologically plausible sentence-processing algorithm to incrementally interpret an input utterance. Each partial (incremental) interpretation is a subset of the instantiated constructions and schemas that go into the final, intended interpretation. Intuitively, this means that there are competing partial interpretations, each of this is trying to explain the part of the input that has been seen so far. The best-fit metric is used to focus the analyzer's attention on more likely partial interpretations.

The analyzer produces rich linguistic analyses for a range of interesting constructions, including embodied SemSpecs for the various motion and force-application constructions designed by Dodge (2016). An array of syntactically interesting constructions is also easy to implement within the analyzer including constructions for passives, simple *wh*-questions, raising, and radial category description of the ditransitive argument structure construction.

Although the English construction grammar is currently the most linguistically well-motivated grammar processed by the analyzer, the analyzer is not tied to English. It has been adapted to simple French and Spanish. It can analyze Mandarin child-directed utterances as well, using a Latin-alphabet Mandarin grammar. Productive omission is incorporated into the system and scored by the best-fit metric (Mok & Bryant 2006). Omitted arguments are resolved to a candidate set by a simple context model.

The workbench (WB) is a powerful program management based on the widely used eclipse system. It was used to produce the screen shots shown as Figures 2 and 3.

Figure 3 shows a view of the WB in a common state. There are many options, but the most basic functions are editing and testing ECG2 grammars. The large Editor window is used for most of the main functions and, in Figure 3, displays a constructional analysis of the input sentence *the red block moved*, shown in the **Sentence** box just above. The narrow box on the right of the screen is used for a wide range of auxiliary displays, which are presented in detail in the Workbench tutorial on the GitHub homepage.

With the grammar opened, you can type an example into the **Sentence** box, followed by CR (carriage return) and have it analyzed by clicking the triangle

above this box. Assuming that all goes well, a traditional text version of a parse tree will appear in the large window; this is not shown here, but can be brought up by clicking on the TextOutput box at the bottom left of the display. Just to its right is the selected SemSpec box, which produced the SemSpec of Figure 3. The current ECG2 workbench contains considerably extended functionality, some of which will be described in later sections. These capabilities have been exploited in some general NLU systems, but have also been used to study particular deep issues including metaphorical language and reference resolution.

4.   Some additional aspects of ECG

The ECG project has involved a wide variety of disciplines and challenges over the decades of its life. Starting from the three core ideas of embodied form-meaning pairs, probabilistic best-fit, and active semantics, there have been a number of theoretical advances and computational systems. The collection of constructions and schemas in current ECG grammars support full semantic analyses of a wide range of utterances. Of particular importance to understanding dialog, ECG grammars now include constructions and schemas that enable identification of the function that a given sentence is intended to perform (e.g. question, statement, or command). This capability is also important in addressing technical issues like reference resolution, metaphor, etc.

Reference resolution is a challenging problem in NLU and is the focus of the so-called Winograd Challenge, which poses particularly difficult instances of the task (Levesque et al. 2012). The challenge arose in response to growing criticism of the Turing Test as a measurement of machine intelligence and also dissatisfaction with purely statistical approaches to language research. Rather than assess intelligence and language understanding by observing interactions with a human interlocutor, the Winograd Challenge requires a computer to resolve an ambiguous pronoun with its antecedent, based on early examples by Terry Winograd. Consider (1):

(1)   The city council refused to grant the protesters a permit because they (feared/advocated) violence.

Here, *they* can alternately refer to *the city council* or *the protesters*, depending on which of the verbs in parentheses is chosen. Crucially, the Winograd cases cannot be resolved with purely syntactic or statistical models; reference resolution requires 'common sense' or 'world knowledge'.

As described above, the ECG analyzer is a best-fit constructional parser that uses an ECG grammar to produce a semantic analysis of an input sentence. This semantic analysis, called semantic specification (SemSpec), contains information

about how words in the sentence activate meaningful bindings in the embodied schemas. This turns out to be very useful in analyzing the Winograd examples, which are simpler than the original example above. An example SemSpec for the sentence *Jane thanked Mary* can be seen in Figure 6 and will be discussed below.

