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LEXICAL REPRESENTATION AND ACQUISITION THEORY

The role and nature of syntactic categories in language acquisition is unresolved. While many researchers assume that children have innate knowledge about syntactic categories which helps them to acquire syntax, others assume that children's early syntactic theories are semantically based and learned. In this paper I will summarize evidence against both a syntactic and a semantic basis for children's syntactic categories, and work out the implications of a Construction Grammar approach for the acquisition of syntactic categories. This approach is based on the insight that words as such do not have a syntactic category, but that their category assignment depends on the context they occur in. In this view, syntactic categories are the result of schematization and frequency effects. In this view, children's early productions will be lexically specific in the sense that they can be correct without having an abstract and adult-like mental representation. And they are language-particular, since each language instantiates its own set of relevant properties for the classification of words into categories.

Introduction

In adults, long term memory represents words not only in terms of their semantics, but also in terms of their formal properties: An entry in the mental lexicon has syntactic information like part of speech and gender, morphological information like their inflectional paradigm, as well as a phonological and orthographic representation (Aitchison, 1987). It is also assumed that derived forms like "curious" and "curiosity", or "act", "active" and "action" are stored as separate lexical entries which are interconnected with all other entries having the same root, as well as with all other words having the same derivational affixes (cf. Clark, 1993, p. 5; Pinker; 1999, p. 43). This model of the mental lexicon assigns a large impact to morphosyntactic information attributed to the individual lexical entry.

But what about children's mental representation of formal features? There has been a longstanding debate about whether children operate with adult syntactic theories or whether their categories are semantically based. More recently, researchers from different theoretical persuasions proposed that children's early syntactic knowledge is tied to the acquisi-

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tion of the lexicon. But there are different theories about the relationship between lexical and syntactic representation. Within the Generative Grammar approach, researchers suggested that innate formal representation comes to bear through a process of *lexical learning* (Pinker, 1989). Within the Cognitive Grammar approach, the claim is that children's early knowledge of grammar is that of *lexical specificity*, i.e., there is initially no separate and abstract level of linguistic representation (Tomasello, 2000; see also Maratsos, 1982).

In this paper I will address the issue of the status of grammatical categories in these frameworks. In Generative Grammar, innate syntactic categories and rules are considered to be the primitive and universal basis for language acquisition and language processing. In Cognitive Grammar, in contrast, language is seen as a pairing of phonological form and meaning. All grammatical relations are symbolic units of form and meaning. In this view, the structural level is an epiphenomenon which emerges from language use by schematization and categorization (Langacker, 1991). I.e., children build syntactic categories based on the occurrence of words in context.

It is apparent that these opposing views on the nature of grammatical categories lead to different hypotheses about what is at stake in language learning. And it goes without saying that each of these theories comes in a variety of subtly different versions, and that no interesting proposal in science ever goes without criticism. But instead of evaluating the evidence for or against particular details of these theories, I will focus on the fundamental implicit and explicit assumptions underlying these *lexicalist* approaches. Consequently, I will refer to the literature which summarizes the debates, not necessarily to the literature which started them. The aim is to define the kind of mental representation that can serve as the starting point for language acquisition, and to work out how children might come to acquire the adult mental representations. I will propose that the solution to category learning that follows from Cognitive Grammar solves the problems of earlier functionalist proposals which assume a semantic basis for syntax.

The role of syntactic categories in linguistic theory

Generative Grammar and modular theories of language processing

The Projection Principle

Modular approaches to language and language processing assume several autonomous levels of representation (lemma , lexeme, morphology, syntax). That is, language and its mental representation can be divided into semantic-conceptual and formal (morphosyntax) as well as phonological properties. The most striking phenomenon for such a layered representation is the tip-of-the-tongue state. Sometimes we cannot retrieve a word although we may know its syntactic category, grammatical gender, and syllable structure. This problem can be explained by arguing that lexical access (the retrieval of words from the mental lexicon) proceeds in two stages: we first retrieve the *syntactic* word or "lemma" (information about part of speech, gender, inflectional class, etc.), and only in a second step we retrieve the phonological word, the actual spoken phonetic content (see Levelt, Roelofs and Meyer, 1999, p. 3)

