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CHAPTER 1

Introduction

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Verbs are the glue that holds clauses together. As elements that encode events, verbs are associated with a core set of semantic participants that take part in the event. Some of a verb's semantic participants, although not necessarily all, are mapped to roles that are syntactically relevant in the clause, such as subject or direct object; these are the arguments of the verb. For example, in *John kicked the ball*, 'John' and 'the ball' are semantic participants of the verb *kick*, and they are also its core syntactic arguments—the subject and the direct object, respectively. Another semantic participant, 'foot', is also understood, but it is not an argument; rather, it is incorporated directly into the meaning of the verb. The array of participants associated with verbs and other predicates, and how these participants are mapped to syntax, are the focus of **the** Study of ARGUMENT STRUCTURE.

At one time, argument structure meant little more than the number of arguments appearing with a verb, for example, one for an intransitive verb, two for a transitive verb. But argument structure has by now taken on a central theoretical position in the study of both language structure and language development. In linguistics, argument structure is seen as a critical interface between the lexical semantic properties of verbs and the morphosyntactic properties of the clauses in which they appear (e.g., Grimshaw, 1990; Goldberg, 1995; Hale & Keyser, 1993; Levin & Rappaport Hovav, 1995; Jackendoff, 1990). Increasingly, this interface is understood as being mediated by a rich representation of event structure based on causal dynamics, the internal temporal structure of events (aspect), or *time* (e.g., Croft, 1991, 1998, in press; Dowty, 1979; Erteschik-Shir & Rapoport, 2005; Pustejovsky, 1991; Tenny, 1994; Tenny & Pustejovsky, 2000; Van Valin & LaPolla, 1997).

Although theorists differ in how they represent argument-structure-related properties of language, they often agree on the view that, across languages, there are strong consistencies in the number of arguments associated with verbs with certain kinds of meanings, and in the typical mapping of these arguments to syntactic roles (e.g., Keenan, 1976; Perlmutter & Rosen, 1984; see Pinker, 1989:94-95 for

discussion). Strong similarities across languages—universals or near-universals—demand explanation, and it has been a familiar step, since Chomsky's work of the 1960s and 1970s, to locate this explanation in the child's innate capacity for language acquisition. Universals, according to this way of thinking, reflect children's a priori expectations about the structure of language. Children come to the acquisition task with inborn knowledge of those abstract aspects of grammar that are universal, and this knowledge enables them to home in quickly on how these universals are instantiated in their particular language. Individual languages, for their part, are constrained to conform to the universal architecture, because if they did not, children would be unable to learn them.

Given this hypothesized link between linguistic universals and the capacity for language acquisition, proposals about universals of argument structure have caught the attention of language acquisition researchers. If children have innate expectations about argument structure—in particular, about the typical correspondences between the semantic and syntactic roles associated with verbs—they could draw on this information to solve a number of learning problems. This thought lies at the heart of several influential hypotheses, to be reviewed shortly, about how children set up their initial phrase structures, acquire the meanings of novel verbs, and figure out which verbs can occur in which syntactic frames.

Despite the emphasis on universals, most of the research on the proposed role of innate argument structure knowledge in language acquisition has revolved around English and closely related languages. It is not yet clear whether children could, in fact, use the hypothesized universals of argument structure to acquire the structures that confront them in a broad range of typologically distinct languages. The present volume attempts to address this concern. The research it presents came about as the result of a unique situation: a cooperation, within the framework of the Argument Structure Project at the Max Planck Institute for Psycholinguistics, between crosslinguistically minded language acquisition specialists and field linguists working on a diverse set of lesser-known languages. Working together over a period of several years, our group of linguists, psychologists, and anthropologists explored claims about argument structure universals, and used findings to jointly analyze and rethink the possible role of argument structure in children's language development. The work often challenges current proposals, especially in showing that there is more crosslinguistic diversity in the domain of argument structure than most specialists in language acquisition have realized. But it also suggests new directions for finding solutions, and it calls attention to argument structure acquisition puzzles that have so far been neglected.

In this chapter, we introduce some of the proposals, controversies, and problems that have inspired and motivated the authors of this volume, and we summarize the organization and contents of the book. Section 1 here overviews the so-called "bootstrapping" hypotheses, according to which innate knowledge of argument structure plays a critical role in language acquisition. Section 2 further sets the stage by reviewing some current major controversies surrounding these hypotheses. Finally, section 3 lays out the plan of the book, and highlights the key findings of the specific chapters.

I. THE PROPOSED ROLE OF ARGUMENT STRUCTURE UNIVERSALS IN LANGUAGE ACQUISITION

What are the language acquisition challenges that children might solve by drawing on inborn knowledge of argument structure? There have been two broad lines of theorizing. Both presuppose that children come to the language acquisition task with expectations about the linking between the semantic and syntactic roles associated with verbs, but they differ in their assumptions about the typical direction of learners' inferences.

One scenario goes from meaning to syntax. In this approach, children are hypothesized to use their nonlinguistic cognitive understanding of the world to determine the structure of everyday events like 'running', 'hitting', and 'giving', including how many participants there are in the event and what their semantic function, or thematic role, is (e.g., agent, patient, recipient). Children then draw on their innate knowledge to predict how noun phrases representing these participants should be mapped to syntactic roles.

The second scenario reverses the direction of inferencing, going from syntax to meaning rather than meaning to syntax. In particular, this proposal is about how children learn the meaning of verbs. On encountering a new verb, children are hypothesized to use the syntactic frame(s) in which it appears to predict some basic aspects of its meaning. Proposals of the first type are lumped loosely under the rubric "semantic bootstrapping," whereas those of the second type are termed "syntactic bootstrapping."

I.1. Semantic Bootstrapping: Using Meaning to Predict Syntax

Cracking into Grammar. Following Chomsky's claim that universals of language are innate, many child language researchers have assumed that children have inborn knowledge of putatively universal syntactic categories and relationships such as "noun", "verb", "subject", and "direct object", and—importantly—of the abstract syntactic properties associated with these constructs. But this would buy children nothing unless they had some way to identify concrete instances of these constructs in the speech around them. To explain how this identification takes place, Pinker (1984, building on Grimshaw, 1981) proposed that children's inborn linguistic toolkit includes not only information about syntactic categories and relationships, but also some cognitively simple "semantic flags" by which these elements can be recognized. He termed this use of semantics to make good guesses about syntax "semantic bootstrapping."

According to this hypothesis, for example, children will initially assume that if a word names a concrete object it is a noun, and if it names an action it is a verb. Of course, not all nouns pick out objects and not all verbs name actions. But this procedure could help children identify a starter set of nouns and verbs correctly; from here they can go on to notice the morphosyntactic elements associated with these forms, and so to identify instances of the categories that lack the default semantics.

