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# BOOK REVIEWS

WILLIAM D. O'GRADY, *Syntactic development*. Chicago, London: The University of Chicago Press, 1997. Pp. ix+409. ISBN 0-226-62077-8.*

The scope of O'Grady's new book is significantly narrower than its title (and perhaps its size too) suggests. This is a book about the PRIMARY acquisition of ENGLISH syntax in MONOLINGUAL children. The back cover recommends it as both a 'reference for specialists in the field of language acquisition' and an 'excellent introduction to the acquisition of syntax for students and researchers'. A bold and perhaps even improbable claim, but, as I hope to show, not one that is annoyingly far from the truth. My impression of this book is quite favourable, although I do have some reservations, which I will outline later in this review. It is impossible to present a comprehensive summary here. Instead, I will highlight a handful of chapters that I found particularly interesting, or that inspired a note of criticism.

*Syntactic development* consists of two parts. The first (Chapters 2–11) deals with the developmental data on a well-chosen array of syntactic phenomena; the second (Chapters 12–16) presents an overview of theoretical issues in learnability and development. The introductory chapter acquaints the reader with some basic concepts and assumptions. Its primary message is that the acquisition of language cannot be fruitfully studied without a general conception of the grammar that the child will eventually attain. This sets the tone for the remainder of the book. O'Grady's presentation rests largely on formalist approaches to acquisition, although certainly not to the exclusion of contributions from other schools of thought.

The first two chapters of the first part deal with the earliest phases of syntactic development, the one-word stage and the stage of early multi-word utterances. Chapter 2 begins with a discussion of how children extract and segment lexical items from the speech input. O'Grady connects this to individual differences in processing (analytic vs. holistic) and language use (referential vs. expressive), but the relation of these topics to general issues of grammatical development is not made clear. The categorial status of first words is discussed, against the back-drop of the continuity–discontinuity debate. Next, the alleged primacy of nouns, and the explanations for this phenomenon are discussed. The chapter continues by pointing to the production–comprehension discrepancy, as indicated by experiments (notably Hirsh-Pasek & Golinkoff's, 1991) that suggest that one-word-stage children understand syntactic structure. Finally, some of the phenomena marking the transition to the multi-word stage are presented.

[*] Thanks go to Maaike Verrips for her helpful comments on a draft version of this review.

Chapter 3 comprises a historical overview of the various theoretical approaches to early combinatorial speech: thematic analysis, pivot grammar, limited scope analyses, and formal syntactic approaches. O'Grady concludes that the hypothesis that children's early utterances are built from abstract syntactic categories has the best credentials, although he adds that it is quite possible that the early syntactic categories are sub-classified according to semantic features.

Starting with Chapter 4, most chapters and sections are cast into the same mould. First, a general sketch of the syntactic phenomenon under review is given, in relatively a-theoretical and non-technical terms. Next, the author gives a roughly historical overview of the relevant empirical studies, both on spontaneous production and comprehension. Each chapter is concluded with a brief summary of the empirical data, the general pattern they show, and the issues that remain to be resolved. The syntactic phenomena discussed are, in order of presentation, word order and case (Chapter 4), subject drop (5), embedded clauses (6), questions (7), inversion (8), relative clauses and clefts (9), passive (10) and anaphor resolution (11).

Chapter 4 opens with the common observation that children hardly ever commit word order errors, and goes on to discuss the few types of word order problems that have been reported. O'Grady surmises that the fixed word order of English is at the basis of children's lack of errors. To endorse the point, he argues, on the basis of Clahsen's (1986) work, that German children initially are 'confused' about word order, and that this may be due to the complexities of verb second. This is one of the very few mistakes in the book. Recent work by, e.g., Poeppel & Wexler (1993, cited in Chapter 15) has shown that German two-year olds know very well that finite verbs go into the second position, and infinitives into the sentence-final position. The point is that they often use an infinitive matrix verb instead of a finite verb. This is the so-called 'optional infinitive' phenomenon (Wexler, 1994), which figures quite prominently in the recent literature, but is not mentioned by O'Grady.

The section on case contains an extensive discussion of children's use of accusative and genitive pronouns in subject position (e.g. *me got bean*), and, among other things, it questions the generality of the phenomenon. This ends with an interesting discussion of Budwig's observation that *I* appears to be associated with low agentivity, whereas *my* signifies high agentivity and control, and *me* takes an intermediate position. I have always wondered how children could come up with such a quirky system of form-function mappings. Budwig herself has suggested that patterns in the input play a role (Lieven, 1997). O'Grady cites evidence of languages in which agentivity and control are crucial to subject case marking, and thus suggests that universal grammar determines the learner's hypothesis space. This is a neat example of how functionalist and formalist approaches can provide complementary contributions to our understanding of child grammar.

Chapter 5 reviews several hypotheses that have been advanced to explain subject drop in child language. O'Grady discusses the processing accounts of P. Bloom (1990) and Valian (1991), Gerken's (1991) phonological approach, and the grammatical accounts, notably Nina Hyams' (1986) pro-drop theory, as well as O'Grady, Peters & Masterson's (1989) proposal that early subject drop is related to the absence of tense contrasts. It has been suggested that children need to look at embedded clauses in order to determine whether the input language has pro-drop or not. O'Grady argues that children can do this, since German children show a preference for verb-final word order, which is typical of subordinate clauses in their language. Regrettably, once again, this claim is unjustified. The verbs that German children use in clause-final position are infinitives, not the finite forms that are distinctive of dependent sentences. Thus, the observation does not suggest anything at all about children's sensitivity to embedded clauses.

Chapter 5 concludes with a summary of formal and functional explanations for the quantitative difference between subject drop and object drop. Other asymmetries between subjects and objects in child language figure quite prominently in Chapters 7 and 9. In Chapter 7, O'Grady dwells on the observation that object *wh*-questions are more difficult (i.e. acquired later, more comprehension errors) than subject *wh*-questions. Parenthetically, this chapter also contains a precise and lucid summary of the intricate experiments that have been conducted to determine children's knowledge of the constraints on *wh*-movement. Chapter 9 highlights the subject–object asymmetry in the interpretation of relative clauses. The overall picture that O'Grady sketches is that children's difficulty with gaps (traces) is correlated with depth of embedding. Thus, subject gaps (in both questions and relative clauses) lead to fewer comprehension errors than direct object gaps, and these in turn are easier than prepositional object gaps. To me, these observations suggest that children have an excessively dominant 'active filler strategy' (Frazier, 1987). They want to associate a moved phrase, or some other antecedent, with the first available theta position in the subsequent structure, even up to the point of rejecting other, longer-ranging dependencies. This raises the question of whether locality requirements in general are stronger in the early grammar than in the mature grammar, and if so, whether there is a relation with the maturation of working memory capacity. But such questions are beyond the scope and purpose of O'Grady's book.

Chapter 11 is another good example of O'Grady's ability to present a complex subject – the interpretation of anaphors – in a lucid, non-technical way, without unwanted simplifications. The chapter opens with Barbara Lust's (1981) discovery of children's strong preference for forward pronominalization (as in *Because Sam$_i$ was thirsty*, *he$_i$ drank some soda*). This sets the stage for the introduction of a structural constraint on the interpretation

of pronouns, *viz*. Principle C of Chomsky's binding theory, and the empirical controversies (stages vs. immediate mastery) that surround its acquisition. This section contains a careful evaluation of the experimental evidence that has been brought to bear on the issue. Next, O'Grady moves on to reflexive pronouns, and introduces the famous (or infamous, if you like) Principles A and B. This, of course, necessitates an explanation of the notions C-COMMAND (dubbed 'prominence' by O'Grady) and MINIMAL DOMAIN ('locality'). All of this leads up smoothly to the empirical picture that has emerged from the many experimental studies conducted over the past 20 years: children have much less trouble understanding reflexives than pronominals. This observation has given rise to numerous controversies, ranging from the technical details of stimulus presentation to the correct formulation of the binding theory. O'Grady succeeds in giving a well-informed and eminently comprehensible review of the major issues. A careful reading of this chapter will enable anyone to understand any recent paper on the issue.

