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Overview

Construction grammar

Adele Goldberg* and Laura Suttle

Construction grammar, or constructionist approaches more generally, emphasize the function of particular constructions as well as their formal properties. Constructions vary in their degree of generality, from words to idioms to more abstract patterns such as argument structure constructions, topicalization, and passive. There is also no division drawn between semantics and pragmatics, as all conventional aspects of constructions are encoded within the constructions themselves; thus constructions can include information about information structure, register, or genre. The majority of constructionist approaches are also *usage based,* in that they recognize that we retain a great deal of item-specific information. An important desideratum of constructionist approaches is that they interface naturally with what we know about language acquisition, language change, and language typology. In order to capture generalizations within a given language, constructions are related via an inheritance hierarchy, with more abstract, productive constructions being directly related to their more idiomatic instantiations. The functions of particular constructions as well as domain general cognitive and social cognition are appealed in order to capture cross-linguistically valid typological generalizations. *WIREs Cogni Sci* 2010 1 000–0000

What is the nature of our knowledge of language? How do learners acquire generalizations such that they can produce an open-ended number of novel utterances based on a finite amount of input? Why are languages the way they are? In order to address these long-standing questions, many linguists with varying backgrounds have converged on several key insights that have given rise to a family of *constructionist approaches* including various versions of construction grammar. These approaches emphasize that speakers' knowledge of language consists of systematic collections of form–function pairings, or *constructions*, at varying levels of generality and complexity. Our knowledge of language is understood to form a network of interrelated constructions; these constructions are related to one another via (default) inheritance links. Creative, novel utterances are formed by combining constructions on the fly as long as they do not have conflicting specifications: constructions often have open slots that are filled by words or other phrasal patterns.

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On the constructionist approach, no innate, domain-specific principles are assumed. The null hypothesis is that constructions are learned on the basis of the input, together with domain-general processes including attentional biases, principles of cooperative communication, general processing demands, and processes of categorization.

The term *constructionist* is intended to evoke both the notion of 'construction' and the notion that our knowledge of language is 'constructed' on the basis of the input together with general cognitive, pragmatic, and processing constraints. It is intended to be a more inclusive term than construction grammar, as the latter is a particular instance of a constructionist approach.

Constructionist approaches have been used in a variety of interdisciplinary endeavors to shed light on a variety of issues, from computer modeling[1–4] to detailed accounts of language acquisition.[5] The approach predicts a relatively high degree of cross-linguistic variation.[6–8] At the same time, nontrivial cross-linguistic generalizations are recognized to exist; these are accounted for in terms of the functions of the constructions, general diachronic processes, and domain-general factors, instead of by appeals to a 'universal grammar'.[6,7,9–12]

WHAT ARE CONSTRUCTIONS?

Constructions are defined to be learned pairings of form and function, including words and idioms as well as phrasal linguistic patterns. Examples are given in Table 1.

Common patterns such as passive, topicalization, and relative clauses are understood to be learned pairings of form and function, as are words, idioms, and various minor patterns; all are constructions, although they clearly vary in size, complexity, and generality.

The constructionist approach recognizes that language is fundamentally a means of communication. This means that subtle facts about the functions of constructions are emphasized, including their semantic properties, their information structure or discourse properties, and their conditions of use (e.g., register, genre). The entire grammar is composed of these form–meaning pairings: its constructions all the way down.

It is clear we need to posit a construction when there is something noncompositional that needs to be learned. Since the basic 'rules of composition' for a given language are somewhat unique, even simple patterns, such as the transitive, are recognized to be constructions. For example, the transitive construction can specify particulars of case-marking in a language that has case-marking and can also specify any constraints on animacy or definiteness. More specific constructions are then posited in addition, whenever something more than a combination of regular, simple constructions is needed. In this way, any linguistic pattern is recognized as a construction as long as some aspect of its form or function is not strictly predictable from its component parts or from other constructions recognized to exist.

TABLE 1 | Examples of constructions at varying levels of size and complexity

Construction	Form/example
Word	Example: ornithology or ornery
Partially filled word (aka morpheme)	Example: anti-N, pre-N, V-ing
Complex word (filled)	Example: daredevil, shoo-in
Idiom (filled)	Example: trip the light fantastic; what's up?
Idiom (partially filled)	Example: jog someone's memory
Covariational-conditional construction	Form: the Xer the Yer (e.g., the more you think about it, the less you understand)
Ditransitive (double-object) construction	Form: Subj, V, Obj1, Obj2 (e.g., He baked her a muffin)
Passive construction	Form: Subj aux Vpp (PPby) (e.g., The hedgehog was struck by lightning)

In addition, highly frequent form–function pairings are also recognized as constructions even when they are compositional, by those who advocate a *usage-based* constructionist approach.[1,5,11,13–15] While at first it may seem that the addition of fully compositional constructions unnecessarily inflates the size of the grammar, there is much evidence that knowledge about language includes such redundant information. The presence of frequency-based knowledge in language has been clearly established in phonetic research,[16] in that speakers of a given language statistically reproduce the subtle phonetic distinctions as they have been witnessed in the input. We also know that phonological reduction of forms is based on how frequently the forms are used. For example, Bybee[17] observes that high-frequency words such as *every* and *family* are typically pronounced with only two syllables instead of three, while less frequent words such as *mammary* and *summary* are pronounced with three syllables and words that are of intermediate frequency such as *memory*, *camera*, and *family* can be pronounced either with two or three syllables (cf. also Ref 18).

