

Radical Construction Grammar

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1. Introduction

Radical Construction Grammar is a model of morphosyntactic representation that emerged from bringing together the results of typological research and the issues addressed by contemporary theories of syntax. The product of this marriage of typology and syntactic theory is basically a variety of construction grammar, but one that is quite different from some varieties of construction grammar described in this handbook, not to mention nonconstructional syntactic theories.

Most contemporary syntactic theories tend to focus on two dimensions of a scientific theory (Laudan 1977; Croft 1999). A scientific theory is not a monolithic entity. A major division is between those elements of the theory that are part of the **research tradition** of the scientists working in that theory (Laudan 1977:78-81), and the **analyses** of specific phenomena. A research tradition simply represents the “way we do science” and is not directly falsifiable: ‘research traditions are neither explanatory, nor predictive, nor directly testable’ (Laudan 1977:81-82). In linguistics, formalism and functionalism are two major research traditions (or ‘approaches’, as they are usually called in linguistics). Research traditions are characterized by what Laudan calls **metaphysical commitments**, that is, commitments on the part of the scientist about what the scientific phenomenon is. Examples of metaphysical commitments in linguistics include whether syntactic constraints are innate, whether syntactic structure is autonomous (self-contained) relative to meaning, whether grammar is a fixed mental object or evolves through usage, and so on.

In contrast, analyses of particular phenomena, such as ergativity, grammatical voice or complex predicates, are much closer to the empirical evidence. Often, alternative analyses of the same phenomenon exist in a single research tradition and one may be discarded for another based on empirical data. Although any particular analysis is couched in the metaphysical commitments of a particular research tradition, particular analyses may be translated into another research tradition (Croft 1999:96-97).

A second aspect of a research tradition that is specific to linguistic theories are **representational commitments** (Croft 1999:91-96). Representational commitments are the structures and notations used to represent the grammatical analyses of particular sentences or utterances. The systems of representational commitments are essentially formal languages for the description of grammatical structures of sentences. These are the most salient properties of syntactic theories, especially for students learning the theory. One characteristic feature of formal syntactic representations is how much they vary and change over time. The syntactic structures posited by, for instance, the Minimalist Program (MP), Lexical Functional Grammar (LFG), Head-driven Phrase Structure Grammar (HPSG) and Role and Reference Grammar (RRG) for the same sentence are very different. These four models are only a subset of the models that have been proposed. Likewise, the syntactic structures in the various versions of Chomskyan generative grammar over the past fifty years, and in the versions of the other

aforementioned models referred to over their thirty-odd year lifetimes, also differ considerably.

Radical Construction Grammar's critique of other syntactic models focuses on another, much less discussed part of the research traditions in syntax: the methods of argumentation for a syntactic analysis. This is part of what Laudan calls the **methodological commitments** of a scientist in a particular research tradition. Methods of syntactic argumentation are far less discussed in the literature comparing formalism and functionalism, although other methodological commitments, such as the use of invented examples vs. naturally occurring utterances, have attracted more attention (e.g. Sinclair 1991; Fillmore 1992; Stubbs 1996). Yet a critique of syntactic argumentation reveals some deep metaphysical assumptions that are rejected in Radical Construction Grammar.

Above all, the critique of syntactic argumentation, combined with the empirical results of typological research, results in the absence of most representational commitments. Radical Construction Grammar has very few representational commitments. Radical Construction Grammar does not require learning (and relearning) a complex, detailed representation language. This is because the grammatical categories that make up the building blocks of the representational languages of other syntactic theories are language-specific and construction-specific. The only universal representational commitment for formal syntactic structure is the part-whole structure of constructions and the grammatical roles that occur in constructions.

Instead, the substantive universals of grammar are found in the mapping between linguistic form and linguistic meaning in constructions. As in other varieties of construction grammar described in this handbook, constructions are a pairing of syntactic structures with semantic structures; that is, they are signs or symbolic units. The main difference between signs/symbols in construction grammars and signs/symbols in nonconstructional theories is that signs/symbols in construction grammars may be complex formal structures, not (just) atomic forms such as words or morphemes. Syntactic universals are therefore universals of the mapping between such complex syntactic structures and the corresponding semantic structures across languages. This mapping is complex, partly arbitrary, and probabilistic (as a crosslinguistic generalization); but there is no point in pretending that universals of syntactic structure mapped onto semantic structure are anything otherwise.

The variability that is observed across languages requires innovations in the representation of syntactic categories and syntactic constructions. The innovations include: a continuous or semi-continuous conceptual space for representing category structure; recasting the form-meaning mapping as a frequency distribution of forms across that conceptual space; abandoning abstract syntactic relations; and a syntactic space whose dimensions are defined by a model of the verbalization of experience. Developing these novel representations is an evolving process, of course.

2. Distributional analysis, constructions and the building block model of grammar

The basic method for syntactic argumentation is **distributional analysis**. The name 'distributional analysis' was used by the American structuralists to describe the method, but it goes under different names in contemporary theories: applying morphosyntactic (grammatical) tests, satisfying grammatical criteria, possessing grammatical properties,

displaying grammatical behavior, presenting a series of syntactic arguments and so on. All of these terms describe essentially the same method.

In distributional analysis, a hypothesis about the proper analysis of a syntactic unit is formed by examining the occurrence or nonoccurrence of that unit in a range of syntactic structures. A relatively simple example is the analysis of certain argument phrases in English (more precisely, certain phrases functioning as arguments of a verb with which they are combined). Certain argument phrases of verbs occur postverbally and without a preposition in the English Active Voice construction, as in (1):

- (1) a. The wind knocked **the potted plants** over.
- b. The police tapped **my phone**.

This is described as the distribution (or a property or behavior) of the phrases in question in a particular position, or **role**, in the Active construction. Alternatively, occurrence of the phrases in question in the particular role is called a test or criterion for the phrase to belong to a grammatical category. On the basis of this distribution, we may hypothesize that the phrases in boldface form a single grammatical category, Direct Object.

Two observations can be made about distributional analysis. First, the distribution of a syntactic unit is actually defined over a set of **constructions**. The ‘tests’, ‘criteria’, ‘properties’, or ‘behavior’ are constructions, which are syntactic structures in their own right. Construction grammars of all varieties explicitly recognize constructions (see any of the other contributions to this volume). Nonconstructional grammars do not explicitly recognize the existence of constructions (indeed, some theories deny their existence; e.g. Chomsky 1981:121, 1993:4); but their method of syntactic argumentation presupposes the existence and identifiability of constructions. Radical Construction Grammar, like other construction grammars, explicitly posits the existence of constructions.

