

**Language Acquisition and Language Variation:
The Role of Morphology**

by

William Brandon Snyder

Submitted to the Department of Brain and Cognitive Sciences
in partial fulfillment of the requirements for the degree of

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Abstract

Evidence from comparative syntax is combined with evidence from child language acquisition to address foundational questions about the mental representation of language-particular syntactic knowledge. Three principal models of language-particular (parametric) knowledge are evaluated: (1) the "switch-box" model, in which the values of parameters are highly abstract and have widespread grammatical consequences independent of any particular lexical item; (2) the "lexical" model, in which points of variation are expressed in terms of the morphosyntactic properties of specific lexical items, especially functional heads; and (3) the "morphological" model, in which points of syntactic variation are determined by overt characteristics of morphology.

An investigation of the morphosyntax of number and degree expressions with noun and adjective phrases indicates that the point of variation determining the syntax of number expressions with NPs also determines the syntax of degree expressions with APs. Yet, cross-linguistically, the syntax of number and degree is shown to be independent of any overt morphology. Hence, even where a syntactic parameter can readily be tied to the morphosyntax of functional heads, overt morphology does not exert any necessary effect on the setting of the parameter. A related, acquisitional investigation of the phenomenon of Noun-drop in Spanish is also reported, though the results are less clear-cut.

In one domain, however, an important link is demonstrated between parametric syntax and overt morphology. Languages are shown to permit complex predicate constructions of the type exemplified by the English resultative, if and only if they freely permit the formation of novel Noun-Noun compounds. Moreover, the age when a child acquiring English first produces complex predicates such as verb-particle combinations, is predicted with remarkable accuracy by the age when the child first produces novel Noun-Noun compounds. The complex-predicate/compounding connection is argued to follow from properties of the syntax-semantics interface; a formalization is provided within a neo-Davidsonian framework. The relevant parameter is shown to be independent of any single lexical item. The findings from complex predicates

and number/degree expressions, taken together, indicate that points of parametric variation in syntax are not necessarily tied either to overt morphology or to a specific lexical item.

Thesis Supervisor: Kenneth Wexler

Title: Professor of Psychology and Linguistics

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I do not deceive myself into thinking that any effort at consciousness-raising will make grammar interesting to everyone or even to very many. It is an odd interest, dependent, I suspect, on some rather kinky gene which, fortunately for our species, is not very widely distributed in the population.

Roger Brown, *A First Language*, page 4.

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Chapter 1

Introduction: Knowledge of Language

1.1 Preview

The objective of this dissertation is to gain a better understanding of the mental representation of language-particular syntactic knowledge. The method employed is a parallel investigation of the acquisition of language by children, and the variation observed across adult languages. Investigation is focused on a limited set of syntactic phenomena, selected for their bearing on issues of grammatical representation.

The following sections of Chapter 1 outline the principal questions to be addressed in Chapters 2 through 5, and explain how evidence from child language acquisition and comparative syntax can be combined to address these questions. Chapter 2 explores the possible relationship between language-particular syntactic knowledge and knowledge of language-particular word-formation processes. The syntactic phenomenon of complex-predicate formation, as observed in English, is analysed in some detail. Converging evidence from child language acquisition and patterns of cross-linguistic variation is presented to demonstrate a striking connection between syntax and morphology: Languages permit complex-predicate formation in the syntax if and only if they permit a very liberal form of compound-formation in their morphology. Within the domain of complex predicates, it appears plausible that cross-linguistic

variation is tied to variation “in the lexicon,” but only in the very general sense that word-formation processes are part of the lexicon. The observed point of cross-linguistic variation is argued not to be tied to any single lexical item, whether overt or phonologically null, and whether drawn from an open- or a closed-class syntactic category. Therefore, the Lexical Hypothesis (discussed below) is rejected as a general model for the psychological representation of language-particular syntactic knowledge: At least certain points of syntactic variation are necessarily represented in a form that is independent of any single lexical entry.

Chapter 3 explores the possible relationship between variation in syntax and variation in the overt morphology of inflectional and declensional paradigms. The source of evidence is a longitudinal case-study of the acquisition of “noun-drop” by a Spanish-speaking child. N-drop, or the omission of the pronominal *one* in a DP of the form, “the red one,” is widely believed to depend on a morphologically rich declensional paradigm. The results of the acquisitional case-study serve to eliminate from the hypothesis-space many of the conceivable relationships between N-drop and declensional morphology. Yet, a close grammatical relationship between N-drop and the declensional paradigm is not ruled out. Replication of the case-study with longitudinal data from other Spanish-speaking children, it is argued, should permit stronger conclusions.

Chapter 4 considers the morphosyntax of quantity and degree as a further source of information about the possible relationship between syntax and declensional morphology. A cross-linguistic survey reveals that the syntax of quantity expressions occurring with NPs is directly linked to the syntax of degree expressions occurring with APs. Yet, despite conceptual reasons to expect that functional heads mediating the syntax of quantity and degree also play a role in the checking of overt declensional morphology, the syntax of quantity and degree is shown to be independent of *any* morphological property of NP, AP, or their accompanying functional projections. It is therefore argued that the morphology of inflectional and declensional paradigms does not play a *general* role in determining the language-particular characteristics of syntax, although there may still exist isolated properties of syntax that follow from

the characteristics of morphological paradigms.

1.2 Issues in Grammatical Representation

Theory of grammar has undergone a dramatic evolution, over the past forty years, in which rules and transformations dedicated to specific grammatical constructions have been supplanted by syntactic principles of increasing generality. Representation of the language-specific properties of a grammar has become correspondingly restricted. Since Chomsky's (1981) *Lectures on Government and Binding*, two principal views of cross-linguistic variation have dominated the syntactic literature.

On one view (e.g. Chomsky 1981, 1982; Rizzi 1982; Kayne 1984; Hyams 1986), the innate biological basis of human language (Universal Grammar or UG) consists in a set of universal principles (constraints on the form or derivation of a structural description) and a finite collection of parameters. Each parameter specifies a point of possible variation in one of the UG principles. Settings of the parameters are compared to settings of switches in an electrical switchbox; the range of possible settings for each parameter is finite. The core grammar of a particular human language is specified by the combination of UG and the complete list of parameter settings for the language. Traditionally, this "classical" view has taken parameters of the computational component (including syntax) to be at least potentially autonomous from the other major repository of language-specific knowledge, the lexicon.

A second view, in many respects only a more restrictive version of the former, holds that cross-linguistic syntactic variation is expressed within the lexicon, especially in the lexical entries for closed-class or functional elements. A strong version of the "lexical" hypothesis states that the principles of UG are in fact invariant, and that "parametric" variation across languages follows from differences in the lexically specified morphosyntactic properties of closed-class elements. (I will nonetheless retain the term "parametric variation" even in this context.) Versions of the lexical hypothesis have been advocated by Borer (1984), Pica (1985, 1987), Wexler & Chien (1985), Hyams (1987), Manzini & Wexler (1987), Wexler & Manzini (1987), Kuroda

(1988), and Chomsky (1991, 1993), among others.¹

A number of general considerations lend plausibility to the lexical hypothesis. First, the lexical hypothesis provides a natural account of “parametric” properties of a language that paradoxically vary depending on choice of lexical item. Borer (1984, Ch. 6), for example, was concerned with the fact that null subjects are possible in Modern Hebrew, but only with certain types of inflectional morphology on the verb (as will be discussed in Chapter 3, below). The classical “switchbox” model has difficulty with such cases. Another consideration is that the lexical hypothesis provides a natural approach to interactions of systematic syntactic variation with overt morphology, while the “switchbox” model is less well equipped to explain such contingencies. A classic example is Pica’s (1985, 1987) observation that long distance versus local binding requirements on anaphors are tied to whether the anaphor is a clitic, and whether the anaphor is mono- or bi-morphemic.

On both the classical and the lexical view, the range of possible variation in the core grammars of human languages is highly constrained. (In the case of the lexical hypothesis, the assumption is that the range of possible variation in the morphosyntactic properties of closed-class elements is innately fixed and finite.) From a theoretical vantage, this restrictedness achieves two, closely related goals. Syntactic theory must account for the types of grammars that are *not* attested in human languages. Furthermore, syntactic theory must account for the logical possibility of language acquisition by the child. A highly constrained model of UG can explain the absence, among known languages, of many logically possible types of grammars. At the same time, a constrained model of UG limits the range of possibilities that the

¹The lexical hypothesis, as defined above, is not strictly identical to the “lexical parameterization hypothesis” (LPH) of Manzini & Wexler (1987), Wexler & Manzini (1987), although for the cases to which the LPH was originally directed the differences are chiefly notational. Taken literally, and extended beyond the context in which it was originally proposed, the LPH allows a UG principle to be parameterized in ways that could not be re-stated as the lexically specified morphosyntactic requirements of a closed-class item (Manzini 1990). This is because, on standard assumptions, morphosyntactic requirements of a lexical item have to be satisfied under strict locality conditions (indeed SPEC-head or head-head relations, in the Minimalist framework of Chomsky 1993).

Both the lexical hypothesis and the LPH are to be distinguished from Rizzi’s (1989) suggestion that all parameters are related to zero-level categories (“heads”); Rizzi is referring not only to particular zero-level lexical items but also to general parameterized principles (e.g. X-bar principles) stated over zero-level categories.

child must evaluate in the course of acquiring the grammar of a particular language.

The original spirit of the principles-and-parameters (P&P) framework (largely retained under the lexical hypothesis), is that each point of parametric variation is also quite abstract. The choice of a value for any given parameter should have widespread consequences, not confined to any particular “construction” of traditional grammar. Thus, Chomsky (1981, p.6) writes, “In a tightly integrated theory with fairly rich internal structure, change in a single parameter may have complex effects, with proliferating consequences in various parts of the grammar. Ideally, we hope to find that complexes of properties differentiating otherwise similar languages are reducible to a single parameter, fixed in one or another way.” If there were a parameter corresponding to each possible surface-level construction, then the P&P framework would amount to little more than a notational variant of earlier, rule-based frameworks.

In the history of generative grammar, however, there has always existed a tension between explanatory and descriptive adequacy (Chomsky 1965). Syntacticians face the challenge of describing a tremendous diversity of surface syntactic phenomena within a highly constrained theory of UG. A natural tendency among syntacticians is thus to postulate large numbers of parameters, each of which is defined rather narrowly. For example, Rizzi (1982) proposed a parameterization of the bounding theory to account for differences in the locality of *wh*-movement in English versus Italian. As Rizzi himself notes (1989), the proposed parameterization of bounding categories is unlikely to be a true parameter in the sense of (Chomsky 1981), in part because the “parameter” is largely inconsequential outside the *wh*-movement phenomena to which it was directly addressed. It is of little interest to recast each isolated difference in the syntactic phenomena of two languages as a separate “parameter.”

A similar danger arises for acquisitionists who attempt (quite reasonably) to understand the observed course of child language acquisition in terms of UG principles and parameters. The risk is that every time the child acquires a new construction or property of the target language, the acquisitionist may interpret the change as the setting or resetting of a parameter. In principle, the same empirical finding might be equally well understood in terms of the child’s acquisition of the construction-specific

rule of a phrase-structure grammar, or in terms of biologically driven maturation of the child's grammatical capabilities (cf. Borer & Wexler 1987, 1992) combined with language-specific knowledge acquired at an earlier time. Of course, a parametric interpretation may well be correct, but there arises the question of when such an interpretation is justified. The problem is only compounded by our scant knowledge of the inferential methods of the child's "language acquisition procedure," and by the tremendous uncertainties in syntactic theory concerning the precise formulation of the principles and their associated parameters.

1.3 Methodological Perspective

Despite the methodological danger of invoking "parameters" too freely, it is reasonable to expect that real parameters in the sense of (Chomsky 1981), and their equivalent under the lexical hypothesis, will be empirically recognizable to the extent that they exist. As discussed by Snyder & Stromswold (in press), a parametric interpretation of an acquisitional phenomenon is motivated when the observed phenomenon simultaneously affects a variety of syntactic constructions, the syntactic constructions do not depend on the same open-class lexical items, the constructions are semantically and conceptually divergent, and, perhaps most importantly, the structure or simple availability of corresponding constructions across different languages is indeed subject to parametric variation.²

The cross-linguistic criterion must be applied carefully, because parametric variation properly refers to variation between grammars, rather than variation in the types of strings generated by grammars. Two superficially equivalent constructions may result from quite different vectors of parameter settings. Ideally, then, when one employs acquisitional evidence in the investigation of parametric issues, comparative syntactic theory should serve as the starting point. The comparison of two or

²Depending on the nature of the phenomenon, one may also need to rule out competing, non-parametric explanations involving, for example, the frequency of a construction in the input to the child, and the possible processing difficulty resulting from structural complexity. On distinguishing effects of parametric learning from effects of internal, biological maturation, see below.

more languages, especially languages that are syntactically fairly similar, may reveal systematic differences. If the surface differences can be tied to a difference in the application of a specific syntactic principle, then a UG parameter is plausibly invoked. The value of acquisitional evidence is then as an independent test of the proposed parameter.

Moreover, the cross-linguistic criterion for parametric learning is especially important in deciding between an account in terms of parametric learning, and an account in terms of biological maturation (cf. Borer & Wexler 1987, 1992). For example, if the superficially distinct constructions that are “acquired” as a group by the child are in fact attested, in more or less the same form, in all known languages, then most probably there is no learning involved at all. The group of constructions is then related by shared dependence on some aspect of the child’s internal biological development, rather than by shared dependence on a particular parameter-setting.

Indeed, interactions between learning and maturation are almost certainly ubiquitous. Where languages exhibit grammatical variation, a child clearly has to acquire the relevant grammatical information from his or her linguistic input. In principle this information could become available to different children at radically different ages. Yet, children acquiring a given language exhibit a considerable degree of consistency in their time course of acquisition. This suggests that children do not make use of grammatical information in their linguistic input until their internal maturational schedule instructs them to do so.

To the extent, however, that biological maturation cuts across many distinct points of grammatical variation, it should still be possible to differentiate effects of parametric learning from effects of maturation. As will be demonstrated in Chapter 2, proposed effects of parametric learning can be compared statistically against more general indices of linguistic development. If an acquisitional effect falls along parametric lines, as determined by comparative syntactic analysis, and moreover is statistically stronger than would be expected simply from general maturational factors, then a parametric account is motivated, even if maturational factors are, as usual, also playing a role.

In the investigation of general issues of grammatical knowledge, relevant acquisitional evidence can come either from longitudinal studies of children's spontaneous speech, or from cross-sectional studies of children's comprehension. For example, the CHILDES database (MacWhinney & Snow 1985, 1990) provides transcripts for a sufficient number of English-speaking children to permit a correlational study. Snyder & Stromswold (*op.cit.*) used this database to investigate parametric questions surrounding English double object datives and a variety of related constructions. Comparative syntactic work by Kayne (1984) had suggested that the possibility of double object datives in English depends on a UG parameter setting that is also responsible for the availability of verb-particle constructions in English. More recent work by Larson (1988a,b) and others had suggested that a number of additional English constructions might depend on the same parameter setting.

Snyder & Stromswold tested the acquisitional predictions that (1) the ages of first clear use of a double object dative and a verb-particle construction (as well as other related constructions) would be correlated with one another across the twelve children studied (i.e., that one could predict, with a high degree of reliability, the age of acquisition for one construction given a child's age of acquisition for the other construction); (2) the ages of first clear use for double object datives and for verb-particle constructions would not be significantly different by *t*-test (i.e., that each child acquired the two constructions "concurrently," or at approximately the same age); and (3) the ages of first clear use for double object datives and verb-particle constructions would not exhibit any statistically significant ordering effect by sign test (a second statistical measure of concurrent acquisition).³ The results were that the ages of acquisition were both highly correlated and not significantly different, providing strong acquisitional support for the comparative syntactic hypothesis that the constructions depend on the same UG parameter setting. In Chapter 2 essentially

³The use of this methodology requires that children possess the open-class lexical items required to form each of the constructions under consideration, prior to the age of first clear use of either construction. This requirement was readily satisfied in (Snyder & Stromswold), because the relevant constructions can be formed from open-class lexical items that are used in a variety of simpler constructions and that occur with very high frequency both in the adult input and in the children's spontaneous speech.

the same methodology will be employed to test the hypothesis that the “complex predicate parameter” reduces to a parameter of word-formation.

Acquisitional research on languages other than English requires a different methodology, because at this time there are not enough publically available corpora to permit a statistically meaningful correlational study. (A minimum of ten to twelve corpora would be required.) Several other methods are available, however. For example, a case-study approach can be applied to individual transcript corpora. Chapter 3 applies such an approach to the phenomenon of “noun-drop” observed in Spanish. The age at which noun-drop apparently becomes a grammatical option is compared to various milestones in the acquisition of Spanish morphology, within a single child’s longitudinal corpus. This comparison is, in its own right, sufficiently powerful to provide an interesting test of certain hypotheses about the relationship between noun-drop and lexical knowledge (in this case, knowledge about morphological paradigms).

Still another methodology employs a cross-sectional, rather than longitudinal, study. A postulated parameter may lead to the prediction that any given child either will have acquired the relevant parameter setting, and therefore perform successfully on a comprehension task involving sentences containing *any* of the constructions depending on the parameter, or will not yet have acquired the correct parameter setting, and will systematically fail at comprehension tasks requiring correct syntactic analysis of the constructions depending on the parameter. This methodology is more flexible than the transcript methods, simply in the sense that it can be employed when transcript data are unavailable, but it is subject to a variety of additional problems relating to performance factors. In brief, the researcher crucially must ensure that successful performance on the comprehension task in fact requires a correct syntactic analysis of the sentence. Appropriate use of Crain & McKee’s (1985) truth value judgement task is one way of addressing this problem, provided the researcher can create sentences that are, for example, false on the correct (adult) syntactic analysis yet true on the non-adult (misset parameter) analysis. In some cases an elicited production task (subject to a different set of methodological concerns) might be profitably combined with, or substituted for, the comprehension task.

In Chapter 4, one source of evidence will be pilot data from a cross-sectional study in which English-speaking children's performance on an elicitation task for substantival plural morphology, was compared to their performance on a comprehension task for subcomparison of number. This cross-sectional study serves as an acquisitional test of a hypothesis relating two distinct roles that have been attributed to morphosyntactic properties of a single functional head, Number^0 , in the DP system.

1.4 Theoretical Perspective

The lexical hypothesis requires that morphosyntactic properties of individual lexical items determine the language-particular aspects of syntax. Yet, "morphosyntax" includes a variety of rather disparate phenomena, any number of which could perhaps play a role in determining language-particular properties of syntax. The present work addresses two closely related but distinct questions: First, to what extent is syntactic variation in fact expressed within the lexical entries for individual lexical items? Second, to what extent is syntactic variation expressed as language-particular knowledge about morphology, even where this knowledge is not encoded within individual lexical entries?

The scope of these questions is clearly vast.⁴ To make the first question tractable, I will focus on a syntactic phenomenon that appears to be especially problematic for the lexical approach, namely the same "complex predicate parameter" studied by Snyder & Stromswold. In Chapter 3 this phenomenon will be investigated as a source of information about the nature of language-particular syntactic knowledge. Strong evidence from both comparative syntax and child language acquisition will be provided for the view that resultatives, verb-particle combinations, and other complex predicate constructions are united by shared dependence on a "parametric" property of word-formation: the possibility, in certain languages, of treating open-class, ordinarily non-affixal lexical items as if they were affixes.

This property is a "parameter" in the classical sense of Chomsky (1981), because

⁴For a recent "first pass" at the first question, see (Hermón 1992).

it is not tied to any particular syntactic construction, nor is it tied to any particular closed-class lexical item. The results of Chapter 3 thus indicate that the lexical hypothesis cannot be maintained in all cases. At least one clear instance of parametric variation in syntax is independent of any functional head or other closed-class lexical item. At the same time, the result that this point of syntactic variation is tied to a property of word-formation suggests that syntactic variation might generally take the form of variation in morphology, or the “lexicon,” broadly construed.

In addition to processes of word-formation, two further aspects of morphology will be considered for their possible roles in determining syntactic variation. One area of morphology to be investigated is the “richness” of morphological agreement paradigms. Chapter 3 considers a comparative syntactic hypothesis relating the possibility of “noun-drop” in certain languages to richness of the morphological agreement system within the determiner phrase (DP). This hypothesis is tested in a case-study of a single child’s spontaneous speech during his acquisition of Spanish, a language with both a rich system of morphological agreement within the DP, and a very permissive form of noun-drop.

Another aspect of “morphology” thought to interact with syntax is the checking of “abstract morphological features” associated with particular closed-class lexical items. The hypothetical constraints (e.g. structural locality) on abstract feature-checking are based on what is known about the licensing conditions of overt morphological agreement (e.g. participial agreement in French), together with syntactic evidence for constituent movement that is (arguably) necessitated by morphosyntactic checking requirements. To investigate this area of morphology, Chapter 4 will explore parametric variation in the structure of noun phrases and adjective phrases.

More specifically, variation in the syntactic representation of quantity within noun phrases, and degree (or measure) within adjective phrases, will be examined in relation to the morphosyntactic properties of certain abstract functional categories (Number⁰ and Degree⁰) that have been attributed to the “functional architecture” associated with NPs and APs. In certain recent accounts languages that permit a bare numeral phrase, or equivalently a null *wh*-operator, to serve as a syntactic expression

of quantity within the DP, are thought to have a Number^0 which, as one of its lexically specified morphosyntactic properties, permits a maximal projection to appear in its specifier position. Such languages, as a consequence, also permit the complex comparative construction known as “subcomparison.”

Similarly, languages that require overt plural morphology on every noun whose DP is semantically plural, are thought to have a Number^0 which, as a lexically specified morphosyntactic property, attracts an N^0 (undergoing head-movement and adjunction to Number^0) and checks that it carries morphology corresponding to the semantic number of the DP. Pilot evidence from a cross-sectional acquisitional study favours an account in which these distinct functions, both (tentatively) attributed to Number^0 , are independent of one another, though perhaps still mediated by a single functional head. The cross-linguistic investigation reported in Chapter 4 likewise supports the logical independence of these dual roles of Number^0 .

Furthermore, the cross-linguistic evidence presented in Chapter 4 indicates that the syntactic representation of quantity with NPs and the representation of degree with APs are tightly interrelated. Languages are found to allow measure phrases with APs if and only if they allow bare numeral modifiers, of the English variety, with NPs. A survey of the available acquisitional evidence, including the results of several of my own studies, is found to be consistent with the hypothesis that in the grammars of many children as old as four years, neither Number^0 nor Degree^0 can license an XP in its specifier position; further experimentation is required, however, before any strong conclusions are drawn from these acquisitional findings. The conclusions of the dissertation are elaborated in Chapter 5.

Chapter 2

Complex Predicates and Morphological Compounds

2.1 Introduction

The central claim of this chapter is that the syntax of a language permits complex predicate constructions if, and only if, the morphology of the language freely permits compounding of open-class lexical items. “Complex predicates” here are intended to include at least resultatives, verb-particle combinations, and double object constructions, as exemplified in (1).

- (1) a. John hammered the metal flat.
b. Mary picked the book up / picked up the book.
c. Sue sent Alice a letter.

The unifying property of these constructions is that the main verb can be viewed semantically as forming part of a larger predicate - *hammer flat*, *pick up*, *send a letter* - which in turn takes a remaining VP-internal NP as its object.

This semantic constituency is directly reflected in the syntactic constituency proposed in many analyses, including those of Chomsky (1955/1975, 1993), Jacobson (1987), Larson (1988a, 1988b, 1990), Neeleman (1992), Hale & Keyser (1993),

Marantz (1993), and Pesetsky (1994).¹ Alternative syntactic analyses, involving a small clause or ternary branching structure, include those of Rothstein (1983), Kayne (1985), Hoekstra (1988), Den Dikken (1992), Mulder (1992), Sybesma (1992), Carrier & Randall (1992), and Svenonius (1994). The VP of Larson's (1988a) complex-predicate analysis of the English verb-particle construction is represented in (2a), while (2b) is an example of a small-clause approach (e.g. Hoekstra 1988) to the same construction.

- (2) a. [_{VP} Mary [_{V'} picked_i [_{VP} [_{DP} the book] [_{V'} t_i [_{PP} up]]]]]]
 b. [_{VP} Mary [_{V'} picked [_{PP/SC} [_{DP} the book] [_{P'} up]]]]

In (2a), the verb *picked* has undergone V-raising to head the higher of two VP-shells.

Neeleman (1992) and Neeleman & Weerman (1993) have argued that Dutch verb-particle combinations, as well as verb-adjective combinations in Dutch resultatives, form a word-level unit (or "compound") prior to syntactic movement operations (such as movement to V2 position). One piece of evidence for this claim is the fairly strict adjacency requirement on the verb and the adjective or particle in sentences such as (3a,b) (Neeleman & Weerman, p.436, 6-7).

- (3) a. ... dat Jan de deur (vaak) groen (* vaak) verfde.
 ... that John the door (often) green (*often) painted
 b. ... dat Jan het meisje (vaak) op (* vaak) merkte.
 ... that John the girl (often) up (*often) noticed.

This adjacency requirement contrasts with the relatively free word order normally observed in the Dutch Mittelfeld. In English the direct object routinely intervenes between the main verb and the inner predicate, even when no obvious movement operation has applied, as in (4).

¹Each of these authors proposes a syntactic complex predicate analysis for some, though not necessarily all, of the constructions that are grouped here under the term "complex predicate constructions." In particular, Marantz and Hale & Keyser assume a more intricate analysis of English double object datives. More generally, Pesetsky argues for a highly distinctive execution of the complex predicate analysis, and arrives at structures very similar to those proposed (for quite different reasons) in Section 2.4 below. (For some brief remarks comparing Pesetsky's approach and that of Section 2.4, see Snyder 1995.)

- (4) a. John painted the door green.
b. John called Mary up.

Nonetheless, English complex predicates, like their Dutch counterparts, might form a word-level unit, or “compound,” at some more abstract level of syntactic representation.

Indeed, the hypothesis tested and supported in this chapter is that compounding of the type illustrated in (5) is a necessary and sufficient condition for the formation of complex predicates.

- (5) a. [_{N^o} [_{N^o} coffee] [_{N^o} cup]]
b. [_{N^o} [_{A^o} black] [_{N^o} bird]]
c. [_{N^o} [_{V^o} guard] [_{N^o} dog]]

More precisely, the point of cross-linguistic variation that appears to determine both the availability of complex predicates and the availability of compounding as in (5) is characterized in (6).

- (6) Compounding Parameter: The grammar does (not) freely allow open-class, non-affixal lexical items to be marked [+ Affixal].

The intuition behind (6) is that there is a single mechanism permitting affixation of *coffee* to *cup* in the productive English compounding process exemplified in (5a), and permitting affixation of *up* to *call* in a compound occurring at a more abstract level of representation for (4b).²

The evidence in support of this hypothesis will come from both cross-linguistic variation and child language acquisition, as laid out in Sections 2.2 and 2.3. A possible

²As (6) is stated, a language such as English, with productive N-N compounding, receives the positive parameter setting, and a language such as French, in which the English N-N compound *coffee cup*, for example, becomes the phrasal *tasse à café*, receives the negative setting. Jacqueline Guéron (personal communication) has suggested to me that one might instead think of “French as having something which English lacks.” This could well be true, in the sense that French words, unlike English words, are “complete” at the point of lexical insertion. Yet, undoubtedly as the result of deeply ingrained anglocentrism, I have persisted in stating (6) so that English, rather than French, receives the positive setting of the parameter.

explanation for the compounding/complex predicate relationship, based on the distinctive semantics of complex predicates, will be proposed in Section 2.4. Finally, the implications of this relationship for linguistic theory, including language acquisition, will be explored in Section 2.5.³

2.2 A Cross-linguistic Survey of Resultatives and N-N Compounds

To investigate the cross-linguistic availability of English-style complex predicates, a suitable diagnostic is needed, and the possibility of resultatives as in (7a,b) will be employed here as the principal test.

- (7) a. John hammered the metal flat. (= 1a)
b. Sebastian painted the dome blue.

In a variety of respects the resultative is the paradigm case of the complex predicate construction. In (7b), for example, *the dome* is logically both the object of *paint* and the subject of *blue*. Hence, at least from the perspective of semantic interpretation, *the dome* is more naturally treated as an argument of a complex predicate, *paint blue*, than as the argument of either *paint* or *blue* alone.

Many constructions that have been analyzed in the recent syntax literature as complex predicate constructions are less clear-cut. For example, Larson (1988a) and Chomsky (1993) treat the English *put-locative* (8) as a syntactic complex predicate.

- (8) John put the book on the table.

Here the intuition is that *the book* is logically an argument of the complex predicate *put on the table*. Yet, (8) could also be treated as involving a simple predicate, *put*, which is subcategorized for two internal arguments: a theme and a location. In

³In the interest of brevity this chapter does not recapitulate the full history of my search for a "complex predicate parameter." Snyder (1995), Stromswold & Snyder (1995) and Snyder & Stromswold (in press) consider and reject a number of precursors to the compounding hypothesis, including variation in the licensing conditions for structural accusative case, and variation in the repertoire of phonologically null morphemes provided by the lexicon.

contrast to *paint*, which normally occurs without any specification of a result-state, *put* could easily incorporate a “resultative” meaning and argument-structure within its basic lexical entry, because *put* in fact requires both a direct object and a result-state (location). This is not to say that the complex predicate analysis of (8) is incorrect, but simply that a relatively ambiguous case such as the *put*-locative, by itself, would be an inappropriate diagnostic for the availability of complex predicates in a given language.

Furthermore, the resultative has the desirable property that at least in English it is composed from open-class lexical items that are interpreted in a highly predictable way. For example, (7a) can be approximately paraphrased as, “John hammered the metal until it was flat,” and (7b) can likewise be paraphrased as “Sebastian painted the dome until it was blue.” In contrast, verb-particle combinations such as (9) have the distinctive semantic properties of the complex predicate family, but the relationship between the meaning of the complex predicate and its constituent lexical items is often less transparent.

(9) Alice gave up a promising career.

In (9) *a promising career* is clearly the logical argument of a complex predicate, *give up*, precisely because the career is neither “given” nor “up.” The idiosyncrasy of the interpretation is further demonstrated by the fact that if we substitute *down* for *up*, the sentence becomes nonsensical. To distinguish issues of lexical idiosyncrasy from more general syntactic characteristics of a language, the resultative again appears to be the diagnostic of choice.

The evidence for the central cross-linguistic claim of this chapter is presented in Table 2.1: Languages allow complex predicate constructions (resultatives) if and only if they allow productive (N-N) compounding. The languages in Table 2.1 have been compared along two logically independent dimensions: (i) whether the language allows a direct counterpart to the English sentence, “John painted the house red”; and (ii) whether the language allows a novel N-N compound such as *worm can*, for

'a can in which one stores worms for a fishing trip.'⁴

In Table 2.1 prospective "resultatives" have been excluded if they require an element to intervene between the direct object and the adjective phrase (e.g. 'paint the house in red,' or 'paint the house become(s) red'), or if they employ an adverbial construction (e.g. 'paint the house redly,' or 'paint the house so that it is red'). Prospective "compounds" have been excluded if they require a preposition (cf. 'can of/for worms'), oblique case-marking on one of the nouns (cf. 'can worms-Genitive'), or other connective device (e.g. substantial abbreviation of one of the constituent nouns). The left-to-right order of modifier and head, however, has not been taken as criterial, and in fact varies across the languages that allow N-N compounding.⁵

⁴To my knowledge, the first discussion of cross-linguistic variation in the productivity of N-N compounding occurs in (Sapir 1921), pp. 67-70, where the productive N-N compounding of English, Chinese, Paiute, and Yana is contrasted with the absence or relative paucity of N-N compounding in French, Eskimo, Iroquois, Nootka, and the Semitic languages. Also, Pesetsky (1978) has examined what I am here treating as "productive N-N compounding" under the rubric of "N-to-A category switching," and notes that the availability of this process correlates cross-linguistically with the possibility of employing a pronoun as a determiner, as in *we linguists*. Pesetsky treats English, Norwegian, German, Latvian, Tok Pisin, and Japanese as exhibiting N-to-A category switching; and treats French, Italian, Spanish, and Russian as lacking the process. The only discrepancy of which I am aware, between Pesetsky's survey and the evidence reported in this chapter, is that my informants regard the Japanese cases of N-N compounds as lacking the productivity associated with N-N compounding in the Germanic languages.