There is evidence for usage-based knowledge at the level of grammatical category as well. For example, a definition of adjective would likely include the following: (1) adjectives semantically modify nouns, (2) adjectives can appear attributively (prenominally in English), (3) adjectives can appear predicatively, for example, after the copular or verbs like 'seem'. This definition works for many adjectives, such as *pretty* and *boisterous*. However, there are adjectives that violate each of these generalizations, and many of the exceptions require learning of item-specific facts. A simple case is the fact that the adjective, *blithering*, only appears in one context: attributively before the noun *idiot*, as in the collocation, *blithering idiot*. Another case involves the class of English schwa-initial 'a-adjectives' including *alive*, *awake*, *asleep*, *afloat*, and *afraid*. This class systematically resists prenominal attributive use:

1. **a.** ??The alive/awake/asleep/afloat/afraid boy
   b. The boy seems alive/awake/asleep/afloat.

Goldberg and Boyd[19] argue that this pattern is not the result of any general semantic or phonological dispreferrence. There exists historical motivation for the pattern in that most a-adjectives were historically prepositional phrases, but speakers are unaware of

the historical facts. The pattern needs to be learned by generalizing over the input. Goldberg and Boyd[19] further show that speakers continue to generalize the pattern, extending the distribution to novel a-adjectives, particularly when the novel a-adjectives are witnessed in a preemptive context.

The usage-based model presupposes that some at least implicit memory traces of utterances or phrases exist, so that frequency information can be accrued and generalizations over the input become possible. In fact, speakers do have access to a degree of even *explicit* long-term memory for clause-level utterances heard in naturalistic contexts.[20]

There is in fact a massive and growing amount of evidence that speakers are aware of statistical patterns in the input. These findings make a usage-based account of our knowledge of language virtually impossible to avoid. Knowledge about language is thus knowledge about both item-specific information as well as generalizations: both the items and the generalizations are represented within the interrelated network of constructions: the 'construct-i-con'.

A final note about the form of constructions is in order. It has become the norm among mainstream generative linguists to posit ever more abstract representations of language, including many phonologically null (invisible) nodes and even invisible words.[21,22] Moreover, surface strings often bear little relationship to the 'underlying' syntax posited, requiring recourse to 'movement', despite the fact that the movement is acknowledged to not occur in real time. On this view, surface patterns only hint at the complex underlying formal structures. Constructionist approaches, on the other hand, adopt a 'what you see is what you get' model of language. Although most languages clearly do involve hierarchical structure, no movement nor invisible elements are assumed.

COMBINING CONSTRUCTIONS

Utterances are rarely composed of a single construction. An actual expression typically involves the combination ('unification') of at least half a dozen different constructions. For example, (2) contains a verb phrase (VP), noun phrase (NP), transitive, and subject–predicate constructions as well as the individual constructions corresponding to each of the words involved:

2. The squirrel cracked his nut.

Constructions can be combined freely to form actual expressions as long as they are not in conflict.•For example, the restriction on the ditransitive that it conveys transfer from an actor to a potential recipient renders examples such as (3a) below ungrammatical:

3. a. * The man sent storage a box.

b. (cf. The man sent a box to storage.)

SURFACE GENERALIZATIONS

Constructionist theories do not derive one construction from another, because different surface patterns are typically associated with differences in meaning or different discourse properties. The relation between the ditransitive construction (4a) and the caused motion ('dative') (4b), then, is simply one of paraphrase and partial lexical overlap.

4. a. She gave him a book (ditransitive construction).

b. She gave a book to him (caused motion or 'dative' construction).

Once• we eschew derivations, it becomes clear that 4b, repeated below as 5a, has more in common with 5b–e than it does with 4a, save for the shared verb, *give*:

5. a. She gave a book to him.

b. She tossed a book to him.

c. She tossed a book toward him.

d. She tossed a book toward the fireplace.

e. She moved the book toward the fireplace.