For instance, learners of English will notice that words that name objects—hence, nouns—typically occur in contexts like *a/the/another/my* or *two* and ___ -s, and words that name actions—hence, verbs—occur in contexts like ___ -ed and *is/are* ___ -ing. This morphosyntactic knowledge will enable children to identify *bath* as a noun and *stay* as a verb even though these words do not name an object or a dynamic action, respectively.

Children have to figure out not only the part-of-speech membership of the words in the sentences they hear, but also their syntactic function. According to the semantic bootstrapping hypothesis, "semantic flags" help with this problem, too (Pinker, 1984). For example, suppose that the syntactic constructs "subject" and "direct object"—by hypothesis inborn—are initially cued by the relational roles "agent" and "patient". When a learner of English sees a dog biting a cat, her nonlinguistic understanding of the event tells who does what to whom. If she now hears the sentence *The dog is biting the cat*, she can infer that *the dog* (naming the agent) is the subject and *the cat* (naming the patient) is the direct object. Once she has identified a few subjects and direct objects like this, she will discover how these constituents are typically ordered with respect to the verb, whether and how they are case-marked, and so on. And this knowledge will now allow her to identify other constituents as subjects and direct objects even when they lack the default agent-patient semantics, as in *Mary heard a noise* or *The costume frightened the dog*.

With semantic bootstrapping, then, the child gets a toe in the door of grammar by an initial simple mapping between words and basic semantic types.

Constraining Argument Structure Overgeneralizations. The basic logic of semantic bootstrapping has been applied not only to the initial stages of grammar construction, but also—in a more elaborate form—to a thorny problem arising later in the course of language development: how children avoid overgeneralizations of argument structure alternations.

Many verbs of English and other languages appear in more than one syntactic frame, and whole groups of semantically related verbs often show similar patterns of frame alternations. Children become sensitive to these alternation patterns in the course of language acquisition, and sometimes apply them too liberally. Two kinds of alternations, and a few errors based on them, are shown in (1)-(2) (from Bowerman, 1982a, 1982b; see also Pinker, 1989).

1. Causative Alternation (cf. *The stick broke/Harry broke the stick*)
 - a. You staggered me. (After mother pulls on child's arm when child stumbles. 3;10 [age in years; months])
 - b. I saw a witch and she disappeared them. (Pretending a witch has made some blankets disappear. 4;8)
2. Locative Alternation (cf. *Mary sprayed paint on the wall/Mary sprayed the wall with paint*)

- a. Can I fill some salt into the bear? (= fill the bear [a bear-shaped salt shaker] with salt. 5;0)
- b. Pour, pour, pour. Mommy, I poured you (waving empty container near M. M: You poured me?) Yeah, with water. (= I poured water on you. 2;11)

It is widely acknowledged that children are rarely corrected for such errors. Why then do they stop making them—how do they end up with adult-like intuitions about which verbs do and don't undergo a certain alternation? This question has given rise to much debate (e.g., Bowerman, 1988; Braine & Brooks, 1995; Pinker, 1984, 1989; Randall, 1990).

According to one line of reasoning, the adult state is reached by gradual learning. Children discover an alternation pattern by a process of abstraction and schema formation after exposure to a sufficient number of exemplars of it, and they overgeneralize it because they do not yet know the relevant semantic, morphophonological, or idiosyncratic constraints. With increasing linguistic experience, they fine-tune the pattern to reflect these constraints, and errors fade out (Bowerman, 1982a, 1988; Brooks & Tomasello, 1999; Goldberg, 1995; Goldberg, Casenhiser, & Sethuraman, 2004).

According to a very different approach, children get a tremendous boost toward the adult system through aspects of their innate knowledge (see Pinker, 1989, for the theory, and Gropen, Pinker, Hollander, & Goldberg, 1991a, 1991b, for some applications).

In this approach Pinker updates his (1984) view of how verb meaning is related to argument structure. Rather than relying on simple semantics-syntax correspondences like "if agent, men subject" (as described under *Cracking into Grammar*, earlier), which requires reference to a fixed list of atomic thematic roles (e.g., agent, theme, location, source, goal...), with each noun phrase in a clause assigned to just one role, he adopts the decompositional approach to verb meaning found in, for example, Jackendoff (1987, 1990) and Levin and Rappaport Hovav (1995). Here, thematic roles are positions in a semantic representation of verb meaning that is structured around a set of primitive meaning elements such as "cause," "go," and "be," with each thematic role triggering its own linking rule, for example, "first argument of 'cause' is subject," "second argument of 'cause' [the 'affected object'] is direct object." A particular argument can bear more than one thematic role because it can participate in more than one semantic substructure in the verb's semantic representation; for example, it can be both the second argument of "cause" and the first argument of "go."

As an example, consider the English verbs *pour* and *fill*. Both verbs specify the causation of a change of some sort, but they differ in which argument is specified to undergo the change (i.e., is the "affected object"): *pour* means roughly "cause X (a liquid or particulate mass) to go downward in a stream," whereas *fill* means something like "cause Y (a container) to go to a state of being full by means of causing X to go into Y." By virtue of this meaning difference, the verbs take different direct objects: X for *pour*, but Y for *fill*.

In this account, the syntactic treatment of a verb's arguments is a direct projection of the verb's meaning. Children are hypothesized to have foreknowledge of both predicate primitives like "cause" and "go" and of the specific linking rules associated with them, and to use these in building semantic representations for verbs. This means that if learners represent a verb's meaning correctly, they will automatically be able to link its arguments correctly. But sometimes they misunderstand the meaning of a verb. For instance, if they think *that fill* specifies the caused movement of something (i.e., means something like 'pour'), then they will link the moving entity to object position, making errors like (2a); and if they think that *pour* is about the caused state-change of the poured-upon entity (e.g., it goes to a state of being filled or covered), they will make errors like (2b). Once children have worked out the verb's meaning through repeated observation of the verb's use in context, errors will cease (Gropen et al., 1991a, 1991b; Pinker, 1989).'

Pinker did not christen this process with a convenient name, but Gleitman (1990) subsumed it (despite Pinker's 1994 objections) under an (extended) notion of "semantic bootstrapping," because in this procedure, as in the original semantic bootstrapping procedure (see *Cracking into Grammar*, earlier) the child uses meaning to make predictions about form.