The SemSpec produced by the ECG analyzer is a rich data structure containing both constructional and semantic information about a sentence but does not contain any information about the wider discourse context (e.g. previous sentences that have been uttered), nor does it resolve pronouns with their antecedents. Instead, pronouns are marked as referring to some unknown antecedent and the 'specializer' (Figure 8) does the resolution process. The specializer receives a SemSpec from the ECG analyzer and is responsible for performing several key functions, including extracting task-relevant information and performing anaphora resolution.

Our approach to reference resolution in the specializer is an extension of context mechanisms used in previous applications to robotics and interactive games (Trott et al. 2016). It is based on a taxonomy of semantic regularities that are found in Winograd problems (Raghuram et al. 2017). A standard ECG schema nicely captures each of these. ECG schemas are related to FrameNet frames but focus on deeper meanings and semantic inferences. One common case is the GRATITUDE schema (Figure 5).

```
schema Gratitude
    subcase of BridgeSchema, TransitiveAction
    roles
        theme: RD
    constraints
        bridgePatient <--> agent
        bridgeAgent <--> patient
        bridgeKind <-- @thanks

schema BridgeSchema
    roles
        bridgeAgent
        bridgePatient
        bridgeTheme
        bridgeKind
```

Figure 5. Typical ECG schemas for the Winograd antecedent problem

All of the schemas are subcases of the general BRIDGE schema, which the specializer uses to resolve the referents of expressions such as *she*. The gratitude schema is a subcase of TRANSITIVEACTION and also of the general BRIDGESCHEMA also shown in Figure 5. The idea is that there are different types of BRIDGEKIND that relate pronouns to their correct antecedent. In this case, the agent of thanking is the recipient of the main action. This schema helps solve Winograd problems like *Jane made sure to thank Mary for the help **she** had given/received*. Notice that the binding decision is based on the deep conceptual roles rather than any surface

properties. Figure 6 shows the structure of the SemSpec resulting from processing by the analyzer and specializer. In this case (*received*), Jane is the agent of the transitive thanking action, as indicated by the fact that several roles share the same index (boxed 6 here).
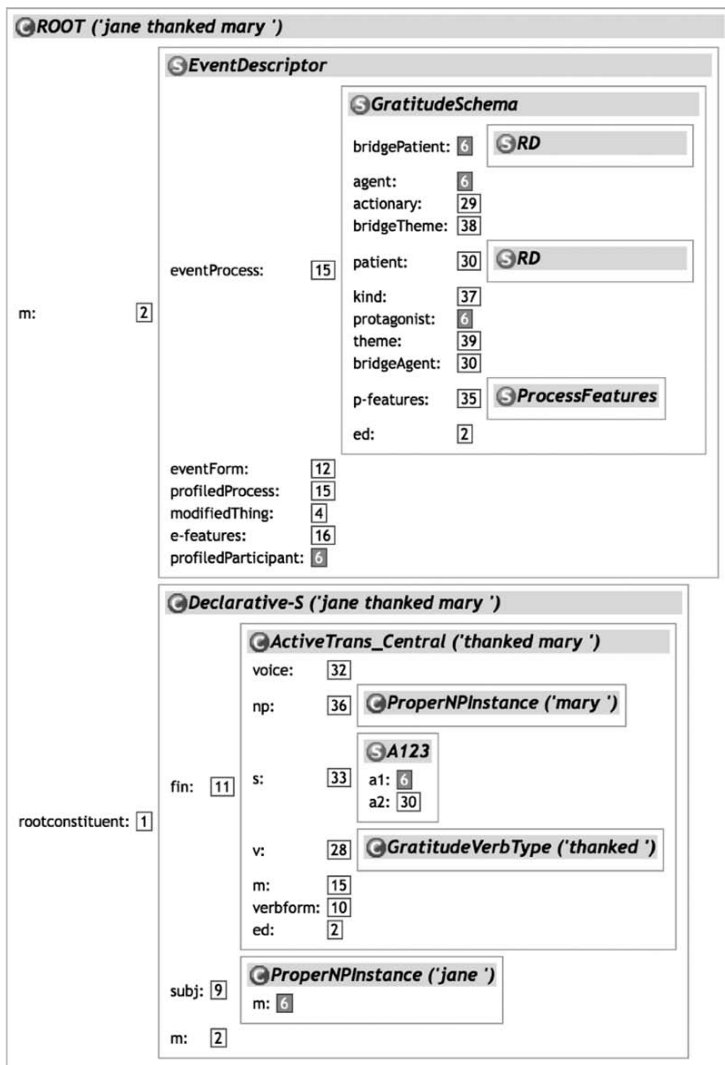
Figure 6. ECG analysis of *Jane thanked Mary*

4.1   Metaphor

Another important addition to the coverage of ECG is the treatment of metaphor within the core formalism. Metaphor was established early on as a foundation of

cognitive linguistics (Lakoff & Johnson 1980) and it was always a goal to extend ECG to cover it. There were some early efforts to add core primitives but this turns out to be unnecessary.