The distributional method defines a mapping between one set of syntactic structures—the words, morphemes, phrases etc. in question—and another set of syntactic structures, namely the constructions used as tests, criteria, etc. (more precisely, the relevant grammatical role in the constructions used). For example, example (1) illustrates a mapping between the set of phrases in boldface and the Active Voice construction, or more precisely the postverbal NP role in the Active Voice construction.

Distributional analysis as originally conceived is a pattern of relations among formal structures. However, distributional analysis may be, and is, extended to include meaning. For example, in examining the distribution of elements that function in the role of complements of the English auxiliary *must*, one must distinguish between epistemic and deontic meanings. Epistemic meanings allow complements of the form *have* + Past Participle that denote past events (*He must have taken his jacket*), whereas deontic meanings only allow complements in the Bare Infinitive form that denote potential future events (*You must wear a jacket to the dinner*).

The second observation is that the distributional method is generally used to form hypotheses about the syntactic unit that occurs/does not occur in the relevant roles of the constructions used as tests/criteria/etc. Again, the identity of the constructions used as tests/criteria etc. is taken for granted, and the distributional method is taken to reveal something about the identity and distinctness of the syntactic units, rather than anything

about the constructions in which they occur/do not occur. For example, the distribution pattern in (1) is taken to define a category Direct Object.

This conclusion is based on a metaphysical and representational commitment to what may be called the **building block** model of grammar. Grammar is seen as being made up of minimal units (words or morphemes) belonging to grammatical categories, and constructions are defined as structured combinations of these units. The purpose of the distributional method, therefore, is to identify the grammatical categories that are the building blocks, and the units that belong to those categories. It is also assumed that the grammatical categories are part of a speaker's mental representation of her grammatical knowledge. The kaleidoscope of "grammatical theories" reflects different and evolving ideas of what the building blocks of grammar are and how they are put together.

3. Empirical variation and Radical Construction Grammar

When the distributional method and the building block model meet empirical fact, however, a problem arises: distributional patterns do not match. For example, we may also compare the distribution of the phrases in (1) in a particular role in another syntactic construction, the English Passive Voice construction, as in (2):

- (2) a. **The potted plants** were knocked over by the wind.
- b. **My phone** was tapped by the police.

It appears that the Passive Subject category corresponds exactly with the Active Direct Object category, but the examples in (3)-(4) demonstrates that this is in fact not correct:

- (3) a. The road extends **ten miles** into the mountains.
- b. 2010 saw **the first hung parliament in Britain for over thirty years**.

- (4) a. ***Ten miles** is extended by the road into the mountains.
- b. ***The first hung parliament in Britain for over thirty years** was seen by 2010.

The distribution (property, behavior, etc.) of the boldface phrases differs in the Passive construction: the examples in (4) are ungrammatical by introspective judgment. Hence there is a difference in distribution between *the potted plants* and *my phone* in (1)-(2) and *ten miles* and *the first hung parliament...* in (3)-(4).

Across languages as well, constructions appear to define different categories (Dryer 1997): Absolutive-Ergative does not match Subject-Object; the Verb category is more inclusive (including "Adjectives" as well) or less inclusive (where a small number of "Verbs" combines with other elements to produce the translation equivalents of English "Verbs").

In other words the facts of languages reveal a conflict in the distributional method on the one hand and the building block assumption on the other. The widely accepted response to the empirical facts is to select certain constructions as criterial in defining a grammatical category. For example, the Passive is generally taken as criterial in defining the Active Direct Object category, and it is concluded that *ten miles* and *the first hung*

parliament... are not Direct Objects. In crosslinguistic comparison, in each language being compared a construction is used—not necessarily the same constructions across languages—to identify a category and to identify that category as the same as, say, English Subject or English Verb. If the construction chosen in a language does not yield the desired category, then another construction may be used instead (for a critique of this strategy in crosslinguistic comparison, see Croft 2009). Another approach to conflicts in distribution is to consider the category in question to be defined by a majority of the constructions used in the distributional analysis.

This strategy—arbitrarily selecting one construction or a subset of constructions as criterial—can be traced back to the American structuralists; it is called **methodological opportunism** in Radical Construction Grammar. Methodological opportunism in effect abandons the distributional method, since it is selective in the employment of distributional facts. For example, no explanation is given as to why *ten miles* and *the first hung parliament...* in (3) have the same distribution as *the potted plants* and *my phone* in (1). The purpose of methodological opportunism is to preserve the building block ontological assumption: if there is a small finite set of building blocks, categories have to be identified as the same from one construction to the next (e.g. Active Direct Object = Passive Subject).

However, mismatches in distributional patterns are pervasive in all human languages, a fact that is evident in any crosslinguistic comparison and in any significantly detailed analysis of a single language. Much of linguistic analysis aims to develop hypotheses that will account for the mismatches in distribution patterns. However, any analysis committed to a particular set of building blocks is forced to devise an essentially ad hoc explanation for the distribution patterns that do not match those of the constructions used to define the building blocks (see Croft 2005, 2009 for critiques of crosslinguistic analyses and Croft 2007a, 2010a for critiques of a single-language analysis). Dryer (1997) essentially argues that the building blocks must be different for every language (see also Barðdal 2011). While this is correct, within-language variation indicates that the “building blocks” must actually be different for every construction in a single language. In other words, if the methodological commitment to distributional analysis is not abandoned, then one must abandon the metaphysical commitment to the building block model of grammar. This is the basic conclusion of Radical Construction Grammar.

In Radical Construction Grammar, there are no grammatical categories independent of constructions, since each construction defines its own distribution, which may be (and usually is) distinct from the distribution of other constructions containing the same words or phrases (see also Broccias and Hollmann 2007 on “noun” and “verb”, Barðdal 2006 for subject and object, van Canegem-Ardijns 2006 for “adjectives” in Dutch, and Pedersen 2005 for “object” in Spanish). In the sentences in (1)-(4), the mismatches in distribution tells us something about the range of Active and Passive Voice constructions, not the categories of the role fillers; in particular, the Passive is more restrictive in what can serve as Passive Subject than the Active is regarding the Active Direct Object. (Following typological practice, the names of language-specific grammatical categories and constructions are capitalized.) In other words, Radical Construction Grammar is methodologically fully committed to distributional analysis. (There are other important methodological commitments that cannot be discussed here for reasons of space; see Croft 2010b.)

