14 Form–function relations: how do children find out what they are?

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Human languages, broadly speaking, provide two kinds of meaningful elements, using both to create grammatical constructions. On the one hand, there are morphemes that make reference to the objects and events of experience, and on the other, there are morphemes that relate these bits of experience to each other and to the discourse perspectives of the speaker. Linguistic theories of all stripes honor this duality, using such distinctions as "material content" vs. "relation" (Sapir 1921/1949), "lexical item" vs. "grammatical item" (Lyons 1968), or, most commonly, "content word" vs. "function word" (or, to include both free and bound morphemes, "functor"). Typically, the first class includes nouns and verbs, and usually also adjectives; the second class includes free morphemes such as conjunctions and prepositions, and bound morphemes, such as affixes marking such categories as number, case, tense, and so forth. It has generally been claimed that: (1) functors express a limited and universal set of meanings ("grammaticizable notions"), and (2) functor classes are small and closed, while content word classes are large and open. The first claim has led to proposals that the set of meanings is, in some sense, "prespecified" for language; the second has led to proposals that this collection of morphemes plays a critical role in both the acquisition and processing of language. Furthermore, many attempts have been made to relate these two "design features" of language:

- Theorists with a nativist bent -- including both generative and cognitive linguists -- equip the mind/brain with predispositions to relate particular types of meaning to grammatical elements and syntactic constructions. Such predispositions make it possible for the child to crack the code and for expert language-users to successfully parse sentences. (This position, for example, can be found in Bickerton 1981, Pinker 1984, and Slobin 1985.) On such accounts, the relations between the two design features -- limited sets of meanings and limited sets of functors -- are facts about the language module or language-making capacity, perhaps in relation to other modules or capacities, but not in need of developmental explanation.

- Theorists more concerned with language use -- functionalists -- point to recurrent diachronic processes that inevitably result in small, closed classes of grammatical morphemes with their characteristic meanings across languages. On these accounts, this design feature of language cannot be attributed to the mental structure of the individual alone.

Regardless of theoretical position, however, everyone agrees that grammaticizable notions are "special." Here I want to examine the consequences for acquisition theory that flow from taking grammaticizable notions as special in one way or another. If it is supposed that the mental lexicon consists of two classes of items, with two distinct kinds of meanings, then there are two separate semantic tasks for the learner. Further, if one class draws on prespecified meanings, its acquisition consists of procedures of look-up and elimination, while the acquisition of meanings in the other class requires some kind of more general learning abilities. I will propose, however, that such theorists -- including myself -- have erred in attributing the origins of structure to the mind of the child, rather than to the interpersonal communicative and cognitive processes that everywhere and always shape language in its peculiar expression of content and relation. As Sapir put it: "language struggles towards two poles of linguistic expression -- material content and relation," but he went on to add: "these poles tend to be connected by a long series of transitional concepts" (1921/1949:109). I will argue that the cline between the two poles, when properly understood, makes it unlikely that the child comes to the task of language acquisition prepared with the relevant distinctions -- either semantic or syntactic -- thereby challenging my own previous assumptions and those of both generative and cognitive linguists. But first, some necessary preliminaries.

1 Grammatically specified notions

It is clear from an examination of even a single language that grammatical morphemes and constructions encode specific types of notions. In English, for example, nouns can be marked for plural, relations of possession, and definiteness. In other languages, these particular notions may be left unmarked, while shape or substance of objects may be grammatically expressed. Looking across many languages, it is evident that there is a great deal of variation both in the categories that are grammaticized and in their boundaries. At the same time, however, it seems that the set of such notions is not vast.

This problem has been explored in depth by Leonard Talmy (1978, 1983, 1985, 1988). He has been struck by the finding that many notions seem to be excluded from grammatical expression. Thus no known language has
grammatical morphemes indicating the color of an object referred to by a noun; nor are there verb inflections indicating whether an event occurred in the daytime or at night, or on a hot or a cold day. In his most extensive study, Talmy (1985) lists conceptual domains which are typically realized as verb inflections or particles, and contrasts this list with a collection of domains which are apparently not amenable to grammaticization. For example, (1a) lists domains that are typically expressed by grammatical elements associated with verbs (inflections, particles), whereas the domains listed in (1b) are apparently excluded from such expressions.

(1a) **Grammaticizable domains typically marked on verbs**
- tense (temporal relation to speech event)
- aspect and phase (temporal distribution of an event)
- causativity
- valence/voice (e.g., active, passive)
- mood (e.g., indicative, subjunctive, optative)
- speech act type (e.g., declarative, interrogative, imperative)
- personation (action on self vs. other)
- number of event participants (e.g., singular, dual, plural)
- gender of participant
- social/interpersonal status of interlocutors (e.g., intimate, formal)
- speaker’s evidence for making claim (e.g., direct experience, hearsay)
- positive/negative status of an event’s existence

(1b) **Conceptual domains not amenable to grammaticization as verbal inflection**
- color of an event participant
- symmetry of an event participant
- relation to comparable events (e.g., “only,” “even,” “instead”)
- spatial setting (e.g., indoors, outside)
- speaker’s state of mind (e.g., bored, interested)

We are faced here with the first major question about grammaticizable notions: why are some conceptual domains apparently excluded from grammatical expression? Talmy goes on to raise a second major issue: within any particular grammaticizable domain, there are striking restrictions in the number and type of distinctions that are grammatically marked. He has explored this question most fully with regard to restrictions on the notions that can be conflated in a single grammatical morpheme. The most widely cited examples concern locative terms, and these will figure in some of the acquisition issues discussed later. For example, an English preposition like through indicates motion that proceeds in some medium (through the grass, water, crowd), but does not indicate the shape or contour of the path (e.g., zigzag, direct, circling), the nature of the medium, or the precise extent of the path. Another type of restriction suggests that grammar is concerned with relative, rather than quantified, distinctions.

For example, the deictic demonstratives this and that are neutral with regard to magnitude. One can just as well compare “this leaf and that leaf” as “this galaxy and that galaxy.” Talmy (1988:171) summarizes across numerous examples to conclude that the notions excluded from grammatical expression “involve Euclidean-geometric concepts—e.g., fixed distance, size, contour, and angle—as well as quantified measure, and various particulars of a quantity: in sum, characteristics that are absolute or fixed.” By contrast, grammaticizable notions are “topological, topology-like, or relativistic.” He offers the following two lists. (For details, see the cited references.) I will call them qualities to distinguish them from domains such as those listed in (1a, b).

(2a) **Non-topological and non-grammaticizable qualities:** material, motion, medium, precise or quantified space or time

(2b) **Topological/topology-like and grammaticizable qualities:** point, linear extent, locatedness, within, region, side, partition, singularity, plurality, same, different, “adjacency” of points, one-to-one correspondence, pattern of distribution

Finally, Talmy (1988) notes a series of restrictions that impose a limited schematization of semantic content for any grammatically specified notion. These restrictions apply to both nouns and verbs. For example, Talmy introduces the term “plexity” to characterize the distinction of number. Thus a “uniplex” noun becomes “multiplex” by pluralization (e.g., bird/birds) and a uniplex verb can become multiplex by verbal inflection and/or auxiliaries (e.g., sighed/sighing). Talmy calls these categories of grammatically specified notions. In the course of a lengthy analysis (Talmy 1988:173–192), he lists the following types of distinction:

(3) **Categories of grammatically specified notions:**
- dimension (continuous/discrete)
- plexity (uniplex/multiplex)
- boundedness (unbounded/bounded)
- dividedness (particulate/continuous)
- disposition (combinations of the above)
- extension (point, bounded extent, unbounded extent)
- distribution (one-way non-resettable, one-way resettable, full-cycle, multiplex, steady-state, gradient)
- axiality (relation to border)
- perspectival mode (long-range/close-up; moving/static)
- level of synthesis (Gestalt/componential)
- level of exemplifiability (full complement/single exemplar)

Putting together the various parts of Talmy’s analysis—domains, qualities, and categories of grammaticizable notions—we can more precisely characterize the meanings of grammatical morphemes. To take just one
example, consider the sentence The boys were running in to the house. The grammatical elements in boldface point to particular domains and categories within those domains, while the lexical items boys, run, and house provide the items of content that are related by the grammatical frame. The article the, together with the plural -s, categorizes the disposition of the actors as multiple and particulate (as opposed to Boys were running, where the absence of the article categorizes the actors as multiple and continuous). The plural past-tense were categorizes the reported event in the domains of tense (past) and number (plural), while the progressive -ing categorizes aspect (progressive). The form in-to schematizes path and ground of movement as directed across a border into an extent. The quality of the path is topological: simply movement across a partition to within a region. (The two uses of the also situate the sentence in a discourse context of presupposed information — that is, the speaker assumes that the listener has specific refers of mind for boys and house. Talmay's analysis does not include the pragmatic functions of grammatical morphemes. The interpersonal domain must also figure heavily in any account of the origins and functions of these items.)

To return to the guiding question: why should precisely these types of notions receive grammatical expression across the languages of the world? Talmay offers two kinds of accounts. One is presented in cognitive terms: "The grammatical specifications in a sentence . . . provide a conceptual framework or, imagistically, a skeletal structure or scaffolding, for the conceptual material that is lexically specified" (1988:166). That is, the grammatical elements - functors and syntactic construction types - provide a schematization of experience. The cognitive argument is that this particular schematization is a consequence of schematization at a nonlinguistic conceptual level. For example, Talmay (1978, 1983, 1988) proposes parallels between structuring in visual perception and in language. Landau & Jackendoff make a similar proposal, tying the limited set of locative prepositions to a "submodule" of the brain specialized for object location: "Our hypothesis is that there are so few prepositions because the class of spatial relations available to be expressed in language -- the notions prepositions can mean -- is extremely limited" (1993:224).

Such parallels between cognitive domains, however, do not explain the linguistic division of labor between content words and functors, nor all of the peculiarities of grammaticizable notions. For Talmay, and other linguists, the division of labor is apparently taken as given, as is the set of grammaticizable notions. Talmay refers to an innate inventory of concepts available for serving a structuring function in language" (1985:197). Such innate knowledge, of course, would facilitate the acquisition task. Bickerton includes a version of the inventory in his bioprogram, equipping the acquisition mechanism with "a very short list of semantic primes" that serve the child as "grammatically-markable semantic features" (1981:205).