That is, the English 'dative' construction is part of a much broader generalization: the construction is used for all kinds of caused motion, not necessarily transfer of an object from an agent to an animate recipient.[23]

Recognizing argument structure constructions allows us to explain how examples are interpreted with novel verbs (6) or with familiar verbs used in new ways (7):

6. She mooped him something ('moop' interpreted to imply transfer[25]).

7. She sneezed the foam off the cappuccino (interpreted to imply caused motion).

RELATING CONSTRUCTIONS: DEFAULT INHERITANCE HIERARCHY

AQ3

Constructions• that are *motivated* by other constructions in that related forms and functions are linked to each other in a default inheritance hierarchy, of the type long found useful for representing all types of relational knowledge.[24,25] Linguistic generalizations within a particular language are naturally captured in this way. That is, broad generalizations are represented by constructions that are inherited by many other constructions; more limited patterns are captured by constructions at various midpoints in the network. For example, the 'What's X doing Y?' construction has a fixed form and connotes some sort of unexpectedness.[26] As Kay and Fillmore[26] observe, this construction is not wholly idiosyncratic: it inherits properties from several more general constructions, including the left isolation, the subject–auxiliary inversion, the subject–predicate and the verb–phrase constructions. The resultative construction as in (8) is likewise motivated by the caused-motion construction (e.g., 5a–e); viewing the former as a grammatical extension of the latter based on a systematic metaphor allows for various distributional properties to be accounted for.[25]

8. She drove him crazy.

Thus, productivity is allowed for by the free combination of constructions and language-internal generalizations are captured by the inheritance hierarchy.

LANGUAGE LEARNING

Constructions are understood to be learned on the basis of positive input and general cognitive and social abilities. This is a major difference between this approach and the traditional approach advocated by Chomsky et al.[21,27,28] Chomsky had argued that language is too complex and the input too impoverished to be learned, concluding that humans must come hard-wired with principles specific to a language faculty, also known as a 'universal grammar'.[27] Universal grammar was thus posited in order to constrain the set of possible languages that a learner would consider when trying to acquire their own language. While Chomsky's poverty of the stimulus arguments appeared convincing at the time they were proposed (1965), most agree that it is now worth revisiting the innateness assumption. We currently have a better understanding of both the natures of the input (via the availability of large corpora of child directed speech), and it is clear that it tends to be highly repetitive.[29–31] Moreover, we now recognize powerful domain-general statistical and rational learning abilities that children are able to employ.[32,33]

A close look at children's early learning suggests that it begins with specific, concrete examples: early on it is *item-based*.[5,34] That is, there have been many demonstrations that children fail to fully generalize many grammatical patterns until around age 3.5 or older.[35–47] This work suggests that because constructions are acquired so late and in such a piecemeal fashion, they must be learned. While it has been widely assumed that children's early conservativism is because of the fact that they have not witnessed a critical mass of items, recent work indicates that young children may simply be less skilled at recognizing regularities in the input[48](but see also Ref 49).

Constructionists argue that grammatical generalizations are ultimately learned on the basis of domain-general abilities. For example, Ambridge et al.[50] have shown that distributed input is more facilitory than massed input, an effect that is well known from the nonlinguistic categorization literature. Another case is that input that is skewed such that one particular verb accounts for the lion's share of instances facilitates the generalization of novel argument structure constructions.[51,52] Here again, this type of skewed input has also been recognized as facilitory in nonlinguistic categorization tasks as well.[53,54]

All linguists recognize that a wide range of semi-idiosyncratic constructions exist in every language, constructions that cannot be accounted for by general, universal, or innate principles or constraints. Mainstream generative theory has taken the position that these constructions exist only on the 'periphery' of language and that, therefore, they need not be the focus of linguistic or learning theorists.[28] Constructionist approaches, on the other hand, have homed in on these constructions, arguing that whatever means we use to learn these patterns can easily be extended to account for so-called 'core' phenomena. In fact, by definition, the core phenomena are more regular and also tend to occur more frequently within a given language. Therefore, if anything, they are likely to be easier to learn and less in need of language-specific innate learning rules.

The powerful domain-general learning mechanisms, the fact that the input is highly repetitive and in many ways well-suited to induction, the evidence for piecemeal, gradual acquisition, and the existence of complex but uncontrovertibly learned patterns all

suggest that language can be learned on the basis of the input, after all.

LANGUAGE UNIVERSALS

Constructions typically do not exist *sui generis*; they are generally not fully arbitrary: relationships between form and meaning are often motivated, and thus we find recurrent patterns cross-linguistically. But because Constructionist approaches do not rely on innate universal linguistic principles, constructions are expected to vary in their specifics cross-linguistically and this does seem to be the case.[6,8] What may be called a passive in one language may differ from a passive construction in another language in a number of subtle ways including the presence or choice of auxiliary, the presence or choice of adposition or case that marks the agent argument, possible semantic or discourse restrictions, and overall frequency in the language. Passives in unrelated languages are generally identified by their related functions; they are constructions in which the topic and/or agentive argument is essentially 'demoted', appearing as less prominent adjunct or not at all.[55] The fact that topics and agents are typically expressed in syntactically prominent slots is motivated by their function; the fact that special constructions exist that allow them to be expressed in nonprominent slots allows speakers a degree of flexibility and is therefore also motivated. Finding two constructions in two different languages that are absolutely identical in form, function, and distribution is a rare occurrence outside of cases of shared diachronic history or language contact.[56,57]