As a result, constructions are the basic units of grammar in Radical Construction Grammar (the first “radical” hypothesis). Radical Construction Grammar is a nonreductionist theory in the sense that complex entities are basic, as in the Gestalt theory of perception. A frequently asked question is, how are constructions identified? But nonconstructional theories, and constructional theories that remain committed to the building block model, actually take constructions for granted because they are presupposed in distributional analysis (§2). Constructions in fact can be described in terms of properties of form and especially meaning. Constructions form categories, and like other categories they may have internal structure (e.g. a prototype and extensions) and the boundaries between constructions may be difficult to define (more precisely, are subject to construal; Croft and Cruse 2004:93-95).

Another example of the shift to constructional primacy in Radical Construction Grammar is the status of the debate between lexical rules and constructions in the analysis of argument structure alternations. The debate is typically framed in terms of verbal polysemy derived by rules (lexical rules) vs. underspecified verb meanings filled out when combined with an argument structure construction. Croft (2003) argues that there is sufficient idiosyncrasy in verb-argument structure combinations that an underspecified verb meaning is empirically inadequate, but one must posit verb-class-specific and even verb-specific argument structure constructions because the verb has its meaning only in particular argument structure constructions. The same argument has been made by Boas (2003) for the English resultative construction, by Cristofaro (2008) for predicate + complement constructions in Ancient Greek, by Iwata (2008) for the English locative alternation, and by Barðdal (2008, Barðdal et al. 2011) for ditransitives and other argument structure constructions in West Scandinavian languages.

The nonreductionist approach to (morpho)syntax may also be extended to phonology; a tentative proposal is found in Vihman and Croft (2007). In a Radical Templatic Phonology, the basic complex unit is a phonological template. The templates are themselves generalizations over phonological word structures (or more concretely, the articulatory score and acoustic pattern of the word as a whole). Vihman and Croft provide extensive evidence that phonological acquisition is guided by the formation of such templates, and argue that adult phonology should also be recast in templatic form.

4. Grammatical categories and grammatical generalizations in Radical Construction Grammar: new models

Radical Construction Grammar rejects grammatical categories independent of the constructions that define them, i.e. it rejects the building block model. One consequence of this rejection is that Radical Construction Grammar does not consist of an elaborate model of all the theory-specific building blocks and rules of combination of those blocks. In Radical Construction Grammar, the only representational commitments are the common denominator of all construction grammars: a conventional symbolic unit, consisting of a form containing one or more formal morphosyntactic elements, paired with a meaning that contains one or more semantic components.

But the metaphysical and representational commitment of the building block model serves a fundamental practical and theoretical purpose. The building block model serves the practical purpose of providing a framework for capturing grammatical patterns, that

is, grammatical generalizations, for linguistic description as well as for constructing linguistic hypotheses. And the building block model provides a simple model of the grammatical knowledge of a speaker, compatible for example with the computational model of the human mind. A theory that rejects the building block model must provide alternative ways to represent grammatical patterns and alternative hypotheses for the representation of grammatical knowledge.

A Radical Construction Grammar description of the grammar of a particular language, for example, should be entirely construction-based. Sections devoted to grammatical categories—a common way to organize grammatical descriptions—should instead be devoted to the constructions which are used to define those categories: sections on parts of speech should be replaced by sections on constructions expressing propositional acts (referring expressions, predication constructions, modifying/attributive constructions), sections on grammatical relations such as Direct Object should be replaced by sections on argument structure constructions (including voice constructions), sections on different types of modifiers such as Adjectives, Numerals, etc.) should be replaced by sections on attributive constructions, and so on. Generalizations defined in terms of grammatical categories are replaced by distributional analysis of the units whose distribution is determined by the constructions in question.

A hypothesized grammatical category is a way of representing a grammatical generalization. For example, the category Direct Object in English is intended to represent a generalization of the occurrence of a class of phrases across different types of constructions (Active, Passive, Information [WH] Question, etc.). In many varieties of construction grammar, grammatical generalizations are also captured by taxonomic relations among constructions and the inheritance relation. For example, the Transitive Verb construction captures grammatical generalizations for a large class of English words, and a more general Verbal Predicate construction subsuming the Transitive, Intransitive etc. constructions captures grammatical generalizations for an even larger class of English words.

However, neither grammatical categories nor constructional taxonomies are good at capturing the full range of grammatical generalizations. First, as argued in §3, different constructions on the whole do not describe the same grammatical category, that is, the distributions defined by the relevant roles in the constructions are not the same. The same can be observed in the taxonomic hierarchy of constructions. For example, *tickle* is a Transitive Verb, while *die* is an Intransitive Verb; that is, [Sbj *tickle* Obj] and [Sbj *die*] are instances of the Transitive [Sbj TrVerb Obj] and Intransitive [Sbj IntrVerb] constructions respectively. But *break* can occur in either the Transitive or Intransitive Construction, and *weigh* occurs in the Transitive (Active) construction but not the Passive construction. Why are these all called Verbs, despite their distribution differences? Because they all also occur in another construction, the Morphological Verb construction, defined by occurrence in the Tense-Agreement inflectional construction (i.e. the Present -Ø/-s alternation and the Past -ed morpheme).

These relationships could be represented in terms of taxonomic relations between constructions and parts of constructions, as is done in Figure 1, as long as we allow for alternative instantiations (e.g. for *break*). This is the commonly-used multiple-inheritance model of construction grammar. But there are other methods for representing these relationships. For example, Figure 2 is a geometrical representation of the distributional

patterns. Bybee (1985) proposes another way of representing generalizations, illustrated in Figure 3. She rejects the notion of an abstract morpheme such as [Past], and instead argues that a generalization such as [Past] emerges from a network of similarity relations in form (final phoneme /d/) and meaning (Past) across individual words.

All of these are different means for capturing grammatical generalizations and representing them in an accessible way to the linguist. Some are more adequate than others. In particular, the network and geometric models are able to capture grammatical patterns that are difficult or impossible to capture using taxonomies or construction-independent grammatical categories. These models are briefly described, and then we return to the second goal, namely, discussing how grammatical knowledge is represented.