Whether or not the "inventory" is innate, it has been assumed to play a key role in the child's entry into the linguistic system. In 1979 I presented Talmay's analysis as part of the child's "initial assumptions" about grammar. And in later work on "operating principles" for acquisition, I suggested "that such notions must constitute a privileged set for the child, and that they are embodied in the child's conceptions of 'prototypical events' that are mapped onto the first grammatical forms universally" (Slobin 1985:1173f). The proposal was that the division between the two classes of grammatical morphemes reflected a cognitive division between concrete and relational concepts, and that the relational concepts were, to some extent, already in place at the beginning of grammatical acquisition (whether on the basis of an "innate list" or arising from prior cognitive development). A similar position was taken by Pinker, in his proposal that "the child can extract . . . the potentially grammatically relevant semantic features of the sentence participants (their number, person, sex, etc.) and of the proposition as a whole (tense, aspect, modality, etc.):" (1984:30). He, too, was agnostic about the prelinguistic origins of such features: "the theory is, of course, mute as to whether these cognitive distinctions are themselves innate or learned, as long as the child is capable of making them" (1984:363). The position continues in Learnability and cognition, with a clear statement of the learning task (Pinker 1989:254f).:

Consider the target in the learning of an inflection, namely, a list of features . . . The features are drawn from a finite universal set of possible grammaticizable features. Each one has a conceptual or perceptual correlate: the child can determine, for example, whether the referent of a noun in a particular context is singular or plural, human or nonhuman. When attempting to learn a given inflection from its use in a given utterance, the child samples a subset of features with their currently true values from the universal pool.

The purpose of these proposals was to clear the way for "operating principles" or "procedures" to work out inflectional paradigms and other form-function mappings. However, such procedures also run into the problem that the set of grammaticizable features, although limited, is still large; and many of the features are not relevant to the particular language being acquired. The solution here was to appeal to a preestablished ranking of notions with regard to their applicability to grammar. With the addition of an innate "accessibility hierarchy" (Talmay 1988:197) or a "weighting of hypotheses" based on "cognitive salience" (Pinker 1984:170), the child is spared the task of initially scanning the entire inventory of grammaticizable notions.3

In my work on operating principles, I called upon cognitive and processing
variables to account for differences in the accessibility of grammaticizable notions, rather than building the hierarchy into a grammar module. My solution was to attempt to ground the accessibility hierarchy in the child’s cognitive development. On this account, the first notions to receive grammatical marking in a child’s speech are those that correspond to the child’s conceptions of “prototypical events.” For example, I proposed that the salience of hands-on action on objects—the “Manipulative Activity Scene”—provided the starting point for the acquisition of such forms as accusative or ergative inflections. Much empirical work remains to be done before we can specify the range of such starting points. I expect that some will be universal, whereas others will show cross-linguistic variation. Pioneering research, such as the work of Bowerman, Choi (Choi & Bowerman 1991; Bowerman 1993, 1994, 1996a, b), Clark (ch. 13 of this volume), and others, places the conceptual origins of grammaticizable notions in domains of cognitive development, tempered by the semantic organization inherent in the exposure language.

It is important, however, to distinguish between the course of development of grammaticizable notions in the child and explanations for their existence as linguistic phenomena. On closer inspection, cross-linguistic diversity in patterns of grammaticization points to adult communicative practices as the most plausible source of form-function mappings in human languages, rather than prototypical events in infant cognition. The following sections of the chapter explore the roles of grammaticizable notions in ontogeny and diachrony, drawing on recent findings in cognitive linguistics and grammaticalization theory.

2 The learning task

This historical and theoretical introduction sets the stage for defining the task that the child faces in determining the meanings of grammatical morphemes. The standard definition of the task assumes the following linguistic conditions to be true:

**Condition 1**: there is a distinct and identifiable collection of grammatical morphemes, arranged in small, closed classes.

**Condition 2**: these morphemes map onto a universal, limited set of semantic entities (grammaticizable notions).

**Condition 3**: grammaticizable notions are arranged in a universal accessibility hierarchy.

According to standard accounts, acquisition occurs on the basis of assumptions about biology and cognition:

**Assumption 1**: conditions 1, 2, and 3 exist because of the structure of the mind/brain (in modules for aspects of language, perhaps in conjunction with other modules).

**Assumption 2**: the role of linguistic input is to allow the relevant mental capacities to organize themselves in terms of the exposure language.

**Assumption 3**: the child learns the meaning of a grammatical form by isolating and identifying a particular stretch of speech as instantiating a grammatical form and attempting to map it onto a relevant grammaticizable notion.

I propose that Conditions 1, 2, and 3 are only partly true, and that therefore Assumption 1 must be seriously modified or abandoned. Assumption 2 remains, but with a shift of emphasis to structures inhering in the exposure language. Assumption 3 must be seriously modified—and this is the challenge to learning theory posed by my reanalysis.

3 Synchronic evidence for modifying the linguistic conditions on learnability

3.1 What is a grammatical morpheme?

Prototypical grammatical morphemes are affixed to content words, are general in meaning, phonologically reduced, and not etymologically transparent. Familiar examples are elements like plural markers on nouns and tense/aspect inflections on verbs. Another obvious type of grammatical morpheme is represented by “little words” like prepositions and auxiliaries, which consist of small sets of items occurring in syntactically fixed positions. But there are also items that are not so obvious. Consider several examples that demonstrate the lack of clear boundaries of syntactic categories defined as “functors,” “grammatical morphemes,” or “closed-class elements.”

3.1.1. English modals and equivalents English has a grammatical class of modal auxiliaries that fit in the frame, SUBJECT MODAL VERB, such as *You should* must *must* go. This is a prototypical small, closed class: *can, could, will, would, may, might, must.* The forms do not function as normal verbs; rather, they have a number of grammatical peculiarities—e.g., they don’t have normal past tenses (*you should* go) or person inflections (*he* should go), they can take a contracted negative clitic (shouldn’t), and they “move” under certain syntactic conditions (e.g., *Should you go*?). However, there are other items that can occur in the same slot, such as *You* *hafta* *need* go. These function as normal verbs—e.g. PAST: *You* had to go; PERSON: you *hafta*; QUESTION: *Do you* *hafta* go? NEGATIVE You don’t *hafta* go. Nevertheless, they, too, are part of a small, closed, and specialized set, with phonological reduction in some contexts.
Therefore some linguists refer to them as “quasi-modals.” Nonverbs can also fall in the specialized slot of modals and quasi-modals, but with other syntactic constraints. Consider *You better go*, which (in American English) has no obvious past tense or question form. It is negated like an auxiliary, but only in the uncontracted form (compare *you should not go*/*you better not go*, but *you shouldn’t go*/*you better not go*). Looking across contexts of use, *better* is another sort of specialized “modal-like” element in American English. If you are a child learning this dialect, you can identify a set of full auxiliaries on syntactic grounds, and find that it maps onto a restricted set of grammaticized meanings in the domain of modality. This knowledge is adequate for the *comprehension* of modals; however, when you are concerned with speech *production*, and access the set of modal notions from your mental set of grammaticizable notions in this domain, you find that there is, indeed, a small closed set — but that it does not have a clear or unitary syntactic definition. The slot in declarative sentences that is reserved for expressing categories within the grammaticizable domain of modality can be filled with a heterogeneous collection of modal auxiliaries, semi-modals, and an adjectival/adverb *better* that does not act like a normal adjective or adverb in this function. The semantic and syntactic tasks do not seem to run in parallel as neatly as in the textbook cases, which take only well-defined grammatical morphemes into account in their expositions.

This is, in fact, a widespread problem in acquisition — only coming to light when we consider production, rather than comprehension. Consider several more examples of the fuzziness of the category “grammatical morpheme” or “closed-class element.”

3.1.2 Spanish modal verbs and auxiliaries In Spanish the equivalents of English modal verbs do not have syntactic peculiarities. That is, they function just like normal, full verbs, using the standard paradigms for person/number and tense/aspect. Yet they, too, are a small closed set, performing similar functions. The set, however, can only be defined on semantic grounds, listing those verbs — such as *puedo* ‘can,’ *deber* ‘should,’ and the like — that perform a modal function. For example, *puedo ir* ‘I can go,’ *debo ir* ‘I should go’ have the same morphosyntactic characteristics as constructions with nonmodal verbs. Lacking the peculiar morphosyntactic definition of English modals, however, the corresponding Spanish verbs are a small closed set within the “open” class. (I will argue that, in fact, the “open class” of verbs is better conceived of as a collection of closed classes.) There is also a small class of about twenty-four “semi-auxiliaries” (Green 1982) which have restricted meanings in particular semantic/syntactic contexts. These are verbs that can function both as main verbs and semi-auxiliaries — again, making it difficult to draw a clear boundary around “grammatical morphemes.” In their grammatical function, such verbs have restricted meanings in comparison to their uses as fully lexical verbs. For example, the verb *llevar* ‘carry,’ in construction with a participle, takes on an auxiliary aspectual meaning; *Juan lleva entendido que X* ‘Juan carries understood that X’ predicates an established state of understanding in Juan that X; *la diferencia viene motivada por X* ‘the difference comes motivated by X’ means that the difference can be accounted for by X. Green notes that some of the twenty-four semi-auxiliaries are more specialized and limited in their functions than others. He observes that a semantic examination of these verbs “strongly favours a gradient analysis... At one extreme of the gradience would be verbs like *haber* [have] which have lost virtually all trace of lexical meaning, and at the other, verbs like *mostrar* [show] and *notar* [note] which have lost virtually none of theirs” (p. 127). A critical feature is thus the “fullness” versus “abstractness” of lexical meaning of an item. This is not a criterion that a child could use to identify an item as belonging to either the lexical class or the grammatical class. Looked at in diachronic perspective, some are more “grammaticalized” than others (as I will discuss later in more detail). Some may remain on the borderline between lexical and grammatical item for centuries, and may never become fully grammaticized.

The Spanish “modal” and “semi-auxiliary” verbs attract our interest because their semantic and discourse functions parallel the more highly grammaticized auxiliaries of English. This leads one to wonder whether Spanish-speaking children are using their presupposed “grammatical acquisition device” or their more general “lexical acquisition device” in learning such forms.

Many more examples could be adduced, underlining the point that there is no clear dividing line between “content words” and “functors.” Rather, there is a continuum with clearly lexical items on one end (nouns like *computer*, *couch*, *zebra*, verbs like *tackle*, *brawl*, *sneez”), and grammatical inflections on the other (such as English progressive -ing, Turkish accusative -i, Warlpiri ergative -ngku). In between, there are lexical items that play more or less specialized roles, sometimes on their way to becoming grammatical morphemes over time. What, then, is a grammatical morpheme? It depends on the purposes of the analysis. In any event, it would be difficult to preprogram the child with an adequate definition.