⁵As noted by Sapir (1921, p.70), there is no cross-linguistic consistency in the left-to-right order of modifier and head; indeed, certain languages are internally inconsistent.

Table 2.1: Resultatives and N-N compounding across languages

Language	Resultatives	N-N Compounding
English	YES	YES
Dutch	YES	YES
German	YES	YES
Khmer	YES	YES
Hungarian	YES	YES
French	NO	NO
Spanish	NO	NO
Russian	NO	NO
Serbo-Croatian	NO	NO
Japanese	NO	NO
ASL	NO	NO
Mandarin	NO	NO
Modern Hebrew	NO	NO
Palestinian Arabic	NO	NO

The language sample on which Table 2.1 is based is limited to languages for which native informants were readily available, but includes a cross-section of distinct language groups and families: Indo-European (Germanic, Romance, Slavic), Finno-Ugric, Sino-Tibetan, Japanese-Korean, Mon-Khmer, American Sign Language, and Afro-Asiatic (Semitic). The actual test items in these languages are provided in (10a,b) and (11a,b).^{6,7,8,9,10,11}

⁶American Sign Language has a small number of lexical N-N compounds (Klima & Bellugi 1979, Ch.9), some of which exhibit a form of phonological reduction discussed by Liddell & Johnson (1986), among others. N-N compounding in ASL is thus distinguished from that in English both by a relative lack of productivity and by a tendency to combine the nouns into a single, "compressed" form (cf. American English *laundromat*). (Items (10.b.v) and (11.b.v) are partial glosses of the ASL expressions, using English words to stand in for signs. There is no generally accepted transcription system for ASL.)

⁷In the Hungarian item (10.a.v), the adjective appears in the "sublative" form. Marácz (1989, p.223) indicates that this is the usual form taken by Hungarian adjectives when they serve as secondary resultative predicates. A concern could be that the sublative form *pirosra* 'red,' is an oblique equivalent of the French PP *en rouge* 'in red,' but this concern appears to be unwarranted. In particular, Hungarian uses exactly the same construction in a sentence such as (i) (based on the examples of Marácz, p.223f), which is quite difficult to express directly in a language of the French type, with or without the introduction of a preposition (e.g. Levin & Rapoport 1988).

(i) János laposra verte Pétert.
 John flat-subl beat-AGR3sg Peter-ACC
 'John beat Peter flat (i.e. to a pulp).'

⁸Hungarian provides several mechanisms permitting a noun to function as a modifier. One is the simple N-N compounding exemplified in (11.a.v), while the other mechanisms employ a suffix (-S or -i) on the modifying noun. All three processes are highly productive, but native informants favour different processes in different cases. The factors determining which type of modification is preferred remain unclear to me, but appear to be largely semantic.

⁹Samir Khalaily (personal communication) informs me that Palestinian Arabic (PA) permits a surface counterpart to the particular English resultative "John painted the house red," as shown in (10b.ix), but the PA construction clearly diverges from that of English. For example, where English has "John hammered the metal flat," PA requires a circumlocution of the form, "Samir hit the metal until it became flat." The preposition-less form in (10b.ix), Khalaily suggests, might be derived by stranding an adjective within an NP whose head (i.e. the cognate noun *dhaan* 'paint') has incorporated into the verb; unlike standard Arabic, PA generally permits adjective stranding.

¹⁰For general discussion of the compounds, including N-N compounds, that occur in the Japanese lexicon, see Makino (1976). Despite the existence of lexical N-N compounds in Japanese, my informants judge novel N-N compounds (as for "worm can") to be possible only as an attempt at lexical innovation; where English would freely permit the spontaneous creation of a novel N-N compound, Japanese normally requires a phrasal construction with the connector *no*.

¹¹The construct-state (CS) expression found in Hebrew and Arabic forms a phonological word (Ritter 1991), but is clearly distinguished from English N-N compounds in a variety of respects. Indeed, in many ways the modifying portion of the CS expression corresponds much more closely to the possessor phrase of an English DP: The modifying phrase is formally genitive; if the modifying phrase contains a definiteness marker, then the head noun must also be construed as definite (cf. *the girl's book* in English); the definite article cannot occur before a CS expression (cf. **the Mary's*

- (10) a. (i) John painted the house red. (English)
(ii) Jan verfde het huis rood. (Dutch)
John paint-ed the-Neut house red
(iii) Hans hat das Haus rot angemalt. (German)
John has the-Neut house red (particle)-paint-ed
(iv) Kira liüp ptea^o krahom. (Khmer)
Kira paint house red
(v) János befestette pirosra a házot. (Hungarian)
John painted red-(sublative) the house-(accusative)
- b. (i) Jean a peint la maison *(en) rouge. (French, result reading)
John has painted the-Fem house (in) red
(ii) *Juan pintó la casa roja. (Spanish, result reading)
John painted the-Fem house red-Fem
(iii) Ivan pokrasil dom *(v) krasnyj tsvet (Russian)
John painted house (in) red colour
(iv) John je ofarbao kucu *(u) crveno. (Serbo-Croatian)
John is painted house (in) red
(v) John-ga ie-o akaku nut-ta. (Japanese)
John-Nom house-Acc “red-ly” (Adv) paint-Past
(vi) HE PAINT HOUSE *(BECOME) RED. (ASL)
(vii) Ta ba fang-zi chi chung hong su. (Mandarin)
he BA house paint become red colour
(viii) Dani tzavaA ?it ha-bayet *(bi)-?adoom. (Modern Hebrew)

book in English); the modifying expression can easily be a proper name (cf. *Mary's book*; ?* (*the*) *Mary book*); and CS expressions can freely be embedded one within the other, as in (i) (based on Ritter's 9a, p.41), which is necessarily translated by the possessive in English.

- (i) ben xaverey ha-mora
son friends the-teacher
'the teacher's friends' son'

See (Ritter 1991), and references therein, for extensive discussion.

- Dani painted P(Acc) the-house *(in)-red
- (ix) Samiir dahan l-beet bi-Hmar/iHmar (Palestinian Arabic)
 Samir painted the house (in/with) red
 ‘Samir painted the house with red paint’
- (11) a. (i) worm can (English)
 (ii) wormkan (Dutch)
 (iii) Wurmkanne (German)
 (iv) kapong’ jole:n’ (Khmer)
 can worm
 (v) giliszta vedér (Hungarian)
 worm bucket
- b. (i) *verre-boite, *boite-verre; OK: boite aux verres (French)
 worm-can, can-worm; can for-the worm-s
 (ii) *gusano-bote, *bote-gusano; OK: bote de gusanos (Spanish)
 worm-can, can-worm; can of worm-s
 (iii) banka *(dlja) nazhivki, banka *(dlja) chervej (Russian)
 can *(for) bait, can *(for) worms
 (iv) *crv konzerva; OK: konzerva za crve (Serbo-Croatian)
 *worm-Nom can-Nom; can-Nom for worms
 (v) esa-?*(no) kan (Japanese)
 bait-(connecting suffix) can
 bait can
 (vi) *CAN-WORM, *WORM-CAN (ASL)
 (vii) zhuang1 chong2 de guan4 (Mandarin)
 store/put worm DE can
 (viii) kufsat tulaAim (Modern Hebrew)
 can (of) worm [construct-state expression]
 (ix) Ailbit balaAit (Palestinian Arabic)

can (of) worms [construct-state expression]

The cross-linguistic contingency between complex predicates and productive N-N compounding is striking and thus far without exception. Even if a small set of counterexamples does eventually emerge, the present cross-linguistic evidence will continue to suggest a close connection between properties of word-formation and syntactic variation, and will require an explanation.

Finally, the descriptive generalization made earlier in this chapter (cf. 6), and restated in a slightly different form in (12), takes into account some additional empirical and theoretical considerations that will now be elaborated.

- (12) Descriptive Generalization: A language allows complex predicates if and only if it freely allows open-class, ordinarily non-affixal lexical items to function as affixes.

First, the prerequisite for complex predicates cannot simply be the availability in the language of *any* type of syntactic affixation (i.e. X^0 adjunction) if, for example, we adopt certain influential analyses of Romance word order. To account for verb-adverb-object order in a French sentence such as (13), Pollock (1989) and Chomsky (1991, 1993) argue that the verb raises and adjoins to an inflectional head prior to phonological spell-out of the sentence.

- (13) Jean (*souvent) voit (souvent) Marie.
'John (*often) sees (often) Mary.'

Raising of N^0 to a functional head in the DP system has also been proposed for French (Valois 1991, 1992), as well as several other Romance languages (e.g. Picallo 1991; Bernstein 1993a,b; Cinque 1993), to account for the predominantly noun-adjective word order illustrated in (14).

- (14) la (*rouge) maison (rouge)
'the (*red) house (red)'

Thus, French has no productive process of N-N compounding (as illustrated in 11.b.i), but is thought to allow syntactic affixation in V-to-I movement and N-

raising.¹² In (12) it is assumed that the crucial difference between V-to-I movement and N-raising, on the one hand, and N-N compounding, on the other, is that the former cases of affixation involve a closed-class, functional category that systematically requires adjunction of a verb or noun, but the case of N-N compounding depends on treating a normally non-affixal, open-class lexical item (N) as an affix.¹³ Thus, the parameter in (6) and the descriptive generalization in (12) crucially refer to the possibility of freely marking an open-class, normally non-affixal lexical item as [+affixal].¹⁴

Moreover, a language such as French, which lacks productive N-N compounding, still exhibits processes of word-formation that apparently involve lexically [+affixal] morphemes. For example, the agentive/instrumental suffix *-eur* (15a-d) is quite productive in contemporary French, and combines with the verb stem in a highly predictable fashion.

- (15) a. *travaill(-er) + -eur -> travailleur* ‘worker’
 b. *port(-er) + -eur -> porteur* ‘porter’
 c. *photocopi(-er) + -eur -> photocopieur* ‘photocopying machine’
 d. *class(-er) + -eur -> classeur* ‘filing cabinet’

Thus, it again appears that what French lacks, with respect to compounding, is the ability freely to treat a normally non-affixal lexical item as an affix. If a morpheme is represented in the French lexicon as [+affixal], however, it can of course function

¹²I shall return to both V-to-I movement and N-raising in Chapter 4.

¹³This open-class/closed-class distinction could perhaps be re-stated in terms of a difference between satisfaction of a morphological [+Affixal] feature, and satisfaction of the checking requirements imposed by abstract tense-features or person/number/gender-features. Then the existence of V-to-I movement or N-raising would be completely independent of any affixational properties of the sort involved in compounding and complex predicate formation. Alternatively, one could exploit Chomsky’s (1995) proposal that syntactic movement is driven by “attraction” to a head with unsatisfied morphosyntactic requirements. Thus, in (13) and (14) a functional category in the inflectional or determiner system carries an affixal feature, and attracts an otherwise non-affixal verb or noun. The open-class verb or noun does not itself have to be marked [+ Affixal] on such an approach, and therefore no conflict results from French taking the negative value of the parameter in (6).

¹⁴Further evidence that simple availability of head-movement is irrelevant to the observed patterns of cross-linguistic variation and child language acquisition comes from the acquisitional studies of Pierce (1989), Poeppel & Wexler (1992), and Wexler (1994), where it is argued that head-movement is available in children’s grammars at extremely early ages (indeed as early as the children use multi-word utterances). In fact, Pierce’s work on the acquisition of French might be taken as further evidence that French has clear cases of syntactic head-movement, despite its lack of resultatives and productive N-N compounding.

as an affix.

A final point apparent from the comparison of English and French is that productivity plays a crucial role in characterizing the relevant point of variation. As noted by Bauer (1978), French does have a relatively limited class of N-N compounds, as illustrated by (15e).

(15) e. *homme grenouille* = 'frog man' (i.e. 'underwater diver')

In contrast to its English translation, however, *homme grenouille* could never refer, say, to a man who sells frogs (Bauer, p.83), but can only be used in its lexically fixed sense of 'diver.'¹⁵ French also has a small class of V-N compounds, illustrated in (15f), that most probably result from relexification of an entire VP; although (15f) functions as a noun, it literally means 'opens can.'

(15) f. *ouvre-boite* = 'can opener'

Thus, it appears that the descriptive generalization (12) concerning compounds and complex predicates crucially must make reference to productivity, or the "freedom" with which non-affixal morphemes become affixes. Isolated cases of apparent compounding, probably resulting from literal translations of foreign compounds (e.g. English 'frog man'), or from relexification as a source of lexical innovation, are observed even in languages that do not "freely," or productively, allow the compounding of open-class, non-affixal morphemes.¹⁶

¹⁵A further piece of evidence that (15e) is to be distinguished from the N-N compounds of English is that in its plural form (i), plural-marking occurs on both nouns.

(i) *hommes grenouilles* 'frog men'

In this respect *grenouilles* is treated as analogous to an attributive adjective, which would likewise exhibit number agreement in French. This suggests, in fact, that (15e) is a full NP, rather than a morphologically complex N⁰.

¹⁶See Bauer, especially pp.83-84 and pp.130-132, for extensive and detailed discussion of the situation in French with respect to N-N compounds.

2.3 Children's Acquisition of Complex Predicates and N-N Compounds

An examination of children's acquisition of English provides converging evidence for a close grammatical relationship between complex predicates and morphological compounding. First, as argued by Snyder & Stromswold (in press), a grammatical relationship internal to the various "complex predicate constructions" of English is suggested by the fact that children's ages of acquisition for these constructions are closely intercorrelated. In a study of the longitudinal transcripts of spontaneous production for twelve children acquiring American English, Snyder & Stromswold found that the ages of acquisition for double object dative constructions such as 'Mary gave John the book' were significantly correlated with the ages of acquisition for V-NP-particle combinations such as 'John picked the book up' ($r = .82$, $t(10) = 4.45$, $p = .0012$), *put*-locatives such as 'John put the book on the table' ($r = .84$, $t(10) = 4.93$, $p = .0006$), causative and perceptual constructions such as 'Mary made/saw John leave' ($r = .75$, $t(10) = 3.54$, $p = .0054$), and *to*-datives such as 'John sent the book to Alice' ($r = .78$, $t(10) = 3.98$, $p = .0026$).

In other words, given the age at which a child begins producing verb-particle combinations, for example, one can predict with considerable accuracy the age at which the same child acquires, say, double object dative constructions. These findings provide acquisitional support for the hypothesis that the family of complex predicate constructions, as a group, shares dependence on some single, "parametric" property of the grammar.

A possible concern about these findings is that children's grammars appear to undergo a sort of "explosion" around the time that their mean length of utterance (MLU) rises above two morphemes (Brown 1973). While part of this explosion could perhaps be attributed to the acquisition of language-particular grammatical knowledge, it seems quite likely that internal maturational factors play at least as large a role. Thus, given that complex predicates are typically first produced around the age of this grammar explosion (as is evident from the mean ages obtained by Snyder &

Stromswold), the timecourse of maturation, rather than the timecourse of acquiring language-particular knowledge, could be responsible for the reported correlations.¹⁷

A fairly direct method is available to test whether the correlations reported in (Snyder & Stromswold) are stronger than would be expected simply on general maturational grounds.¹⁸ By determining, for each child in the study, the age of the transcript in which the MLU first reaches or exceeds 2.5 morphemes (the transition between Brown's 1973 Stages II and III), one can obtain a good estimate of the point at which the "grammar explosion" takes place. A partial regression analysis can then be used to determine whether a significant correlation still exists between the ages of acquisition for two types of complex predicates, after the portion of the variance that can be explained by the age of $MLU \geq 2.5$ has been subtracted away.

Table 2.2 presents the age and MLU for the transcript in which each child first reaches or exceeds an MLU of 2.5 morphemes.¹⁹ After partialling out the variance explainable by the ages in Table 2.2, the ages of acquisition for double object datives are still significantly correlated with the ages for verb-particle combinations ($r = .42$, $t(9) = 3.65$, $p = .0053$), *put*-locatives ($r = .42$, $t(9) = 4.99$, $p = .0007$), causative and perceptual constructions ($r = .42$, $t(9) = 3.82$, $p = .0041$), and *to*-datives ($r = .42$, $t(9) = 3.54$, $p = .0063$).²⁰ These results provide strong support for the view that the correlations discovered by Snyder & Stromswold bear on the process by which

¹⁷Snyder & Stromswold do, however, provide arguments against such an interpretation. In particular, the detailed acquisitional timecourse for these constructions exhibits a complex and highly consistent structure that is difficult to explain in terms of general maturational or performance factors, but that can be explained in terms of the acquisition of language-particular grammatical knowledge. This timecourse is evaluated by combining the correlational analyses with several additional statistical techniques.

¹⁸This method was not, however, applied in (Snyder & Stromswold).

¹⁹The corpora for Adam, Eve, and Sarah are due to Brown (1973); Peter and Allison, to Bloom (1973); Shem, to Clark (1978); April, to Higginson (1985); Naomi, to Sachs (1983); and Nina, to Suppes (1973). The corpora for Mark and Ross were contributed to the CHILDES database by Brian MacWhinney, and the corpus for Nathaniel was contributed by Catherine Snow.

²⁰Furthermore, if one partials out the variance explainable by double object datives, the age at which MLU first reaches 2.5 morphemes is no longer significantly correlated with the age of acquisition for verb-particle combinations ($r = .42$, $t(9) = 1.49$, $p = .1701$ NS), causative/perceptual constructions ($r = .42$, $t(9) = 1.24$, $p = .2460$ NS), or *to*-datives ($r = .42$, $t(9) = .2378$, $p = .8174$ NS); the partial correlation of the MLU ages with the ages for *put*-locatives is significant ($r = .42$, $t(9) = 3.42$, $p = .0076$), but weaker than the partial correlation of double object datives with *put*-locatives when the MLU ages are partialled out ($r = .42$, $t(9) = 4.99$, $p = .0007$).

Table 2.2: Age and MLU of first transcript with $MLU \geq 2.5$ morphemes

Child	Age	MLU
Adam	2.52	2.530
Allison	2.35	3.407
April	2.75	3.499
Eve	1.75	2.594
Mark	1.83	2.857
Naomi	1.92	2.508
Nathaniel	2.47	2.656
Nina	2.18	2.584
Peter	2.02	3.071
Ross	2.56	3.190
Sarah	2.89	2.500
Shem	2.21	3.130

children acquire language-particular properties of their grammar; the correlations are significantly stronger than what we should expect from purely maturational factors, as measured by the developmental landmark of $MLU \geq 2.5$.

Given that the acquisitional evidence for a close grammatical relationship among the various complex predicate constructions appears to be solid, one can now approach the question of whether complex predicate constructions exhibit the predicted acquisitional relationship to morphological (N-N) compounding. For ten of the twelve children examined by Snyder & Stromswold, the ages of acquisition have been determined for productive N-N compounding.²¹ A crucial distinction was made between novel N-N compounds apparently invented by the child, and familiar (lexical) N-N compounds that could have been acquired and used by the child as unanalysed wholes. The first clear uses of a novel N-N compound are presented in Table 2.3.²² In most

²¹Two of the children examined by Snyder & Stromswold, namely Mark and Ross, were excluded from the present compounding analyses because of concerns about the reliability of their corpora. Although these children were not dramatic outliers in the analyses of (Snyder & Stromswold), the maintainers of the CHILDES database have not yet subjected these two corpora to the full battery of checking procedures that have been applied to the data for the ten children included here. A decision was therefore made not to analyse compounding in Mark's and Ross's corpora at this time.

²²Following (Stromswold 1989), age of first clear use was selected as the measure of age of acquisition, where "first clear use" refers to the first occurrence of a construction that soon after becomes clearly productive in the child's speech. Isolated uses that are plausibly due to performance errors or transcription errors rather than grammatical knowledge are excluded, as are utterances that are

Table 2.3: First novel N-N compounds

Child	Age	Novel N-N Compound
Adam	2.26	tattoo man
Allison	2.33	animal cup
April	2.08	pig book
Eve	1.83	pig (=peg) toy
Naomi	1.92	bunny girl
Nathaniel	2.47	Big+Bird book
Nina	1.99	zoo book
Peter	1.87	tape+recorder button
Sarah	2.59	ribbon hat
Shem	2.25	bunny+rabbit record

cases the compound listed is representative, but is only one of several apparently novel compounds that appeared at the same age.

Two controls were obtained for the age of acquisition of novel N-N compounding: the age at which the first lexical N-N compound was produced, and the age at which the first Adjective+Noun combination was produced. A+N combinations are similar in conceptual and processing difficulty to novel N-N compounds, but are thought to be grammatically distinct from such compounds. The results of these control measures are presented in Tables 2.4 and 2.5.

The first question, however, is simply whether the ages of acquisition for productive N-N compounding in Table 2.3 are significantly correlated with the ages of acquisition for the various complex predicate constructions studied by Snyder & Stromswold. In fact, the compounding ages are exceptionally well correlated with the ages of acquisition for V-NP-Particle combinations ($r = .98$, $t(8) = 12.9$, $p < .00005$), and with the ages for *put*-locatives ($r = .95$, $t(8) = 9.09$, $p < .00005$); and are also significantly correlated with the ages of acquisition for causative and perceptual constructions ($r = .91$, $t(8) = 6.27$, $p = .0002$), double object datives ($r = .77$, $t(8) = 3.45$, $p = .0086$), and *to*-datives ($r = .88$, $t(8) = 5.18$, $p = .0008$).

phonetically unclear, stuttered, mumbled, or overlapped by another speaker, as well as utterances that appear to be memorized routines or direct imitations of a preceding adult utterance.

Table 2.4: First lexical N-N compounds

Child	Age	Lexical N-N Compound
Adam	2.26	apple juice
Allison	1.72	baby doll
April	1.83	apple juice
Eve	1.50	tomato soup
Naomi	1.75	tape (re)corder
Nathaniel	2.47	snow ball
Nina	1.98	peanut butter
Peter	1.77	suit case
Sarah	2.27	ice cream
Shem	2.21	orange juice

Table 2.5: First A+N Combinations

Child	Age	A+N Combination
Adam	2.26	big horn
Allison	1.62	big baby
April	1.83	brown bear
Eve	1.50	good girl
Naomi	1.68	bad girl
Nathaniel	2.47	little boy
Nina	1.96	little rabbit
Peter	1.93	big tunnel
Sarah	2.30	bad lion
Shem	2.21	good juice

The next question is whether the correlations between novel N-N compounds and the various types of complex predicates remain statistically significant even when the available control measures have been partialled out. One control measure is provided by the ages of first use of an A+N combination. A partial regression analysis reveals that the correlation between complex predicates and novel N-N compounds remains statistically significant, in four of five cases, even after the variance that can be accounted for by the ages of first A+N combinations has been subtracted away. After A+N combinations are partialled out, novel N-N compounds are still significantly correlated with V-NP-Particle combinations ($r = .70$, $t(7) = 8.45$, $p = .0001$), *put*-locatives ($r = .70$, $t(7) = 5.87$, $p = .0006$), causative and perceptual constructions ($r = .70$, $t(7) = 3.77$, $p = .0070$), and *to*-datives ($r = .70$, $t(7) = 4.99$, $p = .0016$). After the partialling procedure, however, the ages for novel N-N compounds no longer account for a statistically significant portion of the variance in the ages for double object datives ($r = .70$, $t(7) = 1.43$, $p = .1954$ NS).^{23,24}

A further control measure is the age of first use for a lexical N-N compound; this age should not depend on grammatical knowledge of the productive N-N compounding process, because lexical N-N compounds are potentially acquired as an unanalysed lexeme, even before N-N compounding is a productive feature of the child's grammar. Yet, lexical N-N compounds are a useful control measure, because they are identical to

²³Logically, this leaves open the question of whether the acquisition of N-N compounding is causally connected (in some way) to the acquisition of double object datives, because both N-N compounds and A+N combinations are well correlated with double objects. In other words, there is no principled reason why A+N combinations should necessarily be favoured over N-N compounds in explaining the age of acquisition of double object datives. Nonetheless, the result suggests that double object datives may in some sense represent an outlier among the complex predicate constructions, a result that would accord with much of the syntactic literature. For example, Marantz (1993) and Hale & Keyser (1993), drawing on work of Hoffman (1991), take pains to distinguish the syntax of double object constructions from that of other complex predicate constructions. Hence, it would not be surprising if the language-particular knowledge required for the grammar to produce a double object construction were a proper superset of the knowledge required for other complex predicate constructions. In this case we expect double object constructions generally to be a "correlational outlier" among the complex predicate constructions. (See below.)

²⁴Furthermore, if one partials out the variance explainable by the age of first novel N-N compound, the age of first A+N combination is no longer significantly correlated with the age of acquisition for verb-particle combinations ($r = .70$, $t(7) = 0.29$, $p = .7830$ NS), *put*-locatives ($r = .70$, $t(7) = 0.30$, $p = .7716$ NS), causative/perceptual constructions ($r = .70$, $t(7) = 0.89$, $p = .4041$ NS), or *to*-datives ($r = .70$, $t(7) = 1.48$, $p = .1816$ NS); the partial correlation with double object datives is only marginally significant ($r = .70$, $t(7) = 2.23$, $p = .0609$).

novel N-N compounds in morphemic length, stress pattern, and surrounding syntactic context. When the variance that can be accounted for by the ages of first use for lexical N-N compounds has been subtracted out, the ages of acquisition for productive N-N compounding continue to be significantly correlated with the ages of acquisition for the complex predicate constructions in four of five cases: V-NP-Particle combinations ($r = .78$, $t(7) = 7.72$, $p = .0001$), *put*-locatives ($r = .78$, $t(7) = 5.54$, $p = .0009$), causative/perceptual constructions ($r = .78$, $t(7) = 3.34$, $p = .0124$), and *to*-datives ($r = .78$, $t(7) = 4.55$, $p = .0026$).²⁵ Once again, however, after the partialling procedure novel compounds no longer account for a significant portion of the variance in double object datives: $r = .78$, $t(7) = 1.06$, $p = .3259$ NS.

A final control condition that can be applied to the compounding/complex predicate correlation is the same MLU control that was introduced earlier. Yet again, when the ages at which MLU first reaches or exceeds 2.5 morphemes (Table 2.2) are partialled out, novel N-N compounds are significantly correlated with complex predicate constructions in four of five cases: V-NP-Particle constructions ($r = .78$, $t(7) = 7.41$, $p = .0001$), *put*-locatives ($r = .78$, $t(7) = 4.87$, $p = .0018$), causative/perceptual constructions ($r = .78$, $t(7) = 3.14$, $p = .0164$), and *to*-datives ($r = .78$, $t(7) = 3.41$, $p = .0113$).²⁶ After the partialling procedure, however, the correlation between N-N compounding and double object datives is only marginally significant ($r = .78$, $t(7) = 1.95$, $p = .0919$). Hence, the ages of acquisition for novel N-N compounding are very well correlated with the ages for all of the complex predicate constructions examined. With the exception of double object datives, the complex predicate constructions continue to be significantly correlated with novel N-N compounding even after the

²⁵If one partials out the variance explainable by the age of first novel N-N compound, the age of first lexical N-N compound is no longer significantly correlated with the age of acquisition for verb-particle combinations ($r = .78$, $t(7) = 0.09$, $p = .9273$ NS), *put*-locatives ($r = .78$, $t(7) = 0.20$, $p = .8460$ NS), causative/perceptual constructions ($r = .78$, $t(7) = 0.57$, $p = .5848$ NS), *to*-datives ($r = .78$, $t(7) = 1.40$, $p = .2045$ NS), or double object datives ($r = .78$, $t(7) = 1.85$, $p = .1074$ NS).

²⁶If one partials out the variance explainable by the age of first novel N-N compound, the age at which MLU first reaches 2.5 morphemes is no longer significantly correlated with the age of acquisition for verb-particle combinations ($r = .78$, $t(7) = 1.44$, $p = .1940$ NS), *put*-locatives ($r = .78$, $t(7) = 1.41$, $p = .2031$ NS), causative/perceptual constructions ($r = .78$, $t(7) = 0.88$, $p = .4089$ NS), *to*-datives ($r = .78$, $t(7) = 0.46$, $p = .6614$ NS), or double object datives ($r = .78$, $t(7) = 0.07$, $p = .9496$ NS).

variance that can be accounted for by maturational, conceptual, and other control measures has been subtracted away.

2.4 Explaining the Association of Complex Predicates and Compounding

The preceding sections of this chapter have presented converging evidence, from cross-linguistic variation and child language acquisition, for a strong association between complex predicates and morphological compounds. The objective of the present section is to provide an explanation for this association. The chief proposal will be that compound-formation is the basis for the distinctive semantic properties that characterize complex predicates.

A striking property of certain “core” cases of complex predicates, such as resultatives and verb-particle combinations, is that a single NP often serves as the logical argument of the main verb and another maximal projection (XP) taken in combination. In such cases, to view the NP as an argument of either the V or the lower XP alone would be at best to omit part of the sentence’s intended meaning, and at worst to lose the sentence’s meaning entirely. Returning to the examples (1a,b), repeated below, the resultative in (1a) illustrates a case in which an NP (*the metal*) is both the logical object of the main verb (*hammered*) and the logical subject of an inner predicate (*flat*).

(1) a. John hammered the metal flat.

b. Mary picked the book up / picked up the book.

Both relations contribute to the meaning of the VP in such sentences. For example, we might imagine a situation in which an individual Mary becomes red with anger every time John paints his house. Yet, if John were to paint his house an especially noisome shade of puce, and Mary were, as a direct consequence, to turn red, still we could not truly utter the resultative sentence in (16).²⁷

²⁷I gratefully acknowledge Ken Wexler’s assistance in the construction of this example.

(16) John painted Mary red.

The DPs *Mary* in (16) and *the metal* in (1a) cannot (in my judgement) be interpreted simply as the subject of the resultative predicate (*red* or *flat*), without also being interpreted as the logical object of the main verb (*painted* or *hammered*) as well.²⁸

The verb-particle combination in (1b) is a bit more idiosyncratic, in that *the book* is at once the object (Patient) of *pick* and the subject of *up*, yet the action of “picking up” is quite different from the action normally implied by the verb *pick* by itself. Hence, in this case, to view *the book* as simply the object of *pick* would be not only to omit an additional contribution of *up*, but to lose the intended meaning of the sentence entirely.²⁹

Moreover, the predominantly one-to-one relationship between syntactic (DP) positions and the arguments of a predicate, as standardly assumed, for example, in Montagovian approaches to semantic composition, holds if the complex predicate is viewed as a single predicate, but does not (in general) hold if the subparts of the complex predicate are viewed as independent predicates in their own right. For example, (1a) is exceptional, in this respect, if both *hammered* and *flat* take the DP *the metal* as an argument, but not if the complex predicate *hammered flat* has a single argument-position associated with *the metal*.³⁰ Complex predicates thus exhibit an

²⁸The situation for “intransitive” resultatives, however, such as “John sang himself hoarse,” is different. In this case *himself* is not a logical object of *sang*, and an argument for a complex-predicate analysis of the construction must rely on other considerations. Such considerations are, however, readily available. For example, the aspectual arguments supporting a complex-predicate analysis of transitive resultatives, as illustrated below in (18), extend directly to intransitive resultatives.

²⁹Double object datives only occasionally share the property of treating a single DP as the argument of two different predicates. For example, in (i), the DP *Alice* is both the Destination or Goal of *gave*, and the eventual possessor of the book.

- (i) Sue gave Alice a book.
- (ii) Sue sent Alice a letter.

Yet, in (ii) (=1c), it is much less clear that any necessary relationship is implied between Alice and the letter. For example, the letter might be lost in transit, without rendering (ii) false. Hence, in this and a number of other respects, double object datives appear to be “outliers” among the complex predicate constructions.