1.2. Syntactic Bootstrapping: Using Syntax to Predict Verb Meaning

In the approaches just considered, learners acquire the meanings of verbs simply by observing the kinds of events they are paired with. Critics have argued that this procedure is grossly inadequate for verb learning (Gleitman, 1990; Gillette, Gleitman, Gleitman, & Lederer, 1999; Landau & Gleitman, 1985). For example, many verbs encode situations that are not directly observable at all (*think, know*). And many real-world scenes can be described by different verbs depending only on the perspective the speaker is adopting (*The cat CHASED the mouse/The mouse FLED from the cat; The peddler SOLD John a pot/John BOUGHT a pot from the peddler*). Even if the child has all the relevant concepts ahead of time, like 'sell' and 'buy', how does she know which is the one intended?

To solve this problem, Gleitman and her colleagues in a sense turn Pinker's semantic bootstrapping argument on its head. They agree with Pinker that children have foreknowledge of universal syntactic-semantic correspondences, but they propose that, rather than using meaning to predict syntax, children use syntax to narrow in on the general kind of meaning a new verb is likely to have. In particular, syntactic bootstrapping theorists suggest that children can use the number of arguments a verb appears with, and the syntactic arrangement of these arguments, to make a good ballpark guess about the verb's meaning.

For example, a novel verb used in a frame like "X___ Y prep. Z" (e.g., *John GORPED the ball onto the table*) is likely to pick out an action of causing something to go somewhere in a certain manner (e.g., 'throw'). In contrast, a novel verb with a

complementizer (e.g., *John GORPED that the ball was on the table*) is likely to specify an event of cognition or perception (e.g., 'think' or 'see') (Gleitman, 1990). Once children have been able to narrow down the range of possible meanings of the new verb, they can observe its contexts of use to get more detailed information about what *kind* of motion, perception, etc., is at issue. Gleitman termed this process "syntactic bootstrapping," to highlight that the starting point for the child is not meaning, as in semantic bootstrapping, but rather syntax.

Observation of a verb in a single frame is often compatible with more than one kind of meaning; for example, the transitive frame NP, NR is found with verbs from a variety of semantic classes, such as caused state change (*The child broke the vase*), surface contact (*Mary wiped the table*), perception (*I hear a strange noise*), and cognition (*I know that man*). But proponents of syntactic bootstrapping have argued that the ambiguity associated with a single frame can be drastically reduced by taking into account a fuller range of the frames a verb appears in (e.g., Fisher, Hall, Rakowitz, & Gleitman, 1994; Gleitman, 1990; Naigles, 1996; Naigles & Hoff-Ginsberg, 1995, 1998). For example, some verbs that might be encountered in a transitive frame will also turn up in an intransitive frame (*The child broke the vase/The vase broke*), whereas others will not (*Mary wiped the table/*The table wiped*), or, if they do, will arrange their arguments differently (*John read the newspaper/*The newspaper read/John read*). And these differences will correspond systematically to differences in meaning (see Levin, 1993; Levin & Rappaport Hovav, 1995, on how semantic classes of English verbs are distinguished by the argument structure alternations they can appear in). Children can, then, by hypothesis, use information from multiple frames to home in on what kind of meaning a novel verb might have.

2. SOME CONTROVERSIES AND QUESTIONS ABOUT ARGUMENT STRUCTURE AND LEARNABILITY

The two kinds of bootstrapping proposals we have just reviewed deal insightfully with fundamental problems to be solved in accounting for language acquisition, and they have been highly influential in the language acquisition literature. But they have also been subject to important empirical and theoretical challenges. In this section we sketch some of the major controversies surrounding the bootstrapping hypotheses, and raise additional questions bearing on the role of argument structure in children's language acquisition.

2.1. Do Children Behave in Accordance with the Proposed Innate Knowledge?

One basic question for the bootstrapping theories is whether children's use and comprehension of language accord with the predictions that flow from existing hypotheses about what is innate. This is not a primary topic of the present volume,

which focuses more on whether bootstrapping assumptions are tenable in the face of crosslinguistic variation in argument structure and argument realization. But it is worthwhile briefly reviewing the controversy.

On the one hand, a number of experimental studies of novel verb learning, conducted mostly with learners of English, have suggested that young children do make systematically different predictions about a new word's meaning depending on what syntactic frame or frames it has been presented in (see Fisher & Gleitman, 2002, and Naigles, 1998, for reviews of a number of studies, and Gertner, Fisher, & Eisengart, 2006, and Fernandes, Marcus, Di Nubila, & Vouloumanos, 2006, for more recent experimental evidence). Also supporting the idea that children have predispositions for argument mapping is the finding that when deaf children develop self-made "home-sign" systems, they are systematic in their handling of argument structure (Goldin-Meadow & Mylander, 1998).

On the negative side of the ledger, however, several studies of spontaneous speech and of elicited production or comprehension have found no evidence for sensitivity to hypothesized constraints. In one test, Bowerman (1990) examined early word combinations in the spontaneous speech of children learning English. She reasoned that if learners are helped by innate linking rules, as proposed by Pinker (1984, 1989), they should start to combine arguments earlier and more accurately (in terms of word order) with verbs that link canonically (i.e., consistently within and across languages) than with verbs that link noncanonically (variably or counter to prevailing patterns). (Examples of verbs of the former type are prototypical agent-patient verbs like *break* and *open*; an example of the latter type is *get*, as in *John got a present [from Mary]*, where the recipient rather than the agent links to subject position.) But there was no advantage for canonical verbs: as soon as the children began to combine verbs with subject or object arguments at all, they did so equally accurately for verbs of all semantic types.

In a second explicit test of proposals for innate linking rules, Brinkmann (1993, 1997) investigated whether learners of German follow a rule invoked by Gropen et al. (1991a, 1991b) that links an "affected object" (second argument of the primitive predicate "cause") to direct object position (see 1.1 earlier). In elicited production experiments with locative verbs like *schmierem* 'smear', *rieseln* 'drizzle', and *werfen* 'throw', she found no evidence for an inborn "affected object" linking rule: the youngest children were not influenced at all by the relative "affectedness" of the goal entity in their choice between this argument and the theme (i.e., the moving entity) as the direct object, and even the older children were influenced only to a limited extent.

The most sustained attack on the proposal that children are helped by innate knowledge of linking has come from Tomasello and his colleagues (Akhtar, 1999; Akhtar & Tomasello, 1997; Jaakkola & Akhtar, 2000; Tomasello, 1992, 2000a, 2000b; Lieven, Pine, & Baldwin, 1997). On the basis of both early spontaneous speech and experiments with novel verbs modeled in particular syntactic frames, they argue that children's early grammars are organized entirely around individual verbs

and other predicates. Thus, 2-year-olds may know how to combine *hit* with nominate specifying the "hitter" and/or the "hittee," but show no evidence for relational concepts like "agent" and "patient" that apply across a number of verbs, much less for completely verb-general constructs like "subject" and "direct object."²

In summary, evidence from various spontaneous speech studies and experiments does not yet converge on a consistent picture of whether children bring knowledge of argument linking with them to the language acquisition task, or instead learn linking patterns gradually over time on the basis of exposure to the target language. This state of affairs has led to spirited interchanges, as in Fisher's (2002) rebuttal to Tomasello (2000a) and Tomasello and Abbot-Smith's (2002) response. Resolving the controversy can be expected to keep language acquisition researchers busy for some time to come.