The second, theoretical part of the book starts with a well-balanced presentation of the issues pertaining to the learnability problem, i.e. how the acquisition device is capable of constructing a grammar. First, Chapter 12 outlines the knowledge system that the LAD creates, the grammar. O'Grady comes up with a common sense description of the grammar, in that it contains those components that any syntactician would agree to be indispensable. Next, O'Grady goes on to describe the nature of the evidence that the language acquisition device has to work with. He gives an adequate overview of the relevant issues with respect to motherese, and presents the received view on negative evidence (i.e. there is no negative evidence in the strict sense, and if it is provided, children do not seem to profit from it). O'Grady discusses the evidence in favour of the 'interpretability requirement', i.e. the requirement that both utterance forms and meanings are available to the learner. This sets the stage for a discussion of the 'poverty of the stimulus', which, in its turn, is presented as the classical argument for the assumption that the acquisition device comprises 'wired-in' knowledge. The innate knowledge need not be specifically linguistic, but in UG-based theories on language acquisition it is. The UG framework is presented in Chapter 13, which is concluded by an insightful discussion of the pros and cons of the parameter setting hypothesis. It is to be regretted, however, that the chapter does not mention the latest developments, such as minimalism and, in particular, optimality theory, which offers a new and interesting perspective on acquisition, radically different from parameter setting.

In presenting alternatives to the UG framework (Chapter 14), O'Grady restricts himself to theories that share the premise that linguistic development entails the emergence of a system of grammatical representations and principles. Hence, attention is given to distributional learning as proposed by Maratsos (1982), as well as some semantic approaches, notably those of

Braine (1987) and Schlesinger (1988), and to Slobin's (1973) operating principles framework. On the same criterion, the author ignores connectionist approaches. To my mind, this is a missed opportunity, possibly based on an outdated picture of connectionism. In discussing the inductivist approaches, O'Grady concludes that they seem incapable of accounting for the acquisition of hierarchical structure and the constraints on gap placement and pronoun interpretation, and that '[s]ignificant breakthroughs in these ... areas are necessary before the prospects of this approach to learnability can be evaluated more fully' (p. 303). Perhaps the word 'breakthrough' is too strong, but the field has recently seen some highly interesting demonstrations that inductivist (i.e. connectionist) learning devices can develop structural representations that go beyond the statistical relations in the input data, much like those that linguistic theory envisions (Elman, Bates, Johnson, Karmiloff-Smith, Parisi & Plunkett, 1996).

The author concludes Chapter 14 with an overview of his own alternative to the UG-based approach, which he has dubbed 'general nativism'. In contrast to the UG framework, general nativism does not assume the existence of an innate grammar. Rather, the language acquisition device is conceived as a set of processing and knowledge modules rooted in general cognition, which interactively construct the categories and representations of grammar. General nativism differs from the purely inductive theories in that it assumes that a substantial reservoir of knowledge is present prior to the onset of language acquisition. This innate knowledge is not presumed to be procedural, as in e.g. the operating principles framework. Rather, it comprises a 'language of thought' as well as semantic concepts and distinctions.

For instance, the acquisition of syntactic categories is thought to build on semantic knowledge contained in the conceptual module. It is assumed that each of the major syntactic categories (N, V, A) is uniquely associated with a conceptual category: verbs denote events (both actions and states), nouns denote entities that can be individuated, and adjectives denote gradable properties. Each of these categories is linked to a restricted set of attributive notions or dimensions, and the conceptual module comprises these associations. Events are connected to the temporal dimensions expressed by tense and aspect markers. The possibility of individuating something is associated with the possibility of making specific or definite reference to it (e.g. by means of determiners). Gradable properties are connected to notions that express gradation in one way or another. These associations are universal, although the linguistic means by which the attributes are expressed vary. To determine, for example, whether a word is a verb, the learner will try to find evidence that it can co-occur with elements that express tense and aspect, irrespective of what these elements look like (adverbs, inflections, etc.). In a similar vein, O'Grady explains how the propositional module creates phrase structure, and in what way the computational module derives

the prominence requirement (c-command) as applied to anaphor binding. I found these sections quite stimulating, to some extent because the author at this point loses some of the detachment that is so typical of the book as a whole. It is unfortunate, however, that the interest raised is not entirely satisfied, due to the concise and somewhat superficial presentation of the theory. For instance, one of the questions that I think need to be addressed is whether general nativism supplies a viable account of the acquisition of aspects of syntax that are 'invisible', e.g. empty categories and movement.

Chapter 15 deals adequately with the accounts of developmental order that figure in much of the current research, such as maturation and the incremental acquisition hypothesis. The final chapter summarises the properties of the language acquisition device that have been discussed in the course of the preceding chapters, and briefly points to other potential sources of evidence beyond normal language acquisition, such as Creole-formation and deviant language acquisition in clinical populations.

*Syntactic development* provides a comprehensive overview of the study of primary syntax acquisition, which includes the classical, groundbreaking studies, as well as many of the most important studies from the recent past. Moreover, the survey comprises a number of papers which are not widely cited but certainly deserve attention. The presentation of empirical and theoretical issues is up-to-date, thorough, and well-organized. Thus, the book is a good resource for specialists. In addition, O'Grady's writing is very clear, and many chapters are cleverly structured, from a didactic point of view. In short, this book comes up to my expectations of an introductory course text in the most important respects – it is interesting and instructive, for students as well as teachers.

Nonetheless, I have a few general reservations. First of all, O'Grady is somewhat conservative, or perhaps cautious, both in his avoidance of recent theoretical developments in linguistics, and, more importantly, in eschewing an overall perspective, or a unifying theoretical theme. As regards the latter, the general nativist framework would, to my mind, have qualified. A *leitmotiv* would have given the book an exciting extra. But this is a matter of taste, no doubt.

My second point concerns the connection between the two parts of the book. What the second part, particularly Chapters 13–15, does not do, is to provide explanatory accounts of the developmental patterns reported in part one. The learnability chapters discuss abstract, general solutions to the problem of how the child can construct a grammar on the basis of underspecified input. But it is not entirely clear what connects, for instance, parameter setting to the emergence of two-word utterances (Chapter 3), or what maturation has to say about the absence or presence of inversion in questions (Chapter 8). In particular, I would be very curious about the accounts general nativism can provide for the developmental data that are so

skilfully summarized in part one. The gap between data and theory is not really bridged.

Finally, I would also have liked to see some more explicit attention to the perils and pitfalls of the empirical work in language acquisition. We all know that the empirical basis for the study of language development is poor, and that quite a good deal of the success of our endeavours depends on making the 'right' decisions with respect to the data, and entertaining the 'right' theoretical and methodological assumptions. Probably this is the most difficult part of doing language acquisition research, and students need to be made aware of it. This is not to say that O'Grady doesn't touch on this issue at all. At several points, he reviews the problems in interpreting experimental results on comprehension, for instance with regard to the interpretation of anaphors and pronouns (Chapter 11). But there are several other topics that would have merited a more in-depth discussion of the problems, methodological and otherwise, associated with collecting and assessing data. The classification of word order errors (Chapter 4) is an example in point, as well as the problem of distinguishing between functional and lexical categories (Korean vs. English determiners, Chapter 15).

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D. I. SLOBIN (ed.). *The Crosslinguistic Study of Language Acquisition*. Vols. 4 and 5. Mahwah, NJ: Erlbaum. 1997. Pp. xiii+454; xv+339.