The network model is used also in morphosyntactic analysis in typology, where it is known as the **semantic map model**. The semantic map model is a highly flexible method for capturing crosslinguistic generalizations when there is a high degree of variability in grammatical categories across languages. To take a very simple example, in ergative languages, the Intransitive Subject role (usually labeled S) is grammatically grouped with the Transitive Object role (P) in case marking and/or indexation (agreement) constructions (as absolutive), while the Transitive Subject (A) role is categorized distinctly (as ergative). The ergative pattern A vs. S+P contrasts with the nominative-accusative pattern A+S vs. P. But A and P are not grouped together vs. S; they are only grouped together if S is also included (i.e., A+S+P; the neutral alignment). This pattern of variation and limits on variation in core argument categories can be represented by the **conceptual space** in Figure 4. The conceptual space is a network (graph) structure, represented by the solid boldface links in Figure 4. A, S and P are units in the conceptual space; more precisely, they are semantic categories (categories of participant roles in events). Languages may vary as to their grammatical categories for core argument roles. For example, the ergative-absolutive grouping is represented by the dotted-line **semantic maps** in Figure 4 (with labels in italics), while the nominative-accusative grouping is represented by the dashed-line semantic maps (with labels in roman). However, the total possible crosslinguistic variation in alignment systems is limited by the network structure of Figure 4: in particular, A and P cannot be grouped together without also including S. Other possible systems are the neutral system, with no different marking for any of A, S or P; and the tripartite system with different coding for each of A, S and P. This semantic map was presented by Comrie (1978:332) and represents one of the earliest uses of the semantic map model in typology.

The semantic map model captures generalizations based on similarity: if a language-specific construction groups together two functions, e.g. A and S, or S and P, then speakers conceive some similarity between those two functions. The conceptual space represents similarity relations as links of varying degrees of directness between the nodes in the network: A is similar to S, and S is similar to P, but A is similar to P only at a level of generality that includes S. The semantic map model replaces grammatical categories because grammatical categories, like categories in general, are based on similarity relationships among their members. Traditional grammatical categories are like classical necessary-and-sufficient condition categories, however, which do not capture degrees of similarity among members, which is necessary for describing psychological categories (Murphy 2002).

The semantic map model has been widely used in typology. The semantic map model has been applied to grammatical categories such as the perfect and the evidential (Anderson 1982, 1986), the middle voice (Croft et al. 1987; Kemmer 1993), indefinite pronouns (Haspelmath 1997), intransitive predication types (Stassen 1997), modality (van der Auwera and Plungian 1998) and depictive adjectivals (van der Auwera and Malchukov 2005), among many other categories. General introductions to the semantic map model can be found in Croft (2003) and Haspelmath (2003). Croft (2001, 2003) argues that the conceptual space—the network of similarity relations among the units represented in the nodes—is universal, while grammatical categories are language-specific. Both are part of the representation of a speaker’s grammatical knowledge.

However, the semantic map model is difficult to scale up to describe crosslinguistic variation, for grammatical constructions described over a much larger number of situation types, for example the 71 spatial pictures used to elicit spatial constructions in Levinson et al. (2003) or the 250 questionnaire contexts used to elicit tense-aspect constructions in Dahl (1985). Croft and Poole (2008) use a geometric technique, multidimensional scaling, to represent the similarity relationships among the situation types in these more complex domains. The principle is the same: constructions that categorize two situation types indicate that those situation types are construed as similar to some degree. Multidimensional scaling allows us to simultaneously represent vast numbers of similarity relations among many situation types in a geometric model (see Croft and Poole 2008; Croft 2010c).

One empirical result from semantic map and multidimensional scaling studies is that the crosslinguistic variation observed implies that speakers are sensitive to subtle semantic differences between a large number of fine-grained situation types: small differences in distance and angle in the geometric representations are linguistically significant. The implication for grammatical knowledge is that speakers know very specific, richly detailed situation types arranged in a universal conceptual space; this forms the semantic representation on which the language-specific grammatical categories (roles in constructions) are based.

This semantic representation based on crosslinguistic evidence is confirmed by an analysis of the variation in verbalization in a single language (Croft 2010d). Speakers vary in their verbalization of the same experience (in this case, the Pear film; Chafe 1980) under similar circumstances. In semantically similar scenes, speakers used the same range of verbalizations (e.g. specific verbs, or definite article vs. possessive pronouns). However, the frequency distribution of the variants depended on subtle semantic differences between the scenes; for example, the Possessive Pronoun was preferred over the Definite Article depending on the likelihood that the object would be possessed (inalienability). The semantic factors that influenced the frequency distribution of variant verbalizations are the same semantic factors that influence crosslinguistic variation in grammatical expression (see also Croft 2001:107; Hollmann 2007).

These crosslinguistic and language-internal patterns fit with a usage-based, exemplar model of the syntax-semantics relation. In the usage-based model (Bybee 1985, 2010, this volume; Langacker 1988; Barlow and Kemmer 2000; Croft 2000), speakers store tokens of language use as exemplars. In the case of constructions, speakers store tokens of constructions from utterances and their meanings in the context of use. Grammatical knowledge is formed as generalizations over the patterns of use. Much research in usage-

based language acquisition demonstrates that acquisition of grammatical knowledge begins with exemplars of constructions over which generalizations are gradually formed (see Tomasello 2003, 2006, and references cited therein). Deuchar and Vihman (2005) apply Radical Construction Grammar to mixed utterances in bilingual acquisition. They argue that children's use of words in very unadultlike ways, including in a language inappropriate to the conversational context, such as English-Spanish *hat* DOS 'wearing one hat and looking for another', results from children developing constructions holistically, with word classes defined by word use in the children's constructions.

Radical Construction Grammar leads ultimately to an exemplar semantics model of the syntax-semantics mapping. Associated with specific situation types is the frequency distribution of the various constructions used for that situation type (see Croft 2010d). The situation types (the fine-grained meanings) are organized in a multidimensional conceptual space. The formal construction types have a frequency distribution over that conceptual space. These two structures (the conceptual space of situation types and the frequency distribution of the formal construction types over that space) are part of the organization of grammatical knowledge.

Another example of usage-based organization of grammatical knowledge is the level of schematicity of constructions. Structuralist and generative grammarians, and some construction grammarians, posit the existence of the maximally schematic construction analyzable in the data, or even only in the morphosyntactic (not semantic) patterns in the data. The usage-based model purports to be a model of the actual grammatical knowledge of a speaker, not an abstract model to generate sentences. In the usage-based model, schematic constructions are posited only when justified by sufficiently high type frequency and degree of morphosyntactic and semantic similarity; more specific constructions may also be posited if they are of sufficiently high token frequency (see Bybee and Thompson 1997; Croft and Cruse 2004, chapter 11; Barðdal et al. 2011)

Still another way in which grammatical knowledge is organized is in terms of the syntactic space of morphosyntactic types, and in the analysis of construction types based on the verbalization process; these are both described in §6. In sum, grammatical knowledge is organized in multiple intersecting dimensions of morphosyntactic structure, conceptual space, and their symbolic pairing.