Modular theories of language assume that the autonomous levels of representation are connected by symbolic grammatical rules (cf. Pinker's 1999 title "Words and rules: The ingredients of language"). In such a model, words feed into morphological (inflectional/

derivational) and syntactic rules. The role of the lexicon is two-fold: on the one hand, it is the storage for all idiosyncratic and irregular (= not rule-based) properties of language. On the other hand, all lexical entries need to be *fully* specified for grammatical information in order to feed into syntax, as stated in the so-called "Projection Principle" (Chomsky,1981; see below). Hence, lexicalist theories in the generative tradition assume richly specified lexical entries which systematically relate to and predict syntax:

> it has become apparent that many of the facts of grammar are caused by the properties of the particular lexical items that go into sentences. Recent theories of grammar specify rich collections of information in lexical entries and relatively impoverished rules or principles in other domains (Pinker, 1989, p. 4).

Common to all versions of Generative Grammar is the assumption that lexical items *project* syntactic representations since "[s]entences conform to the demands of words in them because of general principles" (Pinker, 1989, p. 4). This division of labor between "words and rules" is motivated by the reductionist aim of the concepts of Universal Grammar, the goal to describe syntax (and not language as a whole) as parsimoniously and formally elegantly as possible.

In developing the *Government and Binding* version of UG theory, Chomsky (1981) states as a guiding principle that "[r]epresentations at each syntactic level (i.e., LF, D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items" (Chomsky, 1981, p. 29). This principle is upheld in the most recent version of Generative Grammar in the Chomskyan tradition, *minimalism*. Chomsky (1995, p. 27) maintains the "principle of full interpretation" that all and only the relevant syntactic properties must be represented at each level, although the concept of syntactic processes has changed: syntactic structures are formed by the operation of "merger": two words can form a syntactic phrase if their formal and semantic features are compatible. E.g., both noun and verb could have the feature '3rd person', which could then be checked off (see Radford, 1997, pp. 67-74 for a summary).

The status of syntactic categories in Generative Theories of acquisition

The most important prerequisite for the lexicalist proposal in the generative approach to language acquisition is the assumption that words have categories. Consequently, each lexical entry in the child's mental lexicon needs to be specified for category. That is, nativism in the Generative Grammar tradition is *representational nativism* in the sense that the child has innate structural knowledge about hierarchical and recursive syntactic representations (cf. Bates & Goodman, 1999). This implies that children have general and adult-like knowledge at their disposal, and their task during the acquisition process is to link this knowledge to the actual lexical items of a given language. This can supposedly be done by a process of triggering, maturation, or lexical learning (see Atkinson, 1996, for review).

In Generative Grammar, each lexeme is specified not only for its semantics, but also for its syntactic properties (category membership, subcategorization properties or argument structure). Supposedly, [±N] and [±V] are features of universal grammar: the possible combinations yield four lexical categories: Verb [-N + V], Noun [+N -V], Adjective [+N +V] , Preposition [-N -V], which are taken to be universal syntactic primitives (Chomsky, 1970; for review on the history of this classification see Eschenlohr 1997). However, the features [±V] and [±N] have no defining properties other than 'nouniness' and 'verbiness'. Consequently, it is unclear on what basis the learner could recognize these

features given the assumption that semantic aspects do not play a role in language acquisition. For example, Stephen Crain, the most outspoken advocate of language learning without positive evidence (1991), posits the innateness of linguistic categories, but is remarkably empiricist as well as vague about the process of how kids learn which words instantiate the innate and primitive categories:

> If the notions "subject" and "noun" are part of UG, then there is no reason to suppose that children's early grammars are semantically based instead of syntactically based. We can assume that children go into the language acquisition task prepared to find "nouns" and "subjects" in their input. They must learn which words (patterns of sounds) are nouns in the language they are acquiring, and they must learn how that language orders subjects vis-a-vis other constituents (i.e., they must determine the settings which their languages use on the head/complement parameter). They can determine these things based on the positive evidence in their input, and thus even their earliest grammar can make use of them (Crain & Lillo-Martin, 1999, p. 141).