Croft[6], for example, notes that words that translate into English as nouns, adjectives, and adverbs, as well as verbs, are inflected for person, aspect, and mood in Makah, an American Indian language, and that no words are inflected for these categories in Vietnamese. Croft points out that tense–mood–aspect inflection cannot be taken as critical for determining the category of V cross-linguistically (unless of course one is willing to say that all words are verbs in Makah, and no words are verbs in Vietnamese). Croft goes on to point out that no syntactic test will pick out all and only entities that one might wish to call verbs, nouns, adjectives, subjects, objects, and so on across all languages. Moreover, he observes that even within a single language, a given criterion often only applies within certain larger constructions. For example,

'If one takes passivizability as the criterion for Direct Object in English, then one's conclusions will tell us something about the Passive, not about some allegedly global category Direct Object. . .(C)onstructions, not categories or relations, are the basic, primitive units of syntactic representation. . .This is radical construction grammar.' (Ref 6, p. 46).

This is not to say that there are no strong universal tendencies or implicational universals to be found across languages. Constructionists argue that such cross-linguistic generalizations are better explained via grammar-external explanations such as universal functional pressures, iconic principles, and processing and learning constraints. Let us consider a few examples in order to illustrate the point.

Languages in which verbs appear at the end of sentences have been shown to generally have postpositions and postnominal modifiers while languages with verbs appearing before their nonsubject complements tend to have prepositions and pronominal modifiers. This is shown in (9) below:

9.

Head Initial Languages :

$_{VP}[V \ldots]_{NP}[N \ldots]_{PP}[P \ldots]$

Head Final Languages :

$_{VP}[\ldots V]_{NP}[\ldots N]_{PP}[\ldots P]$

This 'head-direction parameter' has long been used as an example of a purely syntactic generalization that requires an innate universal grammar.[28,58] Children would then only have to determine where in the sentence the verbs in their language appear and could then deduce from that where to expect all other types of modifiers.

However, this generalization is not without exceptions. Persian, for example, is a verb-final language but has prepositions instead of postpositions. In addition, it is not clear that the generalization poses any sort of acquisition problem, since children must still learn the forms and meanings of the words in their language, including verbs, adpositions, and nouns. The ordering of elements in the sentence is apparent during this learning, which calls into question the conceptual necessity of any innate parameter.

Still, the strong cross-linguistic tendency requires some sort of explanation. Diachronic processes may well provide a better account for the relationship between verbs and adpositions, since adpositions typically develop from verbs.[59] It has also been hypothesized that the tendency for heads to systematically either precede or follow their complements lends a processing advantage[60,61]. Reali and Christiansen[62] have supported this idea by demonstrating that

simple-recurrent networks found consistent head-complement orderings easier to learn than mixed systems; that is, given the chance to adapt to their 'learners', the languages in their simulation, over time, came to have a consistent head-complement order similar to that found in real-world languages.

Other generalizations that have been argued to require recourse to innate principles have also found better explanations elsewhere. Lidz et al.[63] proposed that children come hard wired with specific knowledge that the number of overtly expressed complements should match the number of semantic participants. The fact that learners pay attention to the number of referring expressions in a clause as an indicator of the propositional meaning is not contested. However, the tendency for the number of nouns overtly expressed to reflect the number of semantic participants finds a natural explanation from the domain of Gricean pragmatics. Any referring expression should be assumed to be *relevant* to the topic at hand, and any argument that is relevant and nonrecoverable from discourse needs to be indicated in some way.[10] Beyond this pragmatic generalization, no syntactic stipulation is needed. The pragmatic generalizations say nothing about arguments that are irrelevant or recoverable; this is an advantage, since languages and constructions within a given language treat recoverable and irrelevant arguments differently. For example, many of the world's languages, including Chinese and Korean, readily allow recoverable arguments to be omitted.

Another generalization is that agents and undergoers are expressed in prominent syntactic positions. This is captured in the linking generalizations of Dowty[64] and can be summed up as follows: in simple active clauses, *if* there is a subject and an object, and *if* there is an agent and a patient, then the agent role will be expressed by the subject and the undergoer role as direct object. This is a modest proposal that has been taken by some to express an innate linguistic universal. In fact, the facts are even more modest: there are syntactically ergative languages in which agents are not generally expressed as subjects, there are many languages that do not have canonical subjects, and there are many constructions within a given language that violate the generalizations (e.g., passive which expresses the agent argument as an oblique). But again, there is something to the generalization. The facts can be restated as follows: semantic actors and undergoers tend to be expressed in formally prominent slots. Once stated this way, the generalization is much less mysterious: actor and undergoer arguments are generally expressed in prominent slots cross-linguistically because human beings' attention is naturally drawn to the actors and undergoers in events.[11]

Other generalizations about how form and meaning tend to be linked across languages can be explained by appeal to iconic and analogical processes[65–70] and to Gricean pragmatic generalizations.[71] Constraints on long-distance dependency constructions (traditional 'island constraints') appear to yield to processing explanations that take into account the function of the constructions involved.[72–76] This shift of perspective from seeking explanations in terms of syntactic, innate stipulations to trying to account for generalizations by appealing to independently motivated general cognitive mechanisms has been echoed to some extent within mainstream generative grammar as well. For example, the fact that all languages appear to have noun and verb categories may be explained by the existence of corresponding basic semantic categories.[77] In a recent paper, Chomsky goes so far as to suggest that the only language-specific innate ability that is absolutely required is recursion, and the point is raised that even recursion might turn out not to be specific to language.[78] In fact, the claim that recursion is domain-specific is already hotly contested.[79,80].