³⁰Without complex-predicate formation, (1a) also violates the “popular” version of Chomsky’s (1981) Theta Criterion (requiring a one-to-one mapping between theta-roles and theta-marked chains), but it does not necessarily violate the “official” version of the Theta Criterion in (Chomsky 1981), which simply prevents a single chain from containing two theta-positions, and which therefore

unusual type of semantic compositionality in which distinct and often discontinuous syntactic constituents collectively take a single argument, and are interpreted much as if they formed a single word. The impression created, in fact, is that a form of “lexical composition” is taking place overtly in the syntax, and is employing ordinarily free morphemes (e.g. *hammered*, *flat*) as some of the “lexical primitives,” or compositional building blocks.

Moreover, the semantic contribution of a complex predicate often seems to be greater than the sum of its parts. As discussed in (Snyder 1995), a relatively neglected issue in the recent literature on resultatives is how (17a) is to be distinguished from (17b) or (17c).

- (17) a. John hammered the metal flat.
- b. John hammered the flat metal.
- c. John hammered the metal that was flat.

The sentence in (17a) has a richer aspectual structure than (17b) or (17c). In (17a), the predicate *flat* applies to the metal specifically at the end-point of the hammering event. At earlier stages of the hammering, the metal most probably was not flat. Thus, the interpretation of the complex predicate in (17a) is more than a simple conjunction of the predicates *hammer* (or *be hammered*) and *flat*.

In fact, the purely syntactic introduction of a secondary modifier, including the attributive adjective in (17b) and the restrictive relative in (17c), does not ordinarily alter the aspectual properties of the sentence. Sentential aspect depends primarily on the verb, inflection, and a restricted set of features (such as number and definiteness) of the verb’s arguments. Yet, to offer one example, (18a) is an accomplishment event (in the sense of Vendler 1967), and is fully compatible with the durative phrase *in an hour*, while (18b) and (18c) are both understood as describing a simple activity and resist this durative modifier.

- (18) a. John hammered the metal flat (in an hour).
- b. John hammered the flat metal (?* in an hour).

allows a single structural position to receive multiple theta-roles.

c. John hammered the metal until it was flat (?* in an hour).

In this respect the complex predicate of (17a, 18a) again resembles a novel, complex word, rather than the syntactic combination of fully independent words.

In earlier work (Snyder 1995) I proposed a formalization of the foregoing observations, and I will now outline the key proposals of that work in the hope of achieving greater precision, as well as generating further testable predictions. Naturally, the details of these proposals are likely to require considerable revision even if it proves possible to maintain their guiding intuition, namely that complex predicates depend on morphological compounding because their characteristic semantic properties can be obtained only through morphological composition.

A number of researchers, including Parsons (1980, 1990), Higginbotham (1985, 1986), Dowty (1989), and Schein (1993), have proposed that at least certain syntactic heads require as one of their arguments an “event,” in the sense of (Davidson 1967).

(19) a. John saw Mary.

b. $\exists e, \text{saw}'(\text{John}', \text{Mary}', e)$

c. For some (past) event e , John saw Mary in e .

For example, according to Parsons (1990), a simple sentence such as (19a) would have a more abstract representation corresponding to (19b), and would receive an interpretation along the lines of (19c).

Many, though not all, proponents of a neo-Davidsonian event-semantics go further, to propose that (19c) be decomposed into (19d) and interpreted along the lines of (19e) (cf. in particular Parsons 1990, Schein 1993).³¹

(19) d. $\exists e, \text{Past}(e), \text{seeing}'(e) \ \& \ \text{Experiencer}(\text{John}', e) \ \& \ \text{Theme}(\text{Mary}', e)$

e. For some (past) event e , e is a “seeing” event, John is the Experiencer in e , and Mary is the Theme in e .

³¹I shall use the term “event-argument” even for the event-like argument of an activity predicate. Bach (1986) has suggested “eventuality” as an umbrella term for Vendler’s events (accomplishments and achievements), activities, and states. Thus, “event-argument” in the following discussion should be understood more broadly as “eventuality-argument,” to include activities as well as states. (In treating stative predicates as requiring an eventuality argument, I follow, among others, Higginbotham 1985.)

An interesting property of the neo-Davidsonian approach, at least in its stronger version as represented in (19d,e), is that the event argument serves to mediate the assignment of event-participants to their respective roles in the event. A consequence of this property is that, under certain conditions, compositional processes normally ascribed to the lexicon can occur in the syntax.

Ordinarily, the syntactic reflex of argument structure is a structurally proximate relationship (i.e. specifier-head or head-complement) between a single argument-taking word and its various arguments. A radically neo-Davidsonian approach as in (19d,e), however, creates another possibility: Syntactically independent argument-taking words can jointly contribute to the event-role ascribed to a single argument, provided that these argument-taking words are interpreted as jointly characterizing the same event. In principle, the argument-taking heads need not all enter into a proximate syntactic relationship with the NP that they share as a semantic argument.

Consider again the resultative (20a) (=1a). A (partial) neo-Davidsonian analysis of its semantics is represented in (20b).

(20) a. John hammered the metal flat.

b. $\exists e, \text{Past}(e), \text{hammering}'(e) \ \& \ \text{Agent}(\text{John}',e)$
 $\ \& \ \text{Theme}(\text{the metal}', e) \ \& \ \text{flat}'(\text{Theme}(e), e).$

In (20b) the expression “Theme(the metal', e)” performs the special function of identifying the Theme role of the event *e* with the semantic denotation of *the metal*. The expression “Theme(e)” then denotes the individual that has been assigned the role of Theme in *e*. (The number of arguments will always distinguish these two uses of a function-name such as Theme.)

In (20b) I crucially assume that Theme is the thematic role assigned to the subject of a stative predicate such as *flat*. This ensures that *flat* is predicated of *the metal* rather than *John*, when *hammered* and *flat* are combined to characterize a single event. Notice that *flat* (or more felicitously, *tired*) can be predicated of *John* in (20a), but only on a depictive reading, and never as a resultative (in which John's hammering of the metal is necessarily the cause of his tiredness). The depictive construction is

apparently interpreted as a conjunction of a state (John's tiredness) with a process (John's hammering of the metal), but the resultative is instead interpreted as a single event in which the Theme of *flat* is necessarily also the Theme of *hammered*.

Indeed, the heart of the present proposal is the idea that a predicate can obtain its semantic argument by evaluating a function such as "Theme(e)" in (20b), instead of directly taking the relevant DP (e.g. *the metal*) as an argument within the syntax. Provided that the words *hammered* and *flat* in (20a) are understood as contributing to the characterization of a single event argument, the Theme of this event needs to be expressed as a syntactic argument only once. For example, if *the metal* serves as the syntactic argument of *hammered* in (20a) (as implicitly assumed in 20b), then it need not (and presumably cannot) also serve as a syntactic argument of *flat*. Yet, *flat* can effectively take *the metal* as an argument by referring in its semantics to the Theme of e (as illustrated in 20b).

Thus, a radically neo-Davidsonian approach to semantic interpretation offers a possible account of the apparent interpretive conflict in (1a): Provided that the two syntactic predicates are understood as jointly characterizing a single event, they can effectively share a semantic argument that only one of the predicates takes as a syntactic argument. Yet, the neo-Davidsonian approach offers something more. By postulating an explicit event-argument in the semantics of a predicate, an approach is offered to interactions of argument structure and aspect.

In particular, building blocks of argument structure and building blocks of event structure can be manipulated in similar ways. The observation that formation of the resultative in (20a) has substantial consequences for the event-structure of the sentence (cf. 18), can be captured rather directly in the present framework if we suppose that alongside *hammered* and *flat*, a phonologically null aspectual morpheme is one of the building blocks of the resultative predicate.³²

In what follows I will require the aspectual notion of "culmination subevent,"

³²As mentioned in Chapter 1, the present proposal is similar in many respects to that of (Pesetsky 1995); although the null morpheme in this analysis is motivated by different theoretical considerations than the corresponding null morpheme of (Pesetsky 1995), the resulting syntactic structures are quite similar.

which derives from work of Vendler and ultimately Aristotle. An accomplishment event, in the system of (Vendler 1967), is an event that can be subdivided into a “development” period and a point of “culmination.” For example, the sentence, “John built a house” implies both a protracted period of house-building, and a culmination point at which the house is judged complete. A culmination, in this sense, is the natural endpoint of a larger event, and is often associated with a change of state in the event’s Theme (e.g. completion of the house).³³

Intuitively, then, the null aspectual morpheme in the resultative (20a) must combine a process predicate such as *hammered* and a stative predicate such as *flat*, to form an accomplishment event in which the process predicate specifies the “development” subpart, and the stative predicate specifies a state that is true of the event’s Theme at the “culmination” subpart of the event. This intuition is expressed formally in (21).

$$(21) \parallel \phi_{telic} \parallel =_{df} f : D_{\langle E, t \rangle} \rightarrow D_{\langle E, t \rangle}$$

For any event E, and any P a predicate of events,

$$f(P, E) = \text{True} \text{ iff } P[\text{Culmination}(e)] = \text{True}.$$

The proposed aspectual morpheme in (21) is labelled “ ϕ_{telic} ,” and its semantic contribution is characterized by a function *f* that maps event-predicates (i.e. elements drawn from the domain of $\langle \text{event}, \text{truth-value} \rangle$ pairings) into new event-predicates. In (21), ϕ_{telic} takes as its innermost argument a function *P* mapping states to truth-values, and returns a new function mapping accomplishment events to truth-values: This new function maps a given accomplishment event E to “True,” if and only if the original function P maps the culmination subpart of E to “True.” In other words, the aspectual morpheme ϕ_{telic} effectively takes as its arguments an event-predicate P and a particular event E, and is true if and only if P is true of the “culmination sub-event” of e.

³³In (Snyder 1995) I distinguished the notion of “culmination” from a more general notion of “natural endpoint,” and required that for a natural endpoint to qualify as a culmination, it had to entail a change of state in the Theme. In the present discussion the proposals of (Snyder 1995) are being executed somewhat differently, and “culmination” can be taken to refer to any natural endpoint (in the sense of Smith 1992), regardless of whether the Theme is judged to change state at this point.

The appropriate interpretation for (20a), can now be derived by combining ϕ_{telic} with *hammered* and *flat*, as shown in (22).

- (22) a. [_{VP} John hammered_i [_{VP} [the metal] t_i [ϕ_{telic} [_{AP} flat]]]]
 b. $\exists e$, Past(e), hammering'(e) & Agent(John',e)
 & Theme(the metal', e) & flat'(Theme[Culmination(e)], Culmination(e)).
 c. $\exists e$, Past(e), hammering'(e) & Agent(John',e)
 & Theme(the metal', e) & flat'(Theme(e), Culmination(e)).
 d. For some (past) event e, e is a "hammering" event with agent John and Theme the metal, and at the culmination of e the metal is flat.

In the partial structural representation (22a), I assume that *the metal* is the direct object of *hammered*, and is realized as its specifier (cf. Marantz 1993) within the lower of two VP shells. The verb *hammered* then raises into a higher VP-shell containing its subject, *John* (cf. Larson 1988b). The null morpheme heads the internal complement to the verb *hammered* in the lower VP shell, and the AP *flat* is then realized as the complement (and direct argument) of the null telic morpheme.³⁴

In contrast to (20b), the predicates that now must be understood as jointly characterizing a single event are *hammered* and ϕ_{telic} , rather than *hammered* and *flat*. Yet, *flat* is now interpreted as a restrictor on a subpart of the event characterized by *hammered* and ϕ_{telic} . On the assumption that theta-role assignments are transitive across the "mereological" (subpart) relation between events (in other words, taking the Theme of the culmination subevent always to be the same as the Theme of the entire accomplishment event), (22b) can be simplified to (22c), and the desired interpretation, paraphrased in (22d), is obtained. As in (20b), *the metal* effectively serves as the semantic argument of the two predicates *hammered* and *flat*, even though it is realized in the syntax only once. Thus, once again, the state of flatness that holds at the culmination of the event necessarily refers to the same individual (i.e. the metal) that was hammered during the development subevent.

³⁴Without adopting this structure, it would be difficult to accommodate both the direct object and the projection headed by the null telic morpheme, especially if (as proposed below) the null telic morpheme must undergo head-movement and adjoin to the main verb.

What remains to be specified is the set of conditions under which two syntactically independent predicates can be understood as jointly characterizing the event-type of a single Davidsonian event-argument. The crucial proposal is stated in (23).

- (23) Two syntactic heads can be interpreted as jointly characterizing the event-type of a single event-argument, if and only if those heads form a single “word” (X^0 category) at the point of semantic interpretation.

Thus in (20a), (23) requires either that ϕ_{telic} adjoin to *hammered* to form a complex V^0 (at some point in the derivation visible to semantic interpretation), or that *hammered* and ϕ_{telic} be base-generated as a compound.³⁵ If the defining characteristic of complex-predicate formation is the interpretation of syntactically independent heads as subparts of a single predicate, and if the only UG-compatible source for such an interpretation is to view the heads as jointly characterizing a single event, then it follows from (23) that a language will permit complex-predicate formation exactly to the extent that it permits syntactically independent heads to participate in compounding.³⁶

We now have an explanation for why a language allows resultatives of the English type (and more generally, complex predicates of the English type) if and only if it allows compound formation. The idea behind (23) is that each VP in a sentence is assigned only a single event (or “eventuality”) argument. If two independent predicates immediately dominated by the same VP compete for the VP’s event argument (cf. ϕ_{telic} and *hammered* in 22a), then one solution is to interpret the two predicates as forming a complex predicate and sharing a single event argument (yielding an accomplishment predicate in 22). According to (23), however, this is possible only if the

³⁵In the latter case it may be desirable to suppose that *hammered* can raise alone out of the compound V^0 . Neeleman & Weerman (1993) make this proposal to allow extraction of the verb out of a verb-particle combination in Dutch V2 phenomena.

³⁶Certain subtleties of execution now become important. If ϕ_{telic} is regarded either as a closed-class lexical item, or as an open-class item that is listed in the lexicon as an affix, then a question arises as to why it should matter whether the language permits open-class, ordinarily non-affixal elements to be marked affixal. One possibility, based on Chomsky’s (1995) proposal to treat syntactic movement as “attraction,” is to say that the open-class, ordinarily non-affixal main verb (e.g. *paint* in “John painted the house blue”) has to be marked [+Affixal] in order to attract the next lower head, ϕ_{telic} ; simply marking ϕ_{telic} as affixal would be insufficient in such a framework.

two predicates constitute a single word at the point of semantic interpretation.^{37,38}

Whether (23) represents any real progress, with respect to precision or explanatory force, over the descriptive generalization in (12), depends in large measure on whether (23) makes any empirical predictions that (12) does not. One domain in which (23) does appear to generate novel predictions is in the relationship between argument structure and aspect, in those cases where complex-predicate formation (at least as described in Section 2.1) has not occurred.

As noted above, the prototypical accomplishment event differs from a simple activity (or “process”) in having a natural end-point, or “culmination.” In a language that freely permits compounding of (open-class, non-affixal) lexical items, (23) predicts that it will be possible, not only to form complex predicates as described in Section 2.1 (i.e. predicates in which a single NP is effectively the argument of two syntactically independent heads), but more generally to convert an activity predicate into an accomplishment predicate by adding a second syntactic head that contributes a “culmination” to the event. By adjoining the “development” (i.e. activity) head

³⁷Other solutions may be available to avoid semantic uninterpretability, but they will not normally yield the characteristic semantic properties of the resultative. For example, the simple conjunction of a stative and a process predicate, as discussed above, yields a depictive rather than a resultative interpretation. Adverbs, I assume, are similar to attributive adjectives in their mode of interpretation: An adverb denotes a higher-order function that takes an event-predicate (i.e. the VP) as its argument and creates a new event-predicate that includes the restriction imposed by the adverb. Hence, addition of an adverbial modifier does not require a VP to be associated with more than one event argument.

³⁸Notice that cross-linguistic variation in the availability of complex predicates cannot be reduced to simple availability of the element ϕ_{telic} in the lexicon. For example, as discussed in (Snyder 1995), most English verb-particle combinations have a resultative character, but some do not. Example (i) illustrates the typical case, while examples (ii-v) (provided by Tony Kroch, Ken Safir, and Peter Svenonius, personal communication) illustrate exceptions. (See also Svenonius 1994, Ch.5.)

- (i) Mary lifted the box up/lifted up the box.
- (ii) The dam kept the water out/kept out the water.
- (iii) Fred wiped the table off/wiped off the table.
- (iv) Alice finished the work up/finished up the work.

Thus, (ii) does not denote a resultative accomplishment event, but rather is stative. In (iii) and (iv) there is no sense in which the direct object is “off” or “up” at the culmination of the event. Yet, languages (such as French and Spanish) that lack “resultative” particle constructions as in (i) systematically lack the non-resultative cases in (ii-iv) as well. However the appropriate interpretations of (ii-iv) are obtained, they do not derive from the null telic morpheme characterized in (21). My assumption, in fact, is that the telic morpheme is provided to all languages by UG, but can only be employed to form a resultative if the language permits the requisite type of compounding.

and the “culmination” head prior to semantic interpretation, according to (23), it should be possible to create a new predicate satisfying the standard tests for an accomplishment.

Aske (1989), in a fine-grained comparison of English and Spanish that builds on earlier work by Green (1973), Talmy (1975, 1985), Carter (1984), and Levin & Rapoport (1988), among others, observes that the addition of a telic path expression to an activity verb in English yields a predicate compatible with the durational phrase *in an hour*, as illustrated in (24c).

- (24) a. John wrote the paper (in an hour).
b. John walked (* in an hour).
c. John walked to the summit (in an hour).

As discussed by Vendler (1967), compatibility with the durational phrase *in an hour* distinguishes the accomplishment in (24a) from the simple activity in (24b). The durational modifier *in an hour* specifies the time from the beginning of an event to the event’s culmination. A simple activity, which lacks a culmination, is not appropriately modified by *in an hour*. Yet, at least in English, the addition of the telic path expression *to the summit* in (24c) makes the durational phrase fully acceptable. Evidently (24c) characterizes an accomplishment event whose development is supplied by *walked*, and whose culmination is supplied by *to the summit*.

Aske’s crucial observation is that in Spanish, the addition of a telic path expression to an activity verb does not in general have the effect of creating an accomplishment, as shown in (25).

- (25) a. Juan escribió la tema (en una hora).
‘John wrote the paper (in an hour).’
b. Juan caminó (* en una hora).
‘John walked (in an hour).’
c. Juan caminó hasta la cima (* en una hora). (cf. Aske, p.7)
‘John walked to the summit (in an hour).’

The contrast between accomplishment and activity, in compatibility with the dura-

tional modifier 'in an hour' (*en una hora*), is exactly replicated in Spanish (25a,b). Yet, the addition of a telic path phrase to the activity verb in (25c) yields another activity predicate, rather than an accomplishment. While the VP in (25c) includes all the situational information and implications of (24c), the result in Spanish is a heavily restricted activity predicate. The fundamental event-type characterized by *caminó* 'walked' is left unchanged. The contrast between (24c) and (25c) thus provides strong support for Declerck's (1992) point that linguistic aspect is a property of situations or events, but only as they are described by linguistic expressions. In other words, (24c) and (25c), without the durational phrases, are employed in essentially the same contexts, but grammatical differences between Spanish and English result in an aspectual contrast that is not overridden by contextual or pragmatic information.

This contrast between English and Spanish is precisely what (23) predicts, given that Spanish lacks productive compounding of otherwise free lexical items. More specifically, the conversion of the activity (24b) into an accomplishment (24c) presumably involves the joint characterization of a single event by at least two syntactically independent heads, as illustrated in (26).³⁹

(26) a. [_{VP} John walked [_{PP} to [the summit]]]

b. $\exists e$, Past(e), walking'(e) & Agent/Theme(John',e) &

³⁹The analysis depicted in (26) treats *to* as a simple lexical head, whereas (Snyder 1995) decomposed *to*, on its telic reading, into the combination of an atelic form of *to*, plus ϕ_{telic} and a null counterpart to the locational preposition *at*. The simpler analysis in (26) is permitted by a change in execution: In the present discussion, but not in (Snyder 1995), I have distinguished the "characterization" of an event, or the specification of the event's fundamental nature, from simple imposition of truth-conditional restrictions on the event. In (Snyder 1995) I was forced to posit a subtle (and empirically unmotivated) distinction in the truth conditions of English telic *to*, and its Spanish counterpart *hasta*, to the effect that *hasta* specified direction, but not final location, in its truth conditions. As a result of permitting ϕ_{telic} , English allowed the formation of a preposition that specified both direction and final location, and that could therefore serve to convert an activity predicate into an accomplishment predicate. In the present discussion I have assumed instead that "characterization" of an event as an accomplishment is qualitatively different from simply asserting that an activity has an endpoint at which the Theme undergoes a change of state. Thus, even if English telic *to* and Spanish *hasta* are truth-conditionally identical, in Spanish the fact that an activity verb and *hasta* cannot form a compound will prevent the verb-*hasta* combination from characterizing an accomplishment. The pressure to make this conceptual shift probably indicates that I have exceeded the expressive power of a simple truth-conditional interpretation of Davidsonian event-semantics, and need to enrich my "calculus of events," although I will leave this project to future research.

Ground(the summit', e) & to'(Theme(e),Ground(e),e).

- c. For some (past) event *e*, *e* is a “walking” event with Agent/Theme John and Ground the summit, and the Theme of *e* follows a path “culminating” at the Ground of *e*.

In (26a) the heads *walked* and *to* combine to characterize an accomplishment event in which the Theme (John) moves along a path that terminates at a specified location (the object of *to*, i.e. the summit). The interpretation then proceeds as in (26b,c), where the thematic role “Ground” is intended in the sense of Talmy’s (1985) opposition of Figure (i.e. Theme) and Ground.

Thus in English, where the appropriate type of compounding is readily available, the heads *walked* and *to* undergo compounding and are interpreted as jointly characterizing an accomplishment. The head *walked* contributes the development, and the head *to*, a telic path expression, contributes the culmination in the form of the Theme’s reaching a specified end-point location. Without combining the activity verb and the telic path preposition into a word-level unit prior to interpretation, the VP would continue to express an activity, rather than an accomplishment, as in fact is observed in Spanish. In Spanish the verb *caminó* cannot be marked [+ Affixal], and therefore cannot attract another syntactic head that might change its lexically given aspectual properties.⁴⁰

Notice that the contrast observed in (18a,b), repeated below, can now be attributed to the interpretive contribution of ϕ_{telic} .

(18) a. John hammered the metal flat (in an hour).

b. John hammered the flat metal (?* in an hour).

⁴⁰It remains to be determined whether all the languages that lack productive N-N compounding also lack the possibility of converting an activity verb into an accomplishment predicate as in (24c). At least between Germanic and Romance the contrast discussed by Aske appears to hold up rather generally: Romance languages lack N-N compounding and activity-to-accomplishment conversion, while Germanic languages have both. A cautionary note is, however, in order. Nothing in the present discussion precludes a language such as Spanish from having homophonous verb pairs, in which one verb denotes an activity but its homophonous counterpart selects an end-state expression and denotes an accomplishment. The prediction, instead, is that in a language like Spanish such pairs will be lexically restricted, where in English such pairs are freely generated by a completely productive process.

After compounding, *hammered* and ϕ_{telic} jointly characterize an accomplishment event whose development is a “hammering” activity, and whose natural endpoint is understood as a change of state in which the metal becomes flat.

At least one refinement to this account of (18) may, however, be necessary. As noted in (Snyder 1995), the lexical meaning of an activity verb alone lacks the natural culmination point needed to render ϕ_{telic} interpretable. This may explain the necessity of using a telic path morpheme *-to* with the activity verbs in (27a), while the same path morpheme is optional with the accomplishment verbs in (27b). (This contrast is noted and discussed, in rather different terms, by Pinker 1989 and Pesetsky 1994.)

(27) a. John pushed/pulled/slid the box into/*in his room.

b. John tossed/threw/dropped the box into/in his room.

The verbs of unaccompanied motion in (27b) all describe accomplishment events, because the point at which the Agent loses direct physical contact with the Theme constitutes a natural endpoint of the Agent’s activity and a change of state for the Theme. The verbs of accompanied motion in (27a) lack such a culmination. Addition of the telic path morpheme *-to* in (27a), however, adds a culmination in the form of the Theme’s reaching the terminus of a path. The availability of a culmination in the event characterized jointly by the activity verb and the telic path predicate then allows ϕ_{telic} to occur and to introduce a result predicate, *in his room*. The telic path morpheme *-to* is optional in (27a) precisely because the verb’s meaning already entails a culmination, and ϕ_{telic} is interpretable with or without a telic path predicate. On this basis, in (Snyder 1995) I propose that an accomplishment predicate such as *hammered the metal flat* includes two phonologically null morphemes, ϕ_{telic} and a null counterpart to the telic path morpheme *-to*, both of which join with *hammered* in characterizing the nature of the event argument. In this case, of course, the relevant notion of path must be rather metaphorical.

In conclusion, the formulation of the broader generalization (12) as a constraint on the mapping between syntax and event structure (23), within a radically neo-Davidsonian framework, has the virtue of generating novel predictions about the interaction of argument structure, aspect, and principles of word-formation. These

predictions extend beyond the original domain of complex predicates, in the sense of VPs in which an NP serves as the *de facto* semantic argument of several syntactic heads. Furthermore, where detailed comparative work has been conducted, as in (Aske 1989), the predictions of (23) appear to be borne out.

2.5 Theoretical Implications for Syntax, Morphology, and Acquisition

The findings of this chapter have important implications for morphological theory. First, if the “complex predicate parameter” is in fact a parameter of morphology, as argued throughout the chapter, then the results suggest that principles of morphology play a role at points in the syntactic derivation that are substantially removed from PF. For example, as noted for (4a,b) (repeated below), the heads (apparently) comprising a complex predicate (and hence a morphological compound) in English are routinely separated by intervening constituents in the surface syntax.

- (4) a. John painted the door green.
b. John called Mary up.

According to the earlier discussion, in a language such as English, but not in a language such as Spanish, the principles of morphology permit syntactically independent heads to form a morphological compound at an abstract level of representation.

In the case of (4a), however, I proposed (in effect) that the intervention of the direct object between *painted* and *green* is irrelevant, because the morphological compound that is necessary for the correct interpretation of the complex predicate is in fact the compound formed by *painted* and ϕ_{telic} . Given that ϕ_{telic} is phonologically null, it is difficult to determine whether it has already adjoined to *painted* prior to the point of phonological spell-out in (4a).

The question, then, is whether a phonologically null morpheme is plausibly invoked in cases such as (4b) as well. If so, it might be possible to maintain a view (such as that of Marantz & Halle’s 1993 Distributed Morphology model), in which

morphology is concerned exclusively with the relationship between surface syntax and phonological output. Yet, a consideration of verb-particle combinations suggests that at least in some cases, the overt particle itself participates directly in determining the type of event characterized by the VP. For example, the particle *up* in combinations such as *finish up*, *write up*, or *mark up*, is an aspectual particle in its own right, and contributes a form of completive aspect to the VP. At present I can discern no independent empirical motivation for an additional, null aspectual morpheme in a VP such as *finish up*. Thus, the possibility of separating *finish* from *up*, as in “finish the work up,” suggests that the relevant compound is not visible at the PF interface.

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Furthermore, the results of this chapter are compatible with the notion of “morphology at D-Structure” (in which compound-formation can result from operations of merger, but not from operations of syntactic movement - cf. Neeleman & Weerman 1993), *only* if the constituents under an X^0 node can include fully articulated maximal projections (XPs) (as in fact assumed by Neeleman & Weerman). For example, if the entire complex predicate *painted* (ϕ_{telic}) *bright red* forms a morphological compound, then the constraint in (23) can be satisfied independently of head-movement operations in the syntax, but at the cost of positing the rather unusual X-bar structure illustrated in (28):

(28) [VP John painted_i; [VP [the house] [V^0 [V^0 t_i] [VP ϕ_{telic} [AP bright red]]]]

⁴¹Here of course I am setting aside notational tricks such as the postulation of abstract features, visible in the surface syntax, that would serve to indicate that a compound is present at some other level of representation. Such devices are difficult to rule out empirically, but are also of a lesser theoretical interest in my view.

⁴²As suggested to me by Alec Marantz (personal communication), another possible problem raised for Distributed Morphology by the results of this chapter is that a language such as French has a mechanism with which to spell out the approximate meaning of an English N-N compound (namely a phrasal construction with a preposition). Yet, most of the resultative constructions available in English lack any direct, monoclausal translation in French. The prediction of DM would instead be that French should simply realize the semantics of the resultative with whatever morphological means it used to spell out other types of compounds. In fact, although this prediction appears incorrect for languages of the French type, it may prove tenable for languages such as Korean, Mandarin, and ASL, as I shall indicate in Section 2.5 below. Hence, I do not interpret the present results as completely negative for Distributed Morphology.

In (28), the articulated maximal projection *bright red*, as well as the containing maximal projection headed by ϕ_{telic} , must be projected inside the V^0 category headed by *painted*. The V^0 *painted* then raises independently of the rest of this compound, to head a higher VP shell and yield the surface word order.

If we instead assume that the structure in (28) violates X-bar Theory, then we need compound-formation to occur through syntactic movement, much as assumed for “morphologically driven movement” in recent work by Chomsky (e.g. Chomsky 1991, 1993). As illustrated in (29), if *painted* and ϕ_{telic} are in fact base-generated as independent heads of ordinary maximal projections, but combine through covert head-movement to form a morphological compound, then the findings of this chapter are in principle neutral between (so-called) “complex-predicate” and “small-clause” approaches to the syntax of complex predicate constructions.

- (29) a. [_{VP} John [_{V'} [_{V⁰} [ϕ_{telic}]_i painted]_j [_{VP} the house t_j [_{VP} t_i [_{AP} bright red]]]]]]
 b. [_{VP} John [_{V'} [_{V⁰} [ϕ_{telic}]_i painted] [_{VP} t_i [_{AP/SC} [the house] [_{A'} bright red]]]]]]

Whether the Theme in (29) is realized as a syntactic object of the main verb *painted* (as in 29a), or as a small-clause subject of the predicate *bright red* (as in 29b), is irrelevant to the interpretation after ϕ_{telic} adjoins to *painted*, because in either case *the house* will then serve as the semantic argument (Theme) of both predicates.⁴³

The findings of the chapter have several important implications for acquisitional theory. Whether the child first learns about morphological compounding or about

⁴³The proposed interpretation of the compound resulting from head-movement and adjunction, however, does a certain amount of violence to the traditional interpretive notion of “small clause,” because the subject of a small clause is not normally regarded as a semantic argument of the verb that selects the small clause. Still, any “small clause” approach to resultatives and related constructions must somehow deal with the empirical datum that the syntactic subject of the proposed small clause is often interpreted as the logical object of the verb that selects the small clause. For example, the sentence in (29) would be false if John painted the barn instead of the house, even if the house were in fact bright red when John finished painting the barn. (Similarly, recall example 16 above.) Hence, a “small clause” approach to the syntax of complex predicates is coherent only if it is combined with a semantic interpretation that does not directly mirror the proposed syntactic constituency. (Notice also that a small-clause approach to the syntax of complex predicate constructions would be somewhat difficult to reconcile with an approach in which compound-formation can result from merger but not syntactic movement, as sketched above, because the VP-internal NP, logically an argument of the complex predicate, would have to be internal to the morphological compound that constitutes the complex predicate.)

syntactic complex predicate formation in a language such as English, the knowledge should allow the child immediately to infer a considerable amount of additional information about the language. That this is in fact the case is indicated by the extremely tight correlations observed between ages of acquisition of compounding and ages of acquisition for various types of complex predicates. If the child depended on additional sources of information, and did not immediately relate morphological knowledge, for example, to its consequences for syntax, we should not find such exceptionally strong correlations.