Although cross-linguistic approaches have become more common in the years since the publication of the first two volumes in this series in 1985, the skew towards English in language acquisition studies remains very evident. If anyone still doubts whether this in itself should be considered a problem for the field, the volumes under review should provide a clear and definitive answer. A balanced, informed understanding of what is 'universal' in the acquisition of language will never be obtained from the exclusive study, however deep and comprehensive, of a single language.

Many approaches to a project such as this one could be imagined, and more than one is suggested or actually explored in the theoretical and comparative fifth volume of the series. The approach taken by Slobin at the outset of this ambitious project was to draw up a loose outline of topics that seemed to him to constitute the minimum information needed for two major goals: (1) to provide outsiders, on the basis of available data, with some understanding of what acquisition of the language in question involves, and (2) to demonstrate how those data might be expected to inform theories of the nature and process of language acquisition in general.

## VOLUME 4

Volume 4 is made up of a preface, three long chapters devoted to a description of the acquisition of one language each (J. Toivainen on Finnish, U. Stephany on Greek, and Y. Kim on Korean), and one chapter that stands somewhat apart, being a within-family comparative study of the only Finno–Ugric languages for which even minimal acquisition data are available (L. Dasinger on Estonian, Finnish and Hungarian). This more issue-oriented chapter duplicates some aspects of Toivainen's (cf. also Mac-Whinney on Hungarian, v. 2), and at the same time fits in somewhat better with the broader studies of v. 5, since Dasinger's goal is to explore the

differences that result from 'small degrees of variation in the expression of grammatical categories' (p. 4) in the acquisition of these three genetically related and typologically quite similar languages.

All four chapters generally follow Slobin's suggested outline: sketch of the adult language, data sources, summary of overall course of development, 'data' (in depth discussion of selected aspects) and conclusions. The allocation of space to the basic facts about the adult language varies from one-third (Finnish: Much of this is taken up with tables illustrating the functions of inflectional affixes from actual child data) to only five pages out of 108 (Korean). Toivainen offers no summary statement of the overall course of development, whereas Stephany, whose chapter runs to 150 pages, summarizes before going on to elaborate with examples. For the reader unfamiliar with the language, Toivainen's early presentation of child examples is probably the more helpful. Stephany's very thorough presentation was occasionally redundant, although it did provide a clear picture of the acquisition of Greek. Kim's chapter on Korean is intermediate between these extremes, offering a succinct summary at the outset but avoiding redundancy by organizing the in-depth discussion around specific issues, such as the question of 'null subjects'.

The three chapters devoted to single languages all focus on morpho-syntactic development. Since it is impossible to offer even the most superficial of summaries of their extensive descriptive information, I will restrict my attention to children aged 2;0 or younger, those whom Radford (1990) would expect not to have acquired any system of functional categories as yet. I will focus on two interrelated questions involving inflectional morphology, far more central to all six of the languages covered here than is familiar from English, with its meagre inventory of eight obligatory inflections.

(1) What grammatical morphemes do we find in the productions of children under age two?
(2) What evidence suggests that morphology is genuinely productive at this age?

Toivainen reports that the nominal cases that emerge before age 2;0 are the 'most basic and occur with the greatest frequency' (p. 94). It is not clear what independent measure or definition of what is to be considered 'basic' obtains here, however; 'frequency' in this case refers to 'widespread use in the speech of young children', not in the input. That is, the earliest cases to appear are also those used the most often and/or by the largest number of children in his sample. Toivainen reports data by child age at four-month intervals, basing mention of emergent morphology on use by at least three subjects at the age in question. The issue of age vs. developmental level arises here. Surprisingly, it is mentioned in none of the descriptive chapters (but

see Lieven, v. 5), nor do any of them make use of either estimated size of lexicon or mean length of utterance in words or morphemes; perhaps a lack of congruence in crosslinguistic study has discouraged researchers from attempting to align children in this way. The widespread current use of the MacArthur Communicative Developmental Inventory, already available in translation in several languages, may provide a new yardstick, at least as a control measure.

Toivainen reports the use of several verb forms as early as 1;4, most of them involving either a bare stem (imperative, 2d pers. sg.) or lengthening of the final vowel of the stem (3d pers. sg. indicative); the past tense negative marker also appears, as does the passive or 'impersonal' form, used in lieu of the first person plural in colloquial Finnish. Toivainen cites 14 verbs in one child's usage, including two synonyms (regular and baby talk) for the verb 'to sleep'; this abundance of verb production at such an early age is notable in itself. However, we lack any overall vocabulary estimate for the child, one of the most precocious of 25 subjects. Four months later we find the first expression of case, involving the most common object marker, the partitive, and the genitive of possession, two 'internal' locatives ('into', 'in'), and both possessive and instrumental uses of the 'external' locative ('at').

In Greek, as in Finnish, a wide range of inflections have begun to appear by 1;10. The first nouns show an animacy distinction, out of which gender later differentiates: most masculine or feminine noun tokens (largely referring to animates) first appear as subjects, in the nominative, while a majority of neuter nouns (mostly with inanimate reference) function as objects, in the accusative. Number is established well before case, but the extent of case marking and the time of onset shows wide individual differences. In verbs, first person is first marked on subjunctive verb forms (expressing directive or commissive speech acts), while the third person appears on indicative verbs, usually in the past. Aspect and tense are confounded in the indicative: Imperfective verb stems are generally in the non-past, perfective verb stems in the past. Aspect (which involves a differential choice of stems) is marked on most verbs by 1;10, but rarely involves contrastive uses of the same verb, and the subjunctive is more frequent than the indicative or imperative at that age. Proclitics are typically ommitted but enclitics included at 1;10. The earliest multiword utterances are noun phrases only, dependent on the situational context for their propositional meaning.

In conclusion Stephany remarks that children begin with 'globally understood and formally as well as semantically underdifferentiated word forms' (p. 323). She finds no evidence of U-shaped learning curves, noting that the expression of the syncretic inflectional forms of Greek develop locally, not as across-the-board rule learning. She proposes that word forms may be represented doubly in the child's emergent lexicon, both as holistic unanalysed units and as morphologically decomposed forms. She sees no

evidence for a full switch from memorisation to rule use at any one point. Finally, she comments that if grammar is semantically and pragmatically motivated, it must develop together with semantic structure from the beginning: 'The very low degree of grammaticalization characteristic of early child languages is what makes them look so much alike' (p. 328).

Korean is a language whose grammatical structure is 'pragmatically oriented' in a way completely foreign to European languages. Subjects are omitted if the discourse topic allows restoration, case markers may be omitted, predicates show no agreement with their subjects, and 'honorification' and politeness markers are commonly marked on predicates. What is acquired early? Both predicate inflections and nominal particles appear by age 2, with virtually no errors. Predicate inflections, but not cases, are found as early as the one-word stage, and are here considered to be productive if the marker is used on three or more different verbs. Children show considerable sensitivity to semantic and pragmatic differences, including frequent use of the epistemic declarative particle meaning 'I have just come to know this!' In general, child Korean tends to sound quite adult-like, due to the widespread use of ellipsis in adult speech. Kim concludes that what is most needed is data from even younger children, 'because so much seems to happen right after Korean children begin to produce one-word utterances' (p. 436). She also notes the need for more studies of the correlations between input and children's speech, since the children are remarkably sensitive to specific distributional aspects of adult speech.

