



Discussion

Yes, we still need Universal Grammar

Jeffrey Lidz^{a,b,*}, Lila R. Gleitman^{a,b}

^aDepartment of Linguistics, Northwestern University, 2016 Sheridan Road, Evanston, IL 60208, USA

^bDepartment of Psychology, University of Pennsylvania, Philadelphia, PA 19104, USA

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Abstract

In a recent paper [Lidz, J., Gleitman, H., & Gleitman, L. (2003). Understanding how input matters: Verb learning and the footprint of universal grammar. *Cognition*, 87, 151–178], we provided cross-linguistic evidence in favor of the following linked assertions: (i) Verb argument structure is a correlate of verb meaning; (ii) However, argument structure is not directly available to learners as a cue for reconstructing verb meaning, owing to the complexity of form-meaning mappings within and across languages; (iii) A major correlate of argument-structure, namely, noun phrase number, *is* statistically available on the surface in all languages, and serves as a quasi-universal derivative cue to the meanings of verbs; (iv) this cue is *privileged*, in the sense that it is used early and selectively by learners, despite within- and cross-language differences in its availability. Goldberg [Goldberg, A. (2004). But do we need Universal Grammar? Comment on Lidz, Gleitman and Gleitman 2003. *Cognition*] suggests that this cue is not linguistic, that it is too sicklied o'er with exceptions and provisos to be useful to learners, and that conversational conspiracies can in any case serve as the alternative theoretical framework for a theory of predicate learning, and language acquisition more generally. In the present reply, we review and further explicate our original position, to wit: A large part of any generative grammar is a formal statement of the complex alignments between predicate-argument structures and the surface forms (linear strings of words) of sentences. Because the several rules for alignment interact, the surface outcomes reveal individual systematicities only abstractly. Therefore, learning would be impossible if infants could not analyze probabilistically available patterns to recover their principled linguistic sources. This statistics-based discovery procedure is in certain relevant regards specific to language learning. Finally, we argue that while pragmatics and theory of mind properties in learner and tutor necessarily frame language acquisition, that these have not been shown—and probably cannot be shown—to be sufficient to this computational problem. © 2004 Elsevier B.V. All rights reserved.

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* Corresponding author. Department of Linguistics, Northwestern University, 2016 Sheridan Road, Evanston, IL 60208, USA.

E-mail address: jlidz@northwestern.edu (J. Lidz).

Since the inception of cognitive science, the mystery of language acquisition has served as the central criterion of explanation for a theory of language itself. A linguistic theory must ultimately explain how language acquisition is possible given the level of abstraction that is involved in getting from utterances to grammatical representations; that is, in acquiring the system that underlies form-meaning pairing for any possible sentence of the language (“the grammar”). By “abstraction” in the present context, we are referring to the recognition and analysis of the complex and variable ways that propositional content lines up with linguistic expression within and across languages. Not to put too fine a point on it, languages are in the business of expressing, in their basic sentences, who did what to whom. Children must discover the lawful machinery by which the language spoken to them accomplishes this. Looked at from the outside, this task seems daunting just because languages do not express the components of a proposition simply or uniformly.

One of the easiest ways to see the complexity in the mapping of language forms to their meanings in this regard is to look at Table 1 of the article accompanying the present one in which Adele Goldberg takes the present authors to task for unduly mystifying the problem of language learning (Goldberg, 2004). We see immediately in this useful sample of English-language constructions that a speaker can address a listener without making that addressee-reference—the “who” of the matter—explicit at all (“Shut the door!”) and that one can in many instances implicate an event participant without ever explicitly introducing him or her linguistically (“The tiger killed again,” a proposition which implicates some unknown prey). Goldberg’s list of such mapping complexities can be extended just about forever. Still sticking to English, one can speak of some individual’s activity, let us say “eating” without ever so saying (“John ate and Bill did too”, which seems to omit mention of Bill as an eater), and so forth. There are even lawfully unlawful ways of speaking built into the idiomatic structure of a language (“John kicked the bucket”).¹