Metaphors and other types of figurative language appear pervasively and often unconsciously in natural language use. ECG has made important advances in the analysis of such language, developing ECG formalizations of conceptual metaphors and the constructions used to express them. Figure 7 shows a schema and a matching construction that enables analysis of metaphorical phrases such as a *big/huge/small problem*, which are expressions of the conceptual metaphor DIFFICULTYISSIZE.

```
schema DifficultyIsSize_metaphor
  subcase of AbstractStatesArePhysicalProperties_metaphor
   roles
      source: Size
      target: Difficulty
constraints
    source.property <-- @size
    target>property <-- @difficultyScale
    name <-- "difficulty is size"

construction MetaphoricalScalarAdjective_DifficultyIsSize
    subcase of   MetaphoricalScalarAdjective
  constructional
  constituents
      ap: ScalarAdjective_test
    meaning: ScalarProperty
   evokes DifficultyIsSize_metaphor as sap
   constraints
     self.m <--> sap.target
     ap.m <--> sap.source
     ap.m.property <--> sap.source.property
     self.m.domain   <--> sap.target.domain
```

Figure 7. An ECG metaphor schema and a metaphor construction

The top half of Figure 7 is a schema specifying the meaning of the metaphor DIFFICULTYISSIZE as a subcase of the more general metaphor ABSTRACTSTATE-SAREPHYSICALPROPERTIES metaphor. The source and target domain have the appropriate semantic types and properties. The bottom of Figure 7 depicts the ECG construction that will correctly analyze input like *giant problem*. The idea is that a use of the DIFFICULTYISSIZE metaphor has as its meaning a general SCALARPROPERTY schema, like other size metaphors. The construction evokes the schema above and binds the input meanings to the appropriate roles. The "evokes" primitive has been an important feature of ECG (Feldman et al. 2009) allowing an implicitly referenced schema to be a full participant in the analysis of an input.

The ICSI/UCB NLU effort has made significant progress towards creating a comprehensive inventory of schemas for basic and complex concepts, thus formalizing key cognitive linguistic insights into language meaning (Fillmore

et al. 2003). This work and its articulation within ECG are continuing (Dodge
et al. 2014, 2017; Stickles et al. 2015).

5.   ECG2, system and applications

As is well known, natural language usually underspecifies the meaning of an utter-
ance in context. From the outset, the ECG SemSpec was designed to capture all
the meaning relations expressed in an utterance but to leave open those that are
not expressed. Of course, some meanings can only be determined by background,
goals, and context. Crucially, the ECG2 framework of Figure 8 assumes that an
NLU product is focused on some background, goals, and context. For concrete-
ness, think of an NLU system for controlling a (simulated) robot (Eppe et al.
2016). The right side of Figure 8 is called the App side and, in the robot case,
would include a robot API and a robotics oriented Problem Solver, perhaps with
a path planner (Kayrallah et al. 2015).
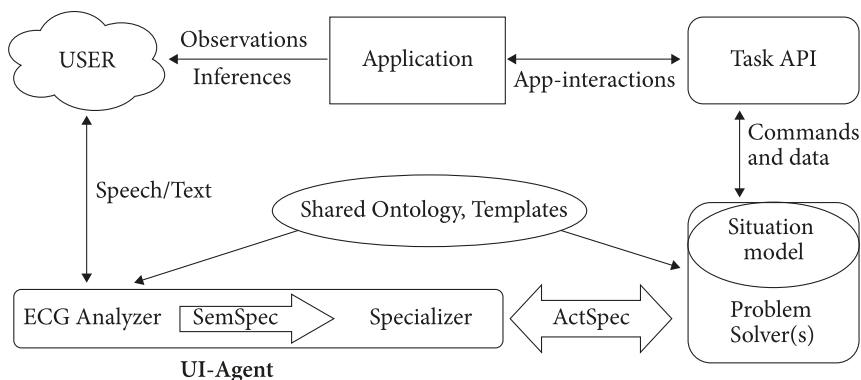
Figure 8. The components of the ECG2 frameworks