3.2 What is a closed-class item?

One way of getting the child started in the task of grammatical form–function mapping has been to equip the language acquisition device with a
leaves open the question of how grammatical morphemes in general are discovered, and how they are mapped onto linguistically relevant notions.

The original motivation behind the definition of "closed" classes comes from the observation that some types of words are rarely added to a language; as a consequence, it is unlikely that speakers will encounter new instances of such words during their lifetimes. Languages are most free in adding new nouns over time, as new artifacts are created and new phenomena are categorized and labeled. It is my impression that verbs are hardly ever invented "out of whole cloth," as nouns are; rather, they tend to be derived from nouns by morphological or phrasal means—e.g. to xerox, to skateboard, to privatize, to test drive, to do a number.

The verb lexicon of a language can be subdivided into many limited, fairly closed classes that provide the language's analysis and categorization of a given conceptual domain. Consider, for example, the set of English verbs of manner of talking (shout, scream, whisper, mumble, mutter...), posture (sit, stand, lie, crouch...), or cooking (bake, fry, roast, boil...). Within such a subclass it is possible to find systematic sets of semantic components in quite the same fashion as componential analyses of grammatical morphemes. A good example is the domain of object destruction, which is quite elaborated in the English verb lexicon. We make distinctions of the nature of the object to be destroyed (e.g. break, tear, smash), force dynamics (e.g. tear vs. rip), the degree of destruction or deformation (e.g. cut vs. shred), the texture or constituency of the object (e.g. crumble, crumple, shatter), and so forth. In learning this "closed-class" set of verbs, the English-speaking child has acquired a language-specific set of linguistically relevant notions, and will not go on learning more and more such verbs throughout life. This process is, in principle, no different than the acquisition of a "closed-class" set such as the English spatial prepositions.

Organization of the verbal lexicon into classes also has profound syntactic consequences. As Beth Levin (1993) has documented in detail in her recent book, English verb classes and alternations, "verbs in English and other languages fall into classes on the basis of shared components of meaning" (p. 11), and the members of a class "have common syntactic as well as semantic properties" (p. 7). This pioneering attempt to characterize the "open class" of verbs as a collection of linguistically definable subclasses poses another type of challenge to theories that postulate a special psycholinguistic module devoted to the acquisition and processing of the "closed class."

### 3.3 What makes a notion grammaticizable?

The other side of the coin is to equip the child with grammaticizable notions that can be mapped onto the specialized morphemes of the "closed
class,” however defined. When we look across languages, though, we find that the same notions are often also used to delimit the meanings of content words — members of the open class — depending on the language and the type of analysis chosen. Simply identifying a notion as grammaticizable does not allow the child to determine whether it is actually grammaticized in the exposure language or how it is grammaticized. (That is, cross-linguistic diversity precludes a preestablished table of correspondences between grammatical forms and semantic meanings, as in Pinker 1984.) Again, there are many possible examples. I will consider three types of problem: (1) morphemes that are called closed class, or grammatical, in one language, compared with similar morphemes that are called open class or lexical in another; (2) languages in which variants of the very same lexical item can function as either closed or open class; and (3) pairs of languages in which the same type of conceptual material is lexicalized in one and grammaticized in the other. The dichotomy between two types of learning mechanisms becomes questionable in the light of all three phenomena.

3.3.1 Mandarin and English classifiers First, it is useful to consider one language from the point of view of grammaticized categories in other types of languages. For example, a Mandarin perspective on English brings our covert classifier system into focus. In Mandarin, as in many languages (cf. Craig 1986), when objects are counted or otherwise pointed to linguistically it is necessary to use a classifier morpheme along with the noun making object reference. Classifiers are considered grammatical morphemes in Mandarin because they constitute a small set with categorical meanings and are obligatory in certain contexts. One says, for example, yi qin ying ‘one flock sheep,’ nêi dai liu ‘that pile garbage,’ zheng chuan zhi ‘whole string pearl.’ Li & Thompson (1981:105) say that Mandarin has “several dozen classifiers” and Erbaugh (1986:406) reports that adults tend almost always to use the single general classifier ge rather than one of the special classifiers. It is apparent that there is a syntactic slot for a classifier, but that it rarely is occupied by a form that has specific meaning. Is this really any different from English, with regard to grammaticizable notions? In most cases, it is sufficient in English to use a numeral or demonstrative, without indicating class membership, and to use a plural morpheme for numbers greater than one; in Mandarin, in most cases, it is sufficient to use a numeral or demonstrative, with an empty classifier, and no noun marking for number. When it is necessary to classify in addition to counting or demonstrating, English has a set of classifiers quite analogous to Mandarin, as is evident in the translations above: flock, pile, strung. In fact, there is no other way to refer to such collections or pluralities in English. The English-speaking child must learn words like these — and grain, piece, sheet, slice, stack, cup, bowl, drop, etc. just as the Mandarin-speaking child must learn classifiers that translate as ‘slice,’ ‘animal,’ ‘row,’ ‘sheet,’ ‘pot,’ ‘grain,’ etc. Yet Chinese classifiers, by tradition, strike us as “grammatical” in a way that English measure terms do not. From the point of view of learning theory, though, it is not evident that the Chinese child is faced with a grammatical task, played off in a prespecified component of the language module, while the American child has to learn a very similar system using a quite different set of linguistic and cognitive resources.

3.3.2 Mayan motion verbs and directionals Mayan languages typically have a small, closed class of directional suffixes that can be used on verbs, stative predicates, and nonverbal predicates of various types, such as adjectives. For example, in Jakalte (Craig 1993) there are ten directional suffixes, such as -(a)y ‘down’ and -toj ‘away from.’ Consider an example in which these two forms are affixed to a caused motion verb (1993:23):

(4) sirnih-ay-toj she naj sat pahow b’et weich

A3 E3 throw-DIR-DIR E3,REFL NCL/be E3 in.front cliff into gully.

‘He threw himself down over the cliff into the gully.’

The first word, sirnih-ay-toj, affixes two directionals to a verb meaning ‘throw,’ similar to English verb particles. The directionals have all of the defining features of closed-class morphemes: there is a small, phonologically reduced set of bound morphemes, with schematic and generalized meanings. However, each of these suffixes corresponds to a full verb of motion, and such verbs are clearly open class by standard definitions. Craig presents the following parallels (1993:23):

<table>
<thead>
<tr>
<th>Motion verbs</th>
<th>Directionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>tayi ‘to go’</td>
<td>-toj ‘away from’</td>
</tr>
<tr>
<td>tita ‘come’</td>
<td>-iij ‘toward’</td>
</tr>
<tr>
<td>ahi ‘to ascend’</td>
<td>-(a)yj ‘up’</td>
</tr>
<tr>
<td>ayi ‘to descend’</td>
<td>-(a)y ‘down’</td>
</tr>
<tr>
<td>oki ‘enter’</td>
<td>-(a)lel ‘in’</td>
</tr>
<tr>
<td>eli ‘to exit’</td>
<td>-(a)lel ‘out’</td>
</tr>
<tr>
<td>eki ‘to pass’</td>
<td>-(a)lel ‘passing through’</td>
</tr>
<tr>
<td>paxi ‘to return’</td>
<td>-pax ‘back, again’</td>
</tr>
<tr>
<td>hanh ‘to remain, to stay’</td>
<td>-kan ‘remaining, still’</td>
</tr>
<tr>
<td>konh ‘to rise, to burst’</td>
<td>-konh ‘up, suddenly’</td>
</tr>
</tbody>
</table>

It would be strange to postulate two different learning mechanisms for these two sets of obviously related items. In fact, both sets are small and closed, and both have the familiar semantic characteristics of grammaticizable notions. Clearly, the directionals are grammaticized forms of the verbs. And just as clearly — within the “open class”— these ten motion verbs...
constitute a small, closed class. Indeed, as I will argue later, the verb class seems to consist of a number of small, closed sets, thus blurring further the distinction between "open" and "closed" classes.

3.3.3 Motion in English and Korean Soonja Choi and Melissa Bowerman, in an important paper (1991; also see chapter 16 of this volume), compare how children learn to express motion events in English and Korean. The details of the analysis cannot be explored here. What is significant for the present argument is the fact that meaning elements that are expressed by grammatical morphemes in English (verb particles) are expressed by verbs in Korean. Choi & Bowerman examine children’s acquisition of expressions for path of movement in English verb particles and Korean path verbs. Note, however, that this is a comparison of closed-class (English) and open-class (Korean) elements. Yet, a common developmental story can be told. This crosslinguistic comparison presents the same pattern as the intralinguistic pattern in the Mayan languages — namely, the expression of comparable locative notions in small, closed sets, as either “content words” or “functor morphemes.” Compare the set of Korean path verbs with the set of English particles:

Korean  | English
-------|-------
olla ‘ascend’ | up
mayje ‘descend’ | down
tule ‘enter’ | in
ra ‘exit’ | out
vina ‘pass’ | past, by
itala ‘move, along’ | along
thonghay ‘move, through’ | through
kalocille ‘cross’ | across
tulle ‘move, via’ | along, through

It is not evident that the task of learning a small, closed set of path verbs is qualitatively different from the task of learning a small, closed set of verb particles expressing path — though these two tasks would be assigned to two different modules or types of acquisition mechanisms on the standard account.

3.4 How are grammaticizable notions organized?

Up to this point I have treated grammaticizable notions as a universally specified collection, applicable across languages. However, it has become more and more evident in research since the late 1980s or so that there is considerable crosslinguistic variation in the meanings of closed-class categories, including both functors and small, closed verb classes. Melissa Bowerman has been a pioneer in arguing that “the way in which languages organize meaning . . . is an integral part of their structure” (1985;1313), with consequences for patterns of acquisition. Her work has demonstrated that children can be guided by language-specific form–meaning relations — perhaps from the earliest phases of acquisition — in establishing categories appropriate to the exposure language (Choi & Bowerman 1991; Bowerman 1994, 1996a, b; Bowerman, de León, & Choi 1995). This work has stimulated others to find similar patterns (e.g. Slobin 1991, 1996; Berman & Slobin 1994; Choi 1997). Crosslinguistic variation in types of “conceptual packaging” in a semantic domain poses another serious challenge to learning models, because there is no set of prelinguistic categories that can be directly mapped onto the meanings of linguistic elements. (See Bowerman 1996a for a recent and cogent exposition of this problem in the domain of spatial concepts and language.) Four types of problems must be faced by learning theories: (1) languages differ in how finely they divide up a conceptual continuum and in where they place cuts for grammatical purposes; (2) languages differ in the combinations of semantic components that are packaged into grammatical morphemes in common conceptual domains; (3) languages differ in the overall division of a semantic domain into linguistically relevant categories; (4) the array of concepts relevant to a particular domain is distributed across several types of linguistic elements in any given language, and the patterns of distribution also vary across languages. I will give examples of these four problem types.