Radford (1990) distinguishes between 'acquisition', for which contrastive use of a category should provide sufficient evidence, and 'mastery', for which something like Brown's (1973) criterion for acquisition, 90% use where obligatory, is needed. Use of an inflection by three children in brief (15 min) samples, as in Toivainen's large sample, provides no assurance that the children are doing more than reproducing fixed lexical routines. Nevertheless, most of the chapters reviewed here provide ample evidence of early contrastive use of some markers for verbal inflection and, somewhat later, for case, in contradiction to Radford's strong claims regarding the absence of functional categories in early child syntax. It is likely that prosodic factors and distributional frequency are critical determiners of the first appearance of inflection; the extent to which such early uses reflect formulaic usage remains unclear.

Unlike the three chapters already discussed, the chapter by Dasinger gives considerable attention to phonology. Dasinger is particularly interested in comparing the acquisition of Estonian and Finnish, whose close similarities, alongside sharply circumscribed differences, promise to allow the investigator to draw clear conclusions. Unfortunately, Estonia, just emerging from almost 50 years as a Soviet republic, has virtually no tradition of child language research. The few studies available are from the West, based on

children growing up in bilingual communities; most of them, including several by the author of this review, date back some 20 years. Dasinger's thoughtful chapter should provide a strong incentive to researchers in Estonia.

Dasinger organizes her chapter around three broad topics suggested by Slobin's outline. First, under 'Early acquisition' she considers the role of quantity (both consonant and vowel length are contrastive in all three languages) and vowel harmony (absent in Estonian). Errors involving quantity are found to be rare, although there are individual differences in the timing of acquisition. Even the three-way length contrast of Estonian fails to cause major problems, perhaps because the central role played by contrastive length in phonological and morphological structure 'may alert the child to its significance earlier on, which seems to be the case of Osterreich's[1] six subjects who learned the contrast between short and long by 1;6, a full six months earlier than the average Finnish child comes to master the short/long distinction' (p. 30f). Additionally, the length distinction in Estonian is supported by other prosodic differences – specifically, by differences in pitch (see now Lehiste & Ross, 1997), which can be expected to be especially salient to young children. Under 'Error-free acquisition' Dasinger considers word segmentation, aided by strong demarcative stress on the first syllable in all three languages, and morpheme ordering, rarely violated in these generally agglutinative languages. Finally, two aspects of these languages lead to 'prolonged acquisition': the morphophonemics of stem alternation, especially as regards consonant gradation, which sometimes creates highly dissimilar forms for a single stem, and the rich system of locative expressions, both case endings and postpositions.

### VOLUME 5: EXPANDING THE CONTEXTS

To some extent the purposes and value of this collection of studies of acquisition in 28 languages are demonstrated in both E. Lieven's 'Variation in a crosslinguistic context' and Slobin's concluding chapter, 'The origins of grammaticizable notions'. On the other hand, A. Peters ('Language typology, prosody, and the acquisition of grammatical morphemes') has difficulty obtaining the information she requires from the existing chapters and advocates a somewhat different, more intensive method, namely, the description and comparison of the acquisition of morphosyntax in languages that are genetically and/or typologically closely related but whose prosodic structure differs enough to create quite different salient surface aspects in the input to which the child is exposed (cf. Dasinger's chapter, v. 4).

In the first chapter of v. 5 ('The universal, the typological, and the particular in acquisition') Slobin distinguishes such an 'intra-typological

[1] This is a probable slip: The source of these data is earlier said to be Oksaar.

approach' from the 'cross-typological'. Pointing out that only a small number of broad typological differences can be captured by a notion like parameter setting, he singles out just one of these, the distinction between 'satellite-framed' and 'verb-framed' languages established by Talmy (1985), for an extensive case-study of verbs of motion based on his own studies of narrative discourse in adults and children aged from 3 to 9. Briefly, 'satellite-framed' languages like English express manner of motion in the verb – *run*, *jump*, *paddle* – but direction of motion in 'satellites', or verb particles – *in*, *down*, *across*, while 'verb-framed' languages like Spanish or Korean do the reverse. Slobin finds that language type guides lexical choices in adults and influences the developmental path as well.

S. Choi ('Language-specific input and early semantic development: evidence from children learning Korean') restricts herself to a single language but covers topics in a comparative fashion, generally with English as the backdrop. Her primary focus is the interaction in acquisition between language and cognition and her main thesis is that 'language-specific input influences children's syntactic and semantic development, and ... interacts with children's general cognitive development in a complex bidirectional way' (p. 47). She supports this from areas of early acquisition, including semantic and morphosyntactic aspects of motion verbs, the acquisition of locative case markers and the acquisition of sentence-ending modal particles. Verbs are acquired relatively late in English; the timing is plausibly related to sentence structure, with earlier acquisition of sentence-final verb particles and other relational words that may occur in isolation and that effectively function as pre-predicates (*more*, *no*, *there*, *uh-oh*, *up*: see McCune-Nicolich, 1981). In Korean, on the other hand, verbs and nouns develop in parallel. In a direct comparison using the broader notion of relational word, Choi found that American children averaged only 19% predicates at the 50-word point while Korean children averaged 40%.

The ways that motion events are expressed in Korean are different from English from the onset of referential word use, at around 1;2 to 1;4, although children encode the same kinds of events (changes in own posture or location, dressing and undressing, manipulating objects). English-learning children use a single set of verb particles for both spontaneous and caused motion while Korean children make use of true verbs, beginning with a pair glossed as 'put on/in/together' vs. 'take off/out/apart' or sometimes 'get unstuck', and keep spontaneous vs. caused motion largely separate, as does the adult lexicon. Notice that the English word *stuck* is commonly used in this period with the meaning 'removable only with difficulty', but no accessible antonym ('easily separable') is available to the child acquiring English or German, who may resort to inventing a form for this meaning by blending *off*, *out*, and *open*, for example (Hildegarde Leopold is one such child: Leopold, 1939).

Korean children are sensitive to the specifics of the verbs they use early on, overextending the notion of 'tight fit' to child-in-mother's-arms, for example. Choi infers that language-specific semantic categories are in place from the beginning of the one-word stage – in parallel with the domain of phonetics/phonology, where some ambient language patterning is evident even prelinguistically (Vihman, 1996). Choi demonstrates that children begin with piecemeal acquisition of a small set of nouns and verbs, making correct use of case markers on nouns in relation to particular verbs. Although they continue to make accurate use of markers reflecting distinctions of animacy and transitivity, with strong support from linguistic structure and input usage, errors in relation to distinctions of state vs. process verbs and direct vs. indirect objects occur in periods of rapid learning of verbs associated with locative marker use, suggesting semantic reorganization.

Peters hypothesizes that characteristics of adult language prosody and typology interact with the 'attentional preferences of the individual child' to determine the type and 'size' of the initial units the child will segment out of the speech stream as a first step in the acquisition of morphology (p. 154f.). Her chapter combines stimulating insights and a raft of exciting research questions with some uncritical acceptance of concepts that have been seriously challenged (e.g. the division of languages into 'stress-timed' vs. 'syllable-timed': cf. Roach, 1982; Wenk & Wioland, 1982), doubtful assertions ('rhythmic languages … tend not to have vowel quantity contrasts', p. 144: What of Estonian, with its strong initial syllable stress?; also, French, with a drop in amplitude along with final syllable lengthening, is not generally characterised as having 'strong phrase-final stress': p. 174) and a number of subjective 'personal communications', including the dubious remark that 'consonant gradation is much more difficult for second-language learners of Estonian than of Finnish' (p. 172). A lack of editorial attention seems to be a problem here as well: surely language names have been misplaced in Fig. 3.1, to yield a classification of Russian, Polish and German as 'agglutinative', while Finnish, Hungarian and Turkish are 'polysynthetic'. Similarly, it is unfortunate that the languages of examples should sometimes go unlabelled, leading to likely confusion in some cases, as when (5) follows mention of French and Japanese but includes a French phrase and a Hungarian sentence.