Furthermore, as observed in (Snyder & Stromswold, in press), children appear to obey a form of Subset Principle (cf. Berwick 1985, among others) in their acquisition of complex predicate formation. This observation receives further support from the compounding facts reported in this chapter. Both compounding and complex predicate formation appear to be readily amenable to the Subset Principle, because both are processes that some languages permit and others do not. Hence, it is straightforward to recognize a grammar without compounding and complex predicate formation as the “subset” grammar, and for the learner to wait for positive evidence before changing the grammar to permit these options.⁴⁴

Finally, and perhaps most importantly, the findings of this chapter provide a direct counterexample to the hypothesis that points of parametric variation in syntax are strictly confined to the lexical entries of functional heads, such as T^0 and D^0 (cf. in particular Borer 1984, Chomsky 1993). It is difficult to imagine that any single, independently motivated functional head will find a natural role both in complex predicates and in a morphological compound such as *coffee cup*. Any technically conceivable approach that reduces the “complex predicate parameter” of (6), repeated below, to information contained in the lexical entry of a single functional head, seems

⁴⁴As noted earlier in this chapter, learning and biological maturation almost certainly interact in complex ways during language acquisition. Gibson & Wexler (1994) have in fact suggested that the “marked” value of a switch-like parameter (as I have proposed for compounding and complex predicates) becomes available later in the course of biological maturation than the unmarked value. This would be one, rather direct way of accounting for the result, reported above, that children apparently do not attend to the English evidence for compounding and complex predicate formation until sometime around the age of one-and-a-half to two-and-a-half years.

to me to represent a distortion of a qualitatively different type of parameter.

- (6) Compounding Parameter: The grammar does (not) freely allow open-class, non-affixal lexical items to be marked [+ Affixal].

The setting of the parameter in (6) is a general property of morphology, potentially affecting a vast range of open-class morphemes. This parameter is “lexical” in the very general sense that it governs principles of word-formation, but it is not by nature tied to any single lexical entry. Hence, (6) is perhaps compatible with the view that the child’s acquisition of syntax should be understood as acquisition of the lexicon, but only under a very broad sense of “lexicon” that would include quite general properties of word-formation, independent of any single lexical entry.^{45,46}

2.6 Addendum: Korean

Since completing the cross-linguistic survey and analysis reported in this chapter, it has come to my attention that Korean is an exception to the generalization that N-N compounding always coincides with resultative constructions of the English type. Korean has productive N-N compounding, but employs a “serializing” construction, reminiscent of that found in Mandarin or ASL, to express the meaning of an English resultative. In this addendum I will argue that the facts from Korean do not necessitate any major changes to the claims of the previous sections, although they do

⁴⁵In my view, the chief interest of the Lexical Hypothesis would be that acquisition of syntax might proceed in a manner parallel to word-learning; the child would simply be acquiring the lexical entries for closed-class, null and overt, word-level items. The type of connection between syntactic knowledge and the lexicon that is compatible with the compounding/complex predicate parameter does not permit a “word-learning” approach to the acquisition of syntax, though it is of acquisitional interest in the somewhat weaker sense that it adds morphology as a possible source of evidence about language-particular properties of syntax.

⁴⁶As noted by Spencer (1991, pp.323-324), the generative literature on morphological compounding has (surprisingly) tended to neglect the issue of productivity in general, and the issue of cross-linguistic variation in productivity in particular. If one adopts the view that productivity is an essential property of Germanic compounding, then the lack of *productive* N-N compounding in Romance might in itself be taken as a clear example of a point of grammatical variation that cannot be tied to any single lexical item. With the evidence from syntactic complex predicates, however, the argument that productivity of compounding is a genuine point of parametric variation becomes considerably stronger. Moreover, the evidence from complex predicates makes it clear that the point of parametric variation cannot be restricted, in its consequences, to morphology proper.

suggest certain important directions for future research.

As shown in (30a), Korean has productive N-N compounding much as in English.⁴⁷

(30) a. pelley-thong

worm-can

'worm can'

b. John-i ku kumsokphan-ul twutwulkye-se phi-ess-ta

John-Nom the metal-Acc hammer(V)-("resultative") (become-flat)-make-Past

'John hammered the metal flat.'

Yet, an English resultative such as "John hammered the metal flat" is normally rendered in Korean by something closer to, "John hammered-and-thereby-flattened the metal," as shown in (30b).

As with the Dutch resultative (Neeleman & Weerman 1993), the elements of the Korean "resultative" predicate strongly resist syntactic movement. Thus we find the contrast between (31a) and (31b).

(31) a. John-i [mangchi-ro twutwulkye-se]; ku kumsokphan-ul t; phi-ess-ta

John-Nom [hammer-with hit-because] the metal-Acc (become-flat)-make-Past

'John, because of hitting it with a hammer, flattened the metal.'

b. ?*John-i [twutwulkye-se]; ku kumsokphan-ul t; phi-ess-ta

John-Nom the metal-Acc hammer(V)-(resultative) (become-flat)-make-Past

'John hammered the metal flat.'

One component of the Korean "resultative" is formally similar to a "because" phrase. Yet, as shown in (31a), a true "because" phrase can be moved to (or perhaps simply generated in) a position in which it is not adjacent to the main verb. In contrast, the elements of the Korean "serial resultative" (31b) behave as parts of an overt morphological compound, much as Neeleman & Weerman describe for Dutch.

The Korean "resultative" differs from the English and Dutch constructions, however, in that it is formally a conjunction of two verbs. This property is perhaps

⁴⁷For general discussion of N-N compounding in Korean, see Han (1994).

unsurprising, because Korean lacks any direct counterpart to the English or Dutch adjective. Korean predicate “adjectives” are in fact verbal, in the sense that they necessarily carry inflectional marking for tense/mood distinctions. (Korean attributive “adjectives” instead employ a nominalizing suffix, but again this has no counterpart in English or Dutch.) Thus, a likely explanation for the lack of a direct Korean counterpart to the English resultative is that a construction of the English-type would prevent satisfaction of the independent morphological requirements of the Korean adjective.

If this explanation is on the right track, then the resultative is simply a poor test, in Korean, for the availability of complex predicate formation. Moreover, we predict that other types of complex predicate formation will be attested in Korean. This prediction is supported by certain syntactic properties of Korean, which I will illustrate with evidence drawn from (O’Grady 1991) and (Lee 1993). First, Korean has a close counterpart to the English double object dative, as shown in (32a) (cf. O’Grady, p.4).

- (32) a. *Nay-ka John-ul chayk-ul cwu-ess-ta.*
 I-Nom John-Acc book-Acc give-Past-Decl
 ‘I gave John a book.’
- b. *Nay-ka John-eykey chayk-ul cwu-ess-ta.*
 I-Nom John-Dat book-Acc give-Past-Decl
 ‘I gave a book to John.’

The construction in (32a) alternates with the construction in (32b), which is formally more similar to the English *to*-dative. Interestingly, Japanese, which is syntactically quite similar to Korean but lacks productive N-N compounding, also lacks the double accusative construction in (32a).

Second, Korean permits a direct counterpart to the English *make*-causative. As shown in (33a), the Korean equivalent of ‘make’ can take an accusative-marked object which is understood as the Patient/Theme argument of the matrix verb as well as the Agent of a lower transitive predicate. (Examples 33a,b correspond to Lee’s examples 5c and 5b, p.450.)

- (33) a. ku-nun Swuni-lul chayk-ul ilk-key ha-ess-ta.
 he-Top Swuni-Acc book-Acc read-Comp do-Past-Decl
 'He made Swuni read a book.'
- b. ku-nun Swuni-eykey chayk-ul ilk-key ha-ess-ta.
 he-Top Swuni-Dat book-Acc read-Comp do-Past-Decl
 'He caused Swuni to read a book'
- c. Jean a fait lire le livre *(à) Marie.
 John has made read the-Masc book (Dative) Mary
 'John made Mary read the book.'

In addition, Korean allows a dative-subject construction (33b), which is reminiscent of the French *faire-causative* (33c). Much as with double object datives, Japanese (like French) lacks productive N-N compounding, and permits only the construction that employs a dative case-marker; Korean and English exhibit productive N-N compounding and permit (or require) a construction that is probably best analysed as a complex predicate, and that does not employ the dative case-marker.

Hence, the generalization made earlier in this chapter is not in fact contradicted by the Korean evidence: Languages exhibit complex-predicate formation if and only if they freely permit open-class, ordinarily non-affixal lexical items to participate in morphological compounding. The only remarkable fact about Korean is that independent properties of the language make the resultative a less than ideal diagnostic for complex-predicate formation.

Yet, the fact that Korean has a resultative construction that is similar to the English or Dutch resultative in important respects (i.e. in exhibiting properties of a morphological compound), but at the same time quite different in form from the English construction, suggests an important direction for future research. Several of the languages discussed in Section 2.2 lack a direct counterpart to the English resultative, but nonetheless have a fairly powerful mechanism for expressing the meaning of an English resultative. Cases in point are the "become" resultatives found in Mandarin and ASL. While these constructions are not direct equivalents to the English resultative, they appear to share the semantic property of denoting a single, complex

event.

Moreover, at least in Mandarin, there is evidence to suggest that a resultative predicate such as *chi chung hong sú* 'paint become red colour' may have the status of a morphological compound. For example, my Mandarin informant rejects any possibility of inserting an adverb to modify only the 'become red' portion of the resultative. If the Mandarin construction were bi-clausal, and simply conjoined descriptions of two separate eventualities, we should expect to be able to insert an adverbial modifier that restricts only one of the two eventualities. Instead, the evidence I have obtained thus far suggests that the Mandarin 'become' resultative forms a morphological compound and characterizes a single, accomplishment-type event.

Therefore, the existence of variation between English and Korean in the syntactic expression of "resultative" meanings, despite the existence of productive N-N compounding in both languages, raises an interesting possibility to be explored in future research. Languages such as ASL and Mandarin, which have rich processes of morphological compounding though not exactly the same processes found in English, may turn out to have constructions that share important properties with the English resultative. In these languages, differences in the available types of morphological compounding may result in different types of resultative construction, rather than a complete absence of a counterpart to the English resultative. Hence, the relationship between variation in word-formation processes and variation in the syntax may be a richer domain of inquiry than I previously envisioned.

Chapter 3

Noun-drop and Morphological Paradigms

3.1 Introduction

The issue explored in this chapter is the possible role of morphological paradigms in determining the syntactic properties of a language. The classic case in which a syntactic parameter has been at least tentatively linked to “richness” of a morphological paradigm is that of null subjects, as found in Spanish, Italian, and under certain conditions, Modern Hebrew, as well as many other languages. Borer (1984), for example, observes that in Modern Hebrew null subjects are possible with precisely those verb-forms that carry overt subject agreement morphology for person and number. Thus in (1a) (Borer p.208, 17a), where the first person singular past tense verb is overtly inflected for person, number, and gender, the subject pronoun need not be expressed in the phonology.

- (1) a. ('ani) 'axalti 'et ha-banana.
 (I) ate acc the-banana
 'I ate the banana.'
- b. *('ani) 'oxelet 'et ha-banana.
 *(I) eat acc the-banana

'I eat the banana.'

In (1b) (cf. Borer p.208, 17b-c), however, where the first person singular present tense verb carries gender and number marking, but no overt person marking, a phonologically overt subject pronoun must appear.

Unfortunately, despite considerable research on the acquisition and comparative syntax of null and overt subject pronouns, it remains unclear whether syntactic knowledge is ever encoded directly in the form of information about morphological paradigms. First, when viewed cross-linguistically, the phenomenon of null subjects appears unlikely to be unitary. For example Chinese, a language with no overt agreement morphology, nonetheless exhibits null arguments, though with a distribution rather different from Italian or Hebrew null subjects. Opinions in fact differ on the extent to which the null-argument phenomenon of Chinese should be related to the null-subject phenomenon of a language such as Italian. Huang (1989) and Jaeggli & Safir (1989) attempt at least a partial unification of the Chinese and Italian cases, while Huang (1984) and Lillo-Martin (1991) regard the Chinese null-argument phenomenon as having a fundamentally different, discourse-based source (i.e. as a syntactic variable bound by a discourse-related operator).

Second, in languages where the availability of null subjects (or more generally, null arguments) does appear to be related to "richness" of an overt morphological agreement paradigm, it is difficult to specify any simple notion of morphological "richness" that explains the possibility of null arguments in one language and not another. To take a standard example, German distinguishes nearly as many person-number feature combinations in its verbal agreement morphology as does Italian, yet German contrasts with Italian in disallowing thematic null subjects. Furthermore, Irish (McCloskey & Hale 1984) allows thematic null subjects despite a verbal agreement paradigm that (at least in the present active indicative) distinguishes far fewer person-number feature combinations than the German paradigm.¹ In fact, after an

¹Here I am referring to the morphologically richer of the two agreement systems provided by Irish; as noted by McCloskey & Hale, use of the less rich agreement system in Irish forces one to employ overt subjects.

extensive cross-linguistic survey, Lillo-Martin (1991) abandons any hope of reducing parametric variation in the availability of null arguments entirely to variation in overt agreement morphology. Instead, she proposes that the availability or unavailability of null arguments in a language is determined by a combination of morphological agreement paradigms and traditional “switch-box” parameter settings.²

If one grants that at least in some languages, the availability of null arguments may still be dependent on the morphological richness of agreement, perhaps in combination with other, more abstract grammatical properties, then one can look to studies of child language acquisition as a further source of information about the nature of this relationship. For example, one can test the strong hypothesis that in a language such as Italian or Modern Hebrew, where there is considerable motivation to relate null subjects to overt agreement morphology, the onset of children’s use of null subjects will occur no earlier than their mastery of the verbal agreement paradigm. Yet, to the extent that this prediction has been tested in the acquisition literature, the results are less than transparent.

An important problem is that even in a language such as English, whose grammar disallows null subjects, young children do in fact omit subjects. One possibility, then, is that the English-speaking children have misset the same “null subject parameter” at work in a language like Italian (as in fact was argued by Hyams 1986). In this case the relevant “null subject parameter” must be independent of richness of the verbal agreement paradigm, because English verbal agreement is relatively impoverished. An alternative, however, is that the English children’s missing subjects result from processing factors, rather than from their grammar. This view has been advocated

²More precisely, Lillo-Martin follows Rizzi (1986) in distinguishing the licensing from the identification of null arguments. On Lillo-Martin’s account, syntactic categories such as V^0 and AGR^0 are parameterized with respect to whether they license a null argument. A licensed null argument still has to be identified, however, if it bears a thematic role. One source of identification is the agreement features, if any, that are overtly expressed on the licensing head. Yet, the features that have to be overtly distinguished in order to satisfy the identification requirement are determined by another parameter, which in turn may take different values depending on the category of head that licensed the null argument. Also, an alternative to identification by agreement morphology, namely identification by coindexation with a discourse topic, is available as an independent parametric option.

most forcibly by Bloom (1993).³ Still another possibility, proposed by Lillo-Martin (1991), is that the omission of subject pronouns in early child English results from a lack of *any* settings for the parameters determining availability of null arguments. On her account, if a child has not yet set a given parameter, then at least in matrix clauses the grammar allows structures corresponding to the marked setting of the parameter, as well as structures corresponding to the unmarked setting.^{4,5}

Thus, when interpreting evidence from children's acquisition even of a language such as Italian or Hebrew, one confounding factor is the difficulty of distinguishing "null subjects" in the child's language that reflect mastery of the adult system, from "null subjects" that arise in some other way. Furthermore, according to Hyams (1986), children acquiring Italian use verbal agreement morphology more or less correctly as soon as they begin speaking. Therefore one cannot simply perform a longitudinal analysis comparing production of subjectless sentences to production of overt verbal agreement as children acquire Italian. Such an analysis has, however, been carried out by Lillo-Martin (1991) for American Sign Language, where children's acquisition of verbal agreement-marking is considerably later than in Italian. The results are complex, but suggest that once a child recognizes ASL as a language with null arguments licensed and identified by AGR, the child's willingness to use null arguments corresponds closely to his or her mastery of verbal agreement morphology.

In this chapter a somewhat different approach will be taken to the question of how syntactic phenomena may relate to morphological paradigms. The source of evidence will be child language acquisition, but a different syntactic phenomenon will be considered, namely what I shall term "Noun-drop" (or N-drop). With N-drop

³For extensive arguments against such an account see (Hyams & Wexler 1993) and (Lillo-Martin 1991).

⁴For details, see (Lillo-Martin 1991, pp. 201-202).

⁵Several more recent findings in the acquisition literature have been taken to suggest that the early "null subjects" observed in English do not in fact indicate that children are exploiting the adult null-subject option found in Italian. First, Valian (1991) has reported that young Italian-speaking children employ null subjects significantly more frequently than do young English-speaking children. Second, Bromberg & Wexler (1995), following up on earlier work by Rohrbacher & Roeper (1995), have argued that null subjects are systematically missing from child English in certain syntactic environments where they would be expected, if the children were exploiting a grammar of the adult Italian type.

it will be possible to avoid certain methodological difficulties encountered with null subjects.

As discussed by Ronat (1977), Torrego (1987), Barbiere (1991), Bernstein (1993a,b), Sleeman (1993), and Kester (1994) (among others), languages vary with respect to the surface form of a DP as in (2).

- (2) a. the rich (people); the rich *(person); the (large) red *(one)
b. les riches 'the rich (pl.)'; le riche 'the rich (sg.)';
le rouge 'the red (sg.)'; *le grand rouge 'the large red (sg.)'
c. los ricos 'the rich (pl.)'; el rico 'the rich (sg.)';
el rojo 'the red (sg.)'; el rojo grande 'the large red (sg.)'

In English the pro-form *one*, or a largely redundant noun such as *person*, is necessary in the DPs of (2a). An exception occurs for the generic human plural, as in *the rich (people)*, where the noun *people* is normally omitted.⁶

In other languages a redundant noun is often dropped more readily, or indeed obligatorily. I shall apply the term "N-drop" to this process, which yields DPs of the form, "D ϕ_N AP." For example, neither French (2b) nor Spanish (2c) has any direct counterpart to the English pro-form *one*.⁷ Moreover, in French and Spanish, the generic human singular, as well as plural, normally occurs without any overt head

⁶Torrego (1987) attempts to relate the obligatoriness of an overt pro-form in the DP, to the null subject parameter, but this clearly does not work for languages such as French and Dutch, which have relatively productive forms of N-drop but are not null-subject languages. For more extensive arguments against Torrego's proposal, see (Bernstein 1993b).

⁷On the other hand, the form of the Spanish masculine singular indefinite article varies slightly depending on whether an overt noun is present:

- (i) un/*uno libro rojo
'a red book'
(ii) uno/*un rojo
'a red (one)'

Bernstein (1993b) argues that the form *uno* is composed of the indefinite article, plus a noun-stem or "word-marking" (WM) morpheme that is projected as a functional head intermediate between the determiner and the NP. According to Bernstein, the WM morpheme surfaces as the final vowel (-o, -a) of regular nouns in Spanish (and Italian), though it is phonologically suppressed with other nouns. In the absence of any noun, the WM morpheme incorporates into the determiner (although its incorporation has overt phonological consequences only with certain determiners, such as Spanish/Italian *un* and Italian *quell*).

noun. At the same time, the phenomenon of N-drop is considerably more productive in Spanish than in French. For example, in Spanish (2c), but not in French (2b), multiple adjectives can occur in a DP whose head noun has been dropped. Also, the class of adjectives compatible with N-drop in French appears to be more restricted than in Spanish.⁸

A widespread perception is that N-drop is licensed (in some way) by richness of the agreement paradigm within the DP, potentially including agreement marking on the adjective as well as on the determiner. For example, Barbiers (1991) has argued that N-drop in Dutch involves a null pronominal (*pro*) licensed by declensional morphology of the adjective; in Dutch, the adjectives that do not carry overt declensional (number/gender) morphology are incompatible with N-drop. Kester (1994), building on Barbiers' work, proposes that Dutch N-drop depends specifically on overt, singular/plural number morphology on the adjective. In the present chapter I will attempt to evaluate the similar (though logically independent) hypothesis that the rich and regular DP agreement paradigm found in Spanish is directly and entirely responsible for the highly productive process of N-drop observed in Spanish.⁹

In other words, the hypothesis of interest is that the language-particular knowledge that Spanish permits an extremely free variety of N-drop is psychologically represented directly as knowledge of a morphological paradigm. The natural alternative to this hypothesis is that the Spanish-speaker represents knowledge of N-drop as a fact that is grammatically independent of the morphological paradigm. In this case one requires an explanation of the (perceived) tendency for languages with rich agreement systems to have N-drop, but such an explanation does not appear unattainable.¹⁰

⁸Snyder & Senghas (in preparation) are conducting a comparative investigation of N-drop in English, French, and Spanish, on which the preceding remarks are based.

⁹See (Bernstein 1993b) for a variant of this hypothesis, in which a proposed noun-stem or "word-marking" morpheme (discussed above), associated with regular gender marking on the noun, is the licenser of the null pronominal in Spanish N-drop. Below I will suggest that my acquisitional findings do not sharply distinguish between Bernstein's version of morphological licensing and licensing by declensional morphology of the determiner/adjective.

¹⁰One possibility, at least in principle, is that the phenomenon has some type of functional explanation. In Spanish, for example, the information that would be conveyed by an overt pro-form (i.e. number and gender) is already encoded in the agreement morphology. In a language such as English, however, use of the pro-form *one(s)*, rather than a null pro-form, makes at least the small

The crucial difference between these alternatives is that in the first case, a child learning Spanish who knows the morphological agreement system for DPs, automatically knows that N-drop is possible in Spanish. In the second case, a learner who knows the morphological agreement system still cannot reliably infer that Spanish necessarily permits N-drop; this information has to be acquired as a logically separate property of the language.

The resulting acquisitional question is whether there ever occurs a stage, in any child's acquisition of Spanish, when the child exhibits mastery of the DP agreement system but resists N-drop. If acquisition of N-drop is even partially independent of acquisition of morphology, then we expect to find at least the occasional child who happens to acquire N-drop later than the DP's agreement system. (As will be discussed below, evidence from children who acquire N-drop at the same time as, or prior to, the agreement system will be more difficult to interpret.)

The acquisitional investigation of N-drop has at least one major advantage over the earlier investigations of null subjects, in that it is much easier to judge whether a child's use of N-drop is due to grammatical rather than performance factors. This is because the frequency of strings of the form 'D _ AP' can be compared against strings of the form '_ N AP,' which serve as a natural experimental control. The latter string is nearly always ungrammatical in adult Spanish, because the vast majority of Spanish DPs require an overt determiner (even in most of the cases where English has no overt determiner, for example with abstract nouns and generic plural nouns).

Furthermore, children's early speech is characterized by a strong tendency to produce content words such as nouns more reliably than function words such as determiners (cf. Brown 1973, among others). We should therefore expect any general process of word-omission to affect determiners at least as often as nouns. Hence, a child who

communicative contribution of expressing number. Thus, the availability of N-drop might be expressed as an abstract parameter setting independent of any morphological knowledge, but there could still exist a functional (or "ecological") tendency for languages to choose the N-drop option if an overt pro-form is entirely redundant. On the other hand, there is little if any evidence to suggest that languages in fact resist morphological redundancy; if anything, the contrary appears to be true. I will briefly discuss a different, non-functional approach to the relationship between parameter-settings and overt morphology in Section 3.4.

produces strings of the form 'D _ AP' substantially more frequently than strings of the form '_ N AP' can with some confidence be described as exercising a syntactic option of Spanish, rather than simply succumbing to performance limitations.¹¹

A corresponding drawback of N-drop is that prior to the child's productive use of determiners, knowledge of N-drop is extremely difficult to assess. For this reason, a child who begins using the adult determiner system at the same age as N-drop, as evidenced by more frequent use of 'D _ AP' than of '_ N AP,' may have acquired N-drop and the DP-system simultaneously, or may have discovered the grammatical possibility of N-drop prior to acquiring the DP system. The latter situation is very difficult to detect because a (typically brief) utterance containing only an AP cannot, with much confidence, be interpreted as an attempt at a DP with an attributive adjective, as opposed to an attempt at a copular sentence with a predicate adjective.

Thus, the hope in the present investigation will be to encounter a child who demonstrates mastery of the DP system, including its morphological agreement paradigms, strictly prior to productive use of N-drop. Discovery of even a single child with this pattern would provide strong evidence against the hypothesis that knowledge of N-drop is directly (and entirely) encoded as knowledge of a morphological paradigm. To the extent that the Spanish-speaking children for whom data are available demonstrate mastery of N-drop and the DP system at the same age, the results will be more difficult to interpret.¹²

¹¹Admittedly, if Lillo-Martin is correct in her account of early null subjects in English, then early cases of N-drop in Spanish might conceivably result from an unset parameter, rather than either performance limitations or mastery of the adult grammar. In this case the chief value of investigating N-drop would simply be to have evidence from a second syntactic domain; the methodological problems associated with null subjects might remain. In Section 3.3, however, the longitudinal records of spontaneous production for two English-speaking children are subjected to (nearly) the same analyses as the Spanish data, and the frequency of N-omission never significantly exceeds the frequency of D-omission. Thus, if the rate of N-drop significantly exceeds the rate of D-omission in the Spanish child's transcripts, this will presumably indicate knowledge, rather than "ignorance" (i.e. an unset parameter), of the adult Spanish grammar.

¹²Notice the operative assumption here, that the possibility of N-drop follows directly either from some property of the declensional paradigm, or from a switch-like parameter. In principle one might imagine that a combination of declensional morphology and switch-style parameters determines whether N-drop is possible, but the hypothesis that I am interested in testing is one in which N-drop is fully independent of any switch-type parameter. One could also perhaps worry that N-drop depends only on the declensional paradigm, but children will sometimes exhibit a delay for independent reasons, between their mastery of adult declensional morphology and their use of N-

The remainder of this chapter presents the results of a detailed case-study of the single Spanish-speaking child for whom long-term, longitudinal transcripts of spontaneous production were available at the time this work was initiated.¹³ As an experimental control, the corpora of two English-speaking children are subjected to corresponding analyses. Because the data for only a single Spanish-speaking child are analysed, it will be all the more difficult to interpret the results if this child does not master the DP system markedly earlier than N-drop. With a larger group of children it would be possible to apply an inferential statistic such as the sign test to determine the likelihood of obtaining the observed results by chance, assuming for example that N-drop and morphological agreement within DP were logically independent and had similar expected ages of acquisition.

In the interest of leaving open, at least initially, the finer-grained question of exactly what aspects of morphology in the Spanish DP system plausibly play a role in licensing N-drop, the case-study that follows will chart all of the morphological forms and distinctions (within DP) attested in the child's spontaneous speech, through the age at which the child demonstrates clearly productive use of N-drop. In this way it is hoped that *any* potential relationship between DP morphology and N-drop will be detected, even in the absence of a more precise hypothesis about the nature of this relationship. Similarly, it is hoped that by choosing as the language of investigation Spanish, which exhibits both rich and regular DP agreement and highly productive N-drop, the results will have the greatest possible generality: If any language permits N-drop as a direct consequence of its agreement system within the DP, then Spanish should be such a language.

drop. I can see no clear reason, however, to expect such a situation, and thus the burden will rest on the advocate of such an account to provide empirical motivation. Moreover, it strikes me as relatively difficult to construct a model of grammar in which the possibility of N-drop follows directly from knowledge of the declensional paradigm, but in which a delay could exist between mastery of the morphology and adult-like use of N-drop, especially considering that N-drop appears to be obligatory wherever possible in the languages that I have examined.

¹³Longitudinal data for a second Spanish-speaking child have since become available, and a natural follow-up to the present work will be to apply the same analyses developed here to the new data.

3.2 Case-study: Juan

José Linaza of the University of Madrid recorded the spontaneous speech of his son, Juan, at fairly regular intervals when Juan was between the ages of 1 year, 7 months and 4 years, 8 months. These recordings have since been transcribed and made publically available through the CHILDES database (MacWhinney & Snow 1985, 1990). Unfortunately the corpus is less than ideal, both because of the several gaps during which Juan was not recorded for many months at a time, and also because Juan's family lived primarily in England until he was approximately 2 years, 1 month old. While in England the child was exposed to both Spanish and English. A certain amount of code-switching is evident in the transcribed speech of both Juan and his father.

Despite these shortcomings, the Linaza corpus was the only longitudinal Spanish corpus available at the time the present research was initiated. Each transcript, from the beginning of the corpus (Juan's age = 1;7) until Juan reached the age of 3;5, was analysed for determiner use and possible cases of N-drop.¹⁴ Table 3.1 presents an exhaustive list of the possible cases of N-drop in Juan's transcribed speech, through the age of 3;5. Items presented in parentheses in this table were judged too uncertain to be included in the final counts. Table 3.2 compares the apparent cases of N-drop ('D AP') to cases of full 'D N AP' phrases, and also to cases of D-omission in which an attributive adjective is present ('N AP'). Finally, Table 3.3 charts the control condition, omission of the determiner in those contexts ('D N (AP)') where it is required in adult Spanish.

Although apparent cases of N-drop are rather few in number, from the age at which N-omission is first observed (2;8), the rate of N-omission substantially exceeds the rate of D-omission. In Juan's transcript data for age 2;8, the rate of D-omission (in any 'D N (AP)' environment) is (.12). Thus, the probability of omitting the N in all five of the relevant contexts, simply as a result of the mechanism causing occasional

¹⁴By 2;8, Juan appears to have acquired N-drop. A large gap in the corpus exists between the ages of 2;10 and 3;5, and the transcriptions at 3;5 were chosen as the stopping point for the present analyses.

Table 3.1: Juan's apparent uses of N-drop, through 3;5.

- (1;9: otro grande otro. '(an)other big (an)other')
 (possibly an imperfect imitation of a previous adult utterance; otherwise,
 target is ambiguous between 'the other is big, the other,' and 'another big (one), another')
- (2;5: sólo sólo ve quina. 'only only see small-Fem')
 (unclear, but *quina* may be attempt at *la chiquitina* 'the small (one)')
- (2;5: uui ese rillo. 'oh that yellow')
 (probably copular, but could be N-drop)
- 2;8: mira mira una mía sólo. 'look look a my (one) (i.e. one of mine) only'
- 2;8: mia # una zul una azul un azul. 'look # a blue a blue a blue (one)'
- (2;8: cojo blanco. 'I-take (by the) white (part)')
 (i.e. the white part of a photographic slide - missing determiner)
- 2;8: un banco (= uno blanco). 'a white (one)'
 (apparently referring to a blank slide)
- 2;8: ese caído rojo tenle. 'that red fallen (one) take it'
- ese una ese una zul. 'that a that a blue (one)'
- 3;5: es # un pardo (= uno pardo). 'it-is # a brown (one)'
 (repeated with expansion: un pardo # un oso pardo. 'a brown (one) # a brown bear')
- 3;5: un porro (= uno pardo). 'a brown (one)'
- 3;5 un un un un un gran parece un lobo. 'a a a a a big (one) it-seems-to-be a wolf'
 (Note: This could instead be a speech hesitation.)
- (3;5: falta una. 'there-is-missing a/one')
 (Without an overt AP, *una* is ambiguous between a determiner and a pronominal.)

Table 3.2: Frequency of N-drop ('D AP') in Juan's 'D (N) AP' contexts.

Age	D _ AP	D N AP	% N-drop	_ N AP
1;7	0	0	n.a.	0
1;9	0	0	n.a.	0
2;0	0	0	n.a.	0
2;1	0	0	n.a.	0
2;3	0	0	n.a.	1
2;4	0	0	n.a.	0
2;5	0	0	n.a.	0
2;8	5	0	100	0
2;10	0	0	n.a.	0
3;5	3	9	25	0

Table 3.3: Juan's frequency of D-omission, by age.

Age	_ N (AP)	D N (AP)	% D-drop
1;7	9	2	82
1;9	39	8	83
2;0	24	21	53
2;1	5	10	33
2;3	3	4	43
2;4	11	6	65
2;5	26	43	62
2;8	38	5	12
2;10	7	11	39
3;5	73	2	3

D-omission, is considerably less than (.001). Similarly, in the transcript data for age 3;5, the rate of D-omission is .03, and the resultant probability of omitting N in at least three of twelve relevant cases is only .0042 by the Binomial Theorem (two-tailed $p = .0084$). Hence, the evidence from spontaneous production suggests that Juan's grammar permitted N-drop by the time he was 2;8.