3.4.1 Dividing a continuum into linguistically relevant categories Izchak Schlesinger has long argued for a distinction between cognitive and semantic levels of categorization (1982, 1988). In a broad crosslinguistic study he offers evidence for the proposal that “conceptually, the instrumental and comitative are really only two extreme points on what is a conceptual continuum” (1979:308). This continuum is marked by a single preposition in English —with— as shown in the following ten sentences that Schlesinger used in his study:

1. The pantomimist gave a show with the clown.
2. The engineer built the machine with an assistant.
3. The general captured the hill with a squad of paratroopers.
4. The acrobat performed an act with an elephant.
5. The blind man crossed the street with his dog.
6. The officer caught the smuggler with a police dog.
7. The prisoner won the appeal with a highly paid lawyer.
8. The Nobel Prize winner found the solution with a computer.
9. The sportsman hunted deer with a rifle.
10. The hoodlum broke the window with a stone.
English speakers were asked to rank these sentences on a continuum from the meaning of "together" (as in "He went to the movie with his friend") to the meaning of "by means of" (as in "He cut the meat with a knife"). The respondents agreed, at a high level of statistical significance, on the ranking given above. Schlesinger then presented these sentences to speakers of languages that use distinct grammatical forms for parts of this continuum. Speakers of twelve different languages divided the continuum at different points and agreed in treating it as a continuum. In general, wherever they may have made a division they did not violate the ranking. For example, sentences 1–8 received the same form in Iraqi Arabic, while 9–10 received a different form; Swahili, by contrast, required a separate form for 7–10. Schlesinger concludes that "the finding that languages differ widely in their cut off points runs counter to the hypothesis that the instrumental and comitative are two disparate categories in our cognitive structures... [Rather], there seems to be a continuum in our cognitive system, which each language segment in its own way" (1979:313).

More recently, Bowerman & Pederson (1992) report a similar pattern in the spatial domain. They found that it was possible to rank pictured situations of locative relations between two objects on a continuum from containment to support, with differences between languages in their division of the continuum. Thus, even if the child were equipped with predefined conceptual continua, it would not be evident how many linguistically relevant cuts to make on a continuum, or even whether it is divisible at all, since some languages use a single term for an entire continuum such as comitative-instrumental (e.g., English with) or containment-support (e.g., Spanish en).

3.4.2 Packaging components into linguistically relevant categories
Languages differ in terms of the "granularity" of their division of conceptual material into linguistically relevant categories. For example, one language may have a simple comitative aspect for any temporally unbounded situation, while others may subdivide this aspect to distinguish between habitual and iterative events, or between progressive events and states. Further, events can be cross-classified on different dimensions: one language may mark such distinctions only in the past, for example, while another might mark them in other tenses as well. It is the hope of cognitive linguists such as Jackendoff (1983, 1987, 1990) that there is a universal set of conceptual components underlying crosslinguistic diversity in the semantics of lexical items. I share this hope, but even if the child had a definitive set of such components, the task of packaging them into the linguistically relevant categories of the particular exposure language would remain. In some learning theories such packages are given in advance, as in Pinker's (1984:41) table of correspondences between grammatical and conceptual categories. On closer inspection, however, considerable diversity remains to be accounted for.

As one example, consider the grammatical category accusative, which appears in various languages in the form of case affixes or particles associated with nouns, or as verb affixes, or as special construction types. In Pinker's table, "Accusative" is linked with "Patient of transitive action." However, in many languages this semantic category is subdivided -- and in different ways. That is, it is not a unitary notion, nor does it lie on a one-dimensional continuum with other case categories, because the subdivisions cut across different types of categories. Here are just a few examples of the many possibilities:

Some factors influencing choice of grammatical marking of patient:
definite patient only (Turkish case inflection)
masculine animate vs. other, whole vs. partial patient, singular vs. plural
patient, affirmative vs. negative clause (Russian case inflections)
whole vs. partial patient, completed vs. non-completed action (Finnish
case inflections)
direct physical action on patient only (Mandarin particle)
patient marking (direct and indirect conflated) in present tense only
(Georgian)
one marker for patient, goal, recipient, beneficiary (English personal
pronouns)

This is just a very brief and simplified list, but it makes it clear that the notion of "patient," or "direct object," conflates with various other notions from language to language, including such categories as tense, aspect, definiteness, nature of effect, and so forth. It may well be that some packagings are more accessible to the child than others, and that children across languages begin with similar notions of patient (e.g., the prototypical event of direct physical manipulation proposed in my "Manipulative Activity Scene" [Slobin 1985]). This is, of course, an empirical question. But however children may break into the mapping of such grammaticizable notions, our learning theories will have to account for the selective fine tuning required for arriving at language-specific patterns of grammaticization. That is, regardless of a child's starting point in grammaticizing a particular notion, a developmental account is needed because the endpoints vary so much across languages.

3.4.3 Carving up a conceptual domain into grammaticized categories
The work of Melissa Bowerman and Soonja Choi is perhaps the clearest example of how languages not only place cuts at different points on a continuum, or confine different categories in particular grammatical forms --
but, more broadly, differ in structuring entire conceptual domains. This work has been presented in detail in a number of places (see references to Bowerman and to Choi in §3.4). The domain in question is spatial location and movement of various types, comparing English and Korean. Consider the domain of locative placement—that is, caused movement of an object from or to a location. It is evident that each of the two languages has a different overall conceptual organization of what it is important to mark linguistically in this domain. For example, English is concerned with relations of containment and support—whether one object is in or on another, whether an object is taken off or out in relation to another. Korean, by contrast, is concerned with the type of surface contact between two objects—tight or loose containment, contact or attachment with a surface. For example, where English uses the same term for putting an apple in a bowl or a tape cassette in its case, Korean uses two terms, indicating loose vs. tight fit. On the other hand, where English uses two terms to differentiate between putting a cassette in a case and a lid on a jar, Korean uses one, because these are both instances of tight fit. Working across entire semantic domains in several languages, Bowerman finds distinctively different arrays and combinations of conceptual features employed in the overall structuring of a domain for purposes of linguistic expression, concluding that children “must work out the meanings of the forms by observing how they are distributed across contexts in fluent speech” (1996a:425).

3.4.4 Distributing a concept across linguistic elements. The child not only has to keep track of the distribution of forms across contexts, but also the distribution of concepts across forms. Up to this point we have primarily considered individual forms, such as verbs, affixes, prepositions, and particles. But, in fact, most linguistic elements are only interpretable in relation to other co-occurring elements. To take a trivial example, an English personal pronoun, taken out of context, only indicates the global thematic relations of subject or object, and the object forms—me, us, him, her, them—do not distinguish such roles as patient, recipient, or goal. However, the forms are not ambiguous in context. The me of she loves me is not the same me, conceptually, as the me of she sent me a letter or she approached me. In English, these concepts are distinguishable in combination with verb semantics and construction type. In any given utterance, the meaning of the closed-class element, me, does not reside in that element alone.

Chris Sinha & Tania Kuteva (1995) have explored this issue in detail with regard to the semantics of locative particles in several types of languages, introducing the useful term, distributed spatial semantics. To begin with, spatial relational meaning is expressed in English by a variety of word types, both lexical and grammatical: prepositions (in), adverbs (inwards), verbs (enter), nouns (inside), adjectives (inner). Sinha & Kuteva also point out that construction types can distinguish aspects of spatial meaning, as in the following Dutch example, where the meaning of a locative particle, in, varies with its position in constructions with verbs of motion:

(6) a. Mieke loopt in het bos.
   ‘Mieke walks in the woods.’

b. Mieke loopt het bos in.
   ‘Mieke walks into the woods.’

Thus spatial relational meaning is distributed over different form classes and constructions.

Distributed spatial semantics can also have consequences for learning the meanings of closed-class elements, depending on their overall functional load in the language. English has a relatively large set of differentiated locative prepositions (at least forty). These forms can often distinguish between paths and figure-ground relationships on their own, with no further information provided by the verb. For example, using a neutral non-path verb such as put, English can differentiate placement from insertion by choice of particle: put the book on in the box. In a language like Spanish, where path is expressed by means of verb selection, there is a smaller collection of prepositions, each with a wider and more general range of meanings, such as en ‘in, on,’ a ‘at, to,’ de ‘from, of,’ por ‘through, via, along, by means of.’ Distinctions such as placement versus insertion must therefore be carried by the verb: poner el libro en la caja ‘place the book en the box,’ meter el libro en la caja ‘insert the book en the box.’ In both types of languages, sentences such as these require understanding of the meanings of all of the lexical items in order to build up the appropriate mental image of the event. However, because parts of the overall semantic content are differentially distributed across linguistic elements, the acquisition tasks differ. Although English and Spanish prepositions appear to be syntactically comparable closed-class items, they play distinctly different roles in the overall structure and use of the language.

Similarly, although English and Spanish motion verbs are “open-class,” they are distinctly different kinds of “open-class sets,” in that Spanish presents a small, closed class of path verbs which play a central role in describing motion events. The following set is typical of the Romance languages in general (and is comparable to the set of Korean path verbs in §3.3.3).

advance, approach, arrive – recede, depart
ascend, climb – descend, fall
enter – exit
pass, cross, come, return
Therefore I disagree with the proposal by Landau and Jackendoff that spatial verbs are qualitatively different from spatial prepositions: "We agree with Talmy (1983) that crosslinguistic investigation should focus on closed-class elements (whether verb markers, prepositions, postpositions, etc.) that express spatial relationships." (1993:238). This claim must be relativized to the overall typology of the language under consideration. One cannot "leave spatial verbs untouched" if one wishes to understand the patterning and acquisition of grammaticizable notions in a verb-framed language.

3.5 Summary

Let us briefly summarize the answers to the questions posed in the preceding four subsections before moving on to the diachronic evidence.

3.5.1 What is a grammatical morpheme? There is a cline of linguistic elements from fully lexical content words to fully specialized grammatical morphemes, but there is no obvious place to draw a line between lexical and grammatical items.