Peters divides children into those who orient to syllables and segments ('syllable children') and those who orient to prosodic 'tunes' ('tune children'). Lieven continues with the theme of individual differences in the learning of structure and the lexicon, reviewing areas of high variability across children learning a single language and drawing analogies with the varying problem spaces afforded by different language structures. Recalling the most widely cited individual difference, the 'referential/expressive' dimension introduced by Nelson (1973), Lieven reminds us that (1) differ-

ences in style need not be correlated with differences in rate and (2) in any study of differences in style it is critical to control for size of lexicon. Many efforts have been made to associate different parameters of individual variation, e.g. 'tune children' with 'expressive/phrasal children'. Lieven provides evidence of continuity between use of formulaic or frozen phrases in the earliest period of lexical learning and a pivot style in early syntax, suggesting that children taking this route move from frames with slots to longer fillers, leading to the discovery of grammar. She then raises the interesting question, how do 'telegraphic' children move forward? Are the early juxtaposed content words actually partial or delayed imitations? Is semantic knowledge of thematic roles structuring these early word combinations? As Lievens notes, 'it is important to have a theory of how a development at one stage might lead to subsequent developments' (p. 211).

Lieven goes on to review differences in individual children and across languages in the timing of inflectional vs. word order learning (e.g. inflections first in Turkish, contrastive use of word order for pragmatic effect first in Georgian). She concludes that 'for some speakers, and perhaps for some parts of the system, low-scope, semi-formulaic learning may be more prevalent than has sometimes been thought' (p. 227). Others, such as Tomasello (1992), have recently suggested that memory work plays a much greater role in acquisition than was previously accepted. Bybee (in press), among others, argues more radically still that even in adult language 'chunks of linguistic experience much larger than the analytic units of morphemes or even words are the usual units of storage and processing [and]... there is no real separation of lexicon from grammar' (p. 1; cf. also Pawley, 1986; Hopper, 1987).

In a brilliant finale Slobin explores the meanings expressed by grammatical morphemes, explicitly reversing his own earlier position, which attributed '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' (p. 267). Slobin begins his exploration with Sapir, still the most lucid exponent of the view 'that there is no direct and universal mapping between the ways in which human beings experience events and express them in language' (id.). Although sympathetic with the idea of a relation between crosslinguistic frequency and ease of acquisition of grammaticisable notions (reminiscent of the proposal that core consonants, widely distributed among languages, are articulatorily basic and are acquired early: Lindblom, 1992), Slobin objects that there is as yet no independent theory of what is (semantically) 'easy' or 'natural', and that it remains unexplained how it could be that 'difficult' or 'unnatural' form-function relations ever come to be learned.

Slobin goes on to illustrate with examples from a number of languages that

even defining GRAMMATICAL MORPHEME crosslinguistically is problematic. Attempts to base such a definition on prosody founder on the fact that closed class items are sometimes stressed. A definition from aphasiology (those items lost in agrammatic speech) also encounters counterexamples (e.g. articles bearing inflections tend to be preserved). Slobin concludes that a single-lexicon model, with processing differences between content and function morphemes, is the most tenable.

Pursuing Sapir's position, Slobin goes on to illustrate that there is no delimitable set of closed class notions. To his discussion of Mayan (open class) motion verbs and (closed class) directionals, morphologically related forms encoding the same directional meanings, we can add Estonian (open class) nouns of place or ground and (closed class) locative postpositions (*maa* 'ground'/*maha* 'to-down', *koht* 'place'/*kohal* 'at-above', *väli* 'field'/*välja* 'to-out'). The conclusion, that any division of conceptual space into 'learned' and 'innate' is unlikely to succeed, is strongly supported by recent work in typology (Croft, 1990).

Slobin argues for a 'cline' from 'fully lexical' content words to 'fully specialized' grammatical morphemes and now accepts that children must analyse form and meaning together from the start. As with the putative boundary between phonetics and phonology, no division can be assumed to exist prelinguistically. Instead, the child must come to language with some attentional predispositions involving speech melodies and meanings associated with caretakers (interlocutors) and discourse settings, as well as sufficient flexibility to 'construct' the organization of both form and meaning in the ways conventionalized by the ambient language. Further, 'grammaticization paths … take place, to begin with, in the processes of communication … 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' (p. 303). The argument is fully parallel with Lindblom's theory of functional 'speaker/hearer' constraints on phonological structure.

In his concluding sections Slobin notes that the constraints approach to language acquisition, essentially conceived as a way to make acquisition more efficient, is problematic. Instead of economy or efficiency Slobin suggests that the primary factors guiding the child's intuition regarding which meanings go with recurrent forms must be the same as those that operate diachronically, namely, frequency and relevance to the communicative situation. He continues to believe that some kind of psychologically plausible primitives must be posited for the construction of grammaticizable notions, but current work suggests ongoing interaction, from the prelinguistic period on, between general cognitive processes and ambient language guidance (Bowerman, 1994; Gathercole, in press).

The two volumes under review constitute, in short, a very rich source of information, ideas, questions and challenges to our standard assumptions, many of which are unreflectingly grounded in patterns familiar from English and the acquisition of English. The books deserve to be widely consulted and read; they should provide a long-lasting stimulus for our field.

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BRENT, M. R. (ed.). (1997). *Computational approaches to language acquisition*. Cambridge, MA: The MIT Press. Pp. 199. ISBN 0-262-52229-2.

This volume is a reprinting of a (1996) Special Issue of Cognition on computational approaches to language acquisition. In addition to a tutorial introduction by Brent, it includes papers by Siskind on cross-situational

techniques for learning word-to-meaning mappings; Brent & Cartwright on the role of distributional regularity and phonotactic constraints in segmentation; Resnick on the acquisition of selectional constraints on the applicability of natural language predicates to arguments; and Niyogi & Berwick on the formal characterization of language learning in finite parameter spaces.

All of these papers report computational studies that are of interest in their own right. However, the principal strength of the volume as a whole is in illustrating the considerable advantages, both in terms of methodological rigour and of theoretical insight, that such approaches can bring to the study of language development. In the rest of this review we will therefore attempt to bring out some of these advantages more clearly using examples from the work presented. We will then make some more general comments about the relation between the computational approach and empirical research on language acquisition in young children.

One obvious advantage of the computational approach is that it requires the researcher to treat language acquisition as an information-processing problem and hence to focus on the process by which learning is achieved rather than on describing the nature of children's knowledge at points along the way. In a field in which even reasonably well-specified verbally-formulated process models are extremely difficult to come by, the serious attempt to think about acquisition problems in this way seems to us to be valuable in itself. However an additional advantage of adopting a computational approach is the discipline forced on the researcher by the need to implement his or her model as a computer programme that runs. This results in models with much greater internal consistency than verbally-formulated theories which often allow the theorist too much latitude in, for example, the specification of how different aspects of the model interact. It also enables the modeller to perform a much more detailed exploration of the consequences of using a particular learning mechanism to solve a particular problem, and hence to investigate properly what that particular mechanism is capable of acquiring.

In this context, one of the most interesting results of both Brent & Cartwright's and Siskind's simulations is their demonstration of the potential power of what Brent calls 'autonomous bootstrapping' as a strategy for learning about language. As Brent points out, there has in recent years been a tendency for both nativist and constructivist researchers to attempt to solve acquisition problems by recruiting knowledge acquired through prior analyses in some other domain. Thus, the semantic bootstrapping hypothesis (Grimshaw, 1981; Pinker, 1984–1989) holds that children begin to learn the syntactic categories of words by using knowledge about their meanings rather than by using syntax itself; and the syntactic bootstrapping hypothesis (Gleitman, 1990) holds that children use the syntactic structure of sentences

containing unknown words to make inferences about the potential meanings of those words.