But there is nothing in the sound pattern of words which corresponds to syntactic categories. Nouns such as "hat" and "xylophone" do not have a single phonetic or prosodic or even inflectional feature in common which would suggest that they are both nouns. The only cue to their sameness would be their distribution, their occurrence in the same syntactic contexts (cf. Chomsky, 1995, p. 31). But to use this as a cue requires knowledge which, according to the theory, need not yet be there. It thus turns out that this acquisition theory which claims the pre-existence of syntactic categories as a starting point for acquisition ends up in an infinite logical loop: innate syntax can only kick in *with* knowledge of the syntactic category of words, but categories cannot be identified *without* knowledge of syntax, i.e., the distribution of these forms in context. The theory thus falters at its very foundation. The so-called "linking problem", the task of linking actually occurring items to innate linguistic knowledge cannot be solved (cf. Atkinson, 1996; Tomasello, 2000), as there is no semantic or phonetic basis for syntactic categories (cf. the articles in Levy, Schlesinger & Braine, 1988; typological research like Dryer, 1997). But then how can categories be identified? This puzzle can be solved only if one does not take categories as ontological primitives which need to be linked to the sound and semantic patterns the child is confronted with, but as the result of processing language in context, as done in Cognitive Grammar.

The status of syntactic categories in Cognitive Grammar

Constructions as basic and primitive units of syntax

Sasse (1993, p. 647) points out that Generative Grammar, unlike other frameworks which take categories as mere heuristics, gave these features status of syntactic primitives. Several researchers attempted to solve the problems induced by the indeterminateness of the features [±N] and [±V] by trying to find determining criteria or establishing markedness hierarchies (see review in Steinitz, 1997; and the articles in the volume by Löbel & Rauh, 1997, in general). But the problem remains that these solutions tend to be language-particular and not universal.

Cognitive Grammar, and in particular Construction Grammar, goes a completely different way by rejecting the assumption that there are universal syntactic primitives (Croft, 2000). This assumption rests on the finding that it has proved to be impossible to define

categories independent of the context. That is, words as such do not have a syntactic category, but rather instantiate a syntactic category in context, as can be illustrated by these inscriptions found on a piece of art[1]:

(1) THE PRESENT ORDER
ORDER THE PRESENT
PRESENT THE ORDER

In many languages, the identity of word forms across categories is pervasive, as is exemplified in (1) where the word form "order" functions as verb and noun, and where the word form 'present' functions as noun, verb, and adjective. In English, few word forms are unambiguous with respect to their syntactic categories (e.g., the English word form "the" functions as a determiner most of the time, but it can also be used in idiomatic but productive constructions of the type "'the more the merrier"). Consequently, categories are not universal and innate syntactic primitives which are represented in each word at each level of representation, but rather an epiphenomenon of syntactic constructions (Croft, 2000).

Cognitive linguists thus see syntactic categories as emergent and language-particular constructs. This view is supported when looking at the history of linguistic theory, since our set of categories is based on Latin Grammar, and its application to other languages leads to serious problems (see Sasse, 1993, pp. 646-648). It gets further support from typological research because one has not succeeded in finding universal criteria of "nouniness", "verbiness"; "subjecthood" (Wilkins & van Valin, 1993; Dryer, 1997). In addition, in many languages the proposed set of universal categories is not sufficient to describe the syntactic categories relevant in that particular language (Steinitz, 1997).

But if there are no characteristic features which define a category, how can we explain that this concept does indeed carry us far in analyzing and describing linguistic structures? The answer lies in the fact that categories are not an inherent property of the word itself, but that a word receives its category from the context it occurs in (cf. the alternative terminology "part-of-speech"). We thus need to move the focus of attention away from the individual word to larger constructions instead (Fillmore, 1988; Croft, 2000). By virtue of our schematic knowledge that the suffix "-ed" symbolizes the past tense relation, we can easily use nouns as verbs (e.g., "At Ascot, Mr. Taylor not only hatted the Queen, but also Queen Mom", or "John xylophoned all afternoon"). By virtue of our knowledge of the meaning of the ditransitive sentence frame it is possible to interpret a sentence like "John sneezed the napkin off the table" in analogy to "John wiped the crumbs off the table", despite the fact that "sneeze" is not a ditransitive verb (Goldberg, 1995).