3.5.2 What is a closed-class item? The lexicon is made up of a number of classes, ranging from almost entirely open (prototypically nouns) to almost entirely closed (prototypically grammatical morphemes such as clitics and inflections).

3.5.3 What makes a notion grammaticizable? At present there is no useful answer to this question beyond an empirically based list of the notions that receive grammatical expression in the languages of the world. The same notions are found repeatedly in the analysis of both lexical and grammatical items, as has been noted frequently by linguists working in various traditions (e.g. Lyons 1968:438). A modern statement of this position can be found in Pinker's (1989) analysis of the acquisition of argument structure. He suggests that a single "Grammatically Relevant Subsystem" of concepts (derived from Jackendoff and Talmy) provides the "privileged semantic machinery" (p. 166) needed both to specify the meanings of closed-class morphemes and to organize verbs into subclasses that are sensitive to various types of lexical rules and patterns of syntactic alternation.

3.5.4 How are grammaticizable notions organized? There is great diversity across languages in the level of granularity, the number and positions of cuts on semantic continua, the types of semantic components employed, and the balance between different parts of the linguistic system in expressing grammaticizable notions. This diversity has not yet been sufficiently systematized to make claims about its conceptual or developmental underpinnings. At the present state of our knowledge, it is premature to attribute a particular organization of grammaticizable notions to the child at the beginning of language acquisition (pace Slobin 1985). It would seem more plausible to endow the child with sufficient flexibility to discern and master the particular organization of the exposure language.

4 Diachronic evidence for modifying the linguistic conditions on learnability

All of the dominant accounts of learnability attempt to relate the structure of the mind with the structure of language, as if these were the only two factors to consider. When the social factor is considered, it is only as a source of data: the "input" language, perhaps with some attention to the interactive speech contexts in which the input is situated. Accordingly, when there is not enough information in the input to account for the structure of language, it must be sought in the individual mind. The end result is always some kind of nativism, whether of syntactic form, semantic content, or some interaction between form and content, perhaps with various cognitive prerequisites added in. This argument has been re-stated thousands of times since Chomsky first proposed it in the 1960s. Of the many formulations, the following representative summary by Jackendoff (1987:87) is useful in clearly revealing the limited options that flow from this conception of the problem:

The claim, then, is that some aspects of our language capacity are not a result of learning from environmental evidence. Aside from divine intervention, the only other way we know of to get them into the mind is biologically; genetic information determining brain architecture, which in turn determines the form of possible computations. In other words, certain aspects of the structure of language are inherited.

This conclusion, which I will call the innateness hypothesis, provides a potential solution to the paradox of language acquisition by appealing to evolution. The child alone does not have enough time to acquire all the aspects of language that linguists are struggling to discover. But evolution has had more time at its disposal to develop this structure than linguists will ever have...

Note a jump in the argument: it begins by discussing "some aspects of our language capacity," but ends up with the claim that "certain aspects of the structure of language are inherited" (emphasis added). There can be no disagreement that aspects of the capacity to acquire and use language are inherited: this is a general truth about species-specific behavior. But the structure of language arises in two diachronic processes: biological evolution and ever-changing processes of communicative interaction. The
structure of language could not have arisen in the genetically determined brain architecture of an individual ancestor alone, because language arises only in communication between individuals. That is, after all, what language is for. As soon as we free ourselves of this confusion of levels of analysis – the individual and the social – many of the puzzles of language structure appear to have solutions beyond divine intervention or genetic determinism. The traditional attempt to account for linguistic structure is rather like trying to locate the law of supply and demand in the minds of the individual producer and consumer, or the shape of a honeycomb in the genetic structure of the individual bee.

Since the late 1970s there has been a rapidly growing interest in the historical, rather than the evolutionary processes that shape language – particularly with regard to the ways in which languages acquire and modify grammatical elements and constructions. A field calling itself “grammaticalization” or “grammaticalization” (see note 1) has revived longstanding interest in language change, using a wealth of new typological, historical, and psycholinguistic data and theory. As I have suggested, this field helps to explain the nature and origins of grammaticizable notions.

A central phenomenon of language change was already identified at the beginning of the last century by the French linguist Antoine Meillet. In 1912, in a paper titled “L’évolution des formes grammaticales,” he introduced the term grammaticalization to designate the process by which a word develops into a grammatical morpheme (“le passage d’un mot autonome au rôle d’élément grammatical”). This process provides an explanation of why it is impossible to draw a line between lexical and grammatical items, as well as why grammatical morphemes have their peculiarly restricted and universal semantics. Hopper & Traugott (1993:7) define a clitic as “a linguistic element from a lexical area” to a “grammatical area,” with no firm boundaries between the categories:

content item > grammatical word > clitic > inflectional affix

Diachronically “a given form typically moves from a point on the left of the cline to a point further on the right” (1993:7).

The literature is full of examples of the lexical origins of grammatical items. Familiar English examples are the development of the verb go from a full verb of motion to a reduced future marker gonna, and the development of modals from verbs of cognition and ability – e.g. can originally meant ‘know how to,’ may and might developed from a verb meaning ‘have the (physical) power to.’ The English contracted negative, n’t, began in Old English as an emphatic form, ne-a-wiht ‘not-ever-anything,’ used to reinforce another negative form, ne. By the time of Middle English it had contracted to nat and eventually replaced the nonemphatic ne, becoming the

new nonemphatic negative and finally contracting (Traugott 1972:146f).

This is the typical progress along the cline from full, stressed form with a more specific meaning, to reduced, unstressed form with a more general meaning. When such processes are traced out in full, the nature of grammatical morphemes – unstressed and general in meaning – is no longer mysterious. Here I will explore only one set of diachronic patterns in some detail, because it is relevant to several of the basic synchronic problems discussed in the previous section.

4.1 Origins and extensions of accusative markers

In the long history of Mandarin Chinese it is possible to see the entire developmental path from a lexical item to a grammatical morpheme (Lord 1982, with examples from Li & Thompson 1974, 1976). In the fifth century bc the verb BD was a full lexical verb meaning “take hold of.” Much later, in the time of the Tang dynasty (seventh–ninth centuries AD), it appears in serial-verb constructions, opening the way to reanalysis and eventual grammaticization. For example, the following sentence is open to two different interpretations:

(8) Zai bd zhigong zhi xi kan

drunk bd dogwood careful look

In the expected serial-verb interpretation the sentence means:

(a) ‘While drunk, I took the dogwood and carefully looked at it.’

However, a verb meaning ‘take’ can also be interpreted, in this context, as simply reinforcing the act of examining something that has been taken or held:

(b) ‘While drunk, I carefully looked at the dogwood.’

On this interpretation, bd has become a sort of object marker. Such possibilities of alternate interpretations open the way to the reanalyses that result in grammaticization. Sentence (8) “invites” a hearer to consider a single act – looking carefully, rather than two acts – taking and then looking carefully. This kind of “conversational implicature” (Grice 1975) or “pragmatic inferencing” (Hopper & Traugott 1993) can set a full verb like bd off on the course towards becoming a grammatical marker. And, indeed, that is what has happened in this case. In modern Mandarin, bd no longer has all of the syntactic properties of a full verb: it can’t take an aspect marker and can no longer occur as the predicate of a simple sentence meaning “take” (Li & Thompson, 1981:464ff.). Now it functions as an objective casemaker in the frame, SUBJECT bd DIRECT OBJECT VERB, as in:
However, the *bá*-construction is still not a full objective or accusative case marker. The process of grammaticization is long, and traces of the original meaning of a lexical item linger on to influence or restrict its grammatical function. The construction can only be appropriately used with a definite direct object, that is, to indicate a referent that the speaker believes the hearer knows about. And, most interestingly, it is further restricted to situations in which something happens to the object — in Li & Thompson's terms (1981:468), "how an entity is handled or dealt with." It cannot mark objects of verbs of emotion, like 'love' and 'miss,' or verbs of cognition, like 'understand' or 'see,' because these verbs do not imply manipulation or handling of the object. It may come to mark such objects at some future time, like accusative casemarkers in languages like German and Russian, but at present it still retains traces of its semantic origin.

Lord describes almost identical grammaticization processes in several West African languages of the Benue-Kwa group. In Akan and Ga, a verb that meant 'take, hold, possess, use' no longer occurs as a verb in simple sentences and does not reflect for tense/aspect. It is now an invariant, noninflecting morpheme that functions as a casemarking preposition but only when referring to physical manipulation and only in affirmative sentences (that is, manipulation that is actually realized). However, in a related language, Idoma, the corresponding morpheme has become a prefix and, although still restricted to affirmative clauses, can also mark the objects of experience, such as 'she prefix-tree saw.' Lord cites a parallel development in the Native American language, Chickasaw, which seems to be at an earlier stage in the process of using a verb meaning 'take' to mark instruments and objects that are moved by an agent.

None of the many language-specific variants of the "accusative" or "direct object" or "patient" category could be part of a child's initial assumptions about the "grammaticizable notion" underlying the object marker in any particular Asian, African, or Amerindian language. Clearly, the child must be guided by the patterns of the exposure language. To be sure, all of these examples are consistent with a collection of "grammatically relevant notions"—definiteness, negation, manipulability, agent vs. experiencer—but there are too many different packagings of such semantic and pragmatic characteristics to build in all of the possibilities in advance or rank them in terms of "naturalness" or "accessibility."

At the same time, there is something intriguing about the fact that a verb like 'take' can repeatedly develop into an object marker in languages that have nothing in common geographically or typologically. In earlier work (Slobin 1981, 1985) I suggested that children might begin to relate an accusative or an ergative casemaker, depending on the typology of the exposure language, to a notion of "prototypical direct manipulation," that is, "the experiential gestalt of a basic causal event in which an agent carries out a physical and perceptible change of state in a patient by means of direct body contact or with an instrument under the agent's control" (1985:1175). Verbs like 'take' clearly fit this definition. Can we conclude, then, that this is a privileged grammaticizable notion (§3.3, 3.5.3)? It is important here to distinguish between what is salient to the cognition and life experience of a 2-year-old and the processes that drive grammaticization in the discourse of adult speakers of a language. The "Manipulative Activity Scene" is central to a 2-year-old's interaction with the world, and grammatical markers that regularly occur in conjunction with such events may well come to be associated with the notion of manipulation or direct effect on an object. But adult speakers of Tang Dynasty Chinese, Akan, Ga, or Chickasaw do not set out to grammaticize manipulation or effect. Rather, they use a verb like 'take' in constructions that allow it to be interpreted as a marker of manipulation, and, over time, such verbs follow the familiarcline described by Hopper & Traugott. The processes, then, are quite different, though superficially similar. In order to fill out the picture, it is necessary to understand the psycholinguistic forces that move a linguistic element along that cline.