The central problem of ECG2 is how to couple a general deep analysis of the
natural language capability with a specific context and goals. One key step is the
introduction of an action specification (ActSpec) formalism. This is encoded as
(JSON) general feature structures and was called N-tuples in some early publica-
tions. Another basic ability of the framework is to view the ActSpecs that result
from the successful analysis of an input. A description of how to do this is avail-
able from the GitHub site.[4]

---

4. <https://github.com/icsi-berkeley/ecg_homepage/wiki/Getting-Started>: viewing-actspecs
-from-existing-grammars

Since the ECG analysis is task-independent and the ActSpec is task-dependent, there needs to be a program (the specializer) that traverses the SemSpec and outputs appropriate ActSpecs (N-tuples), as depicted in the bottom middle of Figure 8. The framework makes it easy to work separately on the language and app side of a project, using ActSpecs as the link. Looking ahead, building an NLU product for a new domain requires defining the shared vocabulary (ontology) and ActSpec templates for the new task. There are workbench tools to help.

ECG2 significantly extends the scope of NLU and all further processing depends on these SemSpecs. Figure 8 is an overview of the full ECG2 framework; the left side is called the language side and shows the analyzer and SemSpec. The workbench is a separate tool, but is tightly integrated for debugging. In operation, an ECG2 product is an integrated system that supports NLU interaction with any application that has an adequate Application Programmer Interface (API). The language (left) side of Figure 8 is largely application-independent, except for some task-specific terminology.

In addition to these various components, the homepage release includes code and documentation for the ECG2 **framework** that ties it all together. There is a good description of the system design in Eppe et al. (2016a). As a starting point for new products, the latest release includes a Core framework that has simple versions of all the components along the bottom of Figure 8. The framework and the associated Github modules have been used to develop new ECG2 products in a variety of domains. The most recent of these, an NLU front end for the Hesperian medical and health wiki[5] will be described in the next section.

In general, retargeting the application module to a new application consists of several crucial steps:

1. Identify the application domain and its relevant vocabulary, as well as the API; if the API does not exist, define/design it.
2. Design n-tuple templates to convey semantics to Problem Solver.
3. Add relevant tokens (and schemas/constructions, if necessary) to the grammar with the Token Tool.
4. Extend the existing Core Specializer and Problem Solver as needed for application.
5. Build and test the new products.

Figure 9 is a screen shot of the ECG2 Token Tool, which is used to add relevant vocabulary to the language side of a product. The screen shot depicts the addition of the verb *grab* to the lexicon of a robot product. Because ECG does deep

---

5. <http://hesperian.org>

semantic analysis, the new word has to have the proper syntactic and semantic types. In this case, *grab* is a subcase of ApplyForceType and has the same meaning as *grasp*.
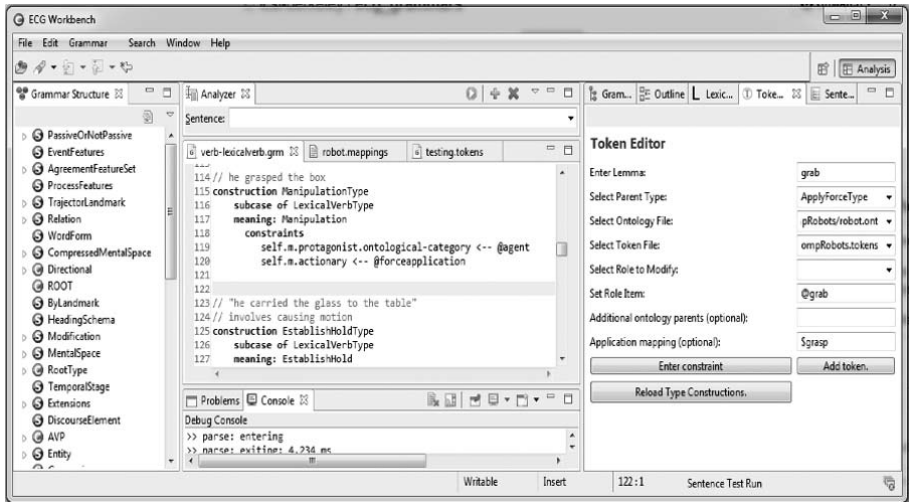
Figure 9. The ECG token editor