In contrast to these approaches involving cross-domain bootstrapping, both Brent & Cartwright's and Siskind's simulations rely on strategies in which partial knowledge about a particular domain is used to analyse future inputs in that same domain and hence to gradually extract more and more knowledge of the domain from these inputs. This kind of strategy is perhaps best illustrated by reference to Siskind's model of the acquisition of word-to-meaning mappings. Siskind conceptualizes the learning of word-to-meaning mappings as the narrowing down of the set of possible symbols that make up a word's meaning and the increasing of the set of necessary symbols. In essence, this is done using a two-step cross-situational learning strategy. First, any meaning symbol that is not present in any possible interpretation of a given sentence is eliminated from the set of possible meaning symbols of each of the words in that sentence. (Each of these sets is initially the universal set of possible meaning symbols). Secondly, any meaning symbol that occurs in all of the possible interpretations of a given sentence but in the possible meaning set of only one of the words in that sentence is added to the set of necessary meaning symbols of that word. The beauty of this strategy is that it can not only explain how word meanings are gradually differentiated and refined, but also how the initial bootstrapping of sets of possible meaning symbols is achieved. This is because it does not require any prior knowledge about the meanings of particular words to get started, but can use information that, by definition, does not require any linguistic analysis, namely, the child's contextually-derived hypotheses about the interpretation of the particular utterance in question.

Interestingly, the strategy also throws up apparent syntactic bootstrapping effects whereby, for example, the presence of particular subject and direct object arguments in an utterance appears to influence the kind of meaning assigned to a particular novel verb within the same utterance. However, such effects occur not as the result of some kind of preliminary syntactic analysis on the part of the model, but because the learning mechanism uses partial knowledge about the meanings of some words in the utterance to draw conclusions about the meanings of other words in the same utterance. This finding is intriguing because it suggests that it may be possible for the same mechanism to do both word-to-meaning and sentence-to-meaning mappings at the same time. Hence, it eliminates both the need for syntactic bootstrapping as such, and the need to specify how the learner's incomplete and sometimes inaccurate knowledge about syntax and semantics interact in the course of learning – a question about which syntactic bootstrapping approaches tend to have rather little to say.

In addition to demonstrating the potential power of particular learning strategies, computational simulations can also reveal unexpected problems

with verbal formulations. A good example of this is found in Niyogi & Berwick's paper on language learning in finite parameter spaces. The parameterization of cross-linguistic variation within modern linguistic theory is obviously intended, at least in part, as a means of reducing the complexity of the learnability task facing the child. However, as Niyogi & Berwick point out, recent work suggests that even grammar learning within a linguistically natural three-parameter subspace is far from a trivial problem. Thus, Gibson & Wexler (1994) have shown that, assuming a simple error-driven parameter-setting algorithm – the Triggering Learning Algorithm (TLA) – which can change only one parameter at a time, the three-parameter space is unlearnable in the sense that the algorithm can get trapped in local maxima representing incorrect hypotheses from which it can never escape.

Gibson & Wexler's work is itself a good illustration of how a sophisticated mechanistic analysis of a particular learnability problem can reveal difficulties which are not apparent in less clearly specified verbal formulations. However, Niyogi & Berwick are able to extend this analysis by showing that it is possible to model parameter space learning using the mathematical theory of Markov Chains. Using this model they are able to demonstrate (1) that the TLA can fall into a trap (i.e. a set of grammars that do not include the target grammar) even when it does not start in one (suggesting that proposed cures for non-learnability in terms of 'maturational' ordering of parameter settings do not solve the problem); and (2) that the TLA will eventually find the target grammar if and only if there are no traps (suggesting that the existence of a path from a particular state to the target, equivalent to the existence of local triggers, is not sufficient to guarantee learnability). They are also able to show that these problems can be avoided by using a rather different algorithm – the Random Step Algorithm (RSA) – that is not restricted to changing one parameter at a time, but moves to a new grammar at random whenever it encounters a sentence that is inconsistent with its current hypothesis. Finally, and perhaps most importantly, the Markov formalism allows Niyogi & Berwick to assign probabilities to the transitions between states. As a result, they are able to address the question not only of whether a given grammar is learnable in the limit, but also of whether, given certain input conditions, it is learnable within a reasonable convergence time. This seems to us to be a major step forward since it permits the adoption of a realistic quantitative approach to the learnability issue and hence means that the relative success of different mechanisms can be evaluated empirically. Moreover, it allows Niyogi & Berwick to demonstrate, perhaps rather counterintuitively, that the RSA tends to converge on the correct grammar with less input than the TLA. In retrospect this result is not particularly surprising since the RSA can change its hypothesis under a wider variety of conditions than the TLA and can hence search the parameter space more quickly. However, it seems to us that the fact that the TLA fares so badly in

such a small parameter space, and is outperformed so comprehensively by such an unconstrained and psychologically implausible search algorithm, ought to be rather worrying for proponents of parameter-setting approaches. At the very least, it would appear to leave such approaches without a viable learning mechanism – or at least one that makes reasonable predictions about the developmental data. Moreover, it suggests that getting psychologically-realistic constraints on the parameter-setting mechanism to interact successfully with the constraints imposed by parameterization itself is likely to prove a much more difficult task than has tended to be assumed in the past. Indeed, one is tempted to ask whether, given this difficulty, parameterization is really buying the theorist very much, at least from the point of view of language learning, and whether more progress could not be made by attempting to develop a learning mechanism that built knowledge more gradually as a result of a much less abstract analysis of the input.

This brings us to a final more general issue about the relation between the work presented in this volume and empirical research on language acquisition in young children. One positive feature of both Brent & Cartwright's and Niyogi & Berwick's work in this respect is their use in at least some of their simulations of realistic input data taken from the CHILDES database (MacWhinney & Snow, 1985). This could be seen merely as a way of attempting to increase the face validity of the research presented. However, it also appears to reflect a realization on the part of the authors that input characteristics are themselves likely to be an important factor in determining how their systems perform. This is brought out most clearly by Niyogi & Berwick, who focus specifically on the importance of input distributions in determining the speed with which their learning algorithm converges on the correct solution. They are able to show not only that certain input distributions can ease the passage of the learning mechanism through parameter space, but also that it is possible to choose a 'malicious' input distribution which increases convergence time to such an extent that it makes the grammar in question effectively unlearnable.

These findings underline the fact that at least part of the solution to the problem of language acquisition is to be found in the frequency distribution of the input to which the learner is exposed. However, they also suggest that there is still a lot of basic work to be done investigating the consequences of assuming different input distributions for the way in which different linguistic systems are or could be acquired. This seems to us to be work to which the computational approach is particularly well suited. On the other hand, we would also argue that this kind of research is likely to be strengthened considerably by being integrated with analyses of the relevant developmental data on early language acquisition – a kind of integration which is conspicuous by its absence from most of the papers in this volume. We would therefore like to take issue with the view expressed by Brent, in his

tutorial introduction to the volume, that the principal goal of computational research should be to provide a formal specification of what has to be computed. We agree, of course, that formal specification is important. However, we would argue that it is only an intermediate goal *en route* to the development of a psychologically-realistic process model. Indeed, it is our view that computational research in this area will only really have come of age when it can go beyond formal specification to both (1) simulate real data as a function of the interaction between a psychologically-realistic learning mechanism and the frequency distribution of the input and (2) generate new predictions about input–output relations in the course of development that can then be investigated empirically. While the degree of formal specification provided by the models in this book takes us at least one step closer to this goal, we believe that, if further progress is to be made, Brent's approach needs to be complemented by another rather different strategy involving the attempt to build computational models that not only solve the learnability problem, but also do so in a way that fits the developmental data. Given the current state of our knowledge, such an approach may initially need to be allowed quite a lot of latitude with respect to the learnability issue. However we suspect that in the longer term, it may prove to be the more powerful research strategy, and that empirical data on human development will ultimately provide more stringent constraints than formal assumptions for narrowing down the search space of possible grammars and learning mechanisms.