A possible concern, however, is that the frequency of D-omission as measured in Table 3.3 might underrepresent the frequency of chance omissions of nouns from 'D N A' sequences. In Table 3.3 the rate of D-omission was calculated as the number of 'N (A)' strings (excluding apparently copular constructions) divided by the total number of 'N (A)' and 'D N (A)' strings. As it happens there were no 'D N A' strings (i.e. with determiner, noun, and adjective all present) prior to the age of 3;5, and the data for 3;5 contain only nine such occurrences. If the per-word rate of performance-based word-omission from three-word target phrases is greater than that for two-word target phrases (as seems likely), then the rate of D-omission from 'D N A' targets will exceed the rate of D-omission from 'D N' targets.

A method of assessing statistical significance that overcomes this problem is to compare the number of 'N A' sequences in Juan's corpus to the number of 'D A' sequences. If a single, performance-based tendency to omit words were equally likely to convert a target of 'D N A' into either 'D A' or 'N A,' then we would expect comparable rates of these two surface strings in Juan's early production data. Instead, in the transcripts from 1;7 to 3;5, we find eight cases of 'D A' (i.e. the apparent cases of N-drop reported in Table 3.1), but only one case of 'N A' (*mira # a tante rota pata* 'look # the elephant (has a) broken foot,' at 2;3).¹⁵ By the Binomial Theorem (i.e. sign test), the probability of finding N-drop, rather than D-drop, in at least eight of nine relevant cases is less than .02 (two-tailed $p < .04$) if N-drop and D-drop are equally probable consequences of a single, performance-based process of word-omission. Although this test is based on fewer data points and is therefore less powerful than the first test above, the outcome is the same, and further supports the

¹⁵Alternatively, this may have been an attempt at a present perfect construction: 'the elephant (has) broken (its) foot'.

view that Juan's apparent uses of N-drop are not simply performance errors.

If we adopt as a rough guideline Cazden's (1968) criterion of "use in at least 90% of obligatory contexts for three consecutive transcripts" (see also Brown 1973), then Juan does not demonstrate mastery of Spanish determiner use until sometime well after the age of 2;8. Juan does however show a strong increase in the reliability of determiner use between the recordings at 2;5 (with determiners used in 38% of obligatory contexts) and the recordings at 2;8 (with determiners used in 88% of obligatory contexts). Thus, it is plausible that Juan's first uses of N-drop occur at a point when the determiner system is coming to be used more consistently. Moreover, there is nothing to suggest that Juan's acquisition of N-drop is delayed relative to his use of determiners.

As discussed in Section 3.1, this outcome is difficult to interpret, because a single child could easily acquire N-drop and the determiner system at roughly the same ages, even if the possibility of N-drop did not directly follow from the nature of the Spanish determiner system. Further children will have to be examined before even a tentative conclusion can be drawn. To the extent, however, that Juan's data are at least consistent with the hypothesis that N-drop follows directly from some property of Spanish agreement morphology within DP, it is of interest to determine how much knowledge of determiner and adjective agreement is evident in Juan's spontaneous speech by the time he begins using N-drop.

Tables 3.4 through 3.6 contain a timeline of Juan's determiner uses, broken down by type of determiner. The notion of "determiner" has been taken very broadly, so as to include anything that might plausibly function as a determiner in the child's grammar. Some of the "determiners" are probably not so analysed by the adult speaker of Spanish. (For example, see Chapter 4 on the syntactic representation of numerals.)¹⁶

Interestingly, Juan's use of the feminine singular indefinite determiner *una* shows a marked increase at the age of 2;8. Prior to this age, the vast majority of Juan's

¹⁶Also, note that the form *uno* 'one' occurs once in place of the masculine singular indefinite determiner *un*, and the forms *las* and *estas* are unattested.

Table 3.4: Timeline of Juan's singular, agreeing determiners, by type

Age	el/al	la	un	una	(uno)	ese	esa	otro	otra
1;7	1	0	0	0	0	0	0	0	0
1;9	0	0	0	1	0	0	0	0	0
2;0	2	3	12	1	0	0	0	0	0
2;1	1	0	6	0	0	0	0	0	0
2;3	0	3	0	0	0	0	0	0	0
2;4	2	1	1	0	0	0	0	0	0
2;5	4	4	10	0	0	1	0	0	0
2;8	3	3	5	14	0	1	1	0	5
2;10	1	1	6	2	1	0	0	0	0
3;5	12	12	28	6	0	0	0	4	0

(57) agreeing determiners were *un* (masculine singular indefinite, 51%), *la* (feminine singular definite, 19%), and *el* (masculine singular definite, 18%). The remaining agreeing determiners attested in Juan's speech prior the age of 2;8 were *los* (masculine plural definite, 7%), *una* (feminine singular indefinite, 3%), and *ese* (masculine singular demonstrative, 2%). Of the (34) uses of an agreeing determiner recorded at age 2;8, however, the feminine singular indefinite (*una*) accounts for 41% of Juan's determiners. This change may be important because, unlike the *el/la* pair of masculine/feminine definite singular determiners, in the *un/una* pair of indefinite determiners *una* is readily analysed as an indefinite morpheme *un* plus a feminine morpheme *-a*. Thus, one possibility is that knowledge of both *un* and *una* allowed Juan to "break the code" of regular grammatical gender agreement on the Spanish determiner, and for that matter on the Spanish adjective, which happens to mark gender in much the same way as the determiner. In support of this hypothesis, it is interesting to note that the regular feminine forms *otra* 'another-Fem' and *esa* 'that-Fem' also make their first appearance at 2;8. (For a more prosaic alternative to the feminine agreement hypothesis, however, see below.)¹⁷

¹⁷The feminine agreement hypothesis is compatible, in my view, with Bernstein's (1993b) proposal (discussed earlier) that the regular noun-stem morpheme *-o/-a* is the licenser of N-drop in Spanish. Given that the same vowels are employed in determiners, adjectives, and nouns to express (regular) gender concord, Juan's identification of *-a* as the "feminine" vowel in the regular determiners could plausibly coincide with his identification of this vowel as the feminine stem vowel of the

Table 3.5: Timeline of Juan's plural, agreeing determiners, by type

Age	los	(las)	muchos	muchas	estos	(estas)
1;7	1	0	0	0	0	0
1;9	0	0	0	0	0	0
2;0	0	0	0	0	0	0
2;1	3	0	0	0	0	0
2;3	0	0	0	0	0	0
2;4	1	0	0	0	0	0
2;5	0	0	0	0	0	0
2;8	0	0	2	0	0	0
2;10	0	0	0	0	0	0
3;5	2	0	2	1	1	0

Table 3.6: Timeline of Juan's non-agreeing determiners, by type

Age	mi	mis	más	qué	dos	Unclear
1;7	0	0	0	0	0	0
1;9	0	0	0	0	0	7
2;0	0	0	0	0	0	3
2;1	0	0	0	0	0	0
2;3	0	0	0	0	0	1
2;4	0	0	0	0	0	1
2;5	1	0	5	0	1	1
2;8	0	0	0	0	2	2
2;10	0	0	0	0	0	0
3;5	2	1	1	1	0	1

Table 3.7: Gender agreement between D and N in Juan's DPs

Age	# Correct	% Correct	# Incorrect	% Incorrect	Unclear
1;7	2	100	0	0	0
1;9	2	100	0	0	3
2;0	15	83	3	17	3
2;1	10	100	0	0	0
2;3	3	100	0	0	1
2;4	5	100	0	0	1
2;5	14	87	2	13	4
2;8	27	93	2	7	7
2;10	8	89	1	11	2
3;5	60	94	4	6	5

A natural question at this point, of course, is the extent to which the grammatical gender of Juan's early determiners was correct from the perspective of adult Spanish. In fact, even in the earliest transcripts, Juan's determiners correctly agreed with their head nouns in gender as well as number in the vast majority of cases. Table 3.7 contains counts of determiners with correct and incorrect gender agreement, as well as counts of the cases in which the appropriateness of agreement marking could not be determined, for example when the head noun was a neologism of Juan's invention or when the determiner was transcribed as phonetically unclear. Table 3.7 does not include determiners that would not exhibit gender agreement in adult Spanish. As indicated in Table 3.6 above, eleven instances of such non-agreeing determiners or determiner-like elements (*mi(s)*, *qué*, *más*, *dos*) are found in Juan's corpus.

Not only is the error rate remarkably low for every transcript that was analysed, but the error rates in Table 3.7 are probably somewhat inflated. In the interest of scientific conservatism, whenever there was a question as to whether a determiner's gender should be coded as "correct" or "unclear," it was coded as "unclear." More-

regular nouns. Moreover, one cannot easily tell (from spontaneous production data alone) when the child recognizes the tendency for final vowel to predict gender class; for example, Juan makes very few gender errors overall (see below), and correct gender can result either from recognition of the regular pattern or from rote memorization. Hence, I do not see any way of directly distinguishing between morphological licensing by a noun-stem morpheme, and morphological licensing by a gender agreement marker of the determiner/adjective, in a study of the spontaneous production data for Spanish.

over, in cases of doubt between “unclear” and “incorrect,” the determiner’s gender was coded as “incorrect.” Thus, Juan produced remarkably few determiners that were even possibly of an incorrect grammatical gender.

Finally, Table 3.8 provides an exhaustive list of Juan’s uses of attributive adjectives, through the age of 3;5. (Items in parentheses were judged too uncertain to be included in the final counts. Items marked with a † also appear, and are discussed, in Table 3.1.) The list is strikingly brief, and raises a concern that the truly pivotal change in Juan’s language at the age of 2;8 could have been the simple introduction of adjectives into his DPs. N-drop is recognizable as such only if an attributive adjective is present as well as a determiner. Thus, rather than the acquisition of any property of the DP agreement system, Juan’s achievement at 2;8 could simply have been the simultaneous control of determiners and attributive adjectives.

At the same time, it is difficult to judge with confidence whether a child’s utterance of the form “N(P) AP” (e.g. *casa grande* lit. ‘house big’) was intended as a copular sentence with a predicate adjective (e.g. *La casa es grande* ‘The house is big’), or as a DP containing an attributive adjective (e.g. *la casa grande* ‘the big house’). Some of the earlier, apparently predicative adjectives may have been intended as attributive. Hence, attributive adjectives may have become easier to discern as determiner use grew more reliable around the age of 2;8, but may have been present earlier.

In any case, the principal result is that at the age of 2;8, as Juan is developing a command of both determiners and adjectives, N-drop already occurs with a frequency that is greater than would be expected by chance. Whether the possibility of N-drop results from mastery of some aspect of the agreement morphology in the Spanish DP (such as recognition of a distinct feminine gender morpheme within the regular agreement system), or is an independent fact about Spanish that Juan happened to acquire at, or before, the age when he came to use determiners productively, cannot (as far as I can tell) be determined from Juan’s data alone. Additional Spanish-speaking children will have to be examined as their corpora become available. In the next section, however, the spontaneous production corpora for two English-speaking children are examined as a control for Juan’s case-study.

Table 3.8: Juan's uses of attributive adjectives, through 3;5.

(1;9: otro grande otro.)†

(2;0: así grande avión allá # sí niño. 'thus/so big airplane there # yes child')
(Word order and morphology suggest that *grande* 'big' is predicative, rather than attributive.)

(2;5: sólo sólo ve quina.)†

(2;5: uui ese rillo.)†

2;8: mira mira una mía sólo.†

2;8: mia # una zul una azul un azul†

2;8: cojo blanco.†

2;8: un banco (= uno blanco).†

2;8: ese caído rojo tenle.†

ese una ese una zul.†

3;5: es # un pardo (= uno pardo).†

3;5: un pardo # un oso pardo.†

3;5: un porro (= uno pardo).†

3;5 un un un un un gran paece un lobo.†

3.3 English-speaking Controls: Adam and Eve

A concern following from Lillo-Martin's (1991) work on the acquisition of null subjects is that the Spanish-speaking child's grammar might initially permit N-drop as the result of an unset parameter, rather than as the result of mastering the adult grammatical basis of N-drop. To test this possibility, the longitudinal transcripts for two English-speaking children, Adam and Eve (Brown 1973), were subjected to a smaller version of the analysis conducted on Juan's corpus. (The considerable volume of data in these corpora precludes, for the present, a full analysis of the type reported for Juan in Section 3.2.)

Most of Juan's early adjectives were colour terms. Thus, a natural method of sampling the English corpora for DPs comparable to those analysed in Juan's corpora is to search for utterances containing any of the English colour terms, and then to separate apparently attributive (DP-internal) uses from predicative (DP-external) uses.¹⁸ To the extent that 'D A N,' 'D A,' and 'A N' phrases are included in the attributive uses of the adjectives, the frequency of N-omission can be computed (as in Section 3.2) by dividing the number of 'D A' sequences by the total number of 'D A' and 'D A N' sequences. Moreover, the frequency of D-omission can be computed by dividing the number of 'A N' sequences by the total number of 'A N' and 'D A N' sequences.¹⁹ The frequency of D-omission can then be used to compute the probability of obtaining (at least) the observed number of N-omissions as a result of the same process. In addition, a comparison of the rates of 'N A' and 'D A' strings, as in Section 3.2, is available as a second method of assessing the likelihood that the two types of strings arise as the result of a single, performance-based process of word-omission.

¹⁸Specifically, the following English colour terms were included in the analysis: red, orange, yellow, green, blue, purple, black, white, gray, grey, pink, and brown.

¹⁹This natural approach to computation of the D-omission rate, which avoids the problems discussed in Section 3.2, unfortunately was inappropriate in Juan's case, because of the small numbers of 'D N A' and 'N A' phrases recorded in Juan's early transcripts. Notice also that the rate computed here for D-omission, for example, reflects the frequency of omitting the determiner (_ A N) versus producing a full 'D A N' sequence; other possibilities, such as producing a 'D A _' sequence or an adjective in isolation, have been set aside in calculating the frequency of D-omission.

Table 3.9: Eve's N and D use in DPs containing a colour term.

Age	D A N	_ A N	D A _	% D-omission	% N-omission	D AP one	_ AP one
1;6a	0	0	0	-	-	0	0
1;6b	0	0	0	-	-	0	0
1;7a	0	0	0	-	-	0	0
1;7b	0	0	0	-	-	0	0
1;8	0	2	0	100	-	0	0
1;9a	1	4	0	80	0	1	4
1;9b	0	1	0	100	-	0	0
1;9c	0	2	0	100	-	0	0
1;10a	0	0	0	-	-	0	0
1;10b	2	2	0	50	0	0	0
1;11a	2	2	1	50	33	1	2
1;11b	0	0	0	-	-	0	0
1;12	4	5	0	55	0	4	2
2;0	10	3	3	23	23	9	3
2;1a	7	1	0	13	0	3	1
2;1b	1	0	0	0	0	0	0
2;2a	3	1	0	25	0	0	1
2;2b	2	3	3	60	60	2	1
2;3a	1	1	1	50	50	1	1
2;3b	4	1	2	20	33	2	0

Table 3.9 presents the counts of Eve's uses of 'D A N,' '_ A N,' and 'D A _' strings in DP contexts, as well as the resultant frequencies of D-omission and N-omission. Uses of the pro-form *one* are summarized in the two rightmost columns of the table. Table 3.10-11 presents the corresponding figures for Adam.²⁰

Eve's rate of N-omission never exceeds her rate of D-omission, except in her last transcript (2;3b). For this transcript, the rate of N-omission still is not significantly greater than the rate of D-omission. First, the probability of obtaining two cases of 'D A _' and only one case '_ A N' by chance, if both occurrences are equally likely, is .5000 (NS) by the Binomial Theorem (i.e. one-tailed sign test). Second, if the rate of

²⁰Table 3.10-11 excludes from the counts of Adam's D-omissions a number of cases where no determiner would be expected in adult English. Utterances of this type occurred as follows: Age 3;8.0 - 2; Age 3;9.16 - 2; Age 4;1.15 - 1; Age 4;3.13 - 1; Age 4;5.11 - 1; Age 4;6.24 - 1; Age 4;10.2 - 6; Age 5;2.12 - 1.

Table 3.10: Adam's N and D use in DPs containing a colour term, Part I.

Age	D A N	_ A N	D A _	% D-omission	% N-omission	D AP one	_ AP one
2;3.4	0	0	1	-	100	0	0
2;3.18	0	2	0	100	-	0	0
2;4.3	0	0	0	-	-	0	0
2;4.15	0	0	1	-	100	0	0
2;4.30	0	4	1	100	100	0	1
2;5.12	0	0	0	-	-	0	0
2;6.3	1	6	1	86	50	1	6
2;6.17a	1	0	0	0	0	0	0
2;6.17b	0	1	1	100	100	0	0
2;7.14	0	0	0	-	-	0	0
2;8.0	0	4	0	100	0	0	0
2;8.16	0	0	0	-	-	0	0
2;9.4	0	0	0	-	-	0	0
2;9.18	0	4	0	100	0	0	4
2;10.2	0	2	0	100	0	0	1
2;10.16	0	0	0	-	-	0	0
2;10.30	0	0	0	-	-	0	0
2;11.13	0	0	0	-	-	0	0
2;11.28	0	3	0	100	-	0	1
3;0.11	6	2	0	33	0	5	1
3;0.25	8	2	1	20	11	6	2
3;1.9	0	0	0	-	-	0	0
3;1.26	4	3	0	43	0	3	2
3;2.9	1	0	0	0	0	0	0
3;2.21	0	0	0	-	-	0	0
3;3.4	0	0	0	-	-	0	0
3;3.18	0	1	0	100	-	0	0
3;4.1	1	0	0	0	0	1	0
3;4.18	0	0	0	-	-	0	0
3;5.0	0	0	0	-	-	0	0
3;5.15	1	0	0	0	0	0	0
3;5.29	1	0	0	0	0	0	0

Table 3.11: Adam's N and D use in DPs containing a colour term, Part II.

Age	D A N	_ A N	D A _	% D-omission	% N-omission	D AP one	_ AP one
3;6.9	0	0	0	-	-	0	0
3;7.7	3	0	0	0	0	1	0
3;8.0	3	0	0	0	0	0	0
3;8.14	5	0	0	0	0	3	0
3;8.26	3	0	0	0	0	3	0
3;9.16	3	3	0	50	0	2	0
3;10.15	1	0	0	0	0	0	0
3;11.0	3	3	1	50	25	0	0
3;11.14	5	0	1	0	17	5	0
4;0.14	7	1	3	13	30	1	0
4;1.15	9	4	0	31	0	6	3
4;2.17	1	0	0	0	0	0	0
4;3.9	0	0	0	-	-	0	0
4;3.13	5	1	0	17	0	1	0
4;4.0	4	1	3	20	43	1	0
4;5.11	5	0	0	0	0	0	0
4;6.24	2	0	0	0	0	1	0
4;7.0	1	0	0	0	0	1	0
4;7.29	2	0	0	0	0	0	0
4;9.2	1	0	3	0	75	0	0
4;10.2	1	0	1	0	50	0	0
4;10.23	0	0	3	0	100	0	0
5;2.12	2	0	3	0	60	0	0
TOTAL	90	47	24	34	21	41	21

word-omission for N's is the same as that observed for D's in this transcript (20%), then the (one-tailed) probability of Eve's omitting the N from at least two of six 'D A N' targets is .3446 (NS) by the Binomial Theorem. Hence, there is nothing to suggest that Eve ever goes through a stage in which her grammar permits a process of N-drop, as found in Spanish.

Although Adam omits nouns more frequently than does Eve, the results are much the same: Adam's rate of N-omission is never significantly greater than his rate of D-omission. First, in several transcripts the number of N-omissions exceeds the number of D-omissions, but there are too few cases of D-omission to obtain a useful frequency estimate. In these cases a sign test was used to compute the probability of obtaining the observed skew towards N-omission, if N-omission and D-omission were equally likely consequences of a single word-omission process. The one-tailed probabilities are as follows: Age 2;3.4, $p = .5000$ (NS); Age 2;4.15, $p = .5000$ (NS); Age 3;11.14, $p = .5000$ (NS); Age 4;9.2, $p = .1250$ (NS); Age 4;10.2, $p = .5000$ (NS); Age 4;10.23, $p = .1250$ (NS); Age 5;2.12, $p = .1250$ (NS).

Second, in two transcripts D-omission occurred often enough to permit a frequency estimate. In the transcript for age 4;0.14, the rate of D-omission is 12.5%, and the probability of omitting the N from three of ten 'D A N' targets as a result of the same process is .1195 (NS) by the Binomial Theorem (two-tailed $p = .2390$, NS). The probability of observing N-omission, rather than D-omission, in three of four cases in which a single word was omitted from a 'D A N' target, is .3125 (NS) (two-tailed $p = .6250$, NS). Similarly, in the transcript for age 4;4.0, the frequency of D-omission is 20%, and the probability of omitting the N from three of ten 'D A N' targets is .1480 (NS) by the Binomial Theorem (two-tailed $p = .2960$, NS). The probability of observing N-omission, rather than D-omission, in three of four cases of single-word omission is (as above) not significant by one- or two-tailed sign test.

Hence, as for Eve, there is nothing to suggest that Adam ever goes through a stage in which his grammar permits the highly productive process of N-drop found in Spanish. On the other hand, both Adam and Eve exhibit a slight increase in N-omission late in their corpora. This may be due in part to (perhaps imperfect)

acquisition of the adult English possibilities for noun-ellipsis and for the nominalization of adjectives. In particular, many of Adam's cases of N-omission could plausibly result from the processes that yield (4a,b), which are at least marginally possible in adult English.

- (4) a. John has plenty of the blue paint, but he's running out of the red.
b. Mary thinks the painting needs more grey in the background.

Example (4a) is a case of N-ellipsis, while (4b) is a case of nominalization in which the colour adjective becomes a mass noun.

The main result, however, is simply that neither English-speaking child examined shows any sign of going through an early stage in which productive N-drop of the Spanish type is allowed by his or her grammar. This result supports the view that N-drop is a useful domain in which to investigate the possible relationship between morphological paradigms and syntactic phenomena. Unlike null-subjects, which are found even in the speech of children acquiring a non-null-subject language, productive N-drop has been found (thus far) only in the speech of a child acquiring a noun-drop language. Therefore the point in the timecourse of acquisition, at which a child acquiring a noun-drop language begins to drop N's productively, appears to be a useful source of information about the nature of the grammatical knowledge responsible for N-drop in the adult language.

3.4 Conclusions

The preceding section demonstrated that N-drop, unlike null subjects, does not occur productively in the spontaneous speech of children acquiring a language in which it is ungrammatical. This, combined with the use of D-omission as a control measure, permits one to be confident that even early occurrences of N-drop in the Spanish production data reflect knowledge of the adult grammatical mechanism for N-drop, rather than processing limitations or an unset parameter. Much as in the case of Italian null subjects (Hyams 1986), where verbal agreement morphology is correct from the outset, gender agreement of the Spanish determiner with its head noun is

usually correct even in the earliest occurrences of the determiner. Unlike Italian verb-agreement, however, Spanish determiners are not reliably present in the child's early speech.²¹

In the case-study of Juan, N-drop appeared when the child still did not reliably supply obligatory determiners. The point at which N-drop appeared did, however, correspond to a marked increase in the reliability of determiner use in obligatory contexts, from 38% in the previous transcript, to 88%. Thus, there was nothing to suggest that Juan's use of N-drop was delayed relative to his acquisition of the determiner system. The results of the case-study were consistent with the hypothesis that the grammatical knowledge responsible for productive N-drop in adult Spanish is represented directly in terms of knowledge about the morphological agreement paradigm within the DP. Crucially, however, more children must be studied before any conclusion is drawn.

The results of this particular case-study do not bear strongly on the general issue of whether knowledge of N-drop is directly represented in terms of morphology. Yet, the results do have the effect of considerably limiting the hypothesis space for morphological accounts of N-drop. The only aspect of the DP agreement system that underwent a dramatic change at the point when N-drop appeared is the use of determiners with the regular feminine agreement morpheme *-a*. The frequency with which such determiners were employed and the variety of feminine singular determiners produced both exhibited a marked increase at this point. In contrast, the use of plural determiners remained quite infrequent well beyond the age at which the child first used N-drop productively. Hence, if one wishes to maintain a morphologically based account of Spanish N-drop, the evidence from child language acquisition suggests that regular agreement for grammatical gender is plausibly a sufficient con-

²¹One might interpret the contrast between ASL agreement, which is acquired very late according to (Lillo-Martin 1991), and Italian agreement, which is present and correct in extremely early child speech (Hyams 1986), to indicate that ASL agreement requires a linguistic analysis different in some way from the analysis of verbal agreement morphology in a language such as Italian. The fact that Juan acquired gender agreement on Spanish determiners relatively early and with few errors would then suggest that Spanish determiner morphology is more similar in nature to Italian verbal agreement morphology, than to ASL agreement.

dition, while regular agreement for substantival number is unlikely to be a necessary condition for N-drop.²²

To take a somewhat broader perspective, however, the project of relating language-particular properties of syntax directly to a language's inflectional and declensional paradigms has thus far met with strikingly limited success. In some ways this outcome is not especially surprising. The connection between syntax and paradigms of morphology depends entirely on the metaphor of "strength" or "richness" of a morphological paradigm. Current syntactic theory by and large says nothing about the particular morphological features that ought to be overtly distinguished in order for an agreement paradigm to count as morphologically "rich." Instead, this is left as an open, empirical question. Hence, there is currently no principled reason to expect the particular feature-combinations distinguished by a given morphological paradigm to have direct consequences for language-particular properties of syntax.²³

Moreover, one can imagine that the implicational direction should be completely reversed. There could conceivably be a tendency for functional heads that have overt syntactic consequences (such as overt movement, or licensing of a null pro-form) to be associated as a result with rich overt morphology. In this case there might be a grammatical basis for an association between syntax and morphological paradigms, but knowledge of the morphological paradigm would not reliably allow the language-learner to infer the relevant syntactic properties, and it would be a mistake to suppose that the syntactic knowledge was in any sense represented as knowledge of morphology.

Furthermore, Ken Wexler (personal communication) has noted that the literature on the logical problem of language acquisition has turned up surprisingly few instances in which overt morphology should obviously be preferred by the learner over other

²²One possibility, in principle, is that overt morphological expression of any declensional feature checked by a functional head is sufficient to make a language [+N-drop]. Thus, either number morphology on the Dutch adjective (Kester 1994) or gender morphology on the Spanish determiner would be a sufficient condition for N-drop, provided that both gender and number are among the features checked by functional heads.

²³A limited number of attempts have, however, been made to establish a more direct connection between syntax and the overt expression of particular morphological features, particularly in work of Ur Shlonsky and Kyle Johnson.

types of evidence, as a source of language-particular syntactic information. The best such case may be Icelandic V-to-I raising, which is evidenced almost exclusively by the word-order in embedded, indirect questions. Matrix clauses and other types of embedded clauses do not provide clear distributional evidence for V-to-I movement, because of the independent existence of V-to-C movement in such clauses. Hence, if the primary linguistic input to the young child contains few indirect questions, as seems likely, then overt verbal morphology found in the matrix clause would indeed be an acquisitionally preferable source of information about V-to-I movement. Yet, once again, the case of Icelandic V-to-I movement appears to be much more the exception than the rule.

If it turns out that the syntactic knowledge underlying phenomena such as N-drop and null subjects cannot be reduced, even in part, to knowledge of morphological paradigms, then evidence from language acquisition may well provide a definitive demonstration of the point. While the analyses of Juan's data were inconclusive, his case-study lays the groundwork for similar studies of other children. A conclusively negative result is likely in future studies, if knowledge of N-drop is represented completely independently of the morphology.

As suggested in Section 3.1, the easiest outcome to interpret would be to find a child who demonstrates complete mastery of the adult morphology within the DP, and yet continues systematically to resist N-drop. Another possibility, however, is that across several Spanish-speaking children N-drop will always appear fairly early, but there will be no consistency in the point at which N-drop appears, relative to the acquisition of declensional morphology. For example, the onset of productive N-drop in Juan's spontaneous production coincides with the onset of productive use of regular feminine gender-marking on the determiner. If this pattern is accidental, it will not persist as further children's corpora are subjected to the same analyses, and eventually all portions of the morphological paradigm will be eliminated from consideration as possibly necessary conditions for N-drop. Moreover, if a child is encountered who begins using N-drop productively at a point that does not coincide with any other discernible change in the form of the DP, then this result in itself will

speak strongly against the hypothesis that morphological knowledge plays any role in knowledge of N-drop.

Still another, similar possibility is that a child will be encountered who makes no morphological distinctions in the determiner or attributive adjective for gender, number, or anything else at the point when N-drop comes into productive use. In fact, initially Juan often used an undifferentiated determiner transcribed as *a* (and counted in Table 3.6 as “unclear”) with both masculine and feminine nouns. If N-drop is completely independent of declensional morphology, then eventually a child may turn up who uses Spanish N-drop productively prior to demonstrating any knowledge of declensional morphology whatsoever; this outcome would again provide strong evidence that N-drop does not depend in any way on morphological knowledge.²⁴

Thus, further investigation of N-drop has considerable potential, beyond what could be accomplished in the case-study of a single child. Indeed, the primary significance of Juan’s case-study may be as the foundation for further research on children’s acquisition of N-drop in languages such as Spanish. I am unaware of any comparable opportunity, in other domains of language acquisition research, to peer into the workings of the acquisition process and look for syntactic consequences, as each bit of a morphological paradigm comes on-line.

²⁴As usual, there is an issue of whether children’s grammatical competence can be assessed accurately with performance measures such as comprehension or spontaneous production. In the present case-study, Juan initially used only a subpart of the adult determiner paradigm, and yet the subpart that he used was used correctly most of the time. This suggests that Juan made productive use of his morphological knowledge as soon as he had it (because otherwise he should either have made more errors or have produced fewer determiners in his early speech), but at the same time it suggests that he avoided producing determiners for which he did not yet know the correct form (because the full system of adult Spanish determiners is not in evidence until sometime after the age of three years). Of course, this reasoning assumes that no explanation other than lack of lexical and morphological knowledge can be found for Juan’s failure to produce more of the adult Spanish determiner forms in his early transcripts.

Chapter 4

The Morphosyntax of Number and Degree

4.1 Introduction

In the preceding two chapters, two aspects of morphology were examined for their possible roles in the mental representation of language-particular syntactic knowledge. Chapter 3 considered paradigms of agreement morphology, which are finite, phonologically overt, and necessarily committed to memory as part of a language-speaker's lexical knowledge, independently of whether they play a role in syntactic variation. Chapter 2 considered properties of word-formation, which affect potentially infinite sets of lexical items, but again are necessarily acquired as part of the speaker's knowledge of morphology, regardless of whether they play a role in syntax. The third and final aspect of morphology that will be considered, the morphological checking requirements of functional heads, is more properly morphosyntactic, as it is often motivated chiefly by syntactic considerations.

The morphosyntax of functional heads has for some time been a topic of considerable interest to syntacticians, because of its presumed role in the interactions observed between syntactic movement operations and morphological agreement-marking. Two examples will serve to illustrate this point. First, in French, phonologically overt agreement marking on the perfect/passive participle is permitted only if the direct

object of a sentence has undergone overt syntactic movement to a position preceding the participle (Kayne 1975). Thus in (1a), the participle *découvert* 'discovered' cannot carry feminine agreement marking to match the gender of its subsequent direct object.

(1) a. Jean a découvert/*découverte la solution.

John has discovered/*discovered-Fem the-Fem solution

'John discovered the solution.'

b. La solution a été découverte par Jean.

the-Fem solution has been discovered-Fem by John

'The solution was discovered by John.'

c. Quelle solution Jean a-t-il découvert(e)?

what-Fem solution John has-(epenthesis)-he discovered(-Fem)

'What solution did John discover?'

Yet in the passive (1b), where the underlying direct object raises to surface subject position (preceding the verb), morphological agreement of the participle with its feminine object is obligatory; and in (1c), where the underlying direct object is a *wh*-phrase that overtly moves to the left edge of the clause, the participle again carries feminine agreement, although in this case the agreement is optional. While the details are controversial (cf. among others Kayne 1989; Chomsky 1991, 1993; Siloni & Friedemann 1993), the received opinion is that overt morphological agreement of the participle with its direct object is possible only if the direct object, in the course of overt syntactic movement, has entered into a local syntactic relationship with an abstract functional head that mediates morphological agreement between a verb and its object.