2.2. How Universal Are the Alignments between Semantics and Syntax?

From a theoretical point of view, the viability of bootstrapping proposals rests ultimately on the accuracy of the claim that semantic-syntactic correspondences are universal, at least in broad outline: only universal aspects of grammar³ could plausibly be inborn, and so could serve as unlearned jumping-off points from which children could "bootstrap" further knowledge. This is well recognized by the "bootstrapping" authors. For example, according to Gleitman (1990: 35),

The first proviso to the semantic usefulness of syntactic analysis for learning purposes is that the semantic/syntactic relations have to be materially the same across languages. Otherwise, depending on the exposure language, different children would have to perform completely different syntactic analyses to derive aspects of the meaning. And that, surely, begs the question at issue.

Although syntactic bootstrapping theorists are aware of the potential problems presented by language-specific mappings (e.g., Fisher et al., 1994), they argue that there is enough crosslinguistic consistency to at least give children a start into the grammar of their language. But the evidence on universality is in fact still somewhat sketchy, and "problem cases" for bootstrapping proposals—that is, linking patterns that depart from those familiar to speakers of English and other European languages—have played relatively little role in the acquisition literature.⁴

In a move that accommodates some crosslinguistic variation in linking, Fisher has proposed that in the very early stages of acquisition, before children know yet how to identify a subject or direct object in their language, they engage in a precursor to full-fledged syntactic bootstrapping that she terms "structure mapping" (Fisher, 1996,2000; Fisher et al., 1994). To carry out structure mapping, children do not need to know anything about syntactic roles or to recognize conceptual similarities between the agents of different actions or the patients undergoing various motions or state changes. It is enough for them to assume that there will be an analogical match between *the number of noun phrases accompanying a newly*

encountered verb and the number of participants in the event described by the verb: "Children can roughly interpret sentences by bringing the noun phrases of a sentence into one-to-one alignment with the arguments of a conceptual predicate derived from observation of events" (Fisher, 1996: 74).

This proposal has the advantage that it imposes fewer requirements on how languages map between semantic and syntactic roles, and so can tolerate a certain amount of crosslinguistic variation. But it does still presuppose that languages will agree on the number of semantic participants there are in events of various types (e.g., one for 'laughing', two for 'pushing', three for 'giving'), and that this number will be reflected in the number of noun phrases in sentences describing these events.

One important goal of the contributors to this volume has been to expand the crosslinguistic database available to researchers who want to test and explore the explanatory potential of semantic or syntactic bootstrapping procedures. Throughout the volume, the chapters bring information about lesser-known languages to bear on bootstrapping issues, showing kinds of crosslinguistic variability that challenge current proposals and so may help researchers to build more comprehensive models in the future.

2.3. Does the Input Provide Enough Information for the Syntactic Bootstrapping Procedure to Work?

In its classic form, syntactic bootstrapping assumes that children get crucial information about the meaning of a verb from the number of arguments it occurs with and the syntactic roles to which these are assigned. This hypothesis may seem plausible for a language like English, in which noun phrases representing a verb's arguments are reliably present.⁵ But how could syntactic bootstrapping work for children learning one of the many languages of the world that allow extensive argument ellipsis—the omission of arguments whose referents can easily be recovered through previous discourse or nonlinguistic contextual information?

This question was raised influentially by Rispoli (1995) in his work on Japanese. In analyzing child-directed speech from nine Japanese caregivers, Rispoli found that the vast majority of transitive sentences (90%) had *no* or only *one* overt argument, usually not case-marked; only 1% had *two* overt case-marked arguments. (Narasimhan, Budwig, and Murty [2005] find a similar dearth of arguments in child-directed Hindi.) If children often encounter verbs accompanied by none or only a subset of their arguments, how can they use syntactic frames to make good guesses about the verbs' meanings?

One approach to this problem is to note that even though in any one utterance a verb may appear with none or only one of its arguments, across discourse turns all of its arguments may eventually be displayed. For example, Clancy (1996) found that in a Korean adult-child interaction involving a board and plastic shapes that adhered to it, the verb *pwuthita* 'stick, affix' was, over time, combined by the adult

with all three of its arguments: for example, 'shall auntie stick?'(agent); 'stickthis' (theme); 'stick there' (location). A second proposal invokes sources of information other than argument structure that a child might use in distinguishing between verbs with different kinds of meanings. For instance, Rispoli (1987, 1995) found that in Japanese input to children, the distinction between transitive and intransitive verbs is associated with a cluster of properties such as the animacy of the theme and patient referents and the speech act of the utterance in which the verb occurs. (See also Wittek, chapter 14 of this volume, for the suggestion that another source of evidence is the *adverbials* that co-occur with a verb.)

More recent work has pinpointed two other possible sources of help for language learners faced with massive argument ellipsis. First, crosslinguistic studies show that even when children are very young, they are remarkably sensitive to the discourse factors that influence when arguments can be ellipsed (Allen, 2000 and this volume [Inuktitut child language]; Choi, 1998; Clancy, 2003 [Korean]; Narasimhan et al., 2005 [Hindi]; see also papers in Bavin, 2000). As the authors of these studies observe, this sensitivity to contexts of ellipsis might make it possible for children to infer the covert presence of ellipsed arguments in the adult input.

Second, it has been pointed out that even though arguments may often be omitted in the input to children, verbs of different semantic classes are still *probabilistically* associated with different argument profiles; for example, transitive verbs are more likely than intransitive verbs to appear with two noun phrases (Lee & Naigles, 2005, working on Mandarin; Gleitman, Cassidy, Nappa, Papafragou, & Trueswell, 2005). Whether this kind of probabilistic information is sufficient is unclear, however: one of the authors of this introduction (Brown) notes that learners of her field language, Tzeltal Maya, might have to wait for years for any statistical evidence that ditransitive verbs have more arguments than transitive verbs. (See also Demuth, Machobane, and Moloji, 2000, on how learners of Sesotho could acquire restrictions on applicative arguments for which there is very little overt evidence in the input; also see Wilkins's discussion of a paradox for probabilistic evidence in chapter 7.)

2.4. Multiple Frames and Multiple Verb Senses

An intriguing but understudied set of problems in the acquisition of verb meaning and argument structure revolves around the issue of multiple subcategorization frames. Syntactic bootstrapping theorists have noted that hearing a verb in a single frame, for example, transitive, is often compatible with membership in a variety of semantic classes. But—as noted earlier—they argue that this ambiguity can be resolved if children base their guesses about a verb's meaning not on its appearance in a single frame, but on the whole range of frames it occurs in.