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K. HIRSH-PASEK & R. M. GOLINKOFF, *The origins of grammar : evidence from early language comprehension*. Cambridge, MA/London, England: MIT Press, 1996. Pp. x + 230.

*The origins of grammar* is two rather different kinds of monographs in one package – a sort of sandwich. Chapters 1, 2 and 7 are about acquisition theory, arguing persuasively for an eclectic approach. The intervening four

chapters present the authors' well-known 'intermodal preferential looking paradigm' with an overview of a range of published and unpublished studies on early comprehension. The result is a sandwich in which the quality of the bread is superior to that of the filling; but the bread is so good that the sandwich is well worth ordering. Indeed, the bread is a meal in itself, and I've assigned Chapters 1, 2 and 7 to several graduate classes on child language – with great profit. Chapters 4, 5 and 6 (the last written with Letitia Naigles) have provided advanced students with examples to sharpen their methodological tools and critical insights, and to guide them towards future research. All seven chapters are written with clarity and felicity of style, supported by the right number of well-designed tables and figures. The book is compact but not terse, full of good insights and thought-provoking speculations.

The book could perhaps have been better titled *Origins of the child's attention to grammar*. The task is defined at the outset: 'Children must induce the syntactic rules from the linguistic input that they hear as it covaries with the world that they see around them' (p. 1). The authors make the case for 'a biased learner': 'Fortunately, nature seems to equip language learners with strategies that help to guide them toward selecting the most reasonable hypotheses' (p. 1). The book suggests a number of such strategies, supporting some of them with data on very early comprehension (hence the subtitle). Grammar itself, however, is treated as GIVEN – not something with 'origins' in this treatise. And, of course, we are not yet in a position to present THE origins – either of grammar or of attention to grammar. These quibbles aside, H & G present a broad, honest, and thoughtful overview of the state of the art in acquisition theory, with accurate and fair summaries of each position, accompanied by intelligent criticisms of each. To my mind, the major contribution of the book is its attempt to find common ground between the artificially polarized positions that have emerged in the polemical/political struggles in our field.

H & G sort theories into two types: 'inside-out' and 'outside in'. Their Table 2.1 (p. 17) neatly summarizes these two families of theories: The inside-out theories derive from Chomsky, and are divided into structure-oriented theories (such as those proposed by Hyams, Lightfoot, Wexler, and others) and process-oriented theories (exemplified by Gleitman and her colleagues, and Pinker). The outside-in theories also come in two varieties: the social-interactional theories (e.g. Bruner, Nelson, Snow) and the cognitive theories (e.g. Braine, Schlesinger). In this last category, H & G also include models of distributional analysis, such as Maratsos & Chalkley, the competition model of Bates & MacWhinney, and connectionist approaches. Each position is lucidly summarized, with ample references to the literature; and the strengths and weaknesses of each are discussed with impartiality (although the authors classify themselves as inside-out and process-oriented). H & G go on to suggest that the dichotomies proposed in the literature are

TABLE 1. *Distinctions among the major theories*

| | Theory type | |
|---|---|---|
| | Inside-out | Outside-in |
| Initial structure | Linguistic | Cognitive or social |
| Mechanism | Domain-specific | Domain-general |
| Source of structure | Innate | Learning procedures |

'hyperboles', and that 'theories of language acquisition have more in common than has generally been assumed' (p. 41).[1]

In what is perhaps the most useful part of the book (pp. 41–51), H & G attempt to collapse the hyperboles and find common ground. The procedure of the argumentation is to change polar opposites to end points on continua. Each of three hyperboles is reformulated as a continuum.

> *Hyperbole 1*. 'Outside-in theories account for grammatical development in terms of cognitive and social categories. Inside-out theories account for grammatical development in terms of the discovery of facts about an *a priori* grammatical structure' (p. 42).

H & G point out that on a continuum from 'linguistic' to 'cognitive/social', both families of theories rely on early sensitivities to aspects of language and environment, and that the extreme positions (all language or all cognitive-social) have no proponents. The first hyperbole is thus collapsed into a continuum labelled 'type of initial language structure' (p. 43).

> *Hyperbole 2*. 'Outside-in theories rely on domain-general learning processes; inside-out theories rely on domain-specific learning processes' (p. 44).

This hyperbole is collapsed into a continuum dealing with 'mechanism used for language learning' (p. 43), running from domain-specific to domain-general. And, again, all theorists are seen as having some mix of both types of mechanism.

> *Hyperbole 3*. 'Outside-in theories avoid claims for innateness whereas inside out theories are replete with such claims' (p. 46).

Here H & G propose a continuum of 'source of initial structure', running from innate to constructed (p. 43). They conclude, reasonably, that all theorists require that certain types of information be AVAILABLE to the

[1] I find it interesting that H & G discuss Slobin's Operating Principles in Chapter 1, but do not place me in either of their types of theory. This is appropriate, since I have proposed both 'inside-out' and 'outside-in' operating principles, orienting to both process and cognition (Slobin, 1973, 1985), and more recently, to social interaction and the historical origins of grammar (Slobin, 1997). Thus I sympathize with their attempt to depolarize the debates.

learner. Much of the remaining burden of the book is an attempt to characterize what those types of information might be, without prejudging their innateness.

After an excursion of about 100 pages to deal with comprehension experiments (discussed below), H & G conclude, in Chapter 7, with 'a coalition model of language comprehension'. It is, in fact, a coalition model of language acquisition in general, but the mid-section of the book puts comprehension in focus. The data of Chapters 3–6, however, are not critical to the model. In fact, most of the argument is based on older studies, of a variety of types. This chapter is not clearly focused, with vague references to 'mental models' and an unclear presentation of the binding principles. It is almost entirely anglocentric, taking comprehension of English passive sentences (not addressed in the central experimental chapters) as a parade case of the approach. The challenges of crosslinguistic comparisons are not faced in the chapter (not even Demuth's (1989, 1990, 1993) arguments with regard to precocious acquisition of passives in Bantu languages). There are two major contributions in this concluding chapter: a phase model of acquisition and an intelligent attempt to reconcile differing claims about the developmental relations between comprehension and production.

The phase model rests on three types of prerequisites: image-schemas of events, principles of acoustic segmentation and attention, and mapping between speech and ongoing events. Each of three postulated phases represents different sorts of sampling of available cues. Six types of cues are proposed as being constantly available to the learner (presented as a comprehender only): prosody, semantics, syntax, lexical/morphological, social context, and environment/context (action, objects). Language acquisition is possible due to pre-existing attentional biases, an array of data sorting mechanisms, and a world that presents the child with converging cues. The three developmental phases are characterized in terms of the relative salience of the first three types of cues: prosody, semantics, syntax. In Phase I (0;0–0;9) the child relies primarily on prosody to comprehend linguistic messages; in Phase II (0;9–2;0) semantics kicks in as a salient cue; and in Phase III (2;0–3;0) the child attends to syntax (primarily word order, in this presentation). The model is a little too neat, too schematic, and almost entirely focused on the child as an overhearer and observer – yet I agree with its basic outlines. Although the emphasis on a 'coalition of cues', along with 'guided distributional learning', is salutary, one misses the real child, interacting with a responsive and challenging social and physical environment, with goals and intentions, in contexts of ongoing discourse. The model takes the child of H & G's lab experiments – immobilized on a parent's lap with nothing to do but hear a sentence and look to one of two video screens – to be the child who is learning to comprehend (and, one must add, to speak) a language.