5. The internal formal structure of constructions

The empirical crosslinguistic and language-internal evidence presented in the preceding sections supports the absence of representation commitments to specific universal grammatical categories such as Verb or Direct Object in Radical Construction Grammar. The generalizations across constructions within and across languages that universal grammatical categories are intended to capture are in fact too complex for them to capture, so more sophisticated means of inferring grammatical patterns must be employed, such as the semantic map model and multidimensional scaling. These grammatical patterns are formed over populations of stored exemplars of tokens of constructional form and meaning in utterances.

Hence the particular elements in a grammatical construction are language-specific, construction-specific inferences from language use in Radical Construction Grammar. What about the internal formal structure of constructions? All construction grammars

have constructions as complex morphosyntactic units, made up of multiple elements, e.g. the English Agentive Passive construction illustrated in (2) consists of the Passive Subject, an Auxiliary verb (*be, get*), the Verb in Past Participle form, the preposition *by* and the Agent phrase. The elements of a construction are defined by the **role** which each has in the construction as a whole; that is, there is a part-whole relationship between elements and the construction. Grammatical theories also posit syntactic relations between elements of a construction. For example, the Passive Subject is held to be in a Subject relation to the Verb or the Auxiliary, the Agent phrase is held to be governed by the preposition *by*, the preposition *by* plus its governed phrase are held to be in an Oblique relation to the Verb, and the Verb is held to be in a Complement relation (or other such relation) to the Auxiliary.

In Radical Construction Grammar, no such syntactic relations are posited to exist. Syntactic relations suffer from the same empirical and methodological problems as universal syntactic or grammatical categories. The patterns that exist are explainable in terms of the existence of semantic relations, that is, relations between the components of the semantic structure of a construction, whose existence Radical Construction Grammar assumes, along with other construction grammars.

Syntactic relations are typically modeled as either constituent relations (in generative grammar and its offshoots), dependency relations (in some European models such as Word Grammar), or both (in Lexical Functional Grammar). The existence of constituents or dependencies is argued for by using distributional analysis. As with arguments for syntactic categories, distributional analysis gives conflicting results for constituency and dependency, so methodological opportunism is employed in order to posit a single constituent tree or dependency network for a particular sentence. As with categories, one can argue that the grouping of elements is construction-specific, motivated by the function of that construction, and they may not be the same from one construction to the next (Croft 2001, ch. 5).

Syntactic relations can be divided into two broad types, collocational relations and coded relations. Collocational relations are those that link the conventional combinations of particular expressions, ranging from selectional constraints to phrasal idiomatic combinations. Collocational relations have frequently been used to posit syntactic relations, particularly ‘deep’ syntactic relations, but Nunberg, Sag and Wasow (1994) argue persuasively that collocational relations are fundamentally semantic. For example, in the idiomatic collocation *pull strings* ‘exercise influence’, *pull* means ‘exercise’ only in combination with *strings*, and *strings* means ‘influence’ only in combination with *pull*. This observation has a natural interpretation in construction grammar: there is a [*pull strings*] construction with a construction-specific semantic interpretation for its elements, with an overall semantic structure of [EXERCISE INFLUENCE] (see also Wulff, this volume, on idioms in construction grammar).

Coded relations, such as indexation (agreement) and case marking, are generally taken to be evidence of ‘surface’ syntactic relations, in many different grammatical theories. However, syntactic relations are not necessary in a construction grammar. In all construction grammars, there are representational commitments to the structures in Figure 5: (i) the morphosyntactic structure as a whole; (ii) the elements of that structure and their role in the whole construction; (iii) the meaning as a whole; (iv) the components of that meaning and their semantic role in the meaning as a whole; (v) the semantic

relations holding between the components of meaning; and (vi) the symbolic links between the form and its meaning, including between formal elements and semantic components. In comprehension of an utterance, a speaker identifies the construction as a whole and its elements; the speaker can identify the meaning, since a construction is a pairing of form and meaning; the speaker can then identify the semantic components and their relations; and finally, the speaker can identify which syntactic element denotes which semantic component, since the elements of the construction have symbolic links with their semantic components. The speaker can identify the semantic relations between the corresponding semantic components without invoking syntactic relations of any type, by virtue of understanding the meaning as a whole and recognizing the symbolic relations between constructional elements and the corresponding semantic components.

There is also empirical evidence that syntactic relations are not desirable as part of a construction's formal structure. If construction-independent syntactic relations exist, then there must be general principles of semantic interpretation that link those syntactic relations to semantic relations. Nonconstructional theories always posit some sort of iconically-based general principles (projection principles, linking rules, etc.) in order to achieve this goal, because there is no pairing of form and meaning in syntactic structures in these theories. But crosslinguistically, there are far too many noniconic mappings between putative syntactic relations and semantic relations for general mapping principles to hold (Croft 2001:206-20). For example, although 'well' as a manner adverb describes a property of the action expressed by the main predicate, in some languages manner adverbs agree with one of the participants, such as the object as in the following Marathi example (Hook and Chauhan 1988:179, cited in Croft 2001:210).

- (1) ti haa bhaag tsaangLaa vaatsel
 she this part.MSG good.MSG will.read
 'She will read this part well.'

Instead, one must posit construction-specific mappings between constructional elements and the corresponding semantic components—i.e., one is back to construction grammar, but without syntactic relations (see also van Canegem-Ardijns 2006:447).

Serious problems arise also if structures such as indexation and case marking are hypothesized to encode syntactic relations (Croft 2001:220-233). Both indexation and case marking are variable in their appearance; if they flag syntactic relations, then the syntactic relations implausibly come and go. Worse, the syntactic element linked by indexation is often simply absent (e.g. so-called null anaphora in clauses, and so-called headless noun phrases in phrases). Hence there is no element for indexation to relate to another element, syntactically. In Radical Construction Grammar, the elements otherwise taken to indicate syntactic relations are instead argued to be symbolic, that is, encode a relation between form and meaning: indexation denotes a referent, case marking denotes a semantic relation, and so on. The semantic structure indirectly provides the relationship between the elements supposedly related syntactically by indexation and case marking. Phenomena that are commonly explained in terms of syntactic relations, such as the head-dependent contrast and the distinction among dependents between arguments and adjuncts, can be reanalyzed as properties of the symbolic relation between form and meaning among elements in constructions (Croft 2001, ch. 7).