A RANGE OF CONSTRUCTIONIST APPROACHES

There are many varieties of the constructionist approach, differing primarily in emphasis and notation. These include, for example, the following: SBCG, sign-based construction grammar[26,81,82]; CG, cognitive grammar[83,84]; FCxG, fluid construction grammar[85]; ECxG, embodied construction grammar[86,87]; RCxG, radical construction grammar[6]; CCxG, cognitive construction grammar[11,24,25,88]; SS, simpler syntax[89].

Charles Fillmore and Paul Kay first coined the term, 'Construction Grammar'. Their early work on idioms and idiomatic phrasal patterns such as *let alone, even*, and *What's X doing Y?* laid the foundation for many of the variations of Construction Grammar that have since developed. SBCG as developed by Paul Kay, Charles Fillmore, Ivan Sag and Laura Michaelis, in line with most traditional grammatical frameworks, aims to account for the generalizations in language without redundancy. Patterns or expressions that are predictable from other generalizations are assumed not to be part of a speaker's knowledge of language. The frequencies of particular grammatical patterns are also not explicitly represented within SBCG. Instead a strict division

between grammar and the use of the grammar is made.

On the other hand, CG, CCxG, and RCxG are all usage-based frameworks as described above. The aim of these frameworks is to represent grammatical knowledge in such a way that it can interface transparently with theories of processing, acquisition, and historical change. This desideratum has led to the recognition that even fully regular patterns may be stored if such patterns occur with sufficient frequency.

CCxG[11,24,25,90] seeks to provide *motivation* for each construction that is posited. Motivation aims to explain why it is at least possible and at best natural that a particular form-meaning correspondence should exist in a given language. Motivation is distinct from prediction: recognizing the motivation for a construction does not entail that the construction *must* exist in that language or in any language. It simply explains why the construction 'makes sense' or is natural.[24,25,91] Functional and historical generalizations count as explanations, but they are not predictive in the strict sense, just as parallel generalizations in biology are not predictive. That is, language, like biological evolution, is contingent, not deterministic. Just as is the case with species, particular constructions are the way not because they *have* to be that way, but because their phylogenetic and ontogenetic evolution was motivated by general forces.

Perhaps, the primary difference between SBCxG and CCxG is one of the emphasis. Both approaches intend the grammars proposed to be psychologically valid, and both strive to be explicit and to capture relevant generalizations. Still, arguably CCxG ranks the desideratum of psychological validity higher than the goal of being formal or maximally general, whereas SBCxG generally has the opposite priorities.

RCxG extends work in Construction Grammar by investigating in detail the cross-linguistic divergences among what many assume are atomic, universal syntactic categories, and relations. FCxG offers computational models of how conventionalization in language can get off the ground. ECxG offers a formal notation for capturing rich semantics. SS offers broad coverage of a range of traditional constructions and a useful formalism for it. CG offers another rich formalism for semantics as well as insightful analyses of a wide range of linguistic constructions. These approaches are to a great extent complementary as they have focused on different aspects of our knowledge of language.

CONCLUSION

Constructionist approaches, which include the various versions of Construction Grammar, represent a broad based alternative to mainstream generative grammar that has held sway in the field for the past 50 years. Constructionists recognize that language is primarily a means of communication and that language involves learning an interrelated network of conventional ways of pairing form with function. Most constructionist approaches have adopted a usage-based approach to grammar, recognizing that information about frequencies and particulars of usage are part of our knowledge of language. A growing body of work in language acquisition indicates that language is learnable on the basis of domain-general abilities. A growing body of work in typology indicates that purely syntactic universals are vanishingly rare, while functional pressures and cognitive constraints put a limit on possible variation and account for recurrent general patterns. Many issues remain outstanding, as it is a relatively new approach. But constructionist approaches hold out the promise that we may be able to ultimately account for the complexities of language without appeal to mysterious stipulations.