Although intuitively appealing, this proposal is fraught with problems. In particular, as Grimshaw (1994) and Pinker (1994) point out, different subcategorization frames are often associated with different *senses* of a verb. (Grimshaw gives the

example of two frames for English *shoot*: *She shot the burglar* [an NP complement] and *The burglar shot out of the room* [a PP complement]). Because the number and nature of senses that a verb takes on in a particular language is determined to a large extent by historical accidents, there is no predictable relationship between the meaning of the verb and its full set of subcategorization frames, only a relationship between a particular sense of the verb and its frames. At present, it is unclear how children decide how many senses a verb has and which sets of frames are associated with which senses (see Gropen, Epstein, & Schumacher, 1997, for one suggestion). The child's problem of determining how many senses a verb has raises complex questions about the learning of argument structure alternations such as the locative or the dative. In these alternations, a verb such as *spray* or *give* is saliently associated with two frames, for example, *John sprayed paint on the wall* and *John sprayed the wall with paint*; *Mary gave a book to Wilma* and *Mary gave Wilma a book*. If children use multiple frames to triangulate in on a verb's meaning, they should be looking for a meaning that is compatible with both frames. But this outcome is at odds with the hypothesis (Levin & Rappaport Hovav, 1995; Pinker, 1989) that the reason these verbs have two frames is that they in fact have two meanings, each one of which projects only one syntactic frame.⁶ To learn how the alternation works, and which verbs can undergo it, the child must distinguish the two meanings (Pinker, 1989; see *Constraining Argument Structure Overgeneralizations* in 1.1, earlier).

2.5. Argument Structure and Event Structure

Bootstrapping claims have focused on aspects of verb meaning that are often reflected in relatively coarse aspects of syntax and verb argument structure: for example, the tendency for actions of agents on patients to be expressed with two-place verbs, and for actions of caused transfer to be encoded with three-place verbs. But argument structure has complex associations with other important aspects of verb meaning and clause interpretation, in particular, those implicated in studies of event structure, such as lexical aspect and causativity. Linguists are still heavily debating the proper handling of these notions in linguistic theory (e.g., see Croft, in press, and chapters in Erteschik-Shir & Rapoport, 2005, and Tenny & Pustejovsky, 2000). Although there have been many studies of the acquisition of lexical aspect (see Li & Shirai, 2000, and Shirai, Slobin, & Weist, 1998, for overviews), only a few have looked at the developmental relationship between aspect and argument structure, and these have tended to revolve around the aspectual concomitants of the distinction between two kinds of intransitive verbs, unaccusatives and unergatives (e.g., Randall, van Hout, Weissenborn, & Baayen, 2004; van Hout, 19%). Causativity has been more extensively investigated in connection with the acquisition of argument structure, but within the relatively narrow perspective of whether children associate transitivity with causativity (e.g., Lidz, Gleitman, & Gleitman, 2003; Naigles, Gleitman, & Gleitman, 1993); or causativity with transitivity (e.g., Bowerman, 1982a, 1982b, 1988; Brooks & Tomasello, 1999; Pinker, 1989).

Several chapters of this volume, especially 10,11,12,14, and 15, break new ground in their efforts to understand the relationship, in both language and language acquisition, between argument structure and event structure.

3. PLAN OF THE BOOK

This volume is divided into three sections. Section I focuses on verbs, examining, in particular, crosslinguistic variation in the relationship between verb meaning and verb syntax, and weighing the significance of this variation for the bootstrapping proposals discussed earlier. Section II investigates the role of arguments, especially the learning problems associated with massive argument ellipsis. In section III, verbs and arguments come together in an examination of a cluster of issues revolving around the construct of (in)transitivity and associated meanings such as causativity, control, and telicity; here the problem of multiple senses and multiple syntactic frames is also considered.

Section I. Verb Meaning and Verb Syntax: Crosslinguistic Puzzles for Language Learners. The chapters in this section, all based on adult language data, show that there is more variation in the relationship between verb meaning and syntax than is often supposed. This creates problems for bootstrapping proposals as they now stand, and the authors consider how children may deal with these challenges.

In chapter 2, Danziger takes up the problem of what kinds of meanings are expressed in nouns as opposed to verbs. She shows that actions like 'run', 'laugh', and 'jump' are treated as structurally analogous to possessed nouns in Mopan Maya; for example, to express 'I am jumping', one says, very roughly, 'My jumping continues' (with the semantic information in 'jump' turning up in a nominal argument of an inflected predicate). This systematic violation of the supposedly canonical encoding of action meanings as verbs creates intriguing problems for both semantic and syntactic bootstrapping proposals. For example, if children use semantics to predict form class (semantic bootstrapping) they would misidentify actional nominals as verbs. And if they rely on a verb's syntactic frames to get at verb meaning (syntactic bootstrapping), how will they discover the actional meanings in nominals? Ultimately, syntactic bootstrapping is argued to give the best results, but possibly at the cost of giving up noun and verb as universal categories.

Chapter 3 (Bohnenmeyer) shows problems for bootstrapping proposals in the domain of motion event coding. Yukatek Maya lacks the formal clues differentiating motion and non-motion events that the syntactic bootstrapping hypothesis depends on, such as a motion verb's ability to appear in trajectory-expressing frames like 'X VERBED from Y to Z'. At the same time, the meanings of Yukatek motion verbs differ systematically from those of their Indo-European counterparts in a way that cannot—counter to the claims of the other bootstrapping hypothesis, semantic

bootstrapping—be learned solely by observing the use of the verbs paired with real-world situations. An adequate explanation for how these forms are acquired can be achieved only by postulating a strong ongoing interaction in the child's language processing between formal evidence, semantic evidence, and evidence from the behavior of the forms in discourse.

Chapter 4 (Schultze-Bemdt) considers the challenge for both semantic and syntactic bootstrapping posed by the phenomenon of complex predicates. In the Australian Aboriginal language Jaminjung, along with many other languages in the area, most verbal predicates are formally and semantically complex, consisting of one member of a small closed class of semantically generic inflecting verbs, plus one or more members of a second lexical category, "coverbs," which mainly occur together with an inflecting verb. The meanings of the interacting forms are mutually defining: the semantic contribution of each element to the whole can only be determined by taking into account the meanings of the range of elements of the other class with which it co-occurs. A unidirectional model of acquisition by bootstrapping from either syntax to semantics or semantics to syntax is implausible in a case like this; acquisition must proceed by a dialectic between the two.