Thus, in Radical Construction Grammar the only representational commitments for the formal structure of constructions are: the construction itself as a complex Gestalt; its elements; and the role that the element has in the construction as a whole. On the other hand, in Radical Construction Grammar, there is a commitment to a rich semantic representation, which may include parts of a semantic frame or scene that are evoked by the construction but do not have formal elements that denote them directly; and a rich symbolic structure that links not only the formal structure as a whole to the meaning as a whole, but also links most if not all of the syntactic elements to corresponding semantic elements.

There is however another important representational commitment in Radical Construction Grammar, shared with other construction grammars, namely that complex constructions may fill the roles of other complex constructions. For example, the Passive Subject role in the Passive Voice construction is filled by a Subject Phrase construction which may itself be complex: for example consisting of a Noun combined with a Relative Clause, which in turn is a complex construction in its own right. The nesting of complex constructions is similar to the constituent structure of nonconstructional theories. However it differs from those in that the existence of a nested construction is justified only by the autonomy of the construction (i.e. its conventionalization independent of the larger construction). In a construction grammar, some “constituents” may not be autonomous constructions. For example, in the idiomatic construction *shoot the breeze*, *the breeze* is not an autonomous phrasal constituent any more, since the choice of Definite Article as well as the choice of Noun are fixed for this construction.

6. The language-specificity of constructions and the organization of constructions

Radical Construction Grammar’s third major hypothesis is that constructions themselves, or more precisely the formal structure of constructions, are also language-specific. There are no discrete universal construction types such as passive or coordination. This hypothesis is again based on crosslinguistic evidence. Crosslinguistic comparison reveals that the particular combination of syntactic properties that define particular constructions in better-known languages are not always found together in functionally similar or equivalent constructions in other languages. For example, there is a huge variety of voice constructions, far richer than a division into ‘active’, ‘passive’ and ‘inverse’ implies (Croft 2001, chapter 8). ‘Passive’ and ‘inverse’ represent two idealized construction types that differ from the canonical ‘active’ transitive, the former typified by English and other western European languages and the latter typified by Cree and other Algonquian languages. But a construction such as the one in (2) from Bella Coola does not fit either type (Forrest 1994:151-52, cited in Croft 2001:294). The verb is in the basic (‘active’) form; there is a special “passive subject” agreement suffix on the verb, but the agent phrase is oblique, governed by a preposition. The Bella Coola construction is required if 3rd person acts on 1st or 2nd person, and is used when the patient is a more topical 3rd person than the agent, not unlike to the Algonquian ‘inverse’.

- (2) k’s -im ci- xnas -cx x- ti- imlk -tx
 see -3SG.PASS ART- woman -ART PREP-ART- man -ART
 ‘The woman is seen by the man.’

In a similar vein, Cristofaro (2003, 2007) shows that the traditional dichotomy between ‘finite’ and ‘nonfinite’ is inadequate to characterize the full range of subordinate clause constructions found in the world’s languages.

As with grammatical categories and the relations among syntactic elements, there are constraints on this crosslinguistic variation. The syntactic properties for constructions such as voice constructions can be used to define a **syntactic space** in which the voice constructions of particular languages can be mapped. In particular, the range of constructions to which the names ‘active’, ‘passive’ and ‘inverse’ have been applied can be mapped onto a two-dimensional syntactic space in which the A argument is more or less subject-like and the P argument is more or less subject-like, based on case marking, indexation and syntactic position of the A and P arguments. This syntactic space in turn covaries with a two-dimensional conceptual space of the degree of topicality of the A and P arguments (Croft 2001, ch. 8). Likewise, the syntactic space of subordinate clause constructions covaries with the functional parameters of the cognitive status and recoverability of semantic information from the dependent state of affairs, and degree of semantic integration of the main and dependent state of affairs (Cristofaro 2003, 2007).

In sum, constructions qua Gestalt combinations of morphosyntactic properties do not come in discrete universal types. However, the range of combinations of morphosyntactic properties is not unconstrained, and is motivated by the functions that those constructions perform.

Another question pertaining to the combinations of morphosyntactic properties that occur together in constructions is: how are constructions combined to yield sentences, or conversely, what ways are the morphosyntactic properties of utterances divided into distinct constructions? For example, in English, argument structure constructions (the combinations of predicates, arguments, and their associated case marking and indexation markers) are independent of the tense-aspect-mood (TAM) constructions (the inflection and auxiliary combinations), although both overlap in containing a Verb element. This separation of argument structure and TAM constructions is widespread though by no means universal. Why is this so?

One possible explanation is found in the verbalization process. Chafe (1977a,b) essentially attacks the problem of how a speaker starts with an unanalyzed, unique experience and produces a linguistic utterance made up of reused parts—words that have been used in prior utterances describing other experiences different from the current one. He argues that three processes are involved: subchunking, propositionalizing and categorizing. In **subchunking**, the speaker breaks up the experience into smaller units of the same type. Roughly, subchunks are “clause-sized” experiences. (Chafe 1994 treats the process not as dividing up a larger experience into a set of parts, but as shifting the focus of consciousness from one “clause-sized” subchunk to another.) Subchunks are **propositionalized**, that is, divided into unlike parts: those parts which (may) recur in other subchunks—i.e. referents—and the rest, which represents the parts of the experience generally specific to that subchunk. Finally, the parts of a propositionalized subchunk—objects, properties, actions—are **categorized** as recurrent entities that have been verbalized in prior utterances about other experiences.

This verbalization model provides a theory of how an experiential Gestalt is broken up into parts and how those parts are categorized as the same as prior experiences—as

content words. An utterance also reestablishes the uniqueness of the particular objects, properties and actions in the experience, and reconstitutes the experience as a whole (Croft 2007b). The reestablishment of the uniqueness of the experience and the entities that make it up is achieved by grammatical constructions that **particularize** the entity in the experience: individuating and quantifying the entity, specifying its location in space, time and the mental spaces of the interlocutors. These are generally various types of inflectional constructions and modifying constructions (modifying predicates as well as referring expressions). Reconstituting the whole subchunk out of its parts is achieved by argument structure and related clausal **structuring** constructions. Relating subchunks to one another is achieved by clause-linking, reference tracking and other **cohering** constructions. For instance, in the utterance *And one kid takes the rock that he tripped on and he throws it to the side of the road*, the experience (from the Pear Film narratives) is subchunked into two events, and the events are categorized as taking and throwing, with recurring participants being the kid, the rock and the road. The events are particularized by situating them in the narrative present tense, in which the entire film narrative is placed by this speaker. The participants are particularized by a numeral *one* selecting one kid from the group of three, the relative clause specifying the relevant rock, and the part phrase *the side of* for the particular place with respect to the road. The participants' roles in the event are structured by the transitive and caused-motion argument structure constructions that indicate who does what to whom. Finally, coherence between the clauses is provided by the coordinating conjunction *and*, and the pronouns *he* and *it* tracking the kid and the rock across the two clauses.