A second example is provided by verb-raising, already mentioned in Chapter 2. Languages such as English and French differ in whether an adverb such as *often* (French *souvent*) precedes or follows the finite verb of its sentence, as in (2a,b) (e.g. Pollock 1989).

(2) a. John (often) sees (*often) Mary.

b. Jean (*souvent) voit (souvent) Marie.

If we postulate either an abstract functional head (e.g. Chomsky's 1986 INFL) or a complex of such heads (e.g. Pollock's 1989 or Chomsky's 1991 "articulated IP") above the VP, then the contrast in (2) can be expressed in terms of a language-particular property of morphosyntax: In French, but not English, INFL (or one of its constituent heads) must perform a morphological checking operation, involving the inflected verb, prior to the phonological "spell-out" of the sentence. This is a natural way of capturing the point of cross-linguistic variation in (2), provided that morphological checking operations are possible only when the element being "checked" is structurally local to the head that performs the checking operation. The standard interpretation of the facts in (1) lends plausibility to this assumption. Hence, a sentence is grammatical only if the lexically specified morphosyntactic requirements of its functional heads have been fulfilled, and these requirements can be fulfilled only if syntactic movement operations have created local structural relationships between the elements involved in the morphosyntactic checking operations.

In principle, the morphosyntactic requirements driving syntactic movement could be entirely abstract, without any consequences for "morphology" in the conventional sense. Alternatively, as mentioned in Chapter 3, the morphosyntactic requirements of a given functional head could have related consequences for syntax and overt morphology. For example, it could turn out that an inflectional head is "strong" in the sense of forcing overt V-raising, if and only if it is also "strong" in the sense of enforcing rich morphological marking on the verb for person-number agreement or for tense. A number of researchers have sought to identify precisely such a notion of "rich verbal morphology" that distinguishes V-raising from non-V-raising languages (including Platzack 1987, Platzack & Holmberg 1989, Vikner 1990, Rohrbacher 1992, Roberts 1993, and Watanabe 1993), albeit with only partial success.

In this chapter I will explore a parallel question for the functional categories associated with NPs and APs. On a number of recent proposals the DP system includes a "number" head (Num⁰) associated with substantival number. Such a functional head could plausibly play a role not only in checking overt morphological

number-marking on the noun, but also in licensing the bare numeral phrase found in a DP such as *those five books*. In (3a), for example, the bare numeral *five* is realized as the specifier of Num⁰.

- (3) a. [_{DP} those [_{NumP} five Num⁰ [_{NP} books]]]
 b. [_{DP} those [_{NumP} five [_{Num⁰} books Num⁰ [_{NP} t]]]] (LF)

In (3b), after the noun *books* (or a bundle of its abstract features, as in Chomsky 1995) covertly moves and adjoins to Num⁰, the noun's number feature is checked. (Setting aside cases of lexical idiosyncrasy such as *pluralia tantum*, Num⁰ would serve to relate the notional number of the entire DP to the number morphology appearing on the noun.)

In the work of Valois (1990, 1991), Picallo (1991), and Bernstein (1991), however, the proposed functional head Num⁰ is primarily motivated by cross-linguistic variation in DP-internal word-order. For example, in English, an attributive adjective nearly always precedes its head noun, as in (4a).

- (4) a. the grey house
 b. la maison grise
 the-Fem house grey-Fem

Yet, in French, the majority of attributive adjectives follow their head noun, as in (4b).

Much as in the case of V-raising (2), overt raising of N⁰ to a functional head such as Num⁰ is a natural way of accounting for the word-order of the French DP. Thus, (4b) would have the structure in (4c).

- (4) c. [_{DP} la [_{NumP} [_{Num⁰} maison_i Num⁰] [_{NP} grise [_{N⁰} t_i]]]]

This approach does however have difficulty in accommodating the smaller class of French attributive adjectives that precede their head noun. For example, if the DP in (4d) is analysed as in (4e), it is unclear where to place the numeral *trois* and the prenominal adjective *grandes*.

(4) d. les trois grandes maisons grises

the-PL three large-FemPL house-PL grey-FemPL

'the three large grey houses'

e. [_{DP} les [_{NumP} trois? grandes? [_{Num⁰} maisons; Num⁰] [_{NP} grises [_{N⁰} t_i]]]]

Valois (1990, 1991) suggests that prenominal adjectives incorporate into the noun as it raises to Num⁰. Sleeman (1993), drawing on work of Cinque (1993), instead proposes that (at least “intransitive”) prenominal adjectives in French appear as specifiers of functional heads above NumP, in an “exploded” DP system; in such an approach, overt raising of the head noun must end below the functional projection containing the numeral *trois*, although in principle the functional head associated with the numeral could still play a “covert” (LF) role in checking the number morphology of the noun. In any case, the proposed role of Num⁰ in determining noun/adjective word-order is orthogonal to the discussion in the remainder of this chapter.

For present purposes I am more directly concerned with the possible roles of a Num⁰ head in the checking of number morphology and the syntactic licensing of quantity expressions. Cross-linguistic variation is observed in both areas. For example, Japanese employs a numeral classifier system, as illustrated in (5a,b).

(5) a. hito-ga san-nin

person-NOM three-#CL

'three people'

b. san-nin-no hito-ga

three-#CL-GEN person-NOM

'three people'

Miyagawa (1989) observes that the Japanese numeral classifier phrase is syntactically quite different from the bare numeral phrase of English; for example, a Japanese classifier phrase can “float” next to a trace, as in (6), where the object has scrambled to initial position.

(6) hon-o, Taroo-ga t ni-satu kat-ta. (cf. Miyagawa, p.31)

book(s)-Acc, Taro-Nom two-#CL buy-Past

'Taro bought two books.'

In English, however, if we attempt to separate noun from numeral (7a) or numeral from noun (7b) through clefting, for example, a "left branch" effect (cf. Ross 1967) obtains. Numeral and noun must remain together, as in (7c).

(7) a. *It is books that Taro bought two.

b. *It is two that Taro bought books.

c. It is two books that Taro bought.

Furthermore, Japanese diverges from English in having no overt plural morphology on the semantically plural noun *hito* 'person(s)' in (4). Certain Japanese nouns (including *hito*) are compatible with a morpheme *-tati*, which effectively marks the noun as plural, but even where *-tati* is available it is strictly optional. (See Kawasaki 1988 for discussion.)

Thus, one question of interest is whether there is any systematic relationship between the availability of bare numeral phrases of the English type, and the obligatory presence of overt plural morphology on the notionally plural noun. The results will bear on the issue of whether it is reasonable to expect verbal inflection that is "strong" syntactically (in the sense of triggering overt V-movement) also to be "strong" morphologically (in the sense of forcing rich verbal morphology). Both comparative and acquisitional approaches to this question will be pursued below.

Of course, the two functions that I have tentatively ascribed to Num⁰ could easily turn out to be the work of separate functional heads.¹ Yet, the present project is not particularly affected by this uncertainty, because I am simply attempting to evaluate the hypothesis that the types of specifier positions provided by functional heads are dependent in some way on the consequences of the functional heads for overt inflectional and declensional morphology. Given that languages differ in whether they

¹Indeed, as pointed out to me by Noam Chomsky (personal communication), many expressions with a numerical sense (e.g. the adjectives *unique*, *numerous*, *mutually exclusive*) seem unlikely to be closely associated with a Num⁰ element, despite their conceptual connection to number.

permit a quantity-denoting XP to appear as a specifier (somewhere) within DP, the question of interest is whether this property correlates, cross-linguistically, with any property of declensional morphology. Substantival number-marking strikes me as the natural starting point, but other properties of overt declensional morphology (cf. Section 4.5, below) can be systematically considered if number-marking turns out to be unrelated to the syntax of quantity.

Another question of interest is whether there is any systematic relationship between the syntactic expression of quantity in the DP and the expression of measure (or “degree”) in APs such as *six feet high*. The existence of cross-linguistic variation in the syntactic expression of degree is again illustrated by Japanese. Degree phrases such as *ni meetoru* ‘two metres’ are disallowed with the Japanese adjective as in (8a), and a circumlocution such as (8b) is necessary.

(8) a. *John-wa ni meetoru takai.

John-Top two metre tall

*‘John is two metres tall.’

b. John-wa sei-ga ni meetoru da.

John-Top height-Nom two metre (copula)

‘As for John, his height is two metres.’

(9) a. dono-gurai ie-ga ookii-no?

how house big-Q

‘How big is the house?’

b. *How_i is the house t_i big?

Furthermore, left branch effects are not observed in Japanese questions of degree (9a), in contrast to English (9b) where pied-piping of the adjective is obligatory.

Left branch effects are not entirely absent from Japanese, however. For example, as discussed in (Snyder, Wexler, & Das 1995), extraction of a possessor phrase out of a DP, (10a), is disallowed in Japanese much as it is in English (10b).

(10) a. *dare-no John-ga hon-o yon-da-no?

who-Gen John-Nom book-Acc read-Past-Q

'Whose book did John read?'

b. *Whose_i did John read t_i book?

The relevant point of variation between English and Japanese is therefore tied to the syntax of degree expressions, rather than more general constraints on syntactic movement. Japanese *dono gurai* appears to be more directly analogous to the English adverbial phrase *to what extent*, which is likewise immune from any left branch effect, than to the English degree word *how*.

Hence, Japanese diverges from English with respect to all three phenomena under consideration: obligatoriness of plural morphology on notionally plural nouns, availability of bare-numeral expressions of quantity with an NP, and availability of measure-phrase expressions of degree with an AP. The question is to what extent this pattern is accidental, and to what extent it reflects a systematic association of these phenomena across languages. Semantic treatments of quantity and of degree are often highly similar (e.g. Cresswell 1976), but syntactically there is no strong reason to expect the functional projections associated with NPs to parallel the functional architecture associated with APs. In terms of functional morphosyntax, then, the question is whether any systematic relationship exists among the systems of functional heads associated with the different lexical categories (N,V,A,P). Again, this question will be addressed from both comparative and acquisitional perspectives in the following sections.

4.2 A cross-linguistic survey of number morphology and the syntax of quantity

The issue to be addressed in this section is the possible relationship between substantival number-marking and the syntactic expression of quantity, as by bare numerals in English or by numeral classifiers in Japanese. Greenberg (1972) reported a strong cross-linguistic tendency for languages not to employ both a numeral-classifier sys-

tem and an obligatory form of morphological plural-marking. Snyder, Wexler, & Das (1995), drawing on Greenberg's observation, went further and speculated that languages have bare numeral modifiers of the English type if and only if they have overt plural-marking on the noun. To foreshadow the results of this section, however, I will argue that the stronger hypothesis is not borne out: One does in fact find languages that have bare numerals of the English type but no obligatory plural-marking, and one also finds languages with obligatory plural-marking but a syntax of quantity expressions that is significantly different from that of English.

I shall employ three principal tests to judge whether the syntax of quantity in a given language is equivalent to that found in English. First, a language of the English type should have a system of numerals that appear as bare modifiers of a noun. Bare numeral modifiers are to be distinguished both from the numeral classifier phrases found in Japanese, and also from the nominal numerals found in Russian, for example. Russian numerals above four are realized as nouns, and take a genitive plural complement as in (11).²

(11) Ivan prochtal pat' knig.

John read five books-GEN

'John read five books.'

Thus in (11), 'five books' is realized more literally as 'five of books.'

Second, a language of the English type is expected to exhibit "left branch" effects in *wh*-questions of quantity. For example, in English (12a) is ungrammatical.

(12) a. *[How many]_i did John read t_i magazines?

b. Combien_i Jean a-t-il lu t_i de revues?

how-many John has-(epenthesis)-he read t of magazines

'How many magazines did John read?'

²The properties of the Russian numerals from one to four are well known as a linguistic curiosity. In Russian, 'one' is declined as an adjective. The numeral for 'two' has distinct forms depending on whether the complement noun is feminine versus masculine or neuter; the complement to 'two' appears in the genitive singular. The numerals for 'three' and 'four' are invariant in form, and are followed by a complement noun in the genitive singular.

- c. Skol'ko_i pročtal Ivan t_i knig?
 how-many read John books-GEN
 'How many books did John read?'

In direct contrast, however, the approximate counterparts of (12a) in French (12b) and Russian (12c) are fully grammatical.

Finally, a language of the English type is expected to permit what has been termed "subcomparison" of quantity (Bresnan 1972). For example, in English it is possible to make the complex comparison in (13).

- (13) Mary read more books than John read magazines.

On current semantic analyses (e.g. Heim 1985, Moltmann 1993) the interpretation of (13) is obtained by creating two lambda abstracts, roughly as in (14).

- (14) a. λQ , Mary read Q books
 b. λQ , John read Q magazines

The denotation of *more* is a function taking as arguments two such $\langle Q, t \rangle$ (quantity, truth value) abstracts. The sentence in (13) is true if and only if the maximum quantity Q_1 , such that Mary read Q_1 books (14a), is greater than the maximum quantity Q_2 , such that John read Q_2 magazines (14b).

In fact, (14) is still something of a simplification. To obtain an appropriate interpretation for (13), the phrases 'Q books' and 'Q magazines' should be viewed as quantifiers that occupy scopal positions, as in (15a,b).

- (15) a. λQ , [Q books]_x Mary read x
 b. λQ , [Q magazines]_x John read x

The expression in (15b), for example, is intended as a function that is true of a quantity Q if and only if the set containing every magazine x , such that John read x , has cardinality Q . The lambda abstract in (15b) can be created syntactically through covert movement of the DP containing *magazines* to the left edge of the *than*-phrase, followed by extraction of a phonologically null *wh*-operator analogous to *how many*.

Crucially, the creation of (15b) prior to semantic interpretation depends on the possibility of generating, within the DP, a null *wh*-operator of quantity that can undergo covert XP-movement.

The impossibility of an appropriate null operator in certain languages other than English is demonstrated by French.

(16) Marie lit plus *(de) livres que lit Jean *(de) revues.

Mary reads more (of) books than reads John (of) magazines

‘Mary reads more books than John reads magazines.’

In French, a direct counterpart to (13) is impossible, apparently because the quantifier *plus* ‘more,’ and the requisite null operator of quantity in the *que*-phrase, cannot be licensed as XP modifiers of the nouns *livres* ‘books’ and *revues* ‘magazines.’ Instead, French employs a partitive strategy, in which the quantifier *plus*, and presumably also the null operator of quantity in the *que*-phrase, are syntactically realized as the head nouns of their DPs, and take the nouns *revues* and *livres* as oblique complements. The partitive strategy solves the problem of allowing covert XP movement of a null operator, because the null operator becomes the syntactic head of its NP/DP.

A potential concern is that even with a partitive syntax, French still should not be able to isolate the null operator of quantity from the partitive phrase, to create a lambda abstract of the sort in (15b). Yet, the form of *combien* (‘how many’) questions in French suggests that this should not be a major concern. First, the surface form of a *combien* question, as illustrated in (12b) (repeated below), overtly separates the quantity expression *combien* from the partitive phrase, despite the fact that the partitive phrase is apparently a complement to *combien*.

(12) b. Combien; Jean a-t-il lu t; de revues?

how-many John has-(epenthesis)-he read t of magazines

‘How many magazines did John read?’

Second, the resultant interpretation of the *combien* question is equivalent, in relevant respects, to the lambda abstract in (15b). Precisely how this interpretation is to be

Table 4.1: Number-marking and the Syntax of Quantity Across Languages (I)

Language	Bare #'s	Left Branch Effects (#)	Subcomparison of #
English	YES	YES	YES
Japanese	NO	NO	(YES)
French	YES	NO	NO
Russian	NO	NO	NO
Khmer	YES	YES	YES
Spanish	YES	YES	NO
Italian	YES	YES	NO
Hungarian	YES	YES	YES
German	YES	YES	YES
Serbo-Croat.	NO	NO	NO
Mandarin	NO	(n.a.)	NO
Albanian	YES	YES	YES

obtained compositionally is an interesting but orthogonal question that I shall set aside.

Thus, if a language employs the type of bare numeral syntax characteristic of English, then it should have all three of the following properties. First, numerals should appear as bare modifiers within the DP, rather than as a nominal or as a subpart of a classifier phrase. Second, the language should exhibit left-branch effects in *wh*-questions of quantity. Third, the language should permit subcomparatives of quantity. The assumption I will make is that if a language fails even one of these tests, then it employs a syntactic representation of quantity distinct from that found in English. A partial match to the English pattern is interpreted as a distinct system that happens to overlap with English in some of its surface forms.

Thus far I have obtained evidence from some twelve languages concerning the presence or absence of obligatory plural-marking, and concerning the syntax of quantity as assessed by the three tests described above. The results are summarized in Tables 4.1-2, where a language is designated "Type E" if its syntax of quantity appears to be of the English type. In Table 4.3 the main finding is recast in the form of a feature matrix.

Table 4.2: Number-marking and the Syntax of Quantity Across Languages (II)

Language	Type E	Obligatory Plural-marking	Overt D
English	YES	YES	YES
Japanese	NO	NO	NO
French	NO	YES	YES
Russian	NO	YES	NO
Khmer	YES	NO	YES
Spanish	NO	YES	YES
Italian	NO	YES	YES
Hungarian	YES	YES	YES
German	YES	YES	YES
Serbo-Croat.	NO	YES	NO
Mandarin	NO	NO	NO
Albanian	YES	YES	YES

Table 4.3: Feature Matrix for Number-marking and Quantity

	[+Obligatory PL]	[- Obligatory PL]
[+Type E]	English (and others)	Khmer (sole exemplar)
[- Type E]	French (and others)	Japanese (and others)

As illustrated in Table 4.3, the presence or absence of obligatory plural-marking in a language is fully independent of whether the language employs a syntax of the English type for expressions of quantity. Languages that share the cell of English include German, Hungarian, and Albanian. Languages sharing the cell of French include Russian, Serbo-Croatian, Spanish, and Italian. Japanese shares its cell with Mandarin, while Khmer is the one language I have identified that lacks obligatory plural-marking but patterns identically with English in its syntactic representation of quantity.

A proposal of (Snyder, Wexler, & Das 1995), to the effect that languages have the English syntax of quantity if and only if they employ obligatory morphological plural-marking, is counterexemplified most dramatically (within the present language sample) by Khmer, which clearly lacks obligatory plural-marking but shows no divergence whatsoever from the bare-numeral system found in English. In a slightly more subtle way, languages of the French type run counter to our earlier proposal, because despite the presence of obligatory plural-marking and (in the cases of French, Spanish, and Italian) something superficially resembling the bare-numeral modifier of English, these languages clearly pattern differently from English in their syntactic representation of quantity.

Let us now consider the results in Tables 4.1-3 in terms of the proposed functional head, Num⁰. It was demonstrated above that French expressions of quantity in DPs such as *les trois livres* 'the three books' must not be syntactically identical to the bare numerals found in English DPs such as *the three books*. This is because the overt numeral in French cannot simply be replaced by a null *wh*-operator of quantity, as in English, to form a subcomparative. The object DPs must first be converted to a partitive form as in (16).

In terms of the functional head Num⁰, the most direct way to capture this contrast between English and French is to suppose that in English, the numeral is realized as an XP in SPEC of NumP, but in French, the numeral is a spell-out of Num⁰ itself. An XP-level *wh*-operator is then readily substituted for the bare numeral (XP) in

English, but not for the X^0 -level numeral in French.³

More generally, I interpret the key property underlying the syntax of quantity in English to be that Num^0 licenses the presence of a syntactic XP constituent in its specifier position. Not only does this account for the ready availability in English of bare numeral modifiers and subcomparatives of quantity, but it also provides an approach to the existence of left-branch effects in English. The view I will take is that cross-linguistic variation in left-branch effects results from differences in the syntactic representation of the material in the “left branch,” rather than from parametric variation in more general syntactic constraints on movement.

The principal motivation for this view is that languages are sometimes internally inconsistent in whether they exhibit the left-branch effects observed in English. As noted above, Japanese disallows separation of a possessor phrase from its associated NP, but freely permits the *wh*-degree expression *dono gurai* to be separated from its associated AP. Classifier phrases, including the *wh*-quantity expression in Japanese, also pattern with *dono gurai* in the sense that they can sometimes be separated from their associated NP in the surface form of the sentence. My reaction to this pattern of data is to propose that the left branch constraint of English applies universally, but in some languages the element that is realized within the “left branch” of an NP/DP or AP in English is instead realized as a sentence adverbial or an appositive. An element so realized will naturally have a somewhat different distribution in the surface syntax.

It should nonetheless be acknowledged that the precise source of left branch effects

³Here I am leaving open the question of what syntax is assigned to expressions of the form “more than three books” in languages such as French and Spanish. In Spanish, in fact, the form of the expression varies depending on the bracketing:

- (i) *más que [tres libros]* ‘more than [three books]’
- (ii) *[más de tres] libros* ‘[more than three] books’

Yet, the Romance facts should not pose a problem, provided that *más* (for example) is assigned the same syntax as other quantifiers; and provided that numerals (such as *tres*) can occur within a NumP that contains no NP, so as to denote a pure quantity rather than a quantified NP. Given these options, I see no reason why numerals in French and Spanish should not be realized as the head of NumP .

in English is somewhat unclear. A proposal made by Uriagereka (1988) is especially interesting in light of the present discussion, but appears to be empirically untenable. Uriagereka proposed that left-branch effects in the English DP result from the presence of a phonologically overt D^0 in (most) English DPs. On his proposal, null determiners, but not phonologically overt determiners, can serve as proper head-governors of a trace. Thus, one consistently observes left-branch effects with the English DP, but not with the Russian DP, for example, which lacks a phonologically overt determiner.

Uriagereka's idea is of interest in the present discussion not only for its potential explanation of left-branch effects, but also for its attempt to relate a syntactic phenomenon to the overt morphology/phonology of a functional head. Unfortunately, the proposal as stated fails to account for the full range of cross-linguistic variation. First, there exist languages with no overt determiners whatsoever, that nonetheless prohibit movement out of the DP. Khmer is such a language. As shown in (17), it is possible in Khmer to place a *wh*-phrase at the left edge of its clause (17b), although *wh*-in-situ is more usual (17a).

- (17) a. Kira mien siap'ow pon man?
 Kira have book how many
 'How many books does Kira have?'
 b. ?Siawp'ow pon man, Kira mien?
 book how many, Kira have
 'How many books does Kira have?'
 c. *pon man, Kira mien siawp'ow?
 how many, Kira have book
 'How many books does Kira have?'

The impossibility of (17c) then indicates that left-branch effects are present in Khmer.

Notice that it is immaterial for the present discussion whether the topicalization structure in (17b) is obtained by movement of the DP *siawp'ow pon man* 'how many books,' or by movement of a null *wh*-operator to a position adjacent to this DP. If Khmer lacked "left-branch" effects in its DPs, then it should be possible to obtain

(17c) in the same fashion as (17b). Hence Khmer, which lacks any overt determiners, is a direct counterexample to Uriagereka's proposal as stated.⁴

A second problem for Uriagereka's idea is that it does not readily extend to the left-branch effects observed with APs. For example, as discussed by Rizzi (1990, pp.35-37), English (18a) contrasts with Italian (18b) in the possibility of overtly separating a *wh*-degree word from its associated AP.

- (18) a. *How_i is he t_i tall?
b. Quanto_i è alto t_i?
how-much is (pro) tall-Masc
'How tall is he?'

The same type of contrast was noted above for English and Japanese (9a,b). Yet, English, Italian, and Japanese are identical in having no phonologically overt functional head associated with their APs. Hence, it is unclear how to extend Uriagereka's proposal to the AP to account for this observed variation in left-branch effects.

Instead, the crucial difference between English and Italian, as argued by Rizzi, appears to be that Italian realizes the measure phrase as an adjunct to the right of an AP (19), rather than as a specifier within the functional architecture of the AP (as in English). Normally adverbial modifiers in Italian precede the adjective, but in (19) the measure phrase follows it.

- (19) È alto due metri. (cf. Rizzi, p.36)
(pro) is tall-Masc two metres
'He is two metres tall.'

⁴The one way I see for a language to be a more direct counterexample is if the noun were preceded by its modifiers, as in English. Instead, all types of modifying elements appear to follow the noun in Khmer. Uriagereka might conceivably wish to argue that the X-bar structure of the Khmer DP is identical to that of the English DP, but in Khmer the noun raises to a position high within the DP, so that it creates a barrier to government of a trace from outside the DP. The question then becomes whether Uriagereka's proposal retains its original interest, and this depends in large measure on whether one can still in some way deduce from overt phonology and morphology the presence or absence of a left-branch constraint on extraction from the DP. Perhaps a combination of DP-internal word-order facts with information about the phonology of the determiner could be invoked for this purpose, although further comparative work would be needed in order to evaluate such a proposal.

Rizzi suggests that extraction of the Italian measure phrase from its adjunction site is possible because the resulting trace is properly governed by an inflectional head.^{5,6} Here again, cross-linguistic variation in left-branch effects appears to be best explained in terms of differences in the syntactic realization of quantity, degree, and possession, for example, and not in terms of a parameterization of a general Left Branch Constraint (which fails to account for the internal inconsistencies noted in Japanese), or in terms of the overt morphology and phonology of functional heads associated with APs and NPs (which fails to account for the observed variation in whether left-branch effects hold for APs).

In terms of a NumP approach, then, English apparently exhibits systematic left-branch effects because expressions of quantity, degree, and possession are all realized within the functional projections above NP and AP. This pattern presumably obtains because the functional heads in these systems all rather liberally license the presence of such maximal projections in their associated specifier positions. In the expression of quantity, for example, I assume that languages resort to syntactically more complex strategies, such as classifier systems or partitive phrases, only if Num⁰ does not license a bare numeral in SPEC of NumP.

Hence, the two features postulated in Table 4.3 are both very naturally stated in terms of the morphosyntactic properties of Num⁰. Languages of the “English type,” with respect to the syntax of quantity, are languages in which Num⁰ has the morphosyntactic property of licensing an XP in its specifier position. Languages that exhibit obligatory plural-marking on notionally plural nouns are those in which Num⁰ has the morphosyntactic property of checking for the presence of number-marking on the noun.

Despite the fact that both these functions are very naturally attributed to a single

⁵Incidentally, Željko Bošković (personal communication) has informed me that the findings reported by Rizzi for Italian are exactly replicated in Serbo-Croatian. The basic Serbo-Croatian facts will be reported in Section 4.3 below.

⁶The possibility in Japanese of separating the expression *dono gurai* from its logically associated AP can also be explained if *dono gurai*, like English *to what extent*, is generated as a sentential adverb and related to the AP through the discourse rather than the syntax (cf. Snyder, Wexler, & Das 1995).

functional head, Table 4.3 shows that they are fully independent of one another. Whether Num⁰ is “strong” or “weak,” in the sense of licensing a bare numeral to appear as its specifier, is fully independent of whether Num⁰ is “strong” or “weak” in the sense of forcing overt plural-marking on a notionally plural noun. More generally this result implies that functional heads associated with “rich” overt morphology need not be associated with “strong” syntactic consequences, even if there is some tendency in this direction.

Admittedly I am extending the metaphor of syntactic “strength” here beyond the notion of “strong” inflectional features assumed in (Chomsky 1993), for example. Yet, my point is not dependent on the terminology; the issue I am concerned with is whether there is any general reason to expect overt morphology of a given type to be associated with consistent syntactic consequences. The language learner cannot reliably infer syntactic “strength” from morphological “richness,” at least in the general case, if I am correct in assuming that English number morphology and English number phrases should both be related to a single functional head.⁷

In the following section I shall turn to a possible relationship between functional heads that are projected above different lexical (N,V,A,P) categories. First, however, I should like to present the cross-linguistic evidence on which Tables 4.1-3 are based. The simple possibility of bare numeral modifiers in some languages, and not others, is demonstrated in (20). The languages in (20a) allow numeral modifiers that are at least superficially comparable to those found in English.

- (20) a. i. the five books (English)
 ii. les cinq livres (French)
 iii. siawp’ow pram (Khmer)
 book five
 iv. los cinco libros (Spanish)
 vi. a két könyv (Hungarian)
 the two book

⁷Indeed, in Section 4.5 below it will be demonstrated that the same point holds true even if number morphology and numerals are not in fact related to a common functional head.

- vii. die fünf Bücher
- viii. (Tē) pesē libr-at janē mbi tavolinē. (Albanian)
(the) five books-the are on table (bare form)
'The five books are on the table.'
- b. i. hon-ga go-satu (Japanese)
book-NOM five-#CL
- ii. pat' knig (Russian)
five book-GenPL
- iii. pet knjiga (Serbo-Croatian)
five book-GenPL
- iv. wu-ben shū (Mandarin)
five-#CL book

The languages in (20b), on the other hand, require numerals to appear within a classifier phrase or as a nominal head with a genitive/partitive complement. Overt definite determiners have been included in (20) whenever they exist in the language.⁸

The existence of left-branch effects for *wh*-questions of quantity in some languages, and not others, is demonstrated in (21a,b). Languages with left-branch effects in questions of quantity are presented in (21a), while languages without such effects are presented in (21b).

- (21) a. i. *How many did John read books? (English)
- ii. *pon man, Kira mien siawp'ow? (Khmer)
how-many, Kira have book
- iii. *Cuantos leyó Juan libros? (Spanish)
how-many read John books
- iv. *Quanti ha letto libri? (Italian)
how-many (pro) read books
- v. *Hány olvasott el jános könyvet? (Hungarian)

⁸In (20a.viii) I have employed a somewhat longer example, which illustrates the use in Albanian of an obligatory post-nominal determiner, and an optional DP-initial determiner.

- how-many read (Completive) John book-ACC
- vi. *Wieviele hat Hans Bücher gelesen? (German)
how-many has John Books read
- vii. [Tests inapplicable] (Mandarin)
- viii. *Sa lexoi Xhoni libra? (Albanian)
how-many read John books
- b. i. hon-o John-ga nan-satu kat-ta-no? (Japanese)
book-ACC John-NOM wh-#CL buy-Past-Q
'How many books did John buy?'
- gakusei-ga kyoo nan-nin hon-o kat-ta-no? (Japanese)
student-Nom today WH-#CL book-Acc buy-Past-Q
'How many students bought the book today?'
- ii. Combien Jean a-t-il lu de livres (French)
how-many John has-(epenthesis)-he read of books
- iii. Skol'ko prochital Ivan knig? (Russian)
how-many read John books-GEN
- iv. Koliko je John procitao knjiga? (Serbo-Croatian)
how-many is John read book-GenPl

As in the discussion above, the existence of left-branch effects for Khmer, which leaves *wh*-words *in situ*, has been tested by topicalization. For Japanese, which similarly leaves its overt *wh*-words *in situ*, both scrambling and insertion of a sentential adverb have been used to show that the *wh*-word can be separated from its associated noun, at least under certain conditions.

Cross-linguistic differences in the availability of quantity subcomparison are demonstrated in (22). Languages with a direct counterpart to the English subcomparative of quantity are presented in (22a). I have included languages in (22a) even if my informants favoured a version of the subcomparative with gapping of the verb (cf. Hungarian, German). Also, I have included languages in (22a) even if the null *wh*-operator of standard English is realized as an overt *wh*-word (cf. Albanian); as dis-

cussed by Jespersen (1954), there exist non-standard varieties of English that likewise employ an overt *wh*-word in this fashion.⁹

- (22) a. i. Mary reads more books than John reads magazines. (English)
- ii. Mary-wa [John-ga zasshi-o yomu yori-(mo)]
 takusan-no hon-o yomu. (Japanese)
 Mary-TOP [John-NOM magazine-ACC read than]
 many-GEN book-ACC read
 ‘Mary reads more books than John reads magazines.’
 Mary-wa [John-ga zasshi-o yomu yori-(mo)]
 motto hon-o takusan yomu. (Japanese)
 Mary-TOP [John-NOM magazine-ACC read than]
 more book-ACC many read
 ‘Mary reads more books than John reads magazines.’
- iii. Kira mien siawp’ow jran jieng Aroy mien C.D. (Khmer)
 Kira have book many/more than Aroy have C.D.
 ‘Kira has more books than Roy has C.D.’s.’
- iv. János több könyvet olvasott mint Maria újságot. (Hungarian)
 John more book-ACC read than Mary newspaper-ACC
 ‘John read more books than Mary (read) newspapers.’
- v. Maria hat mehr Bücher gelesen, als Hans Zeitschriften (gelesen hat). (German)
 Mary has more books read, than John newspapers read has
 ‘Mary read more books than John read newspapers.’
- vi. Eva lexon më shumë revista se c’lexon Beni libra. (Albanian)
 Ev reads more magazines than what reads Ben books

⁹In (22a.ii) I have provided the two best renderings I could obtain for the subcomparative of quantity in Japanese. In contrast to the decision of (Snyder, Wexler, & Das 1995), I here treat Japanese as allowing comparison of quantity. Informants vary in their judgements, and Ishii (1991), who accepts Japanese subcomparatives in many cases, argues that even for him the construction is more restricted in Japanese than in English. Given that the Japanese syntax of quantity is differentiated from that of English in many other respects, however, it is largely inconsequential for the present discussion whether Japanese is judged to have an (approximate) counterpart to the English construction.