Still another intriguing puzzle for bootstrapping theories is raised in chapter 5 (Kita). Approaches to argument linking on which bootstrapping theories are based assume that for a verb in any particular syntactic frame, each semantic argument role is linked to a particular grammatical role. But in a number of languages, including Japanese, Tzeltal Maya, and Likpe (Kwa, West Africa), the linking for some verbs is left more free, that is, it is "underspecified." For example, consider the spatial configuration of meat on a skewer. If we encode this situation with the English verb *pierce* in a sentence like *The skewer pierced the meat*, the nominals naming the "pointed entity" (piercer) and the "penetrated entity" (piercee) must be subject and object; the reverse linking—**The meat pierced the skewer*—is not possible. Speakers of Japanese, in contrast, can say the equivalent of either "The skewer pierced [*sasuru*] at the meat" or "The meat pierced at the skewer." Their choice of which argument to link to which position is influenced by pragmatic considerations, but, crucially, it is not prespecified by either the meaning of the verb or more general linking rules. Underspecificity creates an important indeterminacy at the semantic/syntactic interface, with implications, as Kita shows, for both linguistic theory and language acquisition theory.

Chapter 6 (Margetts) throws up a problem for one assumption, shared by both semantic and syntactic bootstrapping, that there is a universal set of basic verbs whose meanings are obvious concepts that would be formed by children anywhere, and whose syntax follows transparently from their meaning. (So that meaning, once established, can predict syntax, or, alternatively, syntax provides a good clue to meaning.) One often-cited example is the concept of 'give', which supposedly straightforwardly predicts three arguments: a giver, a thing given, and a recipient (Gleitman, 1990; Pinker, 1989). But in the Oceanic language Saliba, the 'give' concept is divided between two verbs, which differ in argument structure. The verb

glossed as 'give' for third-person recipients is, as expected, ditransitive. But 'give' for first- and second-person recipients has a single object, the "gift" NP, and the recipient is indicated with a directional suffix comparable to 'hither' or 'thither' (depending on whether the recipient is the speaker or the addressee). Margetts discusses the problems this arrangement might present for learners of Saliba, and suggests some factors that may facilitate the learning task.

The five chapters in section I all illustrate areas where widespread universalist expectations about the relationship between syntax and verb semantics are not met, and so where a unidirectional inference from either meaning to form or form to meaning cannot straightforwardly guide children to the correct form-function mappings. Additional examples of unexpected mappings between syntax and verb meanings, and suggestions for how children might deal with them, are presented later in the book; see in particular chapters 7, 10, and 11.

Section II: Participants Present and Absent: Argument Ellipsis and Verb Learning. The first section of the volume shows that the relationship between a verb's meaning and its argument structure is less direct than is often assumed. An additional problem often noted for syntactic bootstrapping, as discussed earlier, is argument ellipsis. If arguments are often missing in a language, how can a child identify a verb's argument structure to begin with, and so get the syntactic bootstrapping process off the ground? The three chapters in this section are all based on developmental data in lesser-studied languages, as well as analyses of the relevant structures in adult speech.

The section is kicked off by Wilkins in chapter 7, a "swing" chapter in the sense that it continues the section I focus on proposed correspondences between verb semantics and syntax, but shows how this topic is connected to issues of argument realization. Wilkins considers two verbs in the Australian language Arrernte, which are roughly glossable as 'put' and 'look'. These belong to distinctly different semantic classes (transfer vs. perception), and so should—according to syntactic bootstrapping assumptions articulated by Gleitman (1990)—have different argument structures. But their argument structure is in fact identical: both are three-argument verbs, taking an ergative NP (the putter/looker), an absolutive NP (the thing put/seen), and a dative NP (the place of the thing put/seen). The two verbs do, however, differ strikingly in the frequency with which these arguments are actually realized in adult speech and where they are typically positioned with respect to the verb, and these differences are related to the meanings the verbs express. Wilkins suggests that children could use this information to infer that the verbs belong to different semantic classes. Intriguingly, he finds that even quite old children make errors in marking the crosslinguistically unusual "place seen" argument of Arrernte 'look', which suggests that some mappings of syntax and semantics may indeed be more "natural" than others, even if not universal.

Chapter 8 (Brown) shows that patterns of ellipsis may offer cues not only to the general semantic class of a verb but also to its semantic "richness." For example, in the Mayan language Tzeltal, object arguments are more often omitted for verbs like *k'ux* 'eat crunchy stuff' than for verbs like *tun* 'eat (anything)', probably because the meaning of the verb itself narrows the listener's search for the intended referents of unmentioned arguments. This pattern of argument realization is observable in the speech of both adults and children of age three-and-a-half to four years, suggesting that already at this age children might use rate of argument ellipsis as a cue to the specificity of verb meaning.

Taken together, the chapters by Wilkins and Brown show that what argument ellipsis takes away with one hand (by making it harder to identify a verb's arguments) it may to some extent give back with the other: patterns of argument ellipsis—for example, differences across verbs in which arguments are typically expressed or omitted—could provide potentially useful clues to the verb's meaning.

Chapter 9 (Allen) asks not what children can learn about verb meaning from patterns of ellipsis in adult speech, but rather what children know about the multiple discourse-pragmatic factors that influence decisions by fluent speakers about when to provide or omit arguments. Examining child data from Inuktitut, and reviewing related data from Korean (Clancy, 1996,2003), Allen shows that even very young children are highly sensitive to a wide range of factors that condition argument ellipsis, and so might be able to use this information to infer the existence of "missing" arguments in adult speech.

Section III. Transitivity, Intransitivity, and Their Associated Meanings: A Complex Work-Space for Learnability. No property of verbs has played a greater role in the linguistic and language-development literature than transitivity. The ability—or lack of it—to take a direct object is one of the quintessential concepts in the study of argument structure, verb meaning, and event structure. What can children infer about the meaning of a verb from the fact that it appears with only one argument? With two arguments? How do they decide whether a transitive verb presents an event as telic (culminating at an inherent end point) or atelic (an unbounded activity, process, or state)? How do they figure out how transitivity is related to causativity and state change? In this section, the themes of the first and second sections of this volume—verbs and verb syntax, and the realization of event participants—are intertwined, and it becomes increasingly clear how profoundly language acquisition can be influenced by the typological properties of the language being learned.