6.   Prospects

Over four decades, the NTL/ECG project has addressed several fundamental issues in language, thought, and their neural embodiment. Thanks to the efforts of many groups, our understanding of all this has greatly advanced but there are still deep mysteries (Feldman 2017). The current chapter traces the UCB/ICSI developments through several successively broader views of the domain. Despite the current enthusiasm for theory-free AI, linguistics and cognitive science, with constructions grammars like ECG continue to make important contributions.

One current focus in ECG is an attempt to build and deploy an ECG2-based NLU system for an important social problem – providing personal and social health information to people who lack it. This is a cooperative project with the Hesperian Foundation. Beginning with the development of the classic book *Where There Is No Doctor*, based on a project in the mountains of Mexico in the early 1970s, Hesperian Health Guides has developed and distributed health materials now available in over 80 languages. As it happens, the Hesperian office is just one block from ICSI in Berkeley and impressed us with their efforts in producing books and pamphlets.

Around 2008, Srini Narayanan, with support from Google, carried out a project to extend the Hesperian outreach to on-line access using a Wiki (Gedigian & Narayanan 2009). This is still available as a search box at en.hesperian.org and has been widely used. However, it uses a simple 'bag-of-words' search engine and is prone to various failures. Our current, and most ambitious, ECG2 product will replace the simple search box with an NLU system oriented to the Hesperian health advice domain.

A preliminary version has been built, following the extension paradigm described in the previous section. This involved adding vocabulary, ActSpec templates, for the new (Hesperian) domain, making some simple changes to the grammar and Specializer. As always, the Problem Solver is task-dependent – in the Hesperian case, this involves casting Wiki queries to optimize the passages returned (Raghuram 2018). The preliminary version has been tested successfully. In addition to the domain-specific vocabulary, one of the main tasks is to specify the ActSpec templates that are the main interface between the language and App modules. For the Hesperian domain, a typical ActSpec for this domain is as follows (2):

```
(2)  ActSpec: {
         'descriptorType': 'diseaseDescriptor',
         'gender': 'genderValues',
         'givenness': 'givennessValues',
         'location': {
             'objectDescriptor': {
                 'descriptorType': 'objectDescriptor',
                 'type': 'bodyPart'
             }
         },
         'number': 'singular',
         'type': 'cancer'
     }
```

The ECG types "**singular**", "**genderValues**", and "**givennessValues**" are generic. Notice that the "**location**" role is itself composite, with a structure as its value.

For this product, it was also necessary to add some additional ECG2 schemas to the grammar, because diseases, symptoms, and treatments were not part of the conceptual primitives of the core grammar. Again, a new schema like DISEASE involves formal ECG2 elements with domain-specific types like PATIENT and SYMPTOM. No changes in the analyzer were needed, but the specializer did require some modification to properly fill in the ActSpecs after analysis. In (3), there is the current version of the Hesperian disease schema. It also uses domain specific ontology items like "**@bodyPart**".

```
(3)  schema Disease
        subcaseof RD
        roles
           experiencer: Patient
           location: RD
```

```
        agent: RD
        symptom: Symptom
     constraints
        experiencer.ontological-category <-- @person
        location.ontological-category <-- @bodyPart
        agent.ontological-category <-- @agent
        symptom.ontological-category <-- @symptom
```

In addition, all of our specific products have required some low-level system work to link with Apps on other platforms, languages, etc. For the Hesperian product, one problem was that many diseases, like pink eye, have multi-word names and this requires a modification of the lexical pre-processing module.