Such flexibility of words is in line with non-reductionist, "maximalist" theories of representation (Langacker, 1991, p. 264). Here, the mental representation of verbs is not reduced to a limited set of universal primitives and relevant syntactic features, but includes everything that is necessary to account for all possible uses of this word. Category effects in this view are the result of entrenchment: a frequency effect based on strong and stable associations of the preferred usage of words by a process of schema abstraction and conventionalization (Langacker, 1991; Croft, 1998; Bybee & Scheibman, 1999).

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[1] Ian Hamilton Finley (1991). The present order. Sculpture at the Leipzig Museum of Contemporary Art.

To take syntactic categories as language-particular constructs rather than as primitive syntactic features implies that categories do not crucially rely on semantic features. Although semantic prototype effects play a crucial role in finding the basic concepts and categories of language (see Taylor, 1998), they are not seen as semantic primitives. In language typology, some researchers assume a set of features associated with what functions like a noun or a verb in a given language, but argue that there are no deterministic and universal features which are represented in all languages. Instead, each language with a noun or verb category instantiates a subset of these features (Dryer, 1997). It is important to point out that Construction Grammar is not a theory of semantics projecting syntax. If one does not assume that the semantic prototypes are innate conceptual primitives, then prototype effects can only set in after quite some exposure to and use of language. Again, prototype effects would be the effect rather than the starting point of learning. Hence, prototypes are not part of our innate mental representation, but are usage-based.

Given that the formal and semantic interpretation of a word is influenced by and relies on its use in a larger construction, it is not the individual word which projects syntax, but the syntactic frame which 'projects' onto the word. By making this assumption, it is possible to resolve the insufficiency of semantically based approaches to syntactic categories, which cannot explain why good and bad exemplars of a category function equally well in syntactic operations (Steinitz, 1997).

From this it follows that all linguistic relations can be described as symbolic units which result in a pairing of phonetic or orthographic form (their substance) and meaning (Langacker, 1991, pp. 288-313). What is traditionally conceived of as grammar ("rules") is the epiphenomenon schematization over usage events. In contrast to Generative Grammar there is no principled distinction between lexicon and grammar (words and rules), Rather, both are symbolic units which differ in size and in degree of abstractness. While this may seem unconstrained, it is important to point out that in this framework the same mechanism of forming symbolic units accounts for all of language (the maximalist approach). That is, there is no focus on core syntax only. Hence, Cognitive Grammar cannot dismiss problematic cases as irrelevant to syntax and linguistic theory, as is possible in Generative Grammar. It is also important to point out that Cognitive Grammar does not deny the existence of structural relations or "grammar". But it sees it as the outcome of psychological processes such as schematization and social processes like conventionalization, and it acknowledges that the proportion of idiosyncratic and irregular phenomena forms a large rather than a negligible proportion of language use (cf. Langacker 1998).

Implications of usage-based accounts of grammar for the acquisition of syntactic categories

The implications of Cognitive Grammar for language acquisition are of three kinds:

(a) A Cognitive Grammar approach to language acquisition will have to account for all properties of each language. There is no principled distinction between rule (core) and non-core phenomena (listed exceptions, Langacker, 1991, p. 264). For acquisition this implies that 'odd' or idiosyncratic cases are not disadvantaged, and it takes into account the fact that children do not start out talking core syntax before they acquire the irregular aspects of language.

(b) To take the linguistic relativity of grammatical relations into account implies that language-particular courses of acquisition are expected. As pointed out above, acquisition

of grammatical relations is not determined by a set of syntactic or semantic primitives. In addition, individual differences are expected: if one does not assume a priori knowledge about linguistic relations, there is no reason why all children should start out with the same assumptions.

(c) To take linguistic experience as the vantage point for acquisition means that linguistic knowledge will initially be lexically or construction specific and not as general as that of adults. This means that structural properties attested with one lexeme need not show up with semantically or syntactically related items (cf. Tomasello, 2000, for review).