Chapter 10 (Essegbey) considers the universality of claims that intransitive verbs fall into two formally distinct classes (the Unaccusativity Hypothesis and related proposals). These claims have been influential not only in linguistics but also in acquisition research, where children have been hypothesized to come to the acquisition task anticipating the split (e.g., Randall et al., 2004; van Hout, 1996). But

as Essegbey shows, the distinction is irrelevant in Ewe (Kwa, West Africa), where all intransitives fall into a single class which has a constructional meaning to do with "lack of control" on the part of the event participant picked out by the subject noun phrase. Meanings involving a single participant who is in control of his action—which in English and other European languages are typically expressed with intransitives of the unergative class, as in *John jumped*—are in Ewe expressed with *transitive* constructions (e.g., 'Kofi "jump" hill' = Kofi jumped [on purpose]). This arrangement raises challenges for bootstrapping proposals, which assume that there will be a match between the number of event participants a verb is associated with and *the* number of noun phrases it appears with (Fisher, 1996,2000; Fisher et al., 1994; Gleitman, 1990). Essegbey suggests that learners may be able to use syntactic bootstrapping to discover the meanings of new verbs in Ewe—but only *after* they have already learned the language-specific association between transitivity and control in their language.

Chapter 11 (Ameka) also considers problems posed by Ewe for the universality of the Unaccusativity Hypothesis, and explores, through an in-depth examination of the supposedly unaccusative verb 'die' in Ewe and other languages, how cultural/historical processes can bring about a complex variety of meaning shifts that are not transparently related to syntax (cf. also section 2.4, earlier, on multiple frames). Ameka shows that Ewe 'die' can appear as both a one-place (intransitive) and a two-place (transitive) predicate. It has at least three senses, but these do not line up neatly with the number of arguments the verb appears with, for example, the same sense is involved in both a one-place construction like 'she died' and a two-place cognate-object construction like 'she died a wicked death', whereas different senses may be expressed by formally identical two-place constructions, for example, 'this garment die dirt' [=is dead dirty: intensity] vs. 'he die ear to the matter' [=he turned a deaf ear/does not want to hear: negative desiderative]. Although the senses of Ewe 'die' cannot be predicted from the verb's syntactic frame, Ameka shows that they are related, albeit indirectly, to the properties of the event participants), such as whether or not they are animate. To learn the various meanings of 'die', he suggests, a child must pay close attention—as also proposed by Gropen et al. (1997)—to properties of the verb's participants.

Chapter 12 (van Hout) takes up the problem of how children discover a transitive verb's telicity entailments. Telicity is an aspectual notion having to do with whether an event is presented as having a natural endpoint (e.g., *break a pot*, *write a letter*: telic) or as unbounded (*love Mary*, *write letters*: atelic). It is a property of verbs, and often of entire verb phrases. Van Hout shows that languages signal telicity in a variety of ways, some more closely related to a verb's syntactic frames than others. For example, in English, Dutch, and Finnish, the form of a verb's direct object NP, and in particular this NP's count/mass syntax, provides critical cues to telicity (compare *John wrote LETTERS* [atelic] with *John wrote THE LETTER* [telic]). In Polish and Russian, in contrast, it is the verb form itself that signals telicity (for example, *PISAL pis'mo* 'wrote, was writing letter' [imperfective verb form: atelic] vs. *NA-PISAL*

pis 'mo 'wrote letter' [perfective verb form: telic]). On the basis of experiments, van Hout concludes that children have more trouble grasping telicity entailments when they are signaled by the direct object nominal ("compositional telicity," in her terminology) than when they are marked directly on the verb ("predicate telicity"). The interaction of telicity with direct object marking gives rise to drawn-out learning problems.

The final three chapters of the volume revolve around causativity, and in particular causative-transitive verbs. Chapter 13 (Bowerman and Croft) uses spontaneous speech corpora collected longitudinally from two learners of English over an extended period—about age 2 to 12 years—to examine the nature and time course of causative overgeneralizations of the causative-inchoative alternation (e.g., *Don't giggle me*; see also examples (1a) and (1b) earlier). Overgeneralizations of argument-structure alternations have given rise to intense debates on the nature of language learning, as discussed earlier in section 1.1—in particular, whether alternations are mastered through general learning principles such as schema abstraction and fine-tuning (Goldberg, 1995; Goldberg et al., 2004; Tomasello, 2003), or with assistance from inborn knowledge of the relationship between verb meaning and argument linking (Gropen et al., 1991a, 1991b; Pinker, 1989). Bowerman and Croft find that their subjects' overall pattern of error-making, including the order in which errors with verbs of different semantic classes die out, accords poorly with Pinker's model. The data point instead to a gradual learning process, and especially to the importance of the language-usage-based mechanism of entrenchment (here, simply hearing a verb repeatedly over time only in an intransitive frame).

Chapters 14 (Wittek) and 15 (Pederson) introduce an intriguing new acquisition puzzle for transitive causative verbs such as *kill*, *open*, and *break*: how do children decide whether the state change associated with such a verb is actually entailed by the verb's meaning? It is a commonplace observation that such verbs entail their state change—for instance, you can't say **John broke a plate, but the plate didn't break*. But Wittek's study of German-speaking children shows that learners do not necessarily recognize this entailment: unlike adults, they often accept sentences with causative verbs as descriptions of events in which an action was performed that could be expected to bring about the relevant state change, but the state change did not occur. Wittek suggests that children may interpret causal state-change verbs similarly to verbs like *wash*: the verb implies a certain state change—'clean', in this case—but it does not actually entail it (one can say *I washed the shirt, but it is still dirty*).¹

In crosslinguistic perspective, German children's failure to recognize the state-change entailment in verbs like 'break' and 'kill' is not anomalous: adult speakers of Tamil, tested with the same materials, also tend to accept such sentences even when the state change is not realized (chapter 15, Pederson). In the linguistic literature, it has been argued that in some languages—for example, Tamil and Mandarin—transitive causative verbs do not, in fact, entail a state change (Dcegami, 1985; Talmy, 1991). But Pederson argues that this conclusion is wrong

for Tamil. He suggests that the basic meaning of 'break' and other transitive causative verbs is similar in Tamil and English, but that Tamil is more tolerant than English in allowing speakers to stretch these verbs to situations of near-realization of an event. This tolerance is related, argues Pederson, to larger differences between Tamil and English in the availability of explicit linguistic devices to confirm or deny that an event has been realized; for example, English is richer than Tamil in "denial" markers, as in *John ALMOST killed Harry*.

Together, these two studies show that the status of the state change associated with a transitive verb may be unclear. Bootstrapping theories of how verb meanings are learned offer little help with this problem, but an effective disambiguator comes from a surprising source (Wittek, chapter 14): when children are exposed to a novel verb coupled with a single instance of the adverb *wieder* 'again', in a context where the adverb must refer not to the repetition of the action but to the re-establishment of a prior state (as in *The door blew open but John closed it again*), they can immediately infer that the state change associated with the new verb is entailed, and not merely implicated.