Diachronic paths of accusative development such as these raise critical questions for the Conditions and Assumptions of §2. Each step in the long evolution can be motivated by semantic and discourse factors — but at which point does the form mark a "true grammaticizable notion," and at which point is it a "true grammatical morpheme"? Which of the many "accusatives" in all of these language histories is the one to put on Pinker's innate chart of form/function correspondences? Which of these various historically attested grammatical morphemes corresponds to "core notions" like manipulation or purpose or goal?

4.2 Psycholinguistic forces responsible for restrictions on grammaticizable notions

Grammaticization paths such as those just sketched out take place, to begin with, in the processes of communication. Therefore they are shaped by the online demands on the speaker to be maximally clear within pragmatic constraints and maximally efficient within economy constraints, and by online capacities of the listener to segment, analyze, and interpret the message. Experimental and theoretical psycholinguists have learned much about these processes, in a literature far too large to cite or review here. It is clear
that pressures of expressivity, economy, and clarity are always in competition, keeping language always changing in shifting states of balancing equilibria (e.g., Slobin 1977; Hawkins 1983, 1994; Bybee 1985; Bates & MacWhinney 1987; MacWhinney & Bates 1989). Several psycholinguistic processes seem to account for the peculiar semantic limitations on grammaticizable notions that Talmy and others have discussed.

4.2.1 Frequency of use and generality of meaning Bybee (1985; Bybee, Perkins, & Pagliuca 1994) has explained much of grammatization in terms of the fact that lexical items that are used with high frequency also have general meanings. For example, motion verbs such as crawl, limp, hobble, creep, slither, wriggle are applicable to describing a small number of situations and are, accordingly, not very frequent. By contrast, generalized motion verbs like come and go do not have such restrictions; they are applicable to a wide range of contexts and are used frequently. Generality of meaning and frequency of use go hand in hand – both in the “open” and “closed” classes. For example, compare highly frequent English prepositions like in and on with less frequent and more specialized prepositions such as alongside, underneath, in back of (American) throughout. The latter require more detailed attention to the geometry of the objects involved, and are therefore applicable to smaller limited contexts.

4.2.2 Frequency of use and reduction of form It is also a commonplace that any motor program that is called upon frequently is reduced and automatized. Zipf (1935) demonstrated the strong tendency for the length of a word to be negatively correlated with its frequency. Note that the more specialized prepositions just listed are also much longer than in and on. They are also more etymologically transparent – that is, they still have recognizable lexical components, including nouns (side, back) and more frequent prepositions (in, of, etc.). It is no surprise that as lexical items move along the grammaticization cline they become phonologically reduced and bound to associated content words.

4.2.3 Frequency of use and online accessibility In order for a speaker to express any notion in language, it is necessary to make a rapid decision with regard to the appropriate means of expression of that notion. Elements that are highly frequent and general – both content words and grammatical forms – must be easily accessible to online processing for both speaker and listener. Again, the same processing demands apply to content words and grammatical forms alike. Eve Clark (1978) has observed that early in English child language development the most frequent verbs are go, put, get, do, and make. She reports similar findings for Finnish, French, Japanese, and Korean. This pattern probably reflects the high frequency of such verbs in adult speech, but the fact of their early frequency also bears on the issue of ability to choose the appropriate element online. In Clark’s examples, when a child says Do it! it might apply to unrolling some tape, taking out a toy, or building a tower. Make + noun can mean write, draw, move, cut out, and so forth. Do and make place low demands on online access. In order to say write or draw or cut out the speaker must decide what kind of act of construction is involved, and determine the distinctions that are lexicalized in the language (for example, in some languages a single verb means both ‘write’ and ‘draw’).

These same sorts of “light” verbs appear as the sources of grammatical morphemes, as the examples of ‘go’ and ‘take’ discussed earlier. Hopper & Traugott (1993:87) present this as a general fact of grammaticization:

As we have noted in previous chapters, the lexical meanings subject to grammaticalization are usually quite general. For example, verbs which grammaticalize, whether to case markers or to complementizers, tend to be superordinate terms (also known as “synonyms”) in lexical fields, for example, say, move, go. They are typically not selected from more specialized terms such as whisper, chortle, assert, squirm, writhe. Likewise, if a nominal from a taxonomic field grammaticalizes into a numeral classifier, it is likely to be selected from the following taxonomic levels: beginner (e.g. creature, plant), life form (e.g. mammal, bush), and generic (e.g. dog, rose), but not from specific (e.g. spaniel, hybrid tea), or varietal (e.g. cocker, peace) (Adams & Conklin, 1973). In other words, the lexical items that grammaticalize are typically what are known as “basic words.”

Again, it is an illusion that child language development and grammaticalization are due to the same sorts of processes. Children use basic verbs early on because they are easy to learn: they do not place high demands on lexical choice; they are frequent; they are used across a wide range of situations; they are short. But basic verbs appear at the beginnings of grammaticalization clines because, when they are used in a conversational context, they contrast with the more specific verbs that could be used in that context, thereby signaling to the hearer that those more specific meanings were not intended. This opens the way for the kinds of pragmatic inferencing and reanalysis that lie at the heart of grammaticalization.

Given these facts, it is evident that the special character of grammaticizable notions has its origin, in part, in the lexical items from which grammatical markers are prone to develop. That is, the “open class” is already organized into general and specialized terms – and this division can be accounted for by quite ordinary psycholinguistic and communicative processes. There is no need to postulate a special “grammar module” as responsible for these facts about the meanings of frequent lexical items. Why are such words prone to grammaticize? Because of their generality.
they are both highly frequent and likely to be used in contexts in which the speaker does not intend to communicate a specialized meaning. If I say, for example, “While drunk, I grasped the dogwood” or “seized the dogwood,” the choice of a specialized verb of taking or holding suggests to the hearer that I wish to focus on the manner of taking or holding. This is simply an application of Grice’s second maxim of Quantity: “Do not make your contribution more informative than is required” (Grice 1975). The hearer may well assume that I used a specialized verb because I intended to draw attention to the manner of acting. If, however, I use a more general verb like ‘take,’ the hearer will assume that I have followed the first maxim of Quantity, “Make your contribution as informative as is required (for the current purposes of the exchange),” and will not attend to the manner of taking the dogwood. In fact, following this maxim, the hearer might even at the interpretation given earlier in example (5b) — that is, background the fact of taking entirely and focusing on the act of looking, which is, after all, what may be relevant in this communicative situation. In such situations, the way has been opened for the grammaticization of ‘take’ as an object marker.

4.2.4. Frequency of use and schematization of a domain If a small set of linguistic items ends up being used frequently to reference divisions within a semantic domain, pressures towards easy lexical access will inevitably move the system towards a schematic representation of that domain, selecting a set of parameters or features for sorting instances. The most familiar example of schematization is an inflectional paradigm, in which slots are filled in for such features as person and number, or case and gender, and so forth. But schematization is also evident in linguistic systems which might appear to be more lexical than grammatical. A good example is Levinson’s (1994) analysis of the Tzeltal use of body-part terminology to locate an object in relation to a ground. In English we have suggestions of such a system in grammaticized expressions like in back of the house and lexicalized descriptions such as the foot of the mountain. In Tzeltal, as in many Mesoamerican languages, body-part terms are used systematically to specify the grounds involved in locative relations. One says, for example, that an object is at the ‘ear’ (= corner) of a table or at the ‘butt’ (= bottom) of a bottle (P. Brown 1994:750). Levinson shows that choice of body-part term is based on a precise geometric schematization of objects. For example, the base of an arc defines the ‘butt’ of an object, including the large end of a pear, the bottom of a bowl, and the point where a stem is attached to a leaf. If an object has two surfaces, the flatter, less-featured surface will be labeled ‘back’ and the opposing surface will be ‘belly’ if concave or convex and ‘face’ if flat. In order to use the system in Levinson’s

analysis, the speaker must carry out a series of algorithms, such as finding the orthogonal axis, finding the direction of the subsidiary arc, and finding junctures between surfaces. He proposes that, using such calculations of the intrinsic shape of an object, speakers know how to use the body-part terms with regard to any particular object. Thus, Tzeltal words like ‘butt,’ ‘ear,’ ‘belly,’ and ‘neck’ are as fully grammaticized as English prepositions. They constitute a small, closed set, with schematized representations of those features of their spatial characteristics that are used in the language to specify locative relations of particular types. Because body-part terms must be used to designate parts of any object in the world – doors, tables, computers, chili beans – speakers must be able to decide easily which term to apply to which part or surface of an object. Such a system cannot simply leave the speaker to pick a body-part term and search for a possible metaphorical extension; nor can it leave the speaker to use all possible body parts. Out of several hundred such terms, the language uses about twenty to label parts of inanimate objects. In order to apply this small set to all possible objects, there is no choice but to develop a way of schematizing their meanings within a structured semantic domain.11

4.3 A functionalist account of the classes of grammaticizable and non-grammatizable notions

If a domain is to be divided up such that each of the subcategories can be rapidly accessed online, by speaker and hearer, there cannot be too many divisions in the domain, nor can the deciding factors be infrequent or idiosyncratic. Typically, as forms become highly grammaticized, they divide up a domain exhaustively into a very small number of options: singular vs. plural (with possible additions of dual), perfective vs. imperfective, the six cases and three genders of Russian. Markers such as these are obligatory, which means they must be accessed in almost every utterance. The facts of language processing work against ambiguities of online access. The notions that evolve into such very small and obligatory sets must (1) unambiguously divide the domain, and (2) use criteria that are generally relevant to that domain. Thus it is no mystery that grammatical inflections do not indicate color or rate or ambient temperature: these are not aspects of experience that are universally applicable or memorable with regard to all of the event types that we talk about. That is, they are not aspects that are relevant to how we interpret and store events IN GENERAL. In order, for example, to grammaticize a temperature marker or a color marker, it would be necessary, first, to have a speech community in which lexical items of temperature or color occurred frequently in discourse, and in which there were a few general terms that marked readily agreed-upon distinctions, such as cold--
cool – warm – hot, or black – white – red – yellow – blue/green. Such scenarios are unlikely for several reasons. For one, these distinctions are not relevant to most of human discourse. The things that we care to communicate about, by and large, are true on cool and warm days; the things we act upon are important regardless of their color. Because we don’t tend to store such information in memory, such a language would place terrible burdens on deciding which linguistic form to use in referring to a situation. For example, if I wanted to tell you a juicy bit of gossip, I would have to remember whether the reported event (or the time of my hearing about it) occurred on a warm or cool day. Or when a newspaper reports a bomb explosion in the Paris Metro, he would have to know the color of the bomb, or the Metro, or the explosion. We do not grammaticize such notions because we do not think or talk in such terms.