In the following I will address the issues under (b) and (c) with respect to the acquisition of syntactic categories, and I will spell out the implications of these findings for the mental representation of lexical items.

The language particular acquisition of linguistic categories

To take a Construction Grammar approach to category learning solves one of the old problems of functional approaches to the acquisition of syntax: It is no longer necessary to assume that linguistic categories are semantically based. The assumption that linguistic categories start out from a semantic-conceptual core did not stand scrutiny (see the papers in Levy, Schlesinger, & Braine, 1988; Bowerman, 1985, 1989). But if one assumes language specificity, crosslinguistic differences are expected as there is no need for structural properties to be universal (cf. Slobin, 1997).

Gentner (1978) argued that verbs are more difficult to learn because they are relational rather than referential terms. Recent research shows that the proposed noun bias in the acquisition of the lexicon does not show up in all languages (e.g. Korean, Choi, 1998; Mandarin Chinese, Tardif, 1996; or Tzeltal, a Mayan language, Brown, 1998). Again, an absolute noun bias can only be expected if one assumes that the same abstract properties of the verb category are represented and equally relevant in every language. Languages differ, for example, in whether they allow NP omission or not. In German and English, NP omission is quite restricted, and (relational) verb and case information is needed in order to interpret the function of these NPs. But NP omission tends to be much more common in those languages in which a noun bias in acquisition is not found. This means that (a) children receive different distributions of the noun and verb category in the input, and that (b) the relational properties of verbs may not be as influential in these languages. In addition, verbs can have many of the semantic characteristics of nouns: Tzeltal not only allows NP omission, but its verbs tend to have very concrete 'referential' semantics (the equivalent to 'eat mushy things', 'eat crunchy things', 'slurp'; Brown, 1998). Moreover, languages differ in how well inflectional information on word forms predicts categories: In Korean, the inflection on a word form is a good cue to category, in English it is less valid (Choi, 1998).

Lexical specificity as the onset of learning linguistic structures

Children's correct use of syntax and their few category violations cannot only be explained by full creativity with adult syntax, but also by extreme conservatism, i.e., children speak correctly because they model what they hear. Tomasello (2000) summarizes experimental results on the productivity of children's syntactic knowledge. When are kids

able to use novel verbs in new inflectional or syntactic contexts? It turns out that there is a gradual process of generalizing over more and more complex structures. Importantly, the fact that children use certain structures like transitive sentences or passives with some verbs does not imply that they are able to generalize them to other verbs. It is in this sense that children's early knowledge is lexically specific, rather than general and adult-like.

This notion of lexical specificity differs from the concept of lexical learning outlined above. In lexical learning, the assumption is that children have adult-like syntactic representations, but that these representations initially surface only in a few items. In lexical specificity, the assumption is that children's early words and constructions do not represent adult categories, but that adult-like knowledge is abstracted from usage events (Tomasello, 2000; see Hopper, 1998, on the notion of emergent grammar; Givón, 1998, for critique).

Generalizations on language structure are made possible by distributional or statistical learning (e.g., Maratsos, 1982; see also the articles in MacWhinney, 1999). Brent (1994) argues that statistical learning of syntax and syntactic categories is possible based on knowledge of local cues like function elements (determiners, prepositions, inflectional elements, etc.). These local cues become entrenched because they stay stable even if the lexical elements in these constructions vary. This may also explain why we find conversions (or category shifts) very early in development. For example, when asked " was macht der Ball?" ('what is the ball doing?') a young German child (age 2;2.3) answered "der ballt" ('it ball-s'). Apparently, he coined the novel verb 'to ball' in analogy to previous instances of the type 'it verb-s'.

In the course of development, the processes of item-specific and distributional learning will come together: Children will store 'phrases' around concrete lexical items, and will abstract schemata based on recurrent elements and patterns. This eventually allows them to replace the lexical material in those frames with new ones (Lieven, Pine & Rowland, 1998).