Figure 10 shows the full schema for Disease in the current implementation. Almost all the roles are from the general ECG referent descriptor (RD) allowing the full rich language mechanisms to also apply to this domain-specific concept. Only the "experiencer" and "symptom" needed to be added.
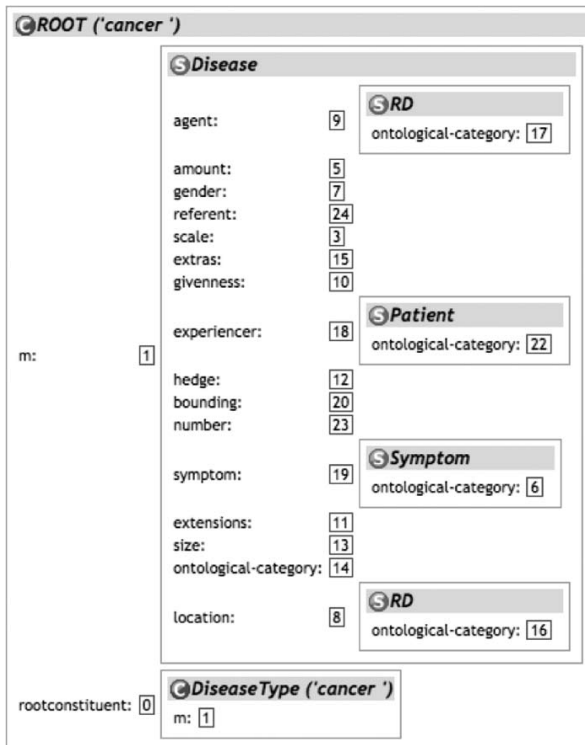
Figure 10. The conceptual structure of Disease for the Hesperian product

Construction grammars, as discussed in this volume, continue to be one of the most productive approaches to the deep problems of language and thought. Embodied construction grammar has been the most explicitly inter-disciplinary

of the construction grammars, with deep links to computation, neuroscience, and cognitive science. The current homepage site provides a number of foundational studies as well as tools and systems to extend this effort.

References

Bergen, B. (2014). *Louder than words: The new science of how the mind makes meaning*. New York: Basic Books.

Bergen, B., Chang, N., & Narayan, S. (2004). Simulated action in an embodied construction grammar. In *Proceedings of the 26th Annual Meeting of the Cognitive Science Society*, 26, 108–113.

Bryant, J. (2008). Best fit constructional analysis. Unpublished UC Berkeley dissertation.

Chang, N., & Mok, E. (2006). Putting context in constructions. In *Proceedings of the 4th International Conference on Construction Grammar (ICCG4)*. Tokyo, Japan.

C&F (2013). In memory of Charles J. Fillmore. *Constructions and Frames*, 5(2), 117–118. https://doi.org/10.1075/cf.5.2.000rb

Dodge, E., David, O., Stickles, E., & Sweetser, E. (2014). *Constructions* and metaphor: Integrating *MetaNet* and embodied construction grammar. Paper presented at *The 8th International Construction Grammar Conference.*

Dodge, E. (2016). A deep semantic corpus-based approach to metaphor analysis: A case study of metaphoric conceptualizations of poverty. *Constructions and Frames*, 8(2), 256–294. https://doi.org/10.1075/cf.8.2.05dod

Dodge, E., Trott, S., Gilardi, L., & Stickles, E. (2017). Grammar scaling: Leveraging FrameNet data to increase embodied construction grammar coverage. *The AAAI 2017 Spring Symposium on Computational Construction Grammar and Natural Language Understanding. Technical Report SS-17–02* (pp. 154–162). Palo Alto, CA: AAAI Publications.

Eppe, M., Trott, S., Raghuram, V., Feldman, J., & Janin, A. (2016). Application-independent and integration-friendly natural language understanding. *Global Conference on Artificial Intelligence (GCAI 2016)* (pp. 340–352). Berlin: EasyChair, EPiC Series in Computing, v.41.

Eppe, M., Trott, S., & Feldman, J. (2016a). Exploiting deep semantics and compositionality of natural language for human-robot interaction. *2016 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 731–738). Daejeon, South Korea: IEEE. https://doi.org/10.1109/IROS.2016.7759133

Feldman, J. (2006). *From molecule to metaphor: A neural theory of language*. MIT Press. https://doi.org/10.7551/mitpress/3135.001.0001

Feldman, J. (2010). Embodied language, best-fit analysis, and formal compositionality. *Physics of Life Reviews*, 7(4), 385–410. https://doi.org/10.1016/j.plrev.2010.06.006

Feldman, J. (2017). Mysteries of visual experience. <http://arxiv.org/abs/1604.08612>