Cross-Cutting Themes. Cutting across the three major sections of this volume there are several additional themes worth pulling out for explicit mention:

- Apparent mismatches between a verb's number of semantic participants and its number of arguments (chapters 4,6,7,10, and 11). A notable subgroup of chapters within this category discusses mismatches involving verbs that express events of "externally caused transfer or change of possessor," such as 'put' and 'give' (chapters 4,6,7): e.g., 'put' or 'give' as a two-argument verb, and 'look' as a three-argument verb identical in argument structure to 'put'.
- Crosslinguistic variation in the semantics and syntax of expressions of motion (chapters 3, 4, 5). For example, are "motion verbs" always associated with distinctive path-trajectory syntactic frames? Do they always inherently specify "motion," or do they sometimes treat motion as involving change of location or configuration?
- Emphasis on the need to assume a continual interaction between meaning and form in children's acquisition of verb meaning and syntax, rather than a one-way street from semantics to syntax (semantic bootstrapping) or from syntax to semantics (syntactic bootstrapping) (chapters 3,4,10).
- The existence of multiple sources of information that could provide useful cues to verb meaning (in addition to, or other than, the traditional focus of bootstrapping proposals, i.e., number and syntactic arrangement of the verb's arguments, and the distinction between arguments that are noun phrases or propositions; cf. Gleitman et al., 2005). For example, the set of elements a complex verb collocates with (chapters 3,10); adverbs, which may modify a specific aspect of a verb's meaning (chapter 14); statistical patterns

of argument omission and realization (chapters 7,8,9); semantic properties of event participants (e.g., animate or not) (chapter 11); the syntax of noun phrases encoding event participants (important for telicity entailments) (chapter 12); and possible inferences about meaning based not only on what is said, but also what is *not* said (chapter 15).

- The relevance for learners of the larger system in which a particular aspect of language is embedded. This includes cultural practices which may make the "unexpected" presence or absence of arguments understandable (chapters 6, 7,11); for example, Wilkins (chapter 7) shows how the surprising existence of a "place seen" argument for the Arrernte 'look, see' verb makes sense in the traditional cultural setting of the language. But it also includes the position of a particular to-be-learned element of language in the system of contrasts drawn by a language's larger linguistic ecology, which can influence patterns of pragmatic inferencing (chapter 15).
- The appeal of the construction grammar approach to argument structure. A number of the contributors to this volume suggest that construction grammar (Croft, 2001; Goldberg, 1995) can deal insightfully with within-language systematicities in argument structure, without presupposing that the regularities embodied in argument-structure constructions are necessarily universal (chapters 3,4,5,10,11).
- Attention to the fine-scale mechanisms underlying language learning, such as what drives generalization and retreat from overgeneralization, and whether there are elements that can rapidly trigger certain kinds of inferences about meaning (chapters 5,13,14).

4. CONCLUSION

This volume provides the first sustained crosslinguistic examination of a set of densely interwoven issues revolving around the role of argument structure in language acquisition. Eight of its chapters are typological in nature, examining the basic structures of a variety of languages with language-learnability issues in mind. Six chapters are devoted more directly to child language itself. Taken together, these chapters make clear that detailed work on crosslinguistic variation is critical if questions about language acquisition are to be handled insightfully. But they also show that despite the challenges that crosslinguistic variation raises for theories of language acquisition, especially for the bootstrapping hypotheses as they now stand, these challenges have plausible solutions.

In particular, the contributors to the volume find that both semantic and syntactic bootstrapping can provide the child with valuable information, but that these two procedures must often work together in a dialectic to arrive at a satisfactory outcome, rather than running off separately (see also Grimshaw, 1994). These two procedures are also likely to interact continually with a wider set of clues to the meaning and syntactic structure of verbs, including, for example, statistical

patterns of argument ellipsis, adverbs, co-verbs, and other elements that co-occur with verbs, information about event participants, cultural practices, and conventional pragmatic inferences.

This mix is rich, and it will not be easy to disentangle the role of the various ingredients. But taken together, the chapters of this volume help point the way to a more sophisticated understanding of the learnability issues associated with argument structure. And that is an outcome worth striving for.

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NOTES

A fuller explanation of Pinker's proposal about how innate knowledge constrains children's argument structure is presented in chapter 13.

²According to Jaakkola and Akhtar (2000: 38), "Findings like these raise some questions about the proposal that even young children have knowledge of general "Unking rules" between grammatical and semantic categories of the type posited in theories of semantic and syntactic bootstrapping...These theories propose: that children have a general understanding of abstract semantic and syntactic categories (like agent and subject); that they are able to correctly assign these categories based on the structures of the event and the sentence; and that they know the correct mapping between the two (e.g., agent-subject). In contrast to this proposal, the current studies showed that... children are not able to use the abstract transitive frame to figure out who is who. In other words, they either do not have the abstract categories of agent or subject, do not know that the agent is the subject, or do not know where the subject is located in the sentence."

³Or at least aspects that are easily parameterized—i.e., that are hypothesized to take one of two or a small number of values, such as "subject is/is not obligatory".

"The single exception is morphological and syntactic ergativity, a family of patterns in which it is arguably patients rather than agents that get linked to subject position. See Marantz (1984), Pinker (1984), Pye (1990), and Van Valin (1992) on how children could learn ergative languages.

Even for these languages there is the thorny question of how children distinguish between arguments and obliques (Fisher et al., 1994: 368; Grimshaw, 1994: 417; see Randall, 1990, for one suggestion). For example, in *He read the book ON HIS BED*, the PP *on his bed* is an oblique, and so has no significance for the meaning of *read*, whereas in *He put the book ON HIS BED*, the same PP is an argument of *put* that is intimately related to its meaning.

⁶E.g., the first *spray* is hypothesized to mean roughly "cause Y [here, paint] to move in a certain manner", whereas the second *spray* means something like "cause Z [the wall] to go to the state of being covered (by causing X to go onto it in a certain manner)". In both versions of the verb, it is the affected object (second argument of

"cause") that is the direct object, but which argument this is differs in the two versions of the verb, because, by hypothesis, the versions have different meanings. 'Chen (2005) has recently used Wittek's test materials with learners of Mandarin. In this language, caused state changes are typically expressed by resultative verb compounds (RVCs), e.g., *zhai-xia* 'do.picking.action-descend' (= pick, pick off/down). In an RVC it is the second verb that coirirms that the state change came about; the first verb, e.g. 'pick', 'break', 'kill', does not, in itself, entail a state change. Ironically, Mandarin learners often made the opposite error to that of German learners: rather than incorrectly failing to recognize that a verb like 'pick', 'break', or 'kill' entails a state change, they incorrectly failed to recognize that it does *not* entail a state change. Chen concludes that children's early strategies for interpreting verb meaning are not language-independent, but are influenced at a young age by the specific lexicalization patterns of the target language.

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