Implications for building networks in the mental lexicon

Various word forms of verbs may be initially unrelated: children can either build up one central frame and start with the same core, or they can start with several frames and abstract the relationship between them later. For instance, learners could have a functional analysis of whole utterance frames, without establishing links between the uses of the 'same' word in different contexts: Theakston (2000) and Israel (2000) analyzed the acquisition of the highly versatile verbs "go" and "get", and find that children acquire different constructions in different contexts without evidence that these uses are initially related. It is possible to explain these results in the sense that the various usage patterns of these multifunctional verbs are not linked to one another, but initially represent different syntactic frames. That is, the individual items may acquire their formal and semantic specification only in the course of development.

Clearly driven by genetic endowment, children restructure their lexical concepts by a process of 'syntactization'. Lexical concepts acquire syntactic category and subcategorization features; verbs acquire specifications of how their semantic arguments (such as agent or recipient) are to be mapped onto syntactic relations (such as subject or object); nouns acquire properties for the regulation of syntactic agreement such as gender,

and so forth. More technically speaking, the child develops a system of 'lemmas', packages of syntactic information, one for each lexical concept. [...] This system of lemmas is largely up and running by the age of 4 years. From then on, producing a word always involves the selection of the appropriate lemma. (Levelt et al. 1999, pp. 2-3).

If one reconceptualizes the role of the child in this process from an undergoer of a genetic process to the agent who generalizes on the basis of context, this proposal outlines a process of category formation compatible with Cognitive Grammar.

What seems clear from processing research is that frequency effects play an important role in lexical access of word forms, and that word frequency and word frequency effects relate to the age of acquisition of a word (for review see Levelt et al., 1999, p. 18f.).

But how can the Cognitive Linguistics view of language be reconciled with psycholinguistic evidence like the tip-of-the-tongue-phenomenon, and the experimental results which propose discrete stages of conceptual, formal and phonological processing (see Levelt et al., 1999)? One of the problems with the experimental evidence so far is that it heavily relies on techniques which present words in isolation (Roberts et al. 1999, pp. 54-55; see also Bybee & Scheibman, 1999, for arguments in favor of mental storage of larger units). That is, they do not really address the planning stage of language production or the issue of how we process speech and words in context. The tip-of-the-tongue state could be explained if one also assumed higher level representations such as whole constructions, i.e., in a tip-of-the-tongue situation we may access a much larger constructional schema of which just one part is not accessible or partially represented (consider also first, and especially second, language learners' problems with memorizing and producing idioms: one knows about the meaning of the idiom and may recall bits and pieces, but not the whole).

Summary and conclusions

The discussion about the different status of syntactic categories in Generative Grammar and Cognitive Linguistics has highlighted the differences between two proposals which state that the acquisition of the lexicon plays an important role in the acquisition of syntax. The two notions of lexicalism derive from different concepts of linguistic theory and different foci of attention with respect to which aspects of language acquisition they try to account for. Generative Grammar is a competence model of language: it is interested in defining the set of rules needed to account for what is possibly grammatical in a language, and it takes its evidence from introspection. Cognitive Grammar is not primarily concerned with what is possible, but with what people do; it is usage-based. This implies that the goal of linguistic explanation is maximalist rather than reductionist: the inclusion of all information necessary to account for speaker's knowledge and performance

In Generative Grammar, category information is an inherent, primitive, and universal property of words which must be represented at each level of representation. Cognitive Grammar, on the other hand, does not distinguish autonomous levels of representation, nor does it treat syntactic categories as linguistic primitives. Instead, language consists of all symbolic units of form and meaning as the basic linguistic relations. These units differ in size and abstractness. This way, children abstract "rules", or rather generalizations, on the basis of what they hear by general cognitive mechanisms such as schema formation. The result of such an acquisition process can be described as developmental modularity

(Karmiloff-Smith, 1992): The fact that we find modular structures in adult language and language processing does not imply that they must be innate, since modularity can be the result of development .

In Generative Grammar, the generalizations are already innately given, and only need to be 'discovered' in acquisition, for example by a process of lexical learning. However, it remains quite unclear how these discovery procedures work, i.e., the processes by which innate knowledge is linked to concrete linguistic items is unclear (Atkinson, 1996). But if one sees categories and a result of categorization processes in acquisition, and if one sees them as radial rather than deterministic, as done in Cognitive Linguistics, the mechanism of acquisition is spelt out.