'Ev reads more magazines than (what) Ben reads books.'

- b. i. Marie a lu plus *(de) livres que Jean a lu *(de) revues. (French)
Mary has read more (of) books than John has read (of) magazines
- ii. Maria prochitala bol'she knig, chem Ivan zhurnalov. (Russian)
Mary read more books-GEN, than John newspapers-GEN
'Mary read more books, than John (read) newspapers.'
- iii. *María lee más libros que Juan lee revistas. (Spanish)
Mary reads more books than John reads magazines
*'Mary reads more books than John reads magazines.'
(?)El número de libros que lee María es mayor
que el número de revistas que lee Juan. (Spanish)
the number of books that reads Mary is greater
than the number of magazines that reads John
'The number of books that Mary reads is greater
than the number of magazines that John reads.'
- iv. *Maria ha letto più libri che Gianni ha letto riviste (Italian)
Mary has read more books than John has read magazines
'Mary read more books than John read magazines.'
Il numero di libri che ha letto Maria è più grande
del numero di riviste che ha letto Gianni. (Italian)
the number of books that has read Mary is more great
than the number of magazines that has read John
'The number of books that Mary read is greater
than the number of magazines that John read.'
- v. Mary je procitala vise knjiga nego sto je John novina. (Serbo-Croatian)
Mary is read more books-GEN than (what) is John newspapers-GEN
'Mary read more books than John (read) newspapers.'
- vi. *John mǎi le bīshū dwō de chàngpyàn. (Mandarin: Fu 1978, p.157)
John buy LE than book many DE record

‘John bought more records than (he bought) books.’

John mǎi de chángpyàn bǐshū dwō. (Mandarin: Fu 1978, p.157)

John buy DE record than book many

‘The records John bought were more numerous
than the books (he bought).’

Languages that require a partitive or genitive construction (e.g. French, Russian, Serbo-Croatian), or another form of circumlocution (e.g. Spanish), are presented in (22b). In general, the expressions given in (22b) were the closest equivalents to the English construction that I could obtain. (In the case of Mandarin, I was unable to obtain even a circumlocution for a full two-way comparison of quantity. Both an ungrammatical subcomparative with ellipsis, and a grammatical circumlocution for this example, are provided in 22b.vi.)

I will not provide examples of plural-marking except for the few cases in which it is somehow remarkable. In Japanese, Mandarin, and Khmer, there is no obligatory plural-marking within notionally plural NP/DPs, but there are devices available to emphasize that a noun is to be understood as plural. For example, as mentioned above, in Japanese the suffix *-tati* can be used for this purpose with a restricted class of nouns. In Khmer, the collective noun *bpoek* ‘group’ can sometimes be used with a count noun (cf. English *a group of people*) to indicate plurality.

The system of number-marking in Hungarian, however, is rather exceptional. An overt expression of plurality is obligatory in the notionally plural Hungarian DP, but plurality cannot be marked more than once. Many determiners, or more generally, pronominal modifiers, are regarded as overtly “plural,” and their head noun cannot bear any additional plural-marking (23a).

- (23) a. két könyv; hány könyv; több könyv
two book; how-many book; more book
‘two books; ‘how many books’; ‘more books’
- b. könyv-ek
book-PL

‘books’

In the absence of such a determiner or modifier, however, overt plural-marking on the noun is obligatory (23b). I therefore regard Hungarian as having obligatory plural-marking, though of an unusual type.¹⁰ I will now turn to the syntax of degree, but will return to number morphology in Section 4.4 when I present my findings from studies of child language acquisition.

4.3 A cross-linguistic survey of the syntax of degree

In the previous section I presented evidence that the syntax of quantity and the morphology of number within the DP vary independently of one another across languages. In this section, however, I shall argue that the syntax of quantity expressions with NPs and the syntax of degree expressions with APs pattern together across languages. In particular, languages exhibit the syntax of quantity associated with the English NP if and only if they exhibit the syntax of degree expressions found with the English AP. This result is surprising for a variety of reasons, as will be discussed below.

The criteria by which I shall judge whether a language employs the “English” syntax of quantity will be the same as in the previous section. As before, I will assume that the tests of the previous section are in fact indicators of whether a functional “number” head, Num⁰, licenses a specifier position in which a bare numeral or a (possibly null) *wh*-expression of quantity can appear.

A quite similar approach can be taken to the possibility of “degree” or “measure” expressions with APs.¹¹ English freely permits extended APs of the type in (24a).

¹⁰One special case, already encountered in (22a.iv), should also be noted. In certain complex comparative constructions, *több* ‘more’ is treated as expressing the plurality of both the adjacent noun and also a noun contained in the *mint-* (*than-*) clause. This could indicate that (features of) both nouns enter into a local relationship with *több* at LF, or perhaps that *több* is associated with an elliptical counterpart adjacent to the lower noun. (The latter idea is similar to a proposal made by Ishii (1991) for certain English subcomparatives.)

¹¹I shall use the terms “degree” and “measure” interchangeably. In the case of (24a), for example, the term “measure phrase” strikes me as more natural than “degree phrase,” but I do not believe

- (24) a. The wall is two metres high.
 b. [DegP [DP two metres] Deg⁰ [AP high]]

Following (Abney 1987), I will assume that the measure phrase *two metres* in (24a) is realized as a maximal projection in the specifier of a functional “degree” head, Deg⁰, projected above the AP.

While DegP and NumP are syntactically parallel in English, there are several reasons to expect them to vary independently of one another across languages. First, DegP and NumP are projected above the distinct lexical categories of A(P) and N(P). Current syntactic theory assumes no obligatory relationship among the systems of functional heads projected above different lexical categories. If DegP and NumP were associated with identical semantic functions, we might expect a single lexical item to serve as the head of both functional projections. Yet, semantic analyses of degree and quantity normally relate an expression of quantity to the denotation of an NP in a different way than they relate an expression of degree to the denotation of an AP.

For example, Cresswell (1976), in a fairly standard Montagovian approach, treats adjective meanings (i.e. extensions) as functions from an individual and a degree to a truth value. The interpretation of (24a) thus takes the form in (25).

- (25) high’(the wall’, two metres’)

When no overt expression of degree appears in the sentence, the degree argument in (25) is inferred from the discourse. Hence, even in a sentence such as “John is tall,” the truth conditions vary depending on the cut-off point for degree that is appropriate in context – for example, depending on whether John is said to be tall in relation to professional basketball players or in relation to two-year-olds.

In contrast, the usual semantic approaches to plural nouns do not require the discourse to specify a quantity when none is given overtly in the syntax. (See among

there is any difference between the structural position occupied by the “measure phrase” in (24a), and the position occupied by the null operator of “degree” in the English degree comparatives to be discussed below.

others Link 1983, Schwarzschild 1991, Schein 1993, and the extensive literature cited in those works.) The basic meaning of a plural noun leaves quantity ambiguous; the truth-conditions of a sentence containing a plural noun and no overt specification of quantity do not ordinarily vary depending on the context. An overt quantity expression in the syntax is therefore related to the noun's meaning by an additional operation of modification or quantification.

For example, on one approach the interpretation of (26a) would be obtained along the lines illustrated in (26b).

- (26) a. John saw three owls.
 b. $\text{three}'(\text{owls}', [\lambda x, \text{"John saw } x"])$

Here *owl(s)* is taken to be a simple predicate from individuals to truth values (type $\langle e, t \rangle$), and *three* is taken to be a generalized quantifier taking two such $\langle e, t \rangle$ predicates and returning a truth value. The second $\langle e, t \rangle$ predicate in (26b) can be obtained by covert syntactic movement of the phrase *three owls* to a scopal position, creating a lambda-abstract in which the trace of syntactic movement is interpreted as an individual-type variable. After this movement of the DP, the generalized quantifier *three*, having the semantic type $\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$, combines first with *owls'* and then with the lambda-abstract, to yield a truth value: The sentence is true if and only if $\{x: \text{owl}'(x) \ \& \ \text{"John saw } x"\}$ has cardinality three.

Another approach would be to let Num^0 contribute the semantics of quantification, so that *three* denotes a pure quantity. In this case the interpretation of (26a) would be composed as in (26c).

- (26) c. $\text{Num}'(\text{owls}', \text{three}', [\lambda x, \text{"John saw } x"])$

Here Num^0 plays the role of the abstract *-many* morpheme of (Bresnan 1972): Roughly, (26a) is interpreted as, "John saw three-many owls." The denotation of Num^0 is then a high-order generalized quantifier with type $\langle \langle e, t \rangle, \langle Q, \langle \langle e, t \rangle, t \rangle \rangle \rangle$, where Q is an element from the domain of Degrees/Quantities, as in (Cresswell 1976). After the quantity denoted by *three* is composed with this function, however, the interpretation proceeds exactly as in (26b).

Regardless of the precise approach taken to the interpretation of quantity expressions (and the above do not by any means exhaust the proposals to be found in the semantics literature), the standard move appears to be to treat degree as something intrinsic to the meaning of “gradable” adjectives (i.e. those adjectives compatible with an overt degree expression in English), but to treat quantity as extrinsic to the basic meaning of a plural noun. Hence, even though Cresswell for example assigns expressions of degree and quantity to a single semantic type (“Q”), there is no clear impetus from the semantics literature to attempt a complete unification of Num⁰ with Deg⁰; the relationship of a quantity expression to an NP is thought to be different from that of a degree expression to an AP.

Therefore, the simple prediction is that the syntax of quantity and the syntax of degree should be free to vary independently across languages.¹² The existence of cross-linguistic variation in the syntax of degree was already demonstrated in Section 4.1, where English was contrasted with Japanese, and in Section 4.2, where English was contrasted with Italian. Much as in Section 4.2, I shall assume that the syntactic properties of English degree expressions follow from the ability of the functional head Deg⁰ to license a specifier, and that the availability of SPEC of DegP in a language can be fairly accurately determined through a combination of several syntactic tests, which I shall now illustrate.

First, if Deg⁰ licenses a specifier, then we expect measure phrases to be permitted within the functional architecture above the AP (27a).

(27) a. John is two metres tall.

b. John-wa sei-ga ni meetoru da.

John-TOP height-NOM two metre (copula)

‘John’s height is two metres.’

Hence, the necessity in Japanese of a circumlocution such as (27b) (=8b) is an indication that Japanese lacks a SPEC of DegP position for measure phrases.

¹²One could admittedly challenge the idea that the “content” of Num⁰ and Deg⁰ should bear any connection to the semantic relation between quantity and noun, or between measure phrase and adjective. This issue will be discussed below.

Second, if measure phrases are realized in SPEC of DegP, then we expect *wh*-questions of degree to exhibit left-branch effects, as in English. In Section 4.2 it was argued that cross-linguistic variation in left-branch effects for *wh*-expressions of degree most plausibly result from differences in the syntactic position where the degree phrase is generated. In English the degree word *how* is generated in SPEC of DegP, and overt *wh*-movement forces pied-piping, as illustrated in (9b) (repeated below).

(9b) *How_i is the house t_i big?

(18b) Quanto_i è alto t_i?

how-much is (pro) tall-Masc

'How tall is he?'

(9a) dono-gurai ie-ga ookii-no?

how house big-Q

'How big is the house?'

In Italian, however, where the degree word *quanto* 'how (much)' is apparently generated as a right-adjunct to the AP (18b), and in Japanese, where the degree expression *dono gurai* 'how'/'to what extent' is most probably generated as an adverbial or ad-sentential modifier (9a), no left-branch effect obtains. Hence, if a language either lacks the possibility of overt measure phrases with its APs, or has overt measure phrases but shows no left-branch effects in *wh*-questions of degree, then I infer that the language differs from English in its syntax of degree, and does not in fact have a Deg⁰ that permits a measure phrase to appear as its specifier.

Ideally one would like to use subcomparison of degree as a further test for the possibility of generating a measure expression (in this case, a null operator of degree) in SPEC of DegP. Unfortunately, even in English, informants vary in their willingness to judge such sentences fully grammatical. For example, even the relatively standard example of an English subcomparative of degree given in (28) receives mixed reviews from native English-speakers.

Table 4.4: The syntax of degree across languages.

Language	Measure Phrase	LB Effects (Degree)	Subc. (Degree)
English	YES	YES	YES
Japanese	NO	NO	YES
French	NO	(n.a.)	NO
Russian	NO	(n.a.)	NO
Khmer	YES	(n.a.)	YES
Spanish	NO	(n.a.)	NO
Italian	YES	NO	YES
Hungarian	YES	YES	NO
German	YES	YES	YES
Serbo-Croat.	YES	NO	YES
Mandarin	YES	(n.a.)	NO
Albanian	YES	(YES)	YES

(28) The door is taller than the window is wide.

As a result, I am reluctant to infer from an informant's rejection of a corresponding sentence in a language other than English, that the language necessarily differs from English in its syntactic representation of degree. On the other hand, evidence that a language does permit subcomparison of degree is reasonably taken as support for the hypothesis that the language, like English, provides a SPEC of DegP position for degree expressions.

The results of my cross-linguistic survey of the syntax of degree are rather surprising in light of the preceding discussion. While neither semantic theory nor syntactic theory leads us to expect a necessary relationship between the availability of SPEC of NumP as a position for expressions of quantity, and the availability of SPEC of DegP as a position for expressions of degree, in fact languages appear to have one if and only if they have the other. The cross-linguistic evidence for this claim is summarized in Tables 4.4 and 4.5.

Several cases in Tables 4.4 and 4.5 require special discussion. In Khmer and Mandarin it is quite difficult to determine whether left-branch effects hold for *wh*-questions of degree. Not only do both of these languages entirely lack overt *wh*-movement, but

Table 4.5: The syntax of quantity and degree across languages.

Language	SPEC of NumP	SPEC of DegP
English	YES	YES
Japanese	NO	NO
French	NO	NO
Russian	NO	NO
Khmer	YES	YES
Spanish	NO	NO
Italian	NO	NO
Hungarian	YES	YES
German	YES	YES
Serbo-Croat.	NO	NO
Mandarin	NO	(Unclear)
Albanian	YES	YES

neither language allows topicalization of an AP or a *wh*-degree expression (with or without pied piping). In the case of Khmer, the possibility of degree subcomparison supports an analysis in which degree expressions occupy a SPEC of DegP position. As will be discussed presently, in a substantial majority of cases the possibility of degree subcomparison in a given language coincides with a classification of the language as “[+SPEC, DegP]” by the measure-phrase and left-branch-extraction tests.

In the case of Mandarin, however, subcomparison of degree is impossible, perhaps simply because Mandarin comparative constructions in general are extremely restricted. Hence, I have no evidence that distinguishes between an analysis of Mandarin degree expressions in terms of SPEC of DegP, as in English, and an analysis in which the measure phrase is an AP adjunct, as in Italian or Serbo-Croatian. Therefore I have chosen to treat the Mandarin evidence as “inconclusive.”

Albanian poses a challenge for the opposite reason, in that it has a considerable array of word-order possibilities. As it turns out, an apparent left branch violation with a *wh*-question of degree is not completely ungrammatical for my informant. Yet, this fact may reflect more general properties of movement operations in Albanian, rather than any relevant difference in the underlying syntax of degree expressions. The existence of subcomparatives of degree in Albanian in fact provides support for

an analysis similar to that of English degree-expressions. This is because flexibility of word-order could yield apparent LBC violations, but without the SPEC of DegP position would not lead us to expect the possibility of subcomparison. Moreover, even with the language's flexible word order, my informant does not regard as fully grammatical a surface form that violates the Left Branch Constraint. Thus, in my estimation, the evidence weighs in favour of treating Albanian as a "[+SPEC, DegP]" language.

In general, evidence from the availability of subcomparison is expected to be a less reliable indicator of the availability of SPEC of DegP than of SPEC of NumP. Nonetheless, with only two exceptions, my informants accepted subcomparatives of degree if and only if their language was judged to have a SPEC of DegP position by the measure-phrase and left-branch-extraction tests. Setting aside Khmer, Mandarin, and Albanian, where these tests were difficult to apply, the exceptional languages were Hungarian and Japanese. Hungarian patterned as having both SPEC of NumP and SPEC of DegP positions according to every test except subcomparison of degree. This exception could simply result from a reluctance, on the part of my Hungarian informants, to judge as fully grammatical a sentence whose structure has an extremely low frequency; indeed, I suspect that this is the explanation for the minority of informants who are uncomfortable with the subcomparative of degree in English. Alternatively, the exception may in fact reflect some relevant syntactic difference between English and Hungarian that I have so far failed to identify. In any case, I do not believe that my Hungarian informants' reluctance towards subcomparatives of degree should be interpreted as an indication that the Hungarian Deg⁰ fails to license a specifier.

It would be convenient if I could report that Japanese disallows subcomparatives of degree, as maintained in (Snyder, Wexler, & Das 1995). Since co-authoring that paper, however, I have encountered one informant who finds such subcomparatives perfectly grammatical, provided that the (normally optional) comparative morpheme *motto* 'more' is present (as in 32a.ii, below). Therefore, while informants are far from unanimous on the point, I have chosen to treat Japanese as allowing subcomparatives

of degree.

My current hypothesis, in fact, is that Japanese subcomparatives of degree, for the speakers who permit them, are interpreted along the following lines: “The extent to which the door is tall, is greater than the extent to which the window is wide.” In other words, the null *wh*-operator of degree in Japanese is probably generated within an adverbial or adsentential degree modifier, forming an abstract structure directly analogous to the overt *wh*-degree phrase *dono gurai*. In any case, given that Japanese lacks the possibility of simple measure phrases with APs, and exhibits no left-branch effect in *wh*-questions of degree, the identification of Japanese as a “[–SPEC, DegP]” language is independent of the results of the subcomparison test.

The theoretical implications of the pattern observed in Table 4.5 will be discussed in the concluding section of this chapter. At this point, however, I should like to present in greater detail the results of my cross-linguistic investigation. First, the evidence for the reported variation in the simple availability of measure phrases with adjectives is given in (29).

- (29) a. i. six feet high (English)
ii. jeang nigh kpo⁹ pi mat. (Khmer)
wall this high two metre
‘This wall is two metres high.’
iii. alto due metri (Italian)
tall two metres
‘two metres tall’
iv. két méter magas (Hungarian)
two metre high
‘two metres high’
v. Die Wand ist zwei Meter hoch. (German)
the wall is two metre(s) high
‘The wall is two metres high.’
vi. Zid je visok dva metra. (Serbo-Croatian)
wall is high two metres

- ‘The wall is two metres high.’
- vii. nei ch’ang-pi shì leáng tshù kǎo. (Mandarin)
 that wall be two metre high
 ‘The wall is two metres high.’
- viii. Mur-i ështëë pesë metra i lartë. (Albanian)
 wall-the is five metres (agreement)-high
 ‘The wall is five metres high.’
- b. i. *ni meetoru takai (Japanese)
 two metre high
 *‘two metres high’
- ii. *Le mur est deux mètres haut. (French)
 the-Masc wall is two metres high
 *‘The wall is two metres high.’
- iii. *Stena – dva metra v’sokaya (Russian)
 wall (Copula) two metre-GEN tall-Fem
 *‘The wall is two metres high.’
- iv. *La pared es dos metros alta. (Spanish)
 the-Fem wall is two metres tall-Fem
 *‘The wall is two metres high.’

Here I do not take into account the left-right order of adjective and measure phrase, even where (as in Italian and Serbo-Croatian) it is likely to be important for the correct syntactic analysis.

The evidence for the reported variation in left-branch effects with *wh*-questions of degree is presented in (30).

- (30) a. i. *How is the wall high? (English)
 ii. *Milyen a fal magas? (Hungarian)
 how the wall high

- ‘How high is the wall.’
- iii. *Wie ist die Wand hoch? (German)
 how is the-Fem wall high
 ‘How high is the wall?’
- iv. ?Sa është mur-i i lartë? (Albanian)
 how is wall-the (agreement)-high
 ‘How high is the wall.’
- b. i. dono-gurai ie-ga ookii-no? (Japanese)
 how/to-what-extent house-Nom big-Q
 ‘How big is the house?’
- ii. Quanto è alto? (Italian)
 how-(much) is (pro) tall-Masc
 ‘How tall is he?’
- iii. Koliko je zid visok. (Serbo-Croatian)
 how is wall high
 ‘How high is the wall?’

In French, Spanish, and Russian, there is no *wh*-word that can serve as a degree modifier with an AP. These languages normally use nominalizations of the gradable adjectives to create circumlocutions, as illustrated for French and Spanish in (31a,b).¹³

(31) a. Quelle hauteur le mur a-t-il?

¹³For all of the languages represented in (29b) above it is similarly possible to find a circumlocution by which to express a precise degree measurement. The most popular strategy, widely employed in all of these languages, is again to use a nominalization of the gradable adjective. For example, (ia,b) are commonly used circumlocutions in French and Spanish.

- (i) a. Le mur est deux metres en hauteur.
 the-Masc wall is two metres in height
 ‘The wall is two metres in height.’
- b. La altura de la pared es dos metros.
 the-Fem height of the-Fem wall is two metres
 ‘The wall’s height is two metres.’

what-Fem height the-Masc wall has-(epenthesis)-it (Masc)

'What height does the wall have?'

Qué altura tiene la pared?

what height has the-Fem wall

'What height does the wall have?'

In Khmer and Mandarin *wh*-expressions of degree do exist, but as discussed earlier, there are no movement operations in these languages that provide a suitable test for left-branch effects.

The judgements obtained for subcomparatives of degree are presented in (32).^{14,15,16}

- (32) a. i. The door is taller than the window is wide. (English)
ii. mado-ga hiroi yori doa-ga motto ookii. (Japanese)
window-Nom wide than door-Nom more big
The door is taller than the window is wide.'
iii. pkol nigh we:n jieng twia nigh kpo⁸. (Khmer)
pole this long(er) than door this high
'The pole is longer than the door is high.'
iv. La porta è più alta, di quanto è/sia larga la finestra. (Italian)
the-fem door is more high-Fem, than how-much is wide-Fem the-Fem window
*'The door is taller than the window is wide.'
v. Die Tür ist höher, als das Fenster breit ist. (German)

¹⁴It should be noted that one of my French informants finds (32b.i) to improve somewhat if it is used in a "literary" register, as indicated by the presence of expletive *ne* in the subordinate clause:

(i) (?) La porte est plus haute, que la fenêtre n'est large.
the-Fem door is more high-Fem, than the-Fem window NE is wide
'The door is taller than the window is wide.'

This judgement could perhaps indicate that an earlier form of French employed a different syntax of degree that is preserved in certain fixed, literary constructions. In any case, though, the subcomparative of degree does not appear to be available in ordinary, contemporary French.

¹⁵Once again, the restrictedness of comparative constructions in Mandarin poses certain problems. In (32b.v) I have provided both an ungrammatical rendering of a subcomparative-with-ellipsis, and also a grammatical paraphrase using nominalizations in place of degree adjectives.

¹⁶As for subcomparison of quantity, Albanian employs an overt *wh*-word where standard English presumably has a null operator. Italian and Serbo-Croatian likewise employ an overt *wh*-word here.

- the-Fem door is high-er, than the-Neut window wide is
 ‘The door is taller than the window is wide.’
- vi. Vrata su visa nego sto je prozor sirok. (Serbo-Croatian)
 doors (pluralia tantum) are higher than (what) is window wide
 ‘The door is taller than the window is wide.’
- vii. Dera është më e lartë se c’është dritarja e gjerë. (Albanian)
 door-the is more (agr)-tall than what is window-the (agr)-wide
 ‘The door is taller than (what) the window is wide.’
- b. i. *La porte est plus haute, que la fenêtre est large. (French)
 the-Fem door is more high-Fem, than the-Fem window is wide
 *‘The door is taller than the window is wide.’
- ii. *Dver’ vyshe chem okno shyrokoje. (Russian)
 door higher than window wide
 *‘The door is taller than the window is wide.’
- iii. ?*La puerta es más alta, que la ventana es ancha. (Spanish)
 the-fem door is more high-Fem, than the-Fem window is wide-Fem
 ?*‘The door is taller than the window is wide.’
- iv. *János jobbkepű mint Maria szép. (Hungarian)
 John better-looking than Mary pretty
 *‘John is better-looking than Mary is pretty.’
- v. *jèityáú hé bǐ shen kwan. (Mandarin: Fu 1978, p.159)
 this river than deep wide
 ‘This river is wider than (it is) deep.’
 jèityáú hé de kwandù bǐ shendù dà. (Mandarin: Fu 1978, p.160)
 this river DE width than depth great
 ‘The width of this river is greater than (its) depth.’

In the following section I turn from cross-linguistic variation to child language acquisition.

4.4 Children's acquisition of number, quantity, and degree

In my investigation of the morphosyntax of quantity and degree, evidence from cross-linguistic variation has proved more informative than evidence from child language acquisition. The major difficulty for an acquisitional approach is that the types of syntactic constructions that are most informative about the syntax of quantity and degree are rarely used even by older children (or for that matter adults), and may also present the child with exceptional difficulties of a non-linguistic nature. First, children's mastery of non-linguistic tasks requiring quantitative reasoning or complex comparison is believed to occur very late in relation to most of the language acquisition process. Hence, if children fail at linguistic tasks designed to tap the syntax of quantity or degree, the explanation could easily be the non-linguistic difficulty of the task rather than the extent of the children's pertinent syntactic knowledge.

Second, the low frequency with which most of the relevant syntactic constructions are employed by the adult makes it very difficult to judge, from records of spontaneous production, even the approximate age at which a child's grammar first reflects the language-particular properties of quantity and degree expressions in the target language. The judgement that a grammatical construction is productive cannot be made from a few isolated occurrences in the child's spontaneous speech. Such isolated occurrences cannot be reliably differentiated from memorized, frozen expressions, or even from performance errors that are in fact ungrammatical for the child.

This much having been said, the acquisitional evidence is nonetheless consistent with the claims of the previous section. English-speaking children's mastery of substantial number morphology bears no discernible relation to their mastery of the adult English syntax of quantity. This is as we should expect, if the morphology of number and the syntax of quantity are grammatically independent of one another. Furthermore, children's mastery of the syntax of quantity and the syntax of degree is relatively late in both cases. Given that the syntax of degree and the syntax of quantity pattern together across languages, it would be surprising if children clearly

mastered one substantially earlier than the other.

One test of children's knowledge of adult English quantity and degree constructions is provided by comprehension tasks involving subcomparatives. Townsend (1974) and Townsend & Erb (1975) administered such comprehension tasks to large numbers of four- to six-year-old American children, and found that a sizable percentage of the children, including even the older children, exhibited a marked difficulty with subcomparatives of degree and quantity. This result was replicated for subcomparatives of quantity in a smaller study by Snyder, Wexler, & Das (1995). The latter study employed the Truth Value Judgement Task developed by Crain & McKee (1985), and contrasted subcomparatives with two other forms of comparison: "Comparative deletion," as in "John has more books than Mary has," and (so-called) "subdeletion-with-ellipsis," as in "John has more books than pencils." While a minority of the four-to-five year olds performed entirely as expected for adult English-speakers, the majority performed relatively well on comparative deletion and subdeletion-with-ellipsis, but very poorly on subcomparatives.¹⁷

Snyder, Wexler, & Das proposed that this pattern could indicate late acquisition of the language-particular properties of syntax required for adult-English subcomparatives of quantity – in terms of NumP, late acquisition of the fact that English Num⁰ permits a quantity expression to appear as its specifier. A principal reason for considering this type of explanation, in addition to considering the possibility that subcomparatives are simply "hard" for extralinguistic reasons, was the observation that Japanese, which lacks bare numeral modifiers of the English type, also resists subcomparison of quantity according to some informants, although full comparative deletion and "subdeletion-with-ellipsis" are fully grammatical for these same Japanese speakers.¹⁸

Before a full discussion of the possibility that SPEC of NumP is systematically

¹⁷This result suggests that the term "subdeletion-with-ellipsis," drawn from (Bresnan 1972), is somewhat inappropriate here. The acquisitional evidence certainly suggests that children do not (or need not) regard the sentence, "John has more books than pencils," as an elliptical form of "John has more books than he has pencils."

¹⁸As discussed in Section 4.2, however, the categorical resistance to subcomparison of quantity appears to be restricted to a minority of Japanese speakers.

unavailable to younger children learning English, I will report the results to date of a pilot study comparing children's knowledge of quantity subcomparison, to their mastery of substantival number-marking. In most respects children appear to master the obligatoriness of English plural-marking on notionally plural nouns at a fairly early age (e.g. Cazden 1967, Brown 1973).¹⁹ Yet, Cazden (1967) reported, on the basis of her detailed examination of the spontaneous production data for three English-speaking children (Adam, Eve, and Sarah, discussed in Brown 1973), that there was one context in which plural-marking was often omitted even at rather late ages: The children often omitted plural-marking when nothing internal to the DP clearly indicated that the DP was notionally plural.

For example, in a target sentence of the type, "Those are my crayons," where only the morpheme *-s* serves as a DP-internal indication of plurality in the predicate nominal, omission of the plural morpheme *-s* was observed with some frequency even at ages when plural-marking was highly reliable in other contexts. Cazden thus reports a contrast between DPs of the type, *two crayons* or *these crayons*, where *two* and *these* are unambiguously plural and the noun reliably carries plural-marking before the age of three years in all three children's corpora; and notionally plural DPs of the form, *my crayons*, where *my* (for its own part) is compatible with either a singular or a plural head noun, and the noun often surfaces without the obligatory plural-marker even later than the age of three years.

Before relying heavily on Cazden's report, I confirmed that errors of the type she described are present even in the current versions of the Brown corpora that are publicly available through the CHILDES database (MacWhinney & Snow 1985, 1990). Not only have these corpora been subjected to extensive checking procedures since Cazden's early analysis, but in fact Cazden performed her analysis before Brown's research group had finished recording and transcribing the data for the children at later ages. Hence, there was reason to verify that Cazden's representation of the data was consistent with the versions of the corpora that are in use at present, almost

¹⁹Similarly, Rice & Wexler (1995, p.457) have observed very few errors of number morphology, not only in their tests of linguistically normal children, but also in their studies of children with Specific Language Impairment (SLI).

thirty years later.

A paradigm case of the error-type reported by Cazden is Adam's utterance, "Dese my crayon" (taken from Cazden 1967). This utterance is a copular construction with an overtly plural subject, but with no overt specification of plurality in the predicate nominal. To locate all utterances of this type, I performed a computerized search of the corpora for the three Brown children, and extracted every child utterance containing any of the following words: *these, those, they, dese, dose, dey*. In addition to the child's utterance, I extracted a discourse context of two immediately preceding utterances, due either to the child or to an adult interlocutor. The resulting child utterances were then hand-analysed, in context, for errors of the relevant type that did not appear to result from an irrelevant source such as mumbling, stuttering, a speech hesitation, or an imperfect imitation of a prior adult utterance.

As shown in Table 4.6, errors of the type reported by Cazden are still readily found in the current version of the corpora, and account for 8%-22% of all the notionally plural predicate nominal constructions analysed.²⁰ (See Table 4.7.) Hence, it is at least conceivable that English-speaking children do not truly master the adult English basis for obligatory plural-marking until the relatively late ages at which there is acquisitional evidence for the adult English syntax of quantity. To test this possibility directly, I constructed a two-part experiment in which I combined an elicited-production task for plural predicate nominals with a sentence comprehension (truth value judgement) task for subcomparison of quantity.