The mechanisms of change are drawn directly from Lois Bloom (Bloom, 1993), but without Bloom's attention to affect, cognition, and interaction in development. The child is said to move from Phase I to Phase II because 'the contents of consciousness become different from the data of perception', and so infants 'are presumably encouraged to acquire additional tools' (Bloom's Principle of Discrepancy) (p. 171). The transition from II to III is attributed to Bloom's Principle of Elaboration: 'as children represent more complex propositions about which they wish to communicate, they need greater grammatical capacity to do so' (p. 178). Note that both of these proposed mechanisms of change rely on children's need to 'express their mental models' (p. 171), and not simply to comprehend speech. In the last pages, this framework is presented as consistent with dynamic systems theory. (It also seems consistent with connectionist approaches such as those presented by Elman, Bates *et al*. (1996).) H & G provide a service in drawing the reader's attention to the possibility of developmental changes in attention to cues, and the need to account for such changes, but this is primarily an outline of tasks to be solved by future theory and research.

The other major contribution of Chapter 7 is an attempt to reconcile differing claims about developmental relationships between comprehension and production. Again, H & G are good at classifying. This time (Figure 7.3, p. 194) they set up two dimensions and a fourfold table: high-low extra-syntactic support, high-low complexity of syntactic structure. Early comprehension is 'fragile', requiring high support from both syntax and situation; it can precede production. Late comprehension is 'resilient', relying on complex syntax even with low environmental support; it can follow production. Data from conflicting studies are nicely allocated in this manner, with useful methodological guidelines. H & G frankly conclude: 'This framework for considering language comprehension raises many more questions than it answers' (p. 190). However, the questions are posed so clearly that readers may be led to work out new answers. The middle section of the book provides a valuable method for this work.

Chapter 3 presents 'the Intermodal Preferential Looking Paradigm' in detail, based on Spelke (1979), and familiar to the field at least since Golinkoff *et al*. (1987). It is simply the methods section to Chapters 4–6. Most of the following experiments are newly reported here so they have not undergone the scrutiny that reviewers and editors would provide. They could have been better developed and integrated for a comprehensive presentation, and they are not closely tied to the 'bread' of the 'sandwich'. Essentially, they demonstrate – in beautiful detail – that infants barely over a year in age, often with no productive word combinations, can comprehend combinations of words. As we already know from earlier published studies, the method shows that what Sachs & Truswell (1978) discovered 20 years ago with regard to acting-out tasks can be replicated at earlier ages. Briefly, using

the method of intermodal preferential looking (it's not clear why it should be called a 'paradigm'), the infant faces two video screens, one to the left and one to the right, on which two simultaneous events will occur. The events have the same visual elements, but with different combinations of movement. For example, both screens may show a woman moving some keys in one hand and a ball in the other, and kissing one of the two objects. Presumably the infant has never encountered speech about 'kissing the keys' or 'kissing the ball'. Remarkably, the infant looks longer at the screen that matches the utterance heard from a centrally-located loudspeaker ('She's kissing the keys' vs. 'She's kissing the ball'). This is a very important finding; however, H & G present it as evidence of 'infants' perception of constituent structure' (the title of Chapter 4). But there is no basis for this syntactic claim, as H & G seem to know at some points in their presentation. For example, they conclude that infants 'demonstrated a bias to interpret the input as packages of words rather than as single words' (p. 88). This is certainly true; but H & G go on to claim that the infants 'seemed to know that the crucial unit here was the one that comprised the verb phrase' (p. 88). Yet there is nothing in such findings that forces one to endow the child with syntactic parsing or a hierarchical sentence structure. There is only one screen on which the woman is kissing something, and we don't know if the infant attends to 'the woman is kissing' (not a constituent) or 'kissing the keys' (a constituent). For that matter, we don't even know if these very young infants are making use of English syntax at all, since there are no control tests of such stimuli as 'key kiss' vs. 'ball kiss', or 'woman kiss' vs. 'woman shake', and so forth. H & G report one control study to determine if infants attend to the last word, presenting the same stimulus pairs accompanied by utterances such as 'Find the ball!' and 'Where's the ball?' Predictably, infants have no preference here, since both images have a ball. But this control lacks both an agent and a verb, and seems to be beside the point. Clearly, more varied controls are needed, based on a broader range of hypotheses about early strategies of perception and comprehension. The method is available, and readers should be stimulated to try it further.

Numerous problems arise with regard to the experiments presented in Chapters 5 and 6, and this is not the place for a detailed critique. What we see here is a view of work in progress, as experimenters try out stimuli and grope for controls and new answers. Some of the data are confirmatory of predictions and others are not. No general set of strategies or operating principles emerges. Although claims are made for syntactic strategies, the stimuli often present the infant with an array of syntactic forms with the same words, suggesting that the infant may simply be attending to the salient words and their order, rather than to syntax. Yet H & G have a commitment to an 'inside-out' approach that seems to equip the infant with categories and structures of H & G's favourite syntactic model. Consider, for example, the

following set of stimuli from experiments on word order comprehension (Chapter 5). Note the different positions of *is* in the first two sentences, and the absence of this element in the third. This is not a test of infants' comprehension of simple, active, declarative sentences in English.

> Cookie Monster is tickling Big Bird!
> Where is Cookie Monster tickling Big Bird? Find Cookie Monster tickling Big Bird!

It is important that infants of about 1;6 can respond appropriately to these stimuli, choosing the screen with the described interaction, rather than its inverse. Clearly they can attend to word order. It is not clear, however, that they are attending to syntactic patterns of English. Again, an inappropriate control was used to test for infants' comprehension of word order. They were shown the same paired screens, each with the same two characters and one acting on the other, and asked, for example: 'Where's Cookie Monster?' or 'Find Cookie Monster!'. Again, both screens were appropriate, and no preference was shown. This is taken as evidence that infants are not simply attending to the first noun mentioned. But the control has no other noun, and no verb; this is quite different from a first-noun strategy in a noun-verb-noun sequence. Again, more strategies must be proposed in order to devise interesting controls. And such strategies must be derived from a general theory of infant perception and attention to speech, with careful attention to the range of possibilities presented by different types of languages, and without prejudgment as to the final state of the grammar. Although a few crosslinguistic claims are made in passing discussion, all of the work presented here is remarkably anglocentric, and remarkably based on one particular description of English syntax. Chapter 6, with Letitia Naigles, makes similar claims about phrase structure and syntax, with limited evidence and often lacking the necessary range of controls. In addition, the distinction between infants' 'strategies' and their 'syntax' or 'grammar' is not entirely clear. For example, the two screens present a causal situation (e.g. Cookie Monster turning Big Bird) and a noncausal situation (e.g. both characters turning). The stimuli are 'Where's Cookie Monster turning Big Bird?' vs. 'Where's Cookie Monster turning with Big Bird?'. Older children (girls at 1;11 and boys at 2;4) distinguish these two sentence types in the preferential looking tasks, while younger children treat both stimuli as causal descriptions, apparently not interpreting the preposition *with*. This is an interesting result, and one that could lead to various proposed strategies and further tests of such strategies. Such findings are, however, too quickly assimilated to a dominant theoretical expectation of the authors, who conclude that the older subjects are using a more 'syntactic' strategy, 'focusing on unstressed oblique markers in the sentence frame' (p. 148). The method is so powerful and promising that one is frustrated by such jumps to

a theoretically preferred conclusion. The 'outer' chapters are so wise and tolerant in their explorations of alternatives and their balancings of different types of cues. It is a pity that this wisdom is less evident in the empirical work. However, this work is still in its infancy, and it is sure to motivate these researchers, and many others to follow, to refine our comprehension of children's early language comprehension. If you find this sandwich on your bookstore's menu, it is well worth ordering.

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