Feldman, J. (2018). Towards a science of the mind. <https://arxiv.org/abs/1811.06825>

Feldman, J., Lakoff, G., Bailey, D., Narayanan, S., Regier, T., & Stolcke, A. (1996). L0 – the first five years of an automated language acquisition project. In P. Mc Kevitt (Ed.), *Integration of Natural Language and Vision Processing: Theory and Grounding Representations Volume III* (pp. 205–231). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-009-1639-5_15

Feldman, J., Bryant, J., & Dodge, E. (2009). A neural theory of language and embodied construction grammar. *The Oxford Handbook of Computational Linguistics* (pp. 38–111). Oxford: Oxford University Press.

Fillmore, C., Johnson, C. R., & Petruck, M. (2003). Background to Framenet. *International Journal of Lexicography*, 16(3), 235–250. https://doi.org/10.1093/ijl/16.3.235

Gedigian, M., & Narayanan, S. (2009). A multilingual primary health care resource. *Proceedings of the Computer Science and Global Development Conference* (pp. 63–65). Washington, DC: Computing Community Consortium.

Goldberg, A. (1995). *Constructions: A construction grammar approach to argument structure*. University of Chicago Press.

Khayrallah, H., Trott, S., & Feldman, J. (2015). Natural language for human-robot interaction. Paper presented at the *International Conference on Human-Robot Interaction (HRI)*, Portland, Oregon.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.

Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: University of Chicago Press. https://doi.org/10.7208/chicago/9780226471013.001.0001

Levesque, H., Davis, E., & Morgenstern, L. (2012). The Winograd schema challenge. In *Proceedings of the Thirteenth International Conference on Principles of Knowledge Representation and Reasoning* (pp. 552–561). Palo Alto, CA: AAAI Press.

Michaelis, L. A. (2017). Construction grammar and the syntax-semantics interface. *Bloomsbury Companion to Syntax* (pp. 421–435). New York: Bloomsbury.

Mok, E. H., & Bryant, J. (2006). A best-fit approach to productive omission of arguments. *Annual Meeting of the Berkeley Linguistics Society*, 32 (1), 551–560. https://doi.org/10.3765/bls.v32i1.3462

Narayanan, S. (1999a). Reasoning about actions in narrative understanding. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI '99)* (pp. 350–358). San Francisco: Morgan Kaufmann.

Narayanan, S. (1999b). Moving right along: A computational model of metaphoric reasoning about events. In *Proceedings of the Nat. Conf. on Artificial Intelligence (AAAI '99)* (pp. 121–128). Palo Alto, CA: AAAI Press.

Narayanan, S., & Jurafsky, D. (1998). Bayesian models of human sentence processing. In *Proceedings of the 20th Annual Conference of the Cognitive Science Society* (pp. 752–757). Allendale, NJ: Erlbaum.

Newell, A. (1994). *Unified Theories of Cognition*. Cambridge, MA: Harvard University Press.

Petruck, M. (Ed.) (2016). *Constructions and Frames* [Special issue on Metanet], 8(2). https://doi.org/10.1075/cf.8.2.01pet

Raghuram, V., Trott, S., Shen, K., Goldberg, E., & Oderberg, S. (2017). Semantically-driven coreference resolution with embodied construction grammar. In *Proceedings of the AAAI 2017 Spring Symposium on Computational Construction Grammar and Natural Language Understanding. Technical Report SS-17–02* (pp. 238–244). Palo Alto, CA: AAAI Publications.

Raghuram, V. (2018). Natural language understanding for healthcare queries. *UC Berkeley Technical Report No. UCB/EECS-2018-35*. <http://www2.eecs.berkeley.edu/Pubs/TechRpts/2018/EECS-2018-35.pdf>

Regier, T. (2002). *The human semantic potential*. Cambridge, MA: MIT Press.

Stickles, E., David, O., & Sweetser, E. (2015). Grammatical constructions, frame structure, and metonymy: Their contributions to metaphor computation. In *Proceedings of the 11th Meeting of the High Desert Linguistics Society (HDLS)* (pp. 317–345). Albuquerque, NM: High Desert Linguistics Society.

Trott, S., Eppe, M., & Feldman, J. (2016). Recognizing intentions from natural language: Clarification dialog and construction grammar. Paper presented at *RO-MAN 2016, Workshop on Communicating Intentions in Human-Robot Interaction* . New York, NY.