This model of verbalization provides a functionally-motivated framework for distinguishing the different kinds of constructions that combine in an utterance. In general, the particularizing, structuring and cohering functions are encoded by independent constructions that are combined in the production of utterances. For example, argument structure constructions structure the propositionalized subchunk, while TAM constructions particularize the event. These two verbalization functions are usually carried out by independent constructions. It is also possible, though much less common, that particular combinations of verbalization processes are conventionally combined. For example, in languages with aspect-based split ergative patterns, such as Hindi, one argument structure construction (an ergative one) is used in perfective situations, while another argument structure construction (an accusative one) is found in imperfective situations.

Both the structure of conceptual space and the verbalization processes provide a functional basis for the organization of constructions in a construction grammar. In addition, constructions are also organized in terms of the formal (morphosyntactic) properties they possess. As with the representation of grammatical generalizations, Radical Construction Grammar explores new models for representing constructional organization, such as syntactic spaces defined by formal properties, to supplement and possibly replace more traditional models such as taxonomic hierarchies.

7. Conclusion: Radical Construction Grammar and typological theory

Radical Construction Grammar is a recent theory of grammar even by the youthful standard of contemporary construction grammars. Radical Construction Grammar

adheres to rigorous methodological commitments, to the distributional method and to typological patterns discovered using crosslinguistically valid criteria. As a consequence, compared to other construction grammar models, Radical Construction Grammar has a very spare set of representational commitments to the formal structure of constructions. On the other hand, Radical Construction Grammar appeals to a rich, fine-grained model of semantic structure, and places much of the explanatory power in semantic structure and the symbolic mapping between components of semantic structure and elements of syntactic structure in constructions.

Radical Construction Grammar draws on a number of concepts from typological theory (Croft 2003b), as well as providing a way in which construction grammar can contribute to typology. Typology's most salient methodological principle is the comparison of a genetically and geographically distributed sample of languages of the world. The basis of crosslinguistic comparison for grammatical structures must be their function, because of the great structural diversity of languages (the structural properties are essentially language-specific). In other words, typologists compare how languages encode function in morphosyntactic form. Hence morphosyntactic typology is the crosslinguistic study of form-function pairings, which is directly comparable to construction grammar.

Radical Construction Grammar adheres strictly to the distributional method, recognizing that the distributional method is based on the identification of constructions which serve as the contexts for distributional analysis. Typology represents an extension of the distributional method across languages. Just as functions provide the basis for the crosslinguistic comparison of constructions used to encode those functions, typologists then compare the distribution of similar constructions across those functions.

The integration of language-specific and crosslinguistic distributional analysis may be illustrated with one of the classic studies in typology, Keenan and Comrie's typology of relative clauses and the NP Accessibility Hierarchy (Keenan and Comrie 1977, 1979). Relative clause constructions define a distribution in terms of the syntactic role played by the head in the relative clause that modifies it (subject, object, etc.). A language may have more than one relative clause construction, and the distribution (occurrence) of syntactic roles may differ from one relative clause construction to another in a single language. Keenan and Comrie add a crosslinguistic dimension to this distribution pattern, that is, comparing relative clause constructions across as well as within languages. Keenan and Comrie propose crosslinguistically universal constraints on the distribution of relative clauses across syntactic roles, based on a hierarchical ranking of those roles (Subject < Object < Indirect Object < Oblique < Genitive < Object of Comparison). Thus the basic typological method combines language-internal and crosslinguistic distributional analysis.

Keenan and Comrie's analysis, like other classic, methodologically rigorous typological analyses (e.g. Greenberg 1966/1990; Stassen 1985, 1997, 2009; Koptjevskaja-Tamm 1993; Haspelmath 1997; Cristofaro 2003), provides a sound basis for syntactic argumentation in identifying grammatical universals, that is, universals of grammatical constructions (Croft 2009). First, universals must be based on the simultaneous comparison of a balanced sample of languages. The same constructions must be compared across languages (i.e., no methodological opportunism). The constructions must be identified using criteria that are valid across languages (i.e., no

language-specific criteria). These criteria are ultimately based in function, as noted above. Distributional patterns must be examined in detail (i.e. more than one or two fillers of a constructional role), or else extrapolation from the examples used must be done cautiously and with appropriate qualifications. If anomalous patterns appear to be related to other distributional facts—that is, other constructions appear to interact with the distribution of the construction being examined—then the correlation of constructions must also be crosslinguistically validated in the way described in this paragraph.

The remarkable diversity of morphosyntactic structures and of distributional patterns revealed in rigorous typological analysis underlies the basic tenets of Radical Construction Grammar. The rejection of the building-block model of syntactic structure is grounded in the pervasive mismatches of distributional patterns across constructions within a single language and with the same construction across languages. As noted in §4, useful techniques to identify and represent language universals without syntactic building blocks—the semantic map model and multidimensional scaling—have their origins in typology. The simplification of syntactic structure proposed in Radical Construction Grammar represents the marriage of a theoretical argument from construction grammar—the presence of symbolic relations in a grammatical construction—and empirical evidence challenging syntactic relations from typology. Finally, the nonuniversality of constructions is also a result from typological research; while research in constructional analysis, frame semantics, and verbalization processes are beginning to provide a framework for identifying constructions whose universal properties can be discovered in crosslinguistic comparison.