These complexities are compounded many times over by the diversity of natural language syntax. Though people speaking various languages evidently express many of the very same propositional thoughts, they do so by use of grammars whose surface properties vary massively. How then can children align the forms with the meanings? This learning problem has led syntacticians working in the tradition of generative grammar to posit abstract categories and mechanisms that are far removed from the surface form of a sentence. At this level of abstraction, languages begin to look more similar (Baker, 1996, 2001; Chomsky, 1965, 1975, 1986).² If only the child learner had access to properties at this level of abstraction, understanding the world-wide, species-wide success of language learning would be easier. By hypothesis, these properties would act as a kind of filter on the input. The learner would thus be constrained to

¹ See Jackendoff (1997), McGinnis (2002), and Nunberg, Sag, and Wasow (1994) for discussion of syntactic and semantic regularities found even in idiomatic expressions.

² Fashions certainly change in the grammatical formalisms designed by linguists to bring the forms into lawful alignment with the meanings, but despite many recent rumors to the contrary, the complexity of these mappings is never removed, only shifted, that is, differently apportioned as the linguistic theory in question dictates as between morphology, syntax, and lexicon. For recent discussion of the Minimalist Program in this regard, see Pinker and Jackendoff (in press).

interpret the input in ways that lead to the formation of the right kinds of abstract mechanisms (e.g. Lidz & Musolino, 2002; Lidz, Waxman, & Freedman 2003; Wexler, Culicover, & Hamburger, 1975).

In a recent article in this journal (Lidz, Gleitman, & Gleitman 2003), we presented some experimental evidence suggesting that the child gets a foot up on the acquisition task in just this regard by invoking certain unlearned biases about what these syntax-to-semantics mappings are likely to look like. Specifically, this is the idea that noun phrase number (in simple utterances of the kind that constitute the bulk of early input) will line up as simply as possible with argument number; argument number, in turn is aligned as simply as possible with the number of participants in a scene relevantly observed. This is not a novel idea (for discussion, see inter alia Gleitman, 1990; Jackendoff, 1976; 2002; Pinker, 1984, 1989; for experimental documentation and discussion, Fisher, 1996; Fisher, Gleitman, & Gleitman, 1991; Gleitman & Fisher, *in press*; Naigles, 1990). In our article, we presented cross-linguistic learning evidence suggesting strongly that noun phrase number is a privileged source of information that learners use to detect the semantic structure of predicates in the ambient language. In other words, noun phrase number is a surface property of language that the learner expects to reflect certain properties of the underlying semantic structure of predicates. Not only that: we also showed that other potential cues are ignored or devalued early in the learning process. Robust morphological reflexes of causal interpretation that are manifest in the surface forms of one of the languages that we have studied, Kannada, were ignored by young speakers of that language (but not by its adult speakers). It is in this sense that the noun phrase number cue seems to be “privileged,” compared to other potential cues, as a reconstructive basis for argument structure during learning.

In her response, Goldberg agrees with our conclusion that children use noun phrase number as a cue to verb meaning, even in preference to other surface cues that may be more reliable in the particular language being acquired. What she objects to is the claim that this mapping bias is unlearned, a language-specific learning principle. Instead, Goldberg argues that general properties of social cognition can explain the phenomenon of particular reliance on one kind of cue over another kind. In essence, Goldberg’s stated position is that language-specific principles that guide learning are never necessary.³ Rather, according to her view, what is special about human beings is not anything