Subject index

A

absolute generalization 57–58, 62–63

abstract construction *See under* construction

accusative case 126, 129–132, 138

action-based formalism 149

ActSpec (ECG) 161–163 *See also* Embodied Construction Grammar

adjacency 39, 41, 47, 50

adjective construction *See under* construction

adjective 10–11, 13, 19, 35–36, 60, 63, 71, 74, 77, 78, 84, 101, 108–109

adjectival 20, 101–103

adverb 96–97, 100–101, 123, 125, 131

adverbial 37, 101–102

affective 25, 29, 34

alignment-seeking function 110, 115

alternation 39, 60–61, 85

alternative subfunction 28

anaphora 34, 157

anaphoric 100–103, 108–110

antecedent 13, 16, 31, 33–34, 96–97, 100–104, 108–111, 115–116, 156–158

apprehension 22–23, 29, 46

arbitrariness 87

argument structure construction *See under* construction

argument:
  slot 84
  structure 58, 64

assembly 2–3, 8, 10–12, 14, 16–18, 21–22, 28, 31, 34–39, 41, 45, 47, 50–52
  element 21–22, 25
  assembly-based representation 15, 18

B

attention 25, 69–70, 81, 87, 116, 155
  locus of 32, 51, 32
  focus of 12, 29

audiolingual 120

B

Best-fit (ECG) 154–157
  analysis 154
  approach 155
  metric 155 *See also* Embodied Construction Grammar

BNC *See* British National Corpus

British National Corpus 68–71, 74, 76, 78

C

canonical construction *See under* construction

categorization 10, 18, 21–22, 26, 28, 134–135

cause 66, 70, 98, 120, 150–151
  causation 23, 150, 152
  causative 85

CG *See* Cognitive Grammar

chain 16–17, 21, 45, 116, 152

child language 82, 85

clause:
  clausal 11, 13, 21, 34–35, 37
  clausal reference 25, 37, 39
  co-activation 22, 28, 40
  finite 37
  matrix 13, 19, 43
  relative 13, 39, 41, 43
  subordinate 75, 107

COCA *See* Corpus of Contemporary American English

Cognitive Grammar 8–11, 14–18, 21, 24, 28–34, 38, 41, 46, 50–52

C

cognitive:
  grammar 2, 3, 8, 87
  grounding 3
  linguistics 4, 56, 79, 122, 133–135, 148–150, 152, 159
  organization 82
  salience 39, 45

collexeme 66, 126

collo-profile 81

collocation 20, 58, 65, 67, 69, 80, 86, 88, 120–121

colloconstruction grammar *See under* grammar

collostruction 65, 66

collostructional analysis 3, 65, 66, 67, 69

communicative:
  context 96
  function 10
  intention 85, 134
  interaction 24, 34
  purpose 86
  setting 119–120
  situation 95, 120

complementation 61, 68

complex quantifier 13, 44

component:
  element 19, 20, 23
  structure 8, 9, 10, 20, 25, 49
  subfunction 27–28

composite:
  expression 8–9, 15, 20, 23, 33
  semantic structure 11, 31, 45, 46
  structure 8–10, 13, 17, 20–22, 25, 40–41, 43, 45–46, 50–51
  structure profile 12

compositional 13, 20–21, 33, 41, 98, 124
  structure 9, 154

compositionality 124

Since its foundation in the 1980's, Construction Grammar has been crossing the traditionally imposed borders. From superimposed levels of analysis to the lexicon-grammar continuum, the constructionist approach to language has been built by, quoting Charles Fillmore, "the insistence on seeing specific grammatical patterns as serving given semantic (and often pragmatic) purposes, and in the effort to construct a uniform theory capable of presenting both the simplest and most general aspects of language and the large world of complex grammatical structures". In this volume, five chapters derived from the plenary talks at the 9th International Conference on Construction Grammar provide a sample of the bridges the insistence and effort of construction grammarians have built in the past three decades with other analytical models – namely Cognitive Grammar and Collostructional Analysis –, perspectives – Diachronic Construction Grammar – and applications – Language Pedagogy and Natural Language Understanding.

Originally published as special issue of *Constructions and Frames* 12:1 (2020).

John Benjamins Publishing Company