"Lower" on grammaticization clines there are relatively small sets that provide options. For example, as discussed in §3.1.1, English has a small set of modal auxiliaries, supplemented by quasi-modals and some less clearly grammaticized terms. Most of the time modality can simply be left unmarked. The “zero option” means that it is not necessary to decide about the modality of every utterance. A similar function is provided by the general classifier gē in Mandarin. When a speaker does choose to mark modality in English or to classify a noun in Mandarin, a small set of terms is provided, with more flexibility in their applicability. Erbaugh (1986) finds about twenty-two classifiers in ordinary speech in Mandarin, and she reports that the same object occurs with different classifiers in discourse; e.g. different speakers viewing the same film referred to a goat with the classifiers yi-zhù ‘one, animal,’ yi-tāo ‘one, head,’ and yi-tiāo ‘one, long, thing.’ The choices in a set like the Mandarin classifiers do not unambiguously divide up a domain, but they are still semantically relevant to the nouns that are marked.

Relevance, however, does not have to be part of a universal human “semantic space.” There is nothing in the nature of our cognitive and linguistic systems that precludes grammaticization of idiosyncratic information if it assumes sufficient social or cultural relevance to be regularly communicable. For example, social structure is repeatedly grammaticized in choices of personal pronouns and verb inflections. Although a European speaker would find it hard to decide whether each person addressed is older or younger than the speaker, this is obligatory in Korean, and children learn to pay attention to this feature. English speakers in France might find it hard to decide if an interlocutor falls into the tu or the nous category, and, as Roger Brown and Albert Gilman (1960) have shown, the criteria for choosing one of the two pronoun types have changed historically and vary between European countries. The languages of the world grammaticize an array of social categories of rank, status, relative age, servitude, and the like. These are sociocultural facts, and could not possibly be part of the child’s innate linguistic categories or prelinguistic sensorimotor concepts. Yet they are grammaticized in those societies where they are relevant, and are marked with a small number of forms that are frequent and decidable online. The reason why languages have no grammatical markers for quantified categories of “fixed distance, size, contour, and angle” (Talmy 1988:171) is simply because human beings do not regularly code, store, and report their experience in these terms – not because these categories are a priori excluded from the grammar module. I would suggest, then, that anything that is important and salient enough for people to want to refer to it routinely and automatically most of the time, and across a wide range of situations, can come to be grammatically marked, within the constraints of online processing briefly alluded to earlier.

I believe that similar arguments could be made with regard to each of the “conceptual domains not accessible to grammaticization” listed by Talmy and others (as in (1b)). These arguments would draw on the factors of across-the-board relevance to human experience and communication, online decision making, and the availability of high-frequency and general lexical items that could start off paths of grammaticization in those domains. I leave it to the reader to try to find examples or counterexamples.

5 Challenges to learning theory

5.1 The conditions and assumptions of the learning task

In §2 I listed three linguistic Conditions and three psychological Assumptions underlying standard definitions of the task of learning to use grammatical morphemes. It is time to return to that starting point.

5.1.1 The conditions

Condition 1: there is a distinct and identifiable collection of grammatical morphemes, arranged in small, closed classes. It turns out that there is a cline of linguistic elements, arising naturally over time, and that the “distinct and identifiable collection of grammatical morphemes” only defines the endpoint of that cline. However, looking at an entire language, one can only rank elements on various dimensions, both formal and functional. There are, to be sure, many small, closed and semi-closed sets of items – but they are not all grammatical morphemes. Thus the language does not present itself to the learner as neat set of little packages labeled as “grammatical” and “lexical.”

Condition 2: these morphemes map onto a universal, limited set of semantic entities (grammaticizable notions). The further one moves to the right on
the cline, the more true is this condition. And there are regular diachronic progressions of particular types of meanings towards the highly grammaticized pole of the cline.

Condition 3: grammaticizable notions are arranged in a universal accessibility hierarchy. If "accessible" means either "learnable" or "more frequent in human languages," we lack the data to evaluate this condition. If "accessible" means that some notions are more likely to grammaticize than others, the claim can be filled out with more and more data, and the patterns are amenable to explanation in terms of such interacting factors as online processing, pragmatic inference, and syntactic reanalysis.

5.1.2 The assumptions

Assumption 1: Conditions 1, 2, and 3 exist because of the structure of the mind-brain (in modules for aspects of language, perhaps in conjunction with other modules). There is a great deal of evidence that the Conditions exist because of conditions on the processing, social use, and learning of form–function relations. Such evidence greatly reduces the role of a priori specification of grammatical structures and their specialized meanings.

Assumption 2: the role of linguistic input is to allow the relevant mental capacities to organize themselves in terms of the exposure language. This, of course, remains true - but relativized to the definition of "relevant mental capacities." Linguistic diversity in the domains considered here precludes a simple selection between prespecified alignments of formal and semantic categories. The role of linguistic input is to guide the child towards discovery and construction of the form–function relations inherent in the exposure language. That is, input is not a "trigger" but a "nutrient."

Assumption 3: the child learns the meaning of a grammatical form by isolating and identifying a particular stretch of speech as instantiating a grammatical form and attempting to map it onto a relevant grammaticizable notion. This formulation is built upon a priori definitions of "grammatical form" and "relevant grammaticizable notion" - the very concepts that demand reanalysis. The result of that reanalysis is, of course, the challenge to learning theory.

5.2 Towards a solution

It is not (and cannot be) the goal of this chapter to answer these challenges by presenting The Adequate Learning Theory. At best, a reorientation might serve to head us towards different kinds of solutions. Once we have established a social-historical, rather than an individual-mind source of grammaticized notions and their means of expression, we can abandon the search for an innate form–function module and follow Annette Karmiloff-Smith (1992) "beyond modularity." That is, we can take a developmental approach to the structuring of grammaticizable notions in the child. A major theme that emerges from the reanalysis is the proposal that the same learning mechanisms apply across the lexicon, including "content words" and "functors." To be sure, the child requires specialized mechanisms of perception (auditory for speech, visual for sign), storage, and analysis of linguistic material. And the architecture of syntax is certainly determined by quite different processes than those involved in learning the kinds of form–function mappings considered here. The reanalysis of the learning task places "grammaticizable notions" in the more general domain of concept formation.

5.2.1 The problem of constraints on hypotheses: what is "economy"?

Regardless of the revision of the task definition, the child will always be faced with a large set of possible form–function mappings. My very brief overview of a few problems to do with the grammatical marking of semantic and pragmatic categories makes it evident that the child could be prey to many false starts and dead-end attempts. This fact alone has led to the proliferation of "constraints," "predispositions," "parameter settings," "operating principles," and the like in the theoretical literature of recent decades. But there are no obvious constraints on the constraints, because we have no plausible metric of what makes a task "too hard" for a child learner. We know that children do acquire the manifold and subtle complexities of language. And we realize that this is a hard task for conscious, problem-solving adults (even linguists). Therefore we try to make the task "easier" for children by providing bootstraps that they can use to pull themselves up (an unclear metaphor at best). The list of grammaticizable notions was intended to provide an aid - intended to prevent the child from making too many false hypotheses. But, I would propose, we really have no way of knowing how many false hypotheses it takes to overburden the vastly complex human brain, or how quickly and efficiently they can be revised or dismissed. It is unsettling to realize how many of our theories are aimed at the simplistic criterion of "economy," when we have no rational measure of that economy.

5.2.2 What is "reasonable"? Having voiced these qualms about the soundness of our endeavor, I will return to the attempt to give the child some guidelines for the task. Our theories are haunted by the risk that children might think that everything might be relevant to everything. Our data, however, suggest that children are more "reasonable" than that. As developmental psychologists have pointed out, children are at work constructing "intuitive theories" of domains of experience (e.g. Keil 1989, 1994; Gopnik
Hypotheses about the meanings of linguistic forms occur in the context of such general theorizing, which provides the child with "reasonable" factors to consider when encountering, say, verbs of motion or locative particles or casemarkers. Recall the diachronic processes of grammaticalization (and, I would add, the processes of forming small sets of specialized verbs). The only available items are those which occur again and again in talking about a great range of experiences. They occur so frequently because they are applicable so generally. Therefore it should be no surprise that children find these notions salient. For example, the factors that apply to many instances of moving and placing objects include the force−dynamic and motoric aspects of picking up an object, moving it, and placing it in another location. It is "reasonable" for grammatical items and small verb sets dealing with these actions to be sensitive to such factors as characteristics of figure and ground objects, direction of movement, and relation of the two objects at the end point of the action (e.g. tight fit, located near the bottom of another object, etc.). The color of the objects or the time of day are not relevant to this type of scene, given the kind of social world in which we live at present. In fact, then, children are reasonable because languages are reasonable. It has been assumed in the literature that it is odd that systems of grammatical meaning, and children acquiring such systems, seem to be indifferent to "non−grammaticalize" notions such as those listed by Talmy. However, if we look carefully at the communicative contexts in which language is used - both on the diachronic and ontogenetic planes - the situation seems much less odd. I suggest that the same factors that keep certain notions from becoming grammaticalized also keep children from postulating them as the meanings of grammatical forms.