³ Apparently as part of this claim, one aspect of Goldberg’s discussion is to the effect that certain form–meaning mappings are systematic only within-language. This is surely true. For instance, English has no causative morpheme that regularly occurs with verbs having causal conceptual content (we have *rigidify* and *intensify* but not *eatify*, *meltify*, etc), French disallows dative-alternations (as English *John gave Bill a prize* vs. *John gave a prize to Bill*); and so forth. It follows that experimental studies of the interpretation of nonsense verbs (e.g. “John glorps the horse to Bill”) will in general show an advantage to experienced users of a language over novices (Fisher, Rakowitz, & Gleitman, 1994; see Sethuraman, Goldberg, & Goodman, 1997 for a partial replication). Experience is required to inculcate many specific features of languages, even systematic ones. But showing that some mappings are learned does not vitiate the claim that some are prefigured in the child’s unlearned biases for language acquisition. So we don’t understand why Goldberg raises this issue among her objections to our interpretation of our findings. Obviously, among all the mapping relations at this level exhibited by a language, only those that are exhibited by *all* languages are even candidates as early guides to the learning process.

linguistic but rather our perceptual/conceptual system and the unique capacity of humans for “imitation, and at reading others’ intentions and realizing that they are able to alter them.”

We take the claim that there is *nothing* domain specific about human language to be wholly inconsistent with the results gleaned from the study of natural language syntax and semantics. Take for example, the generalization that nonreflexive pronouns can (but need not) serve as bound variables across clause boundaries, as in (1a), but can never serve as bound variables within a clause, as in (1b).

- (1) a. Every student thinks he is smart.
 = $\forall x$ [student(x) \rightarrow think(x , smart(x))]
 OR = $\forall x$ [student(x) \rightarrow think(x , smart(y))]
 b. Every student saw him.
 $\neq \forall x$ [student(x) \rightarrow see(x , x)]
 = $\forall x$ [student(x) \rightarrow see(x , y)]

What Gricean cooperative principle of conversation is in calling distance of accounting for this formality? Or, consider the fact that, despite the surface dissimilarities in the constructions, preposition stranding occurs only in languages with exceptional case marking constructions, as in English but not French (Kayne, 1981):

- (2) a. Which candidate have you voted for?
 b. *Quel candidat as-tu voté pour?
 (3) a. John believes Bill to have lied
 b. *Jean croit Bill avoir menti.

Does that make any conversational sense? Would it make conversational sense if the facts were otherwise? Or, examine the asymmetry in coreference possibilities for names contained in complement clauses versus those contained relative clauses in *wh*-movement constructions (Lebeaux, 1988; van Riemsdijk & Williams, 1981):

- (4) a. Whose claim that John stole the bacon did he later deny?
 (he \neq John)
 b. Which claim that John made did he later deny?
 (he = John)

Facts like these are the bread and butter of syntactic theory and we know of no concrete proposals that derive them or their relatives from anything other than language specific representations. How can they be explained, alternatively, as general cognitive principles, principles of social cognition, or the general ability to infer the intentions of others? It is quite easy to imagine that the facts would be different while keeping our general social and cognitive abilities unchanged.

In so saying, we of course do not deny that many linguistic facts can be explained as consequences of extralinguistic properties of the human mind. Of course they can.

As we said in our original article, the interesting questions for language acquisition are about which properties of language require domain specific constraints on the learner, which can be derived from other areas of cognition, and how the linguistic and extralinguistic principles interact. Indeed, this is why we looked at a case that we thought might plausibly be explained by a general learning theory, one that open-mindedly placed its bets on the most reliable cue available in the database of input utterances (for another instance where one of us has offered just this kind of account for certain language learning phenomena, see [Trueswell & Gleitman, in press](#)).

For the present case, Goldberg's claim is that domain specific linguistic principles are unnecessary to explain the observation that children use noun phrase number as a cue to verb meaning. Her objection is twofold. First, she claims that the "universal principle" we invoked isn't universal after all; in fact, it is false both within and across languages. Second, she claims that the same effect in learning can be derived from Gricean principles of cooperation. We disagree on both counts.

Regarding universality, we believe Goldberg has misunderstood our claim. She has transmuted it into a different (and indefensible) claim, namely "the Isomorphic Mapping Hypothesis," and then disproved that. She states: "A universalist claim that the Isomorphic Mapping Hypothesis is true would presumably expect the generalization to be universally valid, and yet we see that it is systematically violated both within and across languages." This hypothesis, in no way *our* hypothesis, holds that every semantic participant in an event will be realized by an overt noun phrase in the clause, and that every overt noun phrase will realize a semantic participant.