Moreover, taking results showing the linguistic relativity of syntactic categories into account, the same generalization mechanisms can help us find a way out of the deadlock between semantic or syntactic determinism of syntactic categories in acquisition. Without the assumption of semantic or syntactic primitives, category acquisition reduces to a language particular categorization task.

References

Aitchison, J. (1987). *Words in the mind: an introduction to the mental lexicon*. Oxford: Blackwell.

Atkinson, M. (1996). Now, hang on a minute: some remarks on emerging orthodoxies. In H. Clahsen (Ed.), *Generative perspectives on language acquisition* (pp. 451-485). Amsterdam: Benjamins

Bates, E., & Goodman, J. (1999). On the emergence of grammar from the lexicon. In B. MacWhinney (Ed.), The emergence of language (pp. 28-79). Mahwah, NJ: Erlbaum.

Bowerman, M. (1985). What shapes children's grammar? In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition. Vol. 2: Theoretical issues* (pp. 1257-1319). Hillsdale, NJ: Erlbaum.

Bowerman, M. (1989). Learning a semantic system: what role do cognitive prerequisites play? In M. L. Rice & R. L. Schiefelbusch (Eds.), *The teachability of language* (pp. 133-169). New York: Paul H. Brooks.

Brent, M. R. (1994). Surface cues and robust interference as a basis for the early acquisition of subcategorization frames. In L. Gleitman & B. Landau (Eds.), *Lingua: Special issue on lexical acquisition* (Vol. 92, pp. 433-470).

Brown, P. (1998). Children's first verbs in Tzeltal: evidence from the early verb category. *Linguistics (Special Issue: The development of a verb category)*, 36, 713-753.

Bybee, J., & Scheibman, J. (1999). The effects of usage of degrees of constituency: the reduction of "don't" in English. *Linguistics*, 37, 575-596.

Choi, S. (1998). Verbs in early lexical and syntactic development in Korean. *Linguistics (Special Issue: The development of a verb category)*, 36, 755-780.

Chomsky, N. (1970). Remarks on nominalization. In: R. Jacobs & P. Rosenbaum (Eds.), *Readings in English Transformational Grammar* (pp. 184-221). Waltham, MA: Gin & Co.

Chomsky, N. (1981). *Lectures on government and binding*. Dordrecht: Foris.

Chomsky, N. (1995). *The minimalist program*. Cambridge, MA: MIT Press.

Clark, E.V. (1993). *The lexicon in acquisition*. Cambridge: Cambridge University Press.

Crain, S. (1991). *Language acquisition in the absence of experience*. Behavioral and Brain Sciences, 14, 597-650.

Crain, S. & Lillo-Martin, D. (1999). *An introduction to linguistic theory and language acquisition*. Oxford: Blackwell.

Croft, W. (1998). Linguistic evidence and mental representations. *Cognitive Linguistics*, 9, 151-173.

Croft, W. (2000). *Radical construction grammar: syntactic theory in typological perspective*. Manuscript: University of Manchester.

Dryer, M. (1997). Are grammatical relations universal? In: J. Bybee, J. Haiman, & S. Thompson (Eds.), *Essays on language function and language type* (pp. 115-143). Amsterdam: Benjamins.

Eschenlohr, S. (1997). Zur kategorialen Determiniertheit von Wortformen im Deutschen. In E. Löbel & G. Rauh (Eds.), *Lexikalische Kategorien und Merkmale* (pp. 27-43). Tübingen: Niemeyer.

Fillmore, C. J. (1988). *The mechanisms of Construction Grammar*. BLS, 14, 35-55.

Gentner, D. (1978). On relational meaning: the acquisition of verb meaning. *Child Development*, 49, 988-998.

Givón, T. (1998). The functional approach to grammar. In M. Tomasello (Ed.), *The new psychology of language: cognitive and functional approaches to language structure* (pp. 41-66). Mahwah, NJ: Erlbaum.

Goldberg, A. E. (1995). *Constructions*. Chicago: Chicago University Press.