REFERENCES

1. Bod• R. *Beyond Grammar: An Experience-Based Theory of Language*. University of Chicago Press; 1998.
2. Morris• WC, Cottrell GW, Elman JL. A connectionist simulation of the empirical acquisition of grammatical relations. Pp 175–193 in Stefan Wermter and Ron Sun, eds. *Hybrid Neural Symbolic Integration*. 2000. Springer-Verlag.
3. Borovsky A, Elman JL. Language input and semantic categories: a relation between cognition and early word learning. *J Child Lang* 2006, 33:759–790. doi:10.1017/S0305000906007574.
4. Alishahi A, Stevenson S. A computational model of early argument structure acquisition. *Cogn Sci* 2008, 32:789–834. doi: 10.1080/03640210801929287.
5. Tomasello• M. *Constructing a Language: A Usage Based Theory of Language Acquisition*. Harvard University Press; 2003.
6. Croft• W. *Radical Construction Grammar*. Oxford University Press; 2001.

7. Haspelmath M. Parametric versus functional explanation of syntactic universals. In: Biberauer T, ed. *The limits of syntactic variation*. Amsterdam: John Benjamins; 2008, 75–107.
8. Evans• N, Levinson S. The myth of language universals: language diversity and its importance for cognitive science. *Behav Brain Sci*. In press.
9. Hawkins• JA. *Efficiency and Complexity in Grammars*. Oxford University Press; 2004.
10. Goldberg AE. But do we need Universal Grammar? A comment on Lidz et al. (2003). *Cognition* 2004, 94:77–84. doi:10.1016/j.cognition.2004.03.003.
11. Goldberg• AE. *Constructions at Work: The Nature of Generalization in Language*. Oxford University Press; 2006.
12. Newmeyer• FJ. *Possible and Probable Languages. A Generative Perspective on Linguistic Typology*. Oxford University Press; 2005.
13. Bybee J. *Morphology: A Study of the Relation between Meaning and Form*. Amsterdam: John Benjamins; 1985.
14. Langacker RW. A usage-based model. In: Rudzka-Ostyn B, ed. *Topics in Cognitive Linguistics*. Amsterdam: John Benjamins; 1988, 127–161.
15. Kemmer S, Barlow M. *Usage-Based Models of Language*. Stanford: CSLI; 2000.
16. Pierrehumbert J. Exemplar dynamics: word frequency, lenition, and contrast. In: Bybee J, Hopper P, eds. *Frequency and the Emergence of Linguistic Structure*. Amsterdam: John Benjamins; 2001, 137–157.
17. Bybee J. The phonology of the lexicon: evidence from lexical diffusion. In: Barlow M, Kemmer S, eds. *Usage-based Models of Language*. Stanford: CSLI; 2000 65–86.
18. Gahl S, Garnsey S. Knowledge of grammar, knowledge of usage: syntactic probabilities affect pronunciation variation. *Language* 2004, 80:748–775.
19. Goldberg• AE, Boyd J. *A-adjectives, Historical Persistence and Generalization*. Princeton University; Forthcoming.
20. Gurevich• O, Johnson M, Goldberg AE. *Incidental Verbatim Memory for Language*. Princeton University; Forthcoming.
21. Chomsky N. *The Minimalist Program*. Cambridge: MIT Press; 1995.
22. Kayne• RS. *Movement and Silence*. Oxford University Press; 2005.
23. Goldberg AE. Surface generalizations: an alternative to alternations. *Cogn Linguist* 2002, 13:327–356. doi: 10.1515/cogl.2002.022.
24. Lakoff• G. *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. University of Chicago Press; 1987.
25. Goldberg• AE. *Constructions: A Construction Grammar Approach to Argument Structure*. University of Chicago Press; 1995.
26. Kay P, Fillmore CJ. Grammatical constructions and linguistic generalizations: the What's X doing Y? construction. *Language* 1999, 75:1–34.
27. Chomsky N. *Aspects of the Theory of Syntax*. Cambridge: MIT Press; 1965.
28. Chomsky N. *Lectures on Government and Binding*. Berlin: Walter de Gruyter; 1981.
29. Mintz TH, Newport EL, Bever T. The distributional structure of grammatical categories in speech to young children. *Cogn Sci* 2002, 26:393–424. doi: 10.1016/S0364-0213(2).
30. Dabrowska• E. *Language, Mind and Brain*. Georgetown University Press; 2004.
31. Cameron-Faulkner T, Lieven EVM, Tomasello M. A construction based analysis of child directed speech. *Cogn Sci* 2003, 27:843–873. doi: 10.1016/j.cogsci.2003.06.001.
32. Saffran JR, Aslin RN, Newport E. Statistical learning by 8-month-old infants. *Science* 1996, 274:1926–1928. doi: 10.1126/science.274.5294.1926.
33. Perfors A, Tenenbaum JB, Regier T. Poverty of the stimulus? A rational approach. In: Sun R, ed. *Proceedings of the Twenty-eighth Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Lawrence Erlbaum Associates; 2006, 663–668.
34. Tomasello M. Do young children have adult syntactic competence? *Cognition* 2000, 74:209–253. doi: 10.1016/S0010-0277 (99) 00069-4.
35. Akhtar N, Tomasello M. Young children's productivity with word order and verb morphology. *Dev Psychol* 1997, 33:952–965. doi: 10.1037/0012-1649.33.6.952.
36. Baker CL. Syntactic theory and the projection problem. *Linguist Inq* 1979, 10:533–581.
37. Bates E, MacWhinney B. Competition, variation, and language learning. In: MacWhinney B, ed. *Mechanisms of Language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1987, 157–193.
38. Bowerman• M. Reorganizational processes in lexical and syntactic development. In: Wanner E, Gleitman LR, eds. *Language Acquisition: The State of the Art*. Cambridge University Press; 1982, 319–346.
39. Braine• MDS. Children's first word combinations. *Monographs of the Society for Research in Child Development* 1976, 41 University of Chicago Press.
40. Brooks P, Tomasello M. How children constrain their argument structure constructions. *Language* 1999, 75:720–738.
41. Gropen J, Pinker S, Hollander M, Goldberg R, Wilson R. The learnability and acquisition of the dative alternation in English. *Language* 1989, 65:203–257.