Instead, the linguistic organizing principle that we discussed was one that exists, and shows its influence within a mosaic of other properties of a language. Argument structure is a component of verb meaning with identifiable surface effects that are closely correlated with verb meaning ([Levin, 1993](#)). *While argument structure itself is not directly available to learners as a surface cue leading back to verb meaning, its surface correlate, noun phrase number, is so available and indeed is privileged.* The learner, who knows the principles mapping verb meaning onto verb syntax, expects noun phrase number to be correlated with argument structure and that is why this cue is useful.

It is this derivative relation between noun phrase number, argument structure, and verb meaning that led us to say, "noun phrase number lines up as simply as possible with argument number." The hedge, "as simply as possible," was meant to account for exactly the kind of surface variability that Goldberg identifies. In other words, noun phrase number lines up with argument number except when other well-understood properties of the language get in the way. The existence of passivization, incorporation, argument dropping and light verb constructions does not falsify our claim. Rather these constructions show that the relation between form and meaning is complex, derived from a set of interacting rules and principles that often obscure the effects of one another.

For example, the fact that Kannada and many other languages allow arguments to be dropped does not render the generalization that semantic participants are regularly associated with syntactic phrases false. Rather, the generalization will be discernible only probabilistically on the surface forms of sentences just because its influence is masked by

countervailing effects of interacting generalizations.⁴ Thus, learners of such a language must (a) recognize that arguments can be dropped in certain discourse environments and (b) factor that property into their calculations determining meaning from surface form. Even in such a language it will be true of the database as a whole that verbs of transfer will have more arguments on the surface than simple causatives, which in turn will have more arguments than verbs of motion. For example, a verb meaning something like ‘give’ shows up almost uniformly with three overt arguments in English speech to young children, but with three, two, one, or even zero overt arguments in Chinese caretaker speech (Gentner & Boroditsky, 2001; Lederer, Gleitman, & Gleitman 1995; Li, 1994; Slobin, 1985). A verb meaning ‘climb’ has a different linguistic signature, in both languages: It *never* shows up with three nominal arguments. The point is that noun phrase number is a statistically discernible surface cue that is informative about verb meaning, not that it is determined uniquely by verb meaning or even by argument structure alone. Infants’ and young children’s ability to exploit such probabilistic cues to structure is well known (e.g. Saffran, Newport, & Aslin 1996).⁵

Indeed, our proposal makes a range of interesting testable predictions about learners faced with languages and constructions in which argument number is less directly reflective of verb meaning. In a language with argument dropping, we expect that learners who have not yet discovered the argument dropping property will have trouble learning strictly from argument number information. However, once this property is identified (e.g. by observing a sentence with no syntactic arguments), the learner will know to modulate her hypotheses accordingly. Similarly, if a language has light verb constructions such as the Ewe examples given by Goldberg, we expect learners who have not yet identified the set of light verbs to have trouble identifying the meaning of utterances containing them because there will be more NPs than participants. Once these properties are correctly identified, then the learning mechanism based on argument number, properly modulated, will be an effective tool for the language learner (This is in the spirit of “typological bootstrapping,” Slobin, 2000).

⁴ We want to be very clear here about what we mean by “probabilistic.” We do not mean that languages like Kannada adhere to certain patterning constraints but, say, only 70% of the time. Rather, they exhibit these patternings all of the time, only the effects become invisible at the surface under specified syntactic conditions. Children recover information that is, therefore, available only probabilistically in the database of surface sentences, but use it to acquire all-or-none grammatical generalizations (see particularly Hudson & Newport, 2001).