Hopper, P. J. (1998). Emergent grammar. In M. Tomasello (Ed.), *The new psychology of language: cognitive and functional approaches to language structure* (pp. 155-175). Mahwah, NJ: Erlbaum.

Israel, M. (2000). How children "get" constructions. Manuscript. Leipzig: Max Planck Institute for Evolutinary Anthropology. (to appear in A. Verhagen and J. van de Weijer (Eds.), *Agreement on form: conventions on different linguistic levels. Proceedings from the conference on "Language, Culture, and Cognition"*. Leiden University, March 22-23, 2000).

Karmiloff-Smith, A. (1992). *Beyond modularity: a developmental perspective on cognitive science*. Cambridge, MA: MIT Press.

Langacker, R. W. (1991). *Concept, image, and symbol: The cognitive basis of language*. Berlin/New York: Mouton de Gruyter.

Langacker, R. W. (1998). Conceptualization, symbolization and grammar. In M. Tomasello (Ed.), *The new psychology of language: cognitive and functional approaches to language structure* (pp. 1-39). Mahwah, NJ: Erlbaum.

Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production (with peer commentary). *Behavioral and Brain Sciences*, 22, 1-75.

Levy, Y., Schlesinger, I. M. & Braine, M. D. S. (Eds.) (1988), *Categories and processes in language acquisition*. Hillsdale, NJ: Lawrence Erlbaum.

Lieven, E. V. M., Pine, J. M., & Rowland, C. F. (1998). Comparing different models of the development of the English verb category. *Linguistics (Special Issue: The development of a verb category)*, 36, 807-830.

Löbel, E. & Rauh, G. (Eds.) (1997). *Lexikalische Kategorien und Merkmale*. Tübingen: Niemeyer.

MacWhinney, B. (Ed.) (1999). *The emergence of language*. Mahwah, NY: Erlbaum

Maratsos, M. (1982). The child's construction of grammatical categories. In E. Wanner & L.R. Gleitman (Eds.), *Language acquisition: the state of the art*. (pp. 240-266). Cambridge: Cambridge University Press.

Pinker, S. (1989). *Learnability and cognition: the acquisition of argument structure*. Cambridge, MA.: MIT Press.

Pinker, S. (1999). *Words and rules: the ingredients of language*. New York: Basic Books.

Radford, A. (1997). *Syntax: a minimalist introduction*. Cambridge: Cambridge University Press.

Roberts, B., Kalish, M., Hird, K., & Kirsner, K. (1999). Decontextualised data IN, decontextualised theory OUT. *Behavioral and Brain Sciences* 22, 54-55.

Sasse, H.-J. (1993). Syntaktische Phänomene in den Sprachen der Welt I: Syntaktische Kategorien und Relationen. (= Syntactic phenomena in the world's languages I: categories and relations). In J. Jakobs (Ed.), *Syntax* (pp. 646-686). Berlin: de Gruyter.

Slobin, D. I. (1997). The origins of grammaticizable notions: beyond the individual mind. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition. Vol. 5: Expanding the contexts* (pp. 265-323). Mahwah, NJ: Erlbaum.

Steinitz, R. (1997). Lexikalische Kategorisierung: Ein Vorschlag zur Revision. In E. Löbel & G. Rauh (Eds.), *Lexikalische Kategorien und Merkmale* (pp. 1-26). Tübingen: Niemeyer.

Tardif, T. (1996). Nouns are not always learned before verbs: evidence from Mandarin speakers' early vocabularies. *Journal of Child Language*, 8, 565-582.

Taylor, J. R. (1998). Syntactic constructions as prototype categories. In M. Tomasello (Ed.), *The new psychology of language: cognitive and functional approaches to language structure* (pp. 177-202). Mahwah, NJ: Erlbaum.

Theakston, A. (2000). *Going, Going, Gone. The acquisition of the verb Go*. Manuscript, University of Manchester (submitted).

Tomasello, M. (2000). Do young children have adult syntactic competence? *Cognition*, 74, 209-253.

Wilkins, D. P., & van Valin, R. D. Jr. (1993). *The case for case reopened: agents and agency revisited*. (Technical Report #93-2). State University of New York at Buffalo: Center for Cognitive Science.