42. Ingram D, Thompson W. Early syntactic acquisition in German: evidence for the modal hypothesis. *Language* 1996, 72:97–120.
43. Lieven EVM, Pine JM, Baldwin G. Lexically-based learning and early grammatical development. *J Child Lang* 1997, 24:187–219.
44. MacWhinney B. Basic syntactic processes. In: Kuczaj S, ed. *Language Development, Volume 1: Syntax and Semantics*. Hillsdale, NJ: Lawrence Erlbaum Publishers; 1982, 73–136.
45. Olguin R, Tomasello M. Twenty-five-month-old children do not have a grammatical category of verb. *Cogn Dev* 1993, 8:245–272. doi: 10.1016/S0885-2014 (93)80001-A.
46. Schlesinger IM. *Steps to Language: Toward a Theory of Language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum Publishers; 1982.
47. Tomasello• M. *First Verbs: A Case Study of Grammatical Development*. Cambridge University Press; 1992.
48. Boyd• J, Goldberg AE. *Children are More Conservative than Adults when Exposed to the Same Input and its Benefits for Language Learning*. Princeton University; Forthcoming.
49. Hudson Kam CL, Newport EL. Regularizing unpredictable variation: the roles of adult and child learners in language formation and change. *Lang Learn Dev* 2005, 1:151–195. doi: 10.1207/s15473341lld0102_3.
50. Ambridge B, Theakston AL, Lieven EVM, Tomasello M. The distributed learning effect for children's acquisition of an abstract syntactic construction. *Cogn Dev* 2006, 21:174–193. doi: 10.1016/j.cogdev.2005.09.003.
51. Goldberg AE, Casenhiser D, Sethuraman N. Learning argument structure generalizations. *Cogn Linguist* 2004, 15:289–316. doi: 10.1515/cogl.2004.011.
52. Casenhiser D, Goldberg AE. Fast mapping of a phrasal form and meaning. *Dev Sci* 2005, 8:500–508. doi: 10.1111/j.1467-7687.2005.00441.x.
53. Elio R, Anderson JR. The effects of information order and learning mode on schema abstraction. *Mem Cognit* 1984, 12:20–30.
54. Goldberg AE, Casenhiser D. Learning argument structure generalizations. In: Clark EV, Kelly BF, eds. *Constructions in Acquisition*. Stanford: CSLI Publications; 2006, 185–204.
55. Perlmutter DM, Postal PM. *Toward a universal characterization of passivization. Proceedings of the Third Annual Meeting of the Berkeley Linguistics Society, University of California, Berkeley*; 1977.
56. Birner B, Ward G. *Information Status and Noncanonical Word Order in English*. Amsterdam: John Benjamins; 1998.
57. Zhang N. The interactions between construction meaning and lexical meaning. *Linguistics* 1998, 36:957–980.
58. Jackendoff• R. *Semantic Interpretation in Generative Grammar*. MIT Press; 1972.
59. Nichols J. Head-marking and dependent-marking grammar. *Language* 1986, 62:56–119.
60. Hawkins JA. A parsing theory of word order universals. *Linguist Inq* 1990, 21:222–261.
61. Hawkins• JA. *A Performance Theory of Order and Constituency*. Cambridge University Press; 1994.
62. Reali• F, Christiansen MH. Sequential learning and the interaction between biological and linguistic adaptation in language evolution: a computational approach. *Interact Stud*. In press.
63. Lidz J, Gleitman H, Gleitman L. Understanding how input matters: verb learning and the footprint of universal grammar. *Cognition* 2003, 87:151–178. doi: 10.1016/S0010-0277 (02) 00230-5.
64. Dowty D. Thematic proto-roles and argument selection. *Language* 1991, 67:547–619.
65. Lambrecht• K. *Information Structure and Sentence Form*. Cambridge University Press; 1994.
66. Verhagen A. From parts to wholes and back again. *Cogn Linguist* 2002, 13:403–439. doi: 10.1515/cogl.2002.024.
67. Haiman• J. *Iconicity in Syntax*. Cambridge University Press; 1985.
68. Givon T. Isomorphism in the grammatical code: cognitive and biological considerations. *Stud Lang* 1991, 15:333–377.
69. Kemmer• S, Verhagen A. The grammar of causatives and the conceptual structure of events. In: *Mouton Classics: From Syntax to Cognition, from Phonology to Text*; 2002, 451–491.
70. Blevins• J, Blevins J. Introduction: Analogy in grammar. In: Blevins JP, Blevins J, eds. *Analogy in Grammar: Form and Acquisition*. Oxford University Press; to appear, 1–12.
71. Levinson• SC. *Pragmatics*. Cambridge University Press; 1983.
72. Van Valin• RDJ. The acquisition of wh-questions and the mechanisms of language acquisition. In: Tomasello M, ed. *The New Psychology of Language: Cognitive and Functional Approaches to Language Structure*; 1998, 221–249.
73. Kluender• R. On the distinction between strong and weak islands: a processing perspective. *Syntax Semant* 29:241–280.
74. Kluender R, Kutas M. Subjacency as a processing phenomenon. *Lang Cogn Processes* 1993, 8:573–633. doi: 10.1080/01690969308407588.
75. Erteschik-Shir• N. *The Dynamics of Focus Structure*. Cambridge University Press; 1997.