⁵ Every attempt to model acquisition at this level runs into the problem that, on occasion, knowing the verb meaning would fix the structure and knowing the structure would fix the verb meaning, but in some cases both the structure and the verb meaning are unknown, e.g. hearing “John glorped the ball on the table” is three-argument iff “glorp” is a novel transfer verb (like “give”) but two-argument iff “glorp” is a novel psych verb (like “see”). Notice then that the verb “see” might mistakenly be analyzed as surfacing with three arguments in “John saw the book on the table” just because it surfaces with three noun phrases; alternatively, “see” might be analyzed as a transfer verb in the class of “give.” In this sense, to say that “see” never surfaces with three arguments is *modulo* that the learning mechanism can realize the correct representation in the bulk of instances. How the learner actually solves this problem without overcommitting too soon to one analysis or the other is the subject of intensive recent experimentation (e.g. Snedeker & Trueswell, submitted for publication; Trueswell & Gleitman, in press).

In short, our claim about noun phrase number was not intended to be a descriptive generalization about languages. Rather, our claim was that the principles that map verb meaning onto verb syntax, which are themselves unobservable, cause the surface form of language to express a statistically identifiable, though nondeterministic, signature of verb meaning that learners know to look for and know to use as one source of information regarding verb meaning (see again [Gleitman, 1990](#); [Pinker, 1984; 1989](#)).

Turning now to Goldberg's claim that the effects we observed can be explained by a learner equipped with Gricean pragmatic principles, we have three points to make. First, because the principles Goldberg offers are stated using vague notions like "recoverability" and "relevance," it is extremely difficult to determine just what predictions they make about syntax acquisition either within or across languages. At the moment there is only a very big promissory note in this regard.

Second, even assuming that these notions can be made precise and formulated in a noncircular fashion, Goldberg's account fails to take into consideration the adult findings of the experiments we reported. If children infer from principles of cooperation that verbs with one surface noun phrase (independent of valency or morphology) are noncausative and that verbs with two surface noun phrases (again independent of valency or morphology) are causative, then why did adult subjects in this experiment not behave this same way? Adults relied equally on noun phrase number, valency, and morphology to interpret old verbs in new syntactic contexts. Surely we wouldn't want to conclude that adults behaved differently because they discarded the very Gricean principles upon which their entire grammar, by hypothesis, was constructed. The manifest differences between children and adults in our experiments are, therefore, critical. According to Goldberg, children are in possession of relevant Gricean principles. Because we can assume that adults are equipped with the same relevant cooperative abilities, any divergence between children and adults makes it difficult to ascribe children's behavior solely or even primarily to these abilities.

Third, the present literature is equivocal concerning the actual competencies of young children in deploying Gricean principles to compute the intentions of speakers. Certainly there is some positive evidence in this regard, notably the astonishing findings of Dare Baldwin and her collaborators concerning the conditions for assigning referential properties to a novel word; e.g. [Baldwin, 1991](#); [Booth & Waxman, 2002](#); see also [Markson & Bloom, 1997](#)). Yet there is also important evidence suggesting that in several ways young children are deficient in conversational-inferential capacities or at least in the ability to make use of these to interpret discourse ([Chierchia, Crain, Guasti, Gualmini, & Meroni 2001](#); [Hurewitz, Brown-Schmidt, Thorpe, Gleitman, & Trueswell, 2001](#); [Musolino & Lidz, in press](#); [Noveck, 2001](#); [Papafragou & Musolino, 2003](#)).

Under the circumstances, our Kannada–English experimental findings seem best explained on the hypothesis that very young children overprivilege noun phrase number as a cue to verb meaning. In contrast, the pragmatics-based alternative that Goldberg presents appears to be inadequate to this explanatory task. It fails to account for the adult results of our experiments, and, much more importantly, this alternative kind of explanation at present seems too informally stated even to evaluate. There is a computational basis for language acquisition that cannot be shouldered aside simply by alluding to pragmatic competence.