There are several parts to this argument. One part is social−pragmatic, as has been eloquently and elegantly advanced by Tomasello (e.g. 1992, 1995, ch. 5 of this volume). That is, the child is at work figuring out adults’ intentions, aided both by social knowledge and by the cooperative communicative behavior of adults. Another factor is what might be called "the texture of experience." For example, particular colors do not occur frequently in association with the linguistic encoding of particular event types. The child is not likely to encounter one set of object placement events that consistently occur with red objects and another with black ones. Even a simple model of statistical sampling, not to mention a connectionist network, would quickly drop color as a determining factor in choice of linguistic form. And a third factor can be found in the nature of form−function mappings themselves. It has long been noted by linguists that grammatical morphemes are placed in association with the content words with which they have the most conceptual affinity - e.g. tense is marked on verbs rather than nouns, shape classifiers are placed in relation to object nouns or verbs of handling, and so forth. A classic formulation of this principle was offered by the German linguist Behagel (1932:4): "What belongs together mentally is placed close together syntactically." Bybee (1985) has refined the principle, showing not only that particular notions are relevant to verb stems, but that grammatical morphemes reflecting such notions are ordered in a reasonable way, with those meanings that are most relevant to the meaning of the stem occurring closest to the stem, and often phonologically fusing with the stem. Bybee’s analysis is part of a series of discoveries of the "iconicity" of form−function mappings in language (e.g. Haiman 1985a, b). To the extent that the arrangement of linguistic items is a "diagram" or "icon" of the arrangement of mental items, the child may be aided by "iconic bootstrapping." There are many examples of iconicity in children’s early grammars, across languages, summarized in Slobin (1985). Putting these various sorts of factors together - social−pragmatic, environmental, linguistic - reduces the need to posit a priori constraints on form−function relations.

5.2.3 Typological bootstrapping In the process of concept formation, children build up and revise "explanatory systems" that are relevant to classes of phenomena. As the child develops a successful explanatory structure for part of the exposure language, other parts become more accessible - that is, a coherent theory of the language begins to emerge. This is true, in part, because the language really is a fairly coherent system - as a result of constant balancing out of competing forces. Over time, each language acquires a typological character resulting from the particular interplay of forces in its history. (There is a small number of language types, but this is not because there is a small number of innate parameter settings; rather, there is a small number of solutions to the kinds of competing forces which shape language in use.) At the risk of overburdening the child’s shoe-rack, I propose yet another kind of bootstrapping: typological bootstrapping. For example, Korean uses verbs to express paths of motion, while English uses particles; and each language uses particular semantic features in categorizing location and movement. As a Korean child learns more linguistic constructions describing motion events, the lexicalization patterns and grammaticalized notions of the language become an established pattern. She comes to expect that paths will be lexicalized in verb stems, that cause−motion verbs are sensitive to properties of the objects involved, and so forth. The English-speaking child comes to expect verb particles to structure domains in terms of locative and temporal relations, and finds that certain locative and temporal notions occur again and again. That is, to some extent, the language structures itself as it is learned. Certain patterns of semantic and formal organization become more and more familiar, and,
to use an old term, habits are established. This is possible because of the fact that languages naturally develop into coherent systems of various types. As elements of a system are learned, they come to interrelate because of inherent typological factors. In Karmiloff-Smith's (1992) terms, “representational redescription” occurs—in this case aided by the systematically inherent in the language that is being learned.

An intriguing consequence of typological bootstrapping is that children come to formulate experience for linguistic expression in quite different ways, depending on the type of language they are learning. I have suggested that each type of language fosters its own modes of “thinking for speaking” (Slobin 1991b, 1996). Because of the systematic crosslinguistic diversity in selection and patterning of grammaticizable notions, different patterns of online mental organization result. In crosslinguistic work on narrative development, Ruth Berman and I (Berman & Slobin 1994) have identified a number of ways in which children come to structure discourse in terms of the typological characteristics of the particular language. By school age, children have acquired typologically distinct ways of describing events and constructing connected texts. From this point of view, grammaticizable notions have a role in structuring language-specific mental spaces, rather than being there at the beginning, waiting for an input language to turn them on.

I am aware that this formulation still leaves open the mechanisms that a child might use to detect and “representationally redescribe” the systematicity of the exposure language. Various sorts of “operating principles” and “procedures” will be needed in order to give substance to the formulation. However, the very fact that form–function relations become systematically patterned in the course of acquiring a particular language points to an important learning mechanism. As suggested above, in the course of development the child comes to attend to particular types of meanings and to expect them to be expressed by particular types of forms. Such a combination of thinking for speaking and typological bootstrapping seems to guarantee that language-specific form–function patterns will be established and maintained by learners.

5.2.4 In my end is my beginning. Allow me to end on a retrospective note. Since the 1960s our linguistic, psychological, and philosophical disciplines have sought to replicate themselves in the mind/brain of the child. The modules that are postulated often have names that evoke suspicion: they are the names of our own academic fields (linguistics, mathematics, biology, or subfields (closed-class morphemes, grammaticizable notions). Could God or evolution have anticipated the academic and intellectual organization of late twentieth-century America? At the beginning of my career I was skeptical of building academia into the child. Later I found it attractive to “help” the child by removing some problems from the learning task. Now—partly to my surprise—I find myself thinking things that I said long ago (Slobin 1966:37ff.):

[According to Chomsky] the reason that human languages utilize such strikingly universal grammatical relations and formal devices is... due to the fact that these universal characteristics are themselves part of the innate structure of man... I would rather think of the child as learning [a category such as the Russian animate accusative] through feedback than to have him waiting for confirmation of dozens of such categories from his mother's expansions. It seems to me more reasonable to suppose that it is language that plays a role in drawing the child's attention to the possibility of dividing nouns on the basis of animacy, or verbs on the basis of duration, or determinacy, or validity, or pronouns on the basis of social status, and the like.

NOTES

I have benefited from many long discussions of these topics with Melissa Bowerman, and she will find her influence obvious in the revisions of my earlier position. I am also much to Joan Bybee, Alison Gopnik, Len Talmy, David Wilkins, the many colleagues in Nijmegen who have provided simulation and (re-)education, and the participants in the 1995 conference on “Language acquisition and conceptual development.” Thanks also to Paul Bloom, Steve Levinson, Marianne Mithun, lechak Schlesinger, Elizabeth Traugott, and Tania Kuteva for valuable correspondence regarding this paper. A longer version of this chapter has been published as “The origins of grammaticizable notions: beyond the individual mind” (Slobin 1997).

1 At present there are two roughly synonymous terms in the literature: “grammaticalization” and “grammaticization.” I prefer the former, shorter form, but nothing hangs on the difference. Theorists working within the same overall theoretical framework have not agreed. It seems that American researchers prefer “grammaticization” (e.g., Wallace Chaik, Marianne Mithun, Joan Bybee, and her associates), while those of European origin prefer “grammaticalization” (e.g., Elizabeth Traugott, Paul Hopper, Bernd Heine, and his associates).

2 This is a partial listing, extracted from Talmy (1985:126–138). The domains listed in (1a) can be expressed by bound morphemes (inflections), suggesting that they are more highly grammaticized than other domains that Talmy lists as being realized as satellites to the verb. The important distinction for present purposes is between (1a) and (1b). For details, see Talmy (1985).

3 Various investigators have proposed that the hierarchy corresponds to the frequency of occurrence of grammaticized notions in the languages of the world (e.g., Pinker 1984:171; Bowerman 1985:1306). This suggestion has at least two major problems: (1) we lack an adequate sample of the world's existing languages, and can never have a full sample of all of the languages that have been used by human beings; (2) on this hypothesis, languages using “bare” forms should pose problems of acquisition and processing—but there is no evidence for such problems. (For discussion of these issues, see the longer version of this chapter (Slobin 1997).)
There is also a long tradition in aphasiology that has sought to find a neurological basis for grammatical morphology in syndromes of telegraphic speech. The classical claim has been that closed-class items are lost, thus proving that they reside in a distinct module. However, by now there is ample evidence against the view that agrammatism is simply an impairment of linguistic structure. Grammatical morphology is often preserved in judgments of grammaticality and in tasks that reduce online time pressure; cross-linguistic studies of aphasia show differential loss of grammatical morphemes, depending on both their “functional load” in the language and their acoustic salience (e.g. Bates & Wulfeck 1989). All of these findings remove any basis for a neurological definition of the closed class as a linguistic subsystem. What remains is a congeries of factors which lie outside the various attempts to distinguish the two classes on linguistic grounds, including “the sonority hierarchy, the status of an affix with respect to derivational or inflectional morphology, the lexical status of a root or stem, the salience of a lexical item, attentional and control processes” (Caplan 1992:340).

Abbreviations: A = Absolutive, DIR = Directional, E = Ergative, NCL = Nominal classifier, REFL = Reflexive.

The languages were Slovak, Serbo-Croatian, Iraqi Arabic, Polish, Luo, Akan, Alur, Finnish, Swahili, Japanese, Korean, and Tamil. This ordering of languages reflects the division point on the continuum, from mainly comitative to mainly instrumental. For example, Slovak uses a distinct instrumental only for sentence 10 (“with a stone”), whereas Tamil uses a special comitative form only for sentences 1 and 2 (“with the clown,” “with an assistant”).

Pinker attempts to deal with the typology of Nominative/Accusative and Ergative/Absolutive languages by linking “Agent of transitive action” with “Accusative or Absolutive,” and “Agent of transitive action” with “Nominative or Ergative.” This leaves the child with the problem of determining the typology of the exposure language, with problems such as those spelled out by Van Valin (1992) for ergative languages.

Note that the existence of clines wreaks havoc with parameter-setting theories, which rely on discrete categories and principles that are applicable throughout a language.

Two recent overviews, both with the title Grammatization, have been provided by Heine, Claudi, & Hünnemeyer (1991) and Hopper & Traugott (1993). An early and insightful approach was developed by Bybee (1985), elaborated in successive papers with various collaborators, and most recently presented as The evolution of grammar (Bybee, Perkins, & Pagliuca 1994). Two volumes of conference papers, Approaches to grammatization, have been edited by Traugott & Heine (1991) and published in the John Benjamins Series, “Typological Studies in Language,” which includes many books dealing with diachronic linguistic issues. The journal Language Variation and Change is a forum for diachronic research using statistical methods. The closely related field of “typology and universals” places diachronic issues in a synchronic framework; see textbooks by Comrie (1981) and Croft (1990), and the new journal, Linguistic Typology, of the recently established Association for Linguistic Typology.

For a similar argument against equating processes of ontogeny and grammaticization, see my discussion of the development of the English perfect (Slobin 1994).

Levinson proposes that the schematization is given by the visual system, thus raising a problem for modularity theories: “According to modularity arguments, linguistic processes should have no access to strictly visual processes. Although the present facts are not decisive, together with other observations they favor models where there is shared linguistic and visual access to the underlying processes of volumetric shape analysis” (1994:794).

What was, in retrospect, not “reasonable” was my Platonic hope that all children would start with the same semantic notions — the “Basic Child Grammar” of Slobin (1985).

“Das obere Gesetz ist dieses, daß das geistig eng Zusammengehörige auch eng zusammengestellt wird.”

REFERENCES