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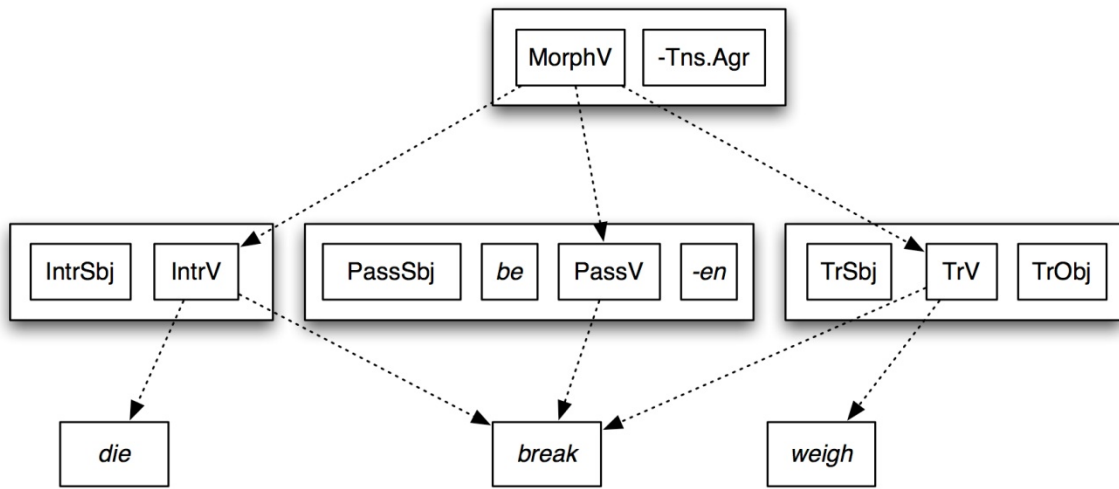


Figure 1. Taxonomic representation of grammatical generalizations.

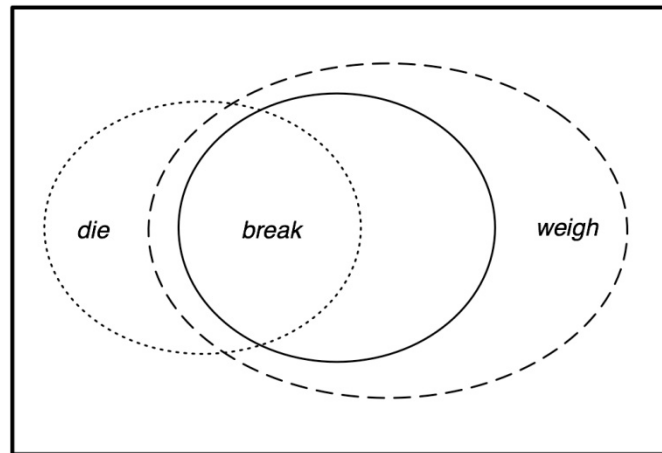


Figure 2. Geometric (Venn diagram) representation of grammatical generalizations.

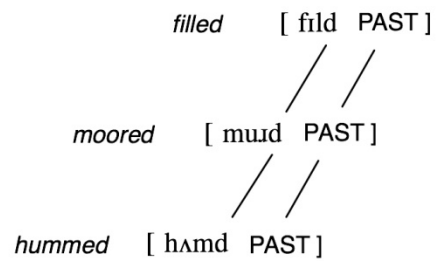


Figure 3. Network representation of grammatical generalizations.

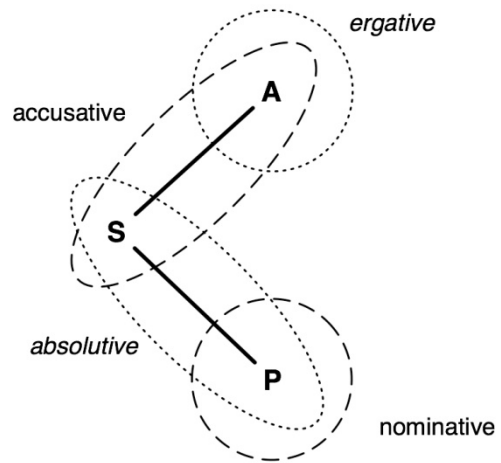
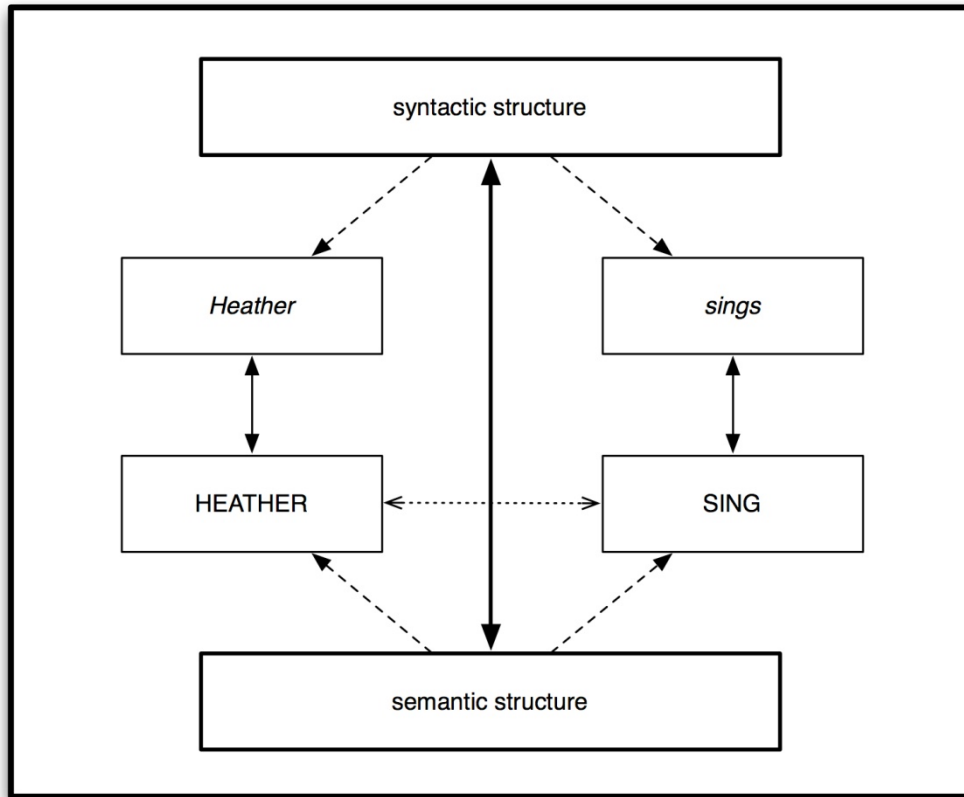


Figure 4. Conceptual space for core participant roles (A, S, P), and semantic maps for ergative-absolutive and nominative-accusative alignment systems.



CONSTRUCTION

- ←.....→ relations between parts (semantic components only)
- role of parts in the whole (syntactic elements and semantic components)
- ↔ symbolic links

Figure 5. The internal structure of a construction in Radical Construction Grammar.