Finally, as we stated in our article (and see Gleitman & Fisher, *in press*, for a review), the existence of a principled alignment between noun phrase number and verb meaning has received massive convergent support from other findings. We will not review them again here, but mention only one. Children deprived of formal linguistic input (the deaf offspring of hearing parents) spontaneously invent iconic languages in which the invented gesture for ‘give’ is associated with three noun phrases, the gesture for ‘kick’ with two, and the gesture for ‘sleep’ with one (Feldman, Goldin-Meadow, & Gleitman, 1978; Goldin-Meadow, 2003; Senghas, 2003). The alignment between argument number and noun-phrase number is thus shown not to be a sometime property of language design, one that must be learned in whole and from scratch by infants. To be sure, aspects of the realization of this principle are variable and complex both within and across languages, as Goldberg, along with every linguistic theory of the past five decades, correctly observes. But this basic property of language design seems to come in some skeletal form from nature’s factory as original equipment with the infant language learner.

References

- Baker, M. (1996). *The polysynthesis parameter*. Oxford: Oxford University Press.
- Baker, M. (2001). *The atoms of language*. New York: Basic Books.
- Baldwin, D. A. (1991). Infants’ contribution to the achievement of joint reference. *Child Development*, 62, 875–890.
- Booth, A. E., & Waxman, S. R. (2002). Word learning is ‘smart’: Evidence that conceptual information affects preschoolers’ extension of novel words. *Cognition*, 84, B11–B22.
- Chierchia, G., Crain, S., Guasti, M. T., Gualmini, A., & Meroni, L. (2001). The acquisition of disjunction: Evidence for a grammatical view of scalar implicatures. In A. H.-J. Do, et al. (Eds.), *BUCLD 25 Proceedings* (pp. 157–168). Somerville, MA: Cascadia Press.
- Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. (1975). *Reflections on language*. New York: Pantheon.
- Chomsky, N. (1986). *Knowledge of language: Its structure, origins and use*. New York: Praeger.
- Feldman, H., Goldin-Meadow, S., & Gleitman, L. (1978). Beyond Herodotus: The creation of language by linguistically deprived deaf children. In A. Lock (Ed.), *Symbol and gesture: The emergence of language*. New York: Academic Press.
- Fisher, C. (1996). Structural limits on verb mapping: The role of analogy in children’s interpretation of sentences. *Cognitive Psychology*, 31, 41–81.
- Fisher, C., Gleitman, H., & Gleitman, L. (1991). On the semantic content of subcategorization frames. *Cognitive Psychology*, 23, 331–392.
- Fisher, C., Hall, G., Rakowitz, A., & Gleitman, L. R. (1994). When it is better to give than to receive: Syntactic and conceptual constraints on vocabulary growth. *Lingua*, 92, 333–375.
- Gentner, D., & Boroditsky, L. (2001). Individuation, relativity and early word learning. In M. Bowerman, & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp. 215–256). New York: Cambridge University Press.
- Gleitman, L. (1990). Structural sources of verb learning. *Language acquisition*, 1, 1–63.
- Gleitman, L. R., & Fisher, C. (in press). *Universal aspects of word learning*. In J. McGilvray (Ed.), *Essays for Noam Chomsky*.
- Goldberg, A. (2004). But do we need Universal Grammar? Comment on Lidz, Gleitman and Gleitman 2003. *Cognition*.
- Goldin-Meadow, S. (2003). *The resilience of language*. New York: Psychology Press.
- Hudson, C. L., & Newport, E. (2001). Regularization during creolization: The learning of inconsistent linguistic input. *Paper presented at the 26th Annual Boston University Conference on Language Development, Boston, MA*.