76. Ambridge B, Goldberg AE. The island status of clausal complements: evidence in favor of an information structure explanation. *Cogn Linguist* 2008, 19:349–381. doi:10.1515/COGL.2008.014.
77. Baker• M. *Lexical Categories: Nouns, Verbs and Adjectives*. Cambridge University Press; 2003.
78. Hauser M, Chomsky N, Fitch T. The faculty of language: what is it, who has it, and how did it evolve? *Science* 2002, 298:1569–1579. doi:10.1126/science.298.5598.1569.
79. Gentner T, Fenn KM, Margoliash D, Nusbaum HC. Recursive syntactic pattern learning by songbirds. *Nature* 2006, 440:1204–1207. doi:10.1038/nature04675.
80. Pinker S, Jackendoff R. The faculty of language: what's special about it? *Cognition* 2005, 95:201–236. doi:10.1016/j.cognition.2004.08.004.
81. Kay• P, Michaelis LA. Constructional meaning and compositionality. In: Maienborn C, von Heusinger K, Portner P, eds. *Semantics: An International Handbook of Natural Language Meaning*. Berlin: Mouton de Gruyter; Forthcoming.
82. Sag• IA. *Sign-Based Construction Grammar: An Informal Synopsis* Stanford University; 2007, Manuscript.
83. Langacker• R. *Foundations of Cognitive Grammar, Volume 1*. Stanford University Press; 1987.
84. Langacker• R. *Foundations of Cognitive Grammar, Volume 2*. Stanford University Press; 1991.
85. Steels L, De Beule J. A (very) brief introduction to fluid construction grammar In: *Proceedings of the 3rd International Workshop on Scalable Natural Language*. Madison, WI: Omnipress Inc.; 2006 73–80.
86. Feldman• J. *From Molecule to Metaphor*. MIT Press; 2006.
87. Bergen BK, Chang N. Embodied construction grammar in simulation-based language understanding. In: Östman J-O, Fried M, eds. *Construction Grammars: Cognitive Grounding and Theoretical Extensions*. Amsterdam: John Benjamins; 2005. (Reprinted in Evans V, Bergen B and Zinken J, eds. *The Cognitive Linguistics Reader*. London, Equinox; 2007.).
88. Stefanowitsch A, Gries ST. Collostructions: investigating the interaction of words and constructions. *Int JCorpus Linguist* 2003, 8.2:209–243.
89. Culicover• P, Jackendoff R. *Simpler Syntax*. Oxford University Press; 2005.
90. Goldberg AE. Constructions: a new theoretical approach to language. *Trends Cogn Sci* 2003, 7:219–224. doi: 10.1016/S1364-6613 (03) 00080-9.
91. Haiman• J. *Natural Syntax: Iconicity and Erosion*. Cambridge University Press; 1985.

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IMPORTANT NOTE: Please mark your corrections and answers to these queries directly onto the proof at the relevant place. Do NOT mark your corrections on this query sheet.

Queries from the Copyeditor:

AQ1 Please rephrase the sentence 'For example, the restriction on the ditransitive that it conveys transfer from an actor to a potential recipient renders examples such as (3a) below ungrammatical:..' for clarity.
AQ2 Please rephrase the sentence 'Once we eschew derivations, it becomes clear that 4b, repeated below as 5a, has more in common with 5b-–e than it does with 4a, save for the shared verb, give:. . .' for clarity.
AQ3 Please rephrase the sentence 'Constructions that are motivated by other constructions in that related forms and functions are linked to each other in a default inheritance hierarchy, of the type long found useful for representing all types of relational knowledge' for clarity.
AQ4 Please provide the place of publication for Reference 1.
AQ5 Please provide the place of publication for Reference 2.
AQ6 Please provide the place of publication for Reference 5.
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