Thus far I have run this experiment on only three children (from four to five-and-a-half years of age), and accordingly the results must be interpreted as preliminary "pilot" data. Nonetheless, at least one of the three children whom I have tested has provided potentially informative results. I will therefore describe the experiment in more detail and report my findings to date in provisional form, without inferential statistics.

In the first phase of the experiment, a "baby dinosaur" puppet was employed as the

²⁰Curiously, though, the famous example, "dese my crayon," from (Cazden 1967), did not turn up. Perhaps this example was later judged to have been erroneously transcribed.

Table 4.6: Omissions of plural-marking in predicate nominals.

- Adam: dey # dey are # hanger. (2;11.13)
 dose are b. [i.e. b's] (2;11.13)
 dose # are [?] ball. (2;11.28)
 dose are number. (2;11.28)
 dey are barn. (3;0.11)
 dose are lobster. (3;1.26)
 dose are lobster. [Separate occurrence] (3;1.26)
 dey are my piece. (3;5.0)
 dey are fireman. (3;5.0)
 dose are rock (3;5.15)
 dese are elephant (3;6.9)
 dese are butterfly (3;7.7)
 does are your tire. (3;11.0)
 are dey lobster? (4;1.15)
- Eve: those are my mitten. (2;8.16)
 these crayon. (2;9.18) [Context implies that this is copular.]
- Sarah: dese are sponge # <that> [//] that has paint in em
 # huh. (4;9.26)

Table 4.7: Rates of plural-omission in predicate nominals.

Child	# Singular	# Plural	% Singular	# Ambiguous/Other
Eve	2	7	22%	0
Sarah	2	22	8%	1
Adam (Overall)	15	111	12%	9
Adam (2;3-3;0)	4	10	22%	3
Adam (3;1-3;4)	3	14	18%	1
Adam (3;5-3;11)	6	27	18%	3
Adam (3;11-5;2)	1	42	2%	2

basis for sentence elicitation. An assistant controlling the dinosaur puppet explained to the child that the baby dinosaur was afraid of “grown-ups,” and hid inside his shell whenever he saw an adult approaching. Each experimental trial began with the baby dinosaur spotting an adult. While the dinosaur was hiding, a familiar adult character such as “Homer” (i.e. a figurine manipulated by the experimenter) came on stage and said something to the following effect: “Look! I found three seashells at the beach. I think I’ll leave them here, and come back to get them later.” When the adult figure was off-stage, the baby dinosaur emerged from his shell and asked the child (his conspirator), “Do you see something over there? What *are* those?!” The target response was an utterance of the form, “(Those are Homer’s) seashell(s).” Five such trials were presented to each child in the first phase of the experiment.

The second phase of the experiment was an abbreviated version of the sentence comprehension task for quantity comparisons that had been developed earlier by Snyder, Wexler, and Das. (Details of the experiment can be found in Snyder, Wexler, & Das 1995.) As before, the tasks contrasted the child’s comprehension of full comparative deletion (“Mary has more books than John has”), full subcomparison (“Mary has more books than John has magazines”), and subcomparison-with-ellipsis (“Mary has more books than magazines”).

If children’s difficulties with subcomparison of quantity had the same source as their failure to provide plural-marking reliably in the cases described by Cazden, then we should expect a given child in the present experiment to produce “plural” predicate nominals without the requisite plural-marking if and only if he or she also exhibited difficulty with the comprehension of quantity subcomparatives. The preliminary results of my cross-sectional study indicate that this strong prediction is not borne out. All three of the children whom I have thus far tested had pronounced difficulties with quantity subcomparatives, as evidenced by performance at or below the 50% accuracy level expected for random guessing. One child performed at or near ceiling on the other types of comparison, indicating a specific difficulty with quantity subcomparison, while the remaining two children appeared to have across-the-board difficulties with comparative constructions.

Yet, all three of the children performed perfectly on the plural elicitation task. The children always produced the desired predicate nominal construction, and not a single error of the type described by Cazden occurred. Given that one of the children exhibited the specific difficulty with quantity subcomparison reported in earlier studies, but showed no sign of the plural-marking difficulty reported by Cazden, I conclude that these two phenomena most probably have two distinct sources. The question of where the Cazden-type errors come from then remains open. To the extent that many of the errors are found in predicate nominals, which are not linguistically “referential,” one might consider the possibility that these errors reflect uncertainty as to the syntax and morphology of English copular constructions. Work by Moro (1993), for example, suggests that plural-marking on a predicate nominal has a different source than plural-marking on “referential” NPs.²¹

In principle, however, it could still turn out that difficulties with plural-marking as in Cazden’s study are associated with difficulties in quantity subcomparison, and that difficulties with quantity subcomparison simply have more than one possible source. Hence, the children in my cross-sectional pilot study may have had difficulties with subcomparison of quantity for extraneous reasons. A better posed question would therefore be whether children who have the Cazden-type difficulties with plural-marking necessarily have trouble with subcomparatives of quantity. Thus far I have not had the good fortune, either in the pilot study or in naturalistic observation of many additional English-speaking children, to encounter any children who clearly made errors of the type described by Cazden.

Nonetheless, the results to date of my cross-sectional work are consistent with the prediction from comparative syntax. Given that cross-linguistic variation in the obligatoriness of number morphology is independent of variation in the syntax of quantity, we do not expect to find any consistent acquisitional relationship between the two. Not only the preliminary results of my cross-sectional study, but in fact all

²¹Also, Babyonyshev, Fein, Ganger, Pesetsky, & Avrutin (1994) have presented interesting evidence suggesting that Russian-speaking children, at surprisingly late ages, similarly make errors with certain presentational or copular constructions in which adult Russian employs the genitive of negation.

the relevant evidence of which I am aware in the acquisition literature, is consistent with the prediction: Aside from Cazden's special case, all indications are that mastery of English number-marking is consistently an early acquisitional milestone. In contrast, evidence for mastery of the English syntax of quantity (as for example in Townsend's work) is seldom if ever obtained for children younger than four years of age.

In fact, as observed in (Snyder, Wexler, & Das 1995), it would not be surprising if children failed to recognize English Num⁰ as licensing a specifier until they reached a rather late age. Such a pattern might obtain, for example, if adult-like comprehension of the relevant linguistic input is blocked until a fairly late age by delays in non-linguistic conceptual development. In other words, if the evidence from which the child infers that Num⁰ can have a quantity specifier takes the form of complex quantity comparisons or *wh*-questions of quantity, then children may not recognize English as [+SPEC, NumP] until they achieve a fairly sophisticated command of quantitative reasoning.

Furthermore, essentially the same acquisitional pattern would be expected for constructions that depend on a SPEC of DegP position. In the previous section I presented cross-linguistic evidence for a strong grammatical relationship between the availability of a SPEC of NumP position and the availability of a SPEC of DegP position. Hence, it would be somewhat surprising if children began to employ one markedly earlier than the other. Moreover, the conceptual difficulty of complex quantity constructions likewise holds for complex degree expressions.

Thus, specifiers of NumP and DegP should become grammatically possible at the same age. The conceptual difficulty of constructions that clearly depend on SPEC of DegP or SPEC of NumP implies that such constructions will not be employed productively by a child until a fairly late age, and may further imply that children will not even be able to acquire the adult English syntax of quantity and degree until such an age. The empirical prediction is therefore that no child should demonstrate clear mastery of either "SPEC of DegP" constructions or "SPEC of NumP" constructions early in the course of language acquisition.

In fact, this prediction appears to be borne out in every test I have been able to devise. As discussed above, subcomparatives of degree and of quantity are both mastered very late, according to the results of comprehension tasks. Spontaneous production of measure phrases with adjectives is also rare in the available corpora. Indeed, even potentially frozen forms such as *three years old* are surprisingly rare. Snyder & Das (1995) in fact performed a computerized search of the spontaneous production corpora for fourteen American children, to obtain all child utterances containing either a singular or a plural form of any of some forty-five commonly used measure terms (e.g. *year, month, day, foot, inch, story, block, mile, etc.*). The resulting utterances were then hand-searched for phrases of the form, "Extent Unit Adjective" (e.g. "five feet tall"), and the discourse contexts for relevant utterances were checked to eliminate direct imitations of adult speech.

Only three of the fourteen children could be described, even generously, as productively using measure phrases by the end of their corpora.²² For these children, the ages of "first apparent use" of a measure phrase were 3;2, 3;9, and 4;5. The early APs with measure phrases were consistently of the form, "N years old," or "N feet tall." Furthermore, of the fourteen children studied, six had corpora extending beyond the fourth birthday, and of these, only one produced even a single measure phrase before the fourth birthday. Hence, the results of (Snyder & Das 1995) were consistent with the hypothesis that a substantial proportion even of four-year-olds have a grammar that disallows degree phrases with adjectives.

Another indication that the possibility of SPEC of DegP may be acquired late in English (and Dutch) comes from the work of Hoekstra, Koster, & Roeper (1992). In a study of four- to six-year-old English- and Dutch-speaking children, many children allowed apparent Left Branch Constraint (LBC) violations with *wh*-questions of degree. For example, adult English-speakers allow (33a) to be interpreted as in (33b) but not as in (33c).

(33) a. How did John paint the cup yellow?

²²Of the remaining eleven children, three had either one or (at most) two isolated uses of the phrase, "N years old," which we judged to be frozen forms for these children.

- b. By what means did John paint the cup yellow?
- c. How yellow did John paint the cup?

Yet, English-speaking children reportedly allowed either interpretation, (33b) or (33c), for (33a).

This finding suggests, in light of the present discussion, that children are generating the *wh*-word of degree not in SPEC of DegP, but rather as some type of AP adjunct (cf. Italian, Serbo-Croatian) or adverbial modifier (cf. Japanese) that can undergo *wh*-movement without pied-piping. In this case we should also expect to find apparent LBC violations in children's spontaneous speech. Jacqueline van Kampen has searched for such errors in the transcribed spontaneous speech of two Dutch children, and reports (Van Kampen 1994) that such errors do indeed occur.²³

Furthermore, we should expect to find that English-speaking children's first uses of correctly formed *wh*-questions of degree, and perhaps also quantity, will (typically) occur at fairly late ages. If children initially assume that SPEC of DegP is unavailable in English (as predicted by the Subset Principle of Berwick 1985 and others), and therefore either avoid *wh*-questions of degree entirely or resort to the types of strategies employed in languages such as Japanese and Italian, then the grammar should not generate pied-piped *wh*-questions of degree as found in adult English, until the relatively late point at which Deg⁰ is finally designated "[+Specifier]."²⁴

In the case of *wh*-questions of quantity, the predictions for spontaneous produc-

²³It should be noted that van Kampen finds left-branch violations such as (i) as well as (ii).

- (i) welke_i wil jij [t_i liedje] zingen?
 which want you [t song] to-sing
 'Which song do you want to sing?'
- (ii) mag ik proeven hoe_i het [t_i heet] is?
 may I taste how it [t hot] is
 'May I taste how hot it is?'

Of course, there is no particular reason to expect the children's errors to be restricted to *wh*-expressions of degree; apparently the Dutch children studied by van Kampen have misanalysed the adult syntax of *which*-phrases as well as degree expressions. (Van Kampen does not mention whether similar left-branch violations are found in the children's *wh*-questions of quantity.)

²⁴If children adopted the representation of *wh*-degree questions employed by adult Italian, then pied-piping would be available for purposes of emphasis, for example, but otherwise dispreferred. For discussion see (Rizzi 1990).

tion are less clear-cut. Some of the languages (e.g. Spanish) that were classified as [-SPEC,NumP] in the previous section nonetheless require pied-piping in *wh*-questions of quantity. Thus, depending on the precise details of the language acquisition procedure, a child who had not yet acquired the [+SPEC,NumP] property of English might simply avoid *wh*-questions of quantity altogether; or might assume a default value of [-SPEC,NumP], and then either employ a structure as in Spanish, for example, which has pied-piping in *wh*-questions of quantity, or a structure as in French, which normally lacks pied-piping in such questions.

In fact, full, sentential *wh*-questions of both quantity and degree occur infrequently in the spontaneous production data for older children, and rarely if ever in the production data for younger children, at least according to my analyses of the three corpora from (Brown 1973). After performing a computer search of Adam's, Eve's, and Sarah's corpora for all child utterances containing the word *how*, hand-coding the results, and checking the discourse contexts of relevant utterances, I found that Eve never used complete sentential questions of degree or quantity at all. Adam likewise never produced a *wh*-question of quantity in which the phrase "how many (NP)" had clearly undergone *wh*-movement.²⁵ On the other hand, Adam did produce a total of seven instances of full sentential *wh*-questions of degree (including both direct and indirect questions), of which only one occurred before the age of four years. Sarah, in contrast, produced a somewhat larger collection of sentential *wh*-questions of quantity and degree. All her questions of quantity, and all but one of her degree questions, were produced after the age of four years.²⁶ All the children's clear uses of sentential *how* (*many*) questions are presented in Tables 4.8 and 4.9.²⁷

In contrast to the findings for Dutch reported by van Kampen, the small collection of *how* (*many*) questions in the Brown corpora did not include any clear-cut cases

²⁵Adam did produce several questions of the type, "How many are there?" These cases were excluded from Table 4.9 because, without an overt head noun, the presence or absence of pied piping could not be assessed.

²⁶Sarah also produced a number of "how many" and "how much" questions that contained no head noun and therefore are not listed in Table 4.9.

²⁷Notice that Sarah's last example in Table 4.8 is reminiscent of the circumlocutions employed in languages such as Spanish and French.

Table 4.8: First clear uses of degree *how* in a sentential question.

Adam:	look how good boy am I. (3;4.18) see how strong I am. wan(t) (t)a see how strong I am? (4;3.9) guess how old I am. (5;2.12) How big is he? (5;2.12) I wan(t) (t)a see how big it can be. (5;2.12) look how high is [?] the Prudential Tower is. (5;2.12) look at how high the Prudential Tower is. (5;2.12)
Eve:	[None]
Sarah:	how old are me? (3;1.24) I show you how full my piggy bank in. (4;1.4) (be)cause I wan(t) (t)a see how big I am. that's how strong I am. (4;7.0) how old are you now? (4;8.13) look how size I have. (4;10.27)

Table 4.9: First clear uses of *how many* in a sentential question.

Adam:	[None]
Eve:	[None]
Sarah:	how many pieces we got left? (4;4.1) how many toes I have? (4;4.11) how many candles are they? (5;0.10) how many days is that? (5;0.16)

of LBC violations. On the other hand, Sarah and Adam made one utterance each that could perhaps be an LBC violation. Sarah said, "I'm gon look at it to see how I do good." (4;5.29). In this example, *how* is ambiguous between a manner reading, and a degree reading in which it is construed with an adverbial *good* (i.e. 'well'), in apparent violation of the LBC. Similarly, Adam produced the utterance, "how is it dangerous? // Mommy # how is it dangerous?" (4;6.24), which is again ambiguous between a manner reading and a degree reading that apparently violates the LBC.

Finally, I have examined uses of simple numerals within DPs in the production corpora for some ten English-speaking children. This source of evidence was not expected to be particularly informative, because the cross-linguistic survey of the previous section had indicated that even languages such as French and Spanish, which do not realize quantity expressions in SPEC of NumP, exhibit the superficial equivalent of English bare numeral modifiers. On the other hand, at least one recognizable error pattern is predicted as a possibility by the cross-linguistic survey. Most of the Slavic languages, including Russian and Serbo-Croatian, realize numerals (over four) as nouns with genitive complements. The literal translation of this construction into English would presumably look like, "five of books."

Interestingly, three of the ten children examined did in fact produce errors of the form, "(numeral) of (bare singular/plural noun)" (Table 4.10). One possibility is that the children experiment with a "nominal numeral" strategy as a response to an erroneous [- SPEC] feature on Num⁰. Yet, all three of the children who produced "(numeral) of" errors, and all but three (Allison, April, and Eve) of the children overall, produced frequent utterances of the type, "three of dose" and "one of 'em." Hence, the errors in Table 4.10 are quite plausibly performance errors in which a determiner has been omitted. In addition, children may occasionally become confused by English expressions such as "dozens of eggs" and "hundreds of dollars," which, though less frequently used, do exist alongside "[a dozen] eggs" and "[a hundred] dollars," for example.

In summary, acquisitional evidence concerning the child's syntax of quantity and

Table 4.10: Utterances of the form, “(numeral) of (bare singular/plural NP)”

Adam:	<why> [/] # why # <your> [/] # your one of brother took it off? (3;3.4) do we have one of [?] valentines? (3;4.1) make eight of bananas and eight of these. (5;2.12)
Allison:	[None]
April:	[None]
Eve:	[None]
Namoi:	[None]
Nathaniel:	[None]
Nina:	<I want> [/] I want one of sticks too. (2;5.27)
Peter:	[None]
Sarah:	I got three of orange. (3;10.9)
Shem:	[None]

degree is difficult to come by.²⁸ Nonetheless, the available evidence is entirely consistent with the predictions that follow from patterns of cross-linguistic variation. First, acquisition of overt number morphology in English bears no discernible relation to acquisition of the adult English syntax of quantity. With the exception of the special case discussed by Cazden, English substantival number morphology is mastered very early, but evidence for mastery of the adult English syntax of quantity is not obtained until children are considerably older. The preliminary results of the cross-sectional investigation comparing performance on Cazden’s special case of number-marking to performance on quantity subcomparison suggest that even the latest-acquired aspect of English number morphology is probably independent of the English syntax of quantity.

On the other hand, it would be surprising, given the evidence from cross-linguistic variation and the considerations from conceptual development, if English-speaking children demonstrated mastery of either the syntax of degree or the syntax of quantity dramatically earlier than the other. The available evidence in fact indicates that there are no surprises. Clearly productive use of overt measure phrases, and adult-like *wh*-questions of degree and quantity (i.e. with clear use of pied-piping), are not found

²⁸For example, children’s spontaneous production of complex comparative constructions was effectively non-existent.

until after the age of four years. Moreover, English-speaking children even in the age range of four-to-six years often exhibit dramatic difficulties with comprehension tasks that rely on the adult English syntax of either quantity or degree (i.e. subcomparison of quantity and degree, and *wh*-questions of degree). Hence, the available evidence suggests that both the adult English syntax of quantity and the adult English syntax of degree are very late acquisitions.

4.5 Discussion

The principal empirical findings of this chapter can be summarized quite succinctly. First, the syntax of quantity expressions is entirely independent of overt number morphology. Second, the syntax of quantity expressions with NPs is closely tied to the syntax of degree expressions with APs.

The first finding has important implications for the project of relating variation in syntax to variation in the feature combinations overtly distinguished within morphological paradigms. Cross-linguistically and acquisitionally, there is no discernible connection between obligatory plural-marking and the availability within the DP of a specifier position for quantity-denoting XPs. Moreover, as will be discussed at some length below, the cross-linguistic evidence reported in this chapter more generally disconfirms almost any possible connection between declensional morphology and the availability of a specifier position for quantity expressions. Such relationships, if they ever in fact occur, are most probably the exception rather than the rule. Hence, the prospects appear poor for a theory of grammar or a model of child language acquisition in which knowledge of language-particular syntactic properties is *in general* represented directly as knowledge of morphological paradigms.²⁹

²⁹Instead, functional heads (such as the proposed Num⁰) appear to be associated with abstract features such as [+/-Number-marking] and [+/-Specifier]. These features are plausibly expressed in a “lexical entry” for the functional head, provided that Universal Grammar effectively constrains the possible lexical entries. Given that Num⁰ (if present at all) is phonologically null in all the cases I have encountered, and has syntactic properties that are independent of any overt morphology, poverty-of-the-stimulus arguments militate for a very limited number of grammatical options within the hypothesis space of the learner.

Perhaps the more remarkable discovery reported in this chapter is that cross-linguistically (and as far as I can determine, acquisitionally), the choice of setting for the [+/-Specifier] feature of Num⁰ (i.e. whatever element or property in fact licenses a quantity-denoting specifier within the DP) always corresponds to the setting for the [+/-Specifier] feature of Deg⁰ within the AP. In principle this result could simply indicate that a single functional head, say “Q⁰,” is necessarily projected above both NP and AP, and serves to license either a measure phrase or quantity expression, up to semantic intelligibility. The strongest argument against such an approach, in my opinion, comes from semantics. As discussed in Section 4.2, a rather consistent feature of semantic analyses of quantity and degree is that an expression of quantity is related to the meaning of an NP differently than an expression of degree is related to the meaning of an AP. The motivation for this difference is empirical: When an overt degree expression is absent, the truth-conditions associated with a gradable adjective vary depending on a contextual specification of degree. No such effect is observed when an overt quantity expression is missing from the DP. Therefore, the functional architecture that serves to license an overt degree expression with an AP is likely to be different (indeed considerably simpler) than the functional architecture associated with the introduction of an overt quantity expression into the DP.

Yet, in principle one could certainly maintain the view that a single, semantically inert functional head (i.e. “Q⁰”) is operative with both NPs and APs, and that a numeral is semantically related to a noun by something other than the functional head. In this case, the chief theoretical interest of the link between quantity and degree expressions would be that the systems of functional heads associated with NPs and APs overlap in a way that is not conceptually necessary. Even if the proposed Num⁰ and Deg⁰ elements *can* be unified, one might very well have expected that languages would exploit the possibility of distinguishing them. Hence, even if one judges the semantic considerations to be irrelevant, and one therefore considers it possible to have a single lexical item Q⁰ deployed in the functional architecture above both APs and NPs, still it is an interesting result that the reported cross-linguistic survey did not turn up any languages that “choose” to employ a Q_A⁰ (=Deg⁰) with a

[-SPEC] feature above Adjectives, and a Q_B^0 (=Num⁰) with a [+SPEC] feature above Nouns.³⁰

The important question still remains, of whether the syntax of quantity/degree can be tied in any way to overt declensional morphology. One, quite interesting possibility has been suggested to me by Ken Wexler (personal communication). Drawing on a proposal of Bures (1992), as developed in subsequent work by Jonathan Bobaljik and Diane Jonas, we might suppose that Num⁰ and Deg⁰ can license a specifier position if and only if they are “supported” by another functional head that adjoins to them prior to phonological spell-out of the sentence. Candidates for the “supporting” head would include a possible functional head associated with grammatical gender agreement, and a possible functional head associated with morphological case-marking on the noun.

The interest of this proposal lies in its attempt to relate the [+/-SPEC] property of Num⁰ and Deg⁰ to some independently required property of the grammar. If the (un)availability of a “supporting” functional head has no independent motivation, then the proposal reduces to a re-statement of the original problem. Hence, the empirical question is whether the [+/-SPEC, NumP/DegP] property has any discernible connection to other properties of the associated AP or NP. If so, the syntactic [+/-SPEC] feature may be reducible to overt morphology after all.

Yet, thus far I have effectively ruled out every non-trivial version of the “supporting functional head” proposal that I have been able to imagine. First, the prevailing left-right order of a noun and modifying (attributive) adjective is independent of the [+/-SPEC] feature. For example, both English and Russian have predominantly A+N order, but English is [+SPEC] and Russian is [-SPEC]. Similarly, both Spanish and Khmer have predominantly N+A order, but Spanish is [-SPEC] and Khmer is [+SPEC].

Second, the presence of overt case morphology on the noun is independent of the [+/-SPEC] property. For example, both Russian and German have overt declensional morphology on nouns (and attributive adjectives), but Russian is [-SPEC] and

³⁰Furthermore, even if one rejects the semantic argument against unification of the proposed Num⁰ and Deg⁰, the findings for complex predicates in Chapter 2 continue to indicate that the points of syntactic variation are not *necessarily* tied to any specific functional head.

German is [+SPEC]. Similarly, neither Khmer nor Mandarin has any declensional morphology whatsoever, but Khmer is [+SPEC] while Mandarin is [-SPEC].

Still another possibility would be that the [+/-SPEC] feature is tied to the existence of grammatical gender agreement. Yet, this hypothesis is also readily falsified. For example, neither English nor Mandarin has any grammatical gender-marking to speak of (setting aside notional gender on personal pronouns), but the two differ on the [+/-SPEC] feature. Similarly, both German and Russian decline attributive adjectives for gender, but the two differ on [+/-SPEC].³¹ Hence, although the proposed role of a “supporting” functional head is intriguing, so far it appears to be empirically untenable in the case of Num⁰ and Deg⁰, except perhaps as a notational variant of the [+/-SPEC] feature.

The existence of a single parameter for degree and quantity expressions is consonant with the spirit of the classical switch-box model of parametric variation. Although the proposed functional heads Num⁰ and Deg⁰ mediate distinct semantic relationships, conceptually they are closely linked by their role in licensing specifiers of the same semantic type. According to Cresswell (1976), for example, degrees and quantities plausibly occupy the same semantic domain. Therefore it would not be surprising, from the perspective of the switch-box model, to find a single, abstract, and highly general grammatical parameter governing the syntactic distribution of quantity and degree expressions.

Setting aside the relative merits of the classical switch-box model, however, a negative conclusion is clear: Parametric variation in syntax, even where it has a conceptually natural connection to the morphosyntactic properties of functional heads, bears no *necessary* relationship to overt morphology. Hence, drawing together the findings of Chapter 2 with the present results, parametric variation in syntax is not *in the general case* tied either to specific items in the mental lexicon, or to overt characteristics of morphology.

³¹ Admittedly, Russian differs from German in declining predicate adjectives, as well as attributive adjectives, for grammatical gender, but the [+/-SPEC] contrast for English versus Mandarin suggests that this is unlikely to be relevant; neither English nor Mandarin has any sort of gender-marking on predicate adjectives.

Chapter 5

Conclusions in Summary

The central questions of this dissertation have now received at least provisional answers. In this section I will bring together the conclusions of the previous chapters in a compact synopsis. In Chapter 1 I posed two main questions: First, can syntactic variation across languages be expressed, in general, as variation in the information contained within the mental lexicon? Second, to what extent do overt properties of morphology, such as inflectional and declensional paradigms, determine language-particular properties of the syntax?

In Chapter 4 I argued that in the general case, language-particular syntactic knowledge is tied neither to specific lexical items nor to overt morphology. First, the syntactic possibility of a quantity-denoting specifier within the DP is entirely independent of overt substantival number morphology, according to both cross-linguistic and acquisitional evidence. Indeed, according to my cross-linguistic survey, the syntax of quantity is independent of any overt aspect of declensional morphology. If language-particular knowledge of syntax, or more narrowly, language-particular knowledge of the morphosyntax of functional heads, were necessarily tied to overt morphology, then we should have found a reliable cross-linguistic relationship between the syntax of quantity and some aspect of declensional morphology.¹

¹Throughout Chapter 4 I set aside the issue of X-bar parameters, in part because advocates of a lexical approach to parametric variation often set aside X-bar Theory as possibly the one domain subject to classical switch-box style parameters, and partly because of recent work by Kayne (1994), which shows promise of relating X-bar parameters to properties of functional heads; at least until the

Second, the syntax of quantity expressions with NPs and the syntax of degree expressions with APs are connected, across languages, in a way that is unexpected under the Lexical Hypothesis. Even if one treats the syntax of degree as mediated by the morphosyntactic properties of a functional head Deg^0 , and the syntax of quantity by the properties of a functional head Num^0 , there is no *a priori* reason why Deg^0 should necessarily be unified with Num^0 , and indeed there exist semantic reasons to question such a unification. The observed association between the possibility of a quantity specifier within NumP, and the possibility of a degree specifier within DegP, casts doubt on the Lexical Hypothesis, because a predicted degree of freedom appears not to be exploited in cross-linguistic variation.

Hence, my investigation of the morphosyntax of degree and number provided a more direct answer to my principal questions than did my investigation of noun-drop in Chapter 3. Yet, further acquisitional investigation of N-drop is warranted, in my opinion. First, if the overt characteristics of morphological paradigms in fact *never* play a role in the representation of syntactic knowledge, then this will be most clearly demonstrated by evidence from the domains, such as N-drop, in which there is *prima facie* support for a connection between the two. Second, if the direction of implication, in a domain such as N-drop, is in fact from syntactic “strength” to morphological “richness” (as briefly suggested in Section 3.4), and not the reverse, then this result is also of theoretical interest for syntax and morphology. Third, it could well turn out that syntactic knowledge is sometimes represented directly as knowledge of morphological paradigms, but only within highly circumscribed areas of syntax. If such were the case, the discovery would still be of considerable theoretical interest, and N-drop remains among the domains in which such a connection between syntax and morphological paradigms is the most plausible.

Furthermore, in Chapter 2 I presented strong evidence in favour of a connection between language-particular properties of syntax and morphology, in the particular

dust has settled on Kayne's current proposals, I consider it unwise to draw strong conclusions about the general nature of parametric variation from properties of X-bar Theory. The syntax of degree and quantity is in my view a better test case, because it is precisely a domain in which syntactic variation can readily be tied both to individual lexical items and to overt morphology.

case of syntactic complex predicates; hence, even if syntactic variation is not *necessarily* tied to morphology or the lexicon, there do seem to be specific instances in which language-particular syntactic knowledge is in fact represented directly as knowledge of morphology. As discussed in Chapter 2, Snyder & Stromswold (in press) had already presented acquisitional evidence from English in support of a single parametric property underlying the entire family of complex predicate constructions (e.g. double object datives, verb-particle combinations, and various types of resultatives). In Chapter 2 I then presented new evidence, both from children's acquisition of English and from patterns of cross-linguistic variation, in support of the hypothesis that the parameter governing complex predicates is in fact a parameter of word-formation.

More precisely, I argued in Chapter 2 that the defining semantic properties of syntactic complex predicates are directly dependent on the formation of a morphological compound, prior to semantic interpretation. In the case of an English resultative, for example, such as "John hammered the metal flat," I argued that the AP *flat* is the syntactic argument of a null aspectual morpheme (" ϕ_{telic} "), and that ϕ_{telic} and *hammered* must combine to form a morphological compound, in order jointly to characterize a single, accomplishment-type event (in the sense of Vendler 1967).

Without compound formation, *hammered* would characterize an activity event (or more properly, "eventuality"), and [ϕ_{telic} *flat*] would characterize an achievement-type event (in which the Theme-participant in the event becomes flat). On the assumption that a single VP characterizes only a single type of event, a conflict is expected. Through compound-formation, I argued, *hammered* and ϕ_{telic} combine to characterize a single accomplishment event whose "development" consists in John's hammering the metal, and whose "culmination" consists in the metal's becoming flat.

Formation of the requisite compound, however, depends on the same mechanism responsible for compounding as a productive process of word-formation. Two forms of converging evidence, in fact, indicate that the language-particular knowledge responsible for syntactic complex-predicate formation is represented directly as knowledge about word-formation. First, the age at which an English-speaking child begins producing complex predicates (such as verb-particle combinations) can be predicted,

with remarkable accuracy, from the age at which the child first produces a novel N-N compound. Second, a cross-linguistic survey indicates that languages with resultatives of the English type always allow productive N-N compounding.² Languages with productive N-N compounding likewise permit resultatives, except (as in Korean – Section 2.5) when the construction is directly blocked by an independent property of the grammar. In fact, the availability of N-N compounding thus far appears to be a perfect predictor of the availability of complex-predicate formation (even in Korean), although the specific types of complex predicates that are possible can be limited by other characteristics of a given language.

In conclusion, a close relationship has been demonstrated between parameters of word-formation and parameters of syntax, in the particular case of compounding and complex predicates. Yet, the example of the degree/quantity parameter from Chapter 4 indicates that in the general case, syntactic variation is fully independent of overt morphology. Moreover, points of parametric variation in syntax cannot in general be tied to specific lexical items; the compounding/complex predicate parameter provides a clear example of a parameter that is independent of any single lexical item.

²N-N compounding was employed in Chapter 2 simply as a sensitive diagnostic for the general possibility, in a given language, of using open-class, ordinarily non-affixal lexical items to form compounds. Resultatives were similarly employed as a sensitive diagnostic for the possibility of complex predicate formation.

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