- Hurewitz, F., Brown-Schmidt, S., Thorpe, K., Gleitman, L. R., & Trueswell, J. C. (2001). One frog, two frog, red frog, blue frog: Factors affecting children's syntactic choices in production and comprehension. *Journal of Psycholinguistic Research*, 29, 597–626.
- Jackendoff, R. (1976). Toward an explanatory semantic representation. *Linguistic Inquiry*, 7, 89–150.
- Jackendoff, R. (1997). Twistin' the night away. *Language*, 73, 534–559.
- Jackendoff, R. (2002). *Foundations of language*. Oxford: Oxford University Press.
- Kayne, R. (1981). On certain differences between French and English. *Linguistic Inquiry*, 12, 349–371.
- Lebeaux, D. (1988). *Language acquisition and the form of grammar*. PhD dissertation. University of Massachusetts, Amherst.
- Lederer, A., Gleitman, L., & Gleitman, H. (1995). Verbs of a feather flock together: Structural properties of maternal speech. In M. Tomasello, & E. Merriam (Eds.), *Acquisition of the verb lexicon*. New York: Academic Press.
- Levin, B. (1993). *English verb classes and alternations*. Chicago: University of Chicago Press.
- Li, P. (1994). *Maternal verb usage in Mandarin Chinese*. Unpublished manuscript. University of Pennsylvania.
- Lidz, J., Gleitman, H., & Gleitman, L. (2003). Understanding how input matters: Verb learning and the footprint of universal grammar. *Cognition*, 87, 151–178.
- Lidz, J., & Musolino, J. (2002). Children's command of quantification. *Cognition*, 84, 113–154.
- Lidz, J., Waxman, S., & Freedman, J. (2003). What infants know about syntax but couldn't have learned: Evidence for syntactic structure at 18-months. *Cognition*, 89, B65–B73.
- Markson, L., & Bloom, P. (1997). Evidence against a dedicated system for word learning in children. *Nature*, 285, 813–815.
- McGinnis, M. (2002). On the systematic aspect of idioms. *Linguistic Inquiry*, 33, 665–672.
- Musolino, J., & Lidz, J. (in press). Why children are not universally successful with quantification. *Linguistics*.
- Naigles, L. (1990). Children use syntax to learn verb meanings. *Journal of Child Language*, 17, 357–374.
- Noveck, J. (2001). When children are more logical than adults: Experimental investigations of scalar implicature. *Cognition*, 78, 165–188.
- Nunberg, G., Sag, I., & Wasow, T. (1994). Idioms. *Language*, 70(3), 491–538.
- Papafragou, A., & Musolino, J. (2003). Scalar implicatures: Experiments at the syntax semantics interface. *Cognition*, 86(3), 253–282.
- Pinker, S. (1984). *Language learnability and language development*. Cambridge, MA: Harvard University Press.
- Pinker, S. (1989). *Learnability and cognition*. Cambridge, MA: MIT Press.
- Pinker, S., & Jackendoff, R. (in press). The faculty of language: What's special about it? *Cognition*.
- Saffran, J. R., Aslin, R., & Newport, E. (1996). Statistical learning by 8-month old infants. *Science*, 274, 1926–1928.
- Senghas, A. (2003). Intergenerational influence and ontogenetic development in the emergence of spatial grammar in Nicaraguan sign language. *Cognitive Development*, 18, 511–531.
- Sethuraman, N., Goldberg, A., & Goodman, J. (1997). Using the semantics associated with syntactic frames for interpretation without the aid of non-linguistic context. In E. Clark (Ed.), *Proceedings of the 27th Annual Child Language Research Forum*.
- Slobin, D. (1985). *The cross-linguistic study of language acquisition*, vol. 1. Mahweh, NJ: Lawrence Erlbaum.
- Slobin, D. (2000). *The crosslinguistic study of language acquisition. Expanding the contexts*, Mahweh, NJ: Lawrence Erlbaum.
- Snedeker, J., & Trueswell, J. C. (submitted for publication). *The developing constraints on parsing decisions: The role of lexical biases and referential scenes in child and adult sentence processing*.
- Trueswell, J., & Gleitman, L. R. (in press). Children's eye movements during listening: evidence for a constraint-based theory of parsing and word learning. In J. M. Henderson, F. Ferreira (Eds.), *Interface of vision, language, and action*. New York: Psychology Press.
- van Riemsdijk, H., & Williams, E. (1981). NP structure. *The linguistic review*, 1, 171–217.
- Wexler, K., Culicover, P. W., & Hamburger, H. (1975). Learning-theoretic foundations of linguistic universals. *Theoretical Linguistics*, 2, 213–253.