SYNTACTIC COMPLEXITY:

EVIDENCE FOR DISCONTINUITY AND MULTIDOMINATION

A Dissertation Presented

by

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Dedicated to my parents, James and Margaret Blevins,
for their unstinting and selfless support.

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ABSTRACT

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Generative analyses have standardly assumed severe constraints on the form of syntactic representations. This thesis explores consequences of relaxing the undermotivated constraints that prohibit discontinuous and converging configurations. A principal benefit of this revision is that it facilitates the assignment of a uniform constituent analysis to constructions that exhibit different constituent orders. This in turn permits a more general account of structure-sensitive phenomena involving anaphora and extraction, and provides a means of extending configurational definitions to derived constructions and languages with variable or otherwise problematic word order conventions.

Chapter 2 presents an arboreal model of phrase structure which admits dis-

continuity and multidomination by partially dissociating order and structure, and relaxing the requirement that each node have a unique parent. Chapter 3 argues for a discontinuous constituent analysis of the Celtic languages Irish, Welsh and Breton, which conform to a dominant VSO pattern. Chapter 4 examines the word order patterns of the Polynesian language Niuean, which again instantiates a VSO order, and proposes a multidomination analysis of the Niuean raising constructions described by Seiter (1980). Chapter 5 examines subordinate Germanic constructions and suggests an analysis which assigns intercalated structural descriptions to cross-serial dependencies. Chapter 6 suggests a strategy for assigning an articulated hiearchical structure to free word order or 'nonconfigurational' languages, and reconsiders the question of Dyirbal's structural ergativity.

Chapter 7 presents arguments, based on anaphoric and extraction domains, that unbounded dependency constructions in English instantiate a canonically discontinuous structure. Chapter 8 adumbrates strategies for admitting some of the discontinuous representations proposed in earlier chapters. Chapter 9 briefly summarizes previous arguments, examines some unresolved issues, and considers the correspondence between discontinuous structural analyses, and conventional representations containing 'gaps'.

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Chapter 1

Discontinuous and Multidominated Constructions

A central tenet of generative approaches to syntax is that the constructions of a natural language can be revealingly described in terms of a fixed stock of structural relations, along with a restricted class of operations that apply either to structural descriptions, or to the rules that generate them. Much work within this general paradigm has been concerned with establishing the syntactic relevance of phrase structure configurations by identifying general structural domains that condition a range of syntactic processes, most notably reflexivization and extraction. An additional advantage claimed for this sort of 'bricks and mortar' approach is that its theoretical apparatus yields explicit and universal definitions of traditional descriptive vocabulary in terms of phrase structure configurations. This is explicitly affirmed in Chomsky (1965), where it is argued that grammatical functions such as 'subject' and 'object', can be defined configurationally as 'the NP immediately dominated by S' and 'the NP immedi-

ately dominated by VP' respectively, while relational categories like 'predicate' can be identified with syntactic constituents such as verb phrases.

Nevertheless, the putative universality of the posited domains and definitions has often been challenged, principally on the grounds that they are inapplicable to some language or class of languages that differs markedly from the paradigm English case. These objections tacitly incorporate the widely-held assumption that the variability of word order conventions within and across languages precludes the possibility of assigning a uniform surface constituent analysis to clauses and other major phrasal categories. In the Standard Theory of Chomsky (1965) and many of its transformational descendants, acceptance of this view leads to the identification of underlying representations as the structures that instantiate the language-universal features of constituency relations. This property of the base has traditionally been attributed to the ostensibly universal status of some set of phrase structure rules, or of a given formulation of the $\bar{X}$ conventions. Differences in constituent structure and order are then ascribed to language-particular differences in the transformational mapping from underlying to surface structures.

Proponents of frameworks such as Relational Grammar and Lexical Functional Grammar take a less sanguine view of the possibility of maintaining sufficiently general configurational domains through recourse to distinct levels of syntactic representation. Rather, they argue, word order variation demonstrates the basic descriptive inadequacy of the strategy of defining syntactic rules and

grammatical functions directly in terms of phrase structure configurations. The alternative advocated within these theories involves according grammatical relations the status of primitive theoretical constructs. A succinct statement of this position is provided in the foreword to *Studies in Relational Grammar 1*.[1]

> The TG tradition had fostered two related ideas about grammatical relations: the idea that they are relevant only at the level of deep structure and the idea that they can be defined in terms of phrase structure configurations. These ideas are related because... the definitions of grammatical relations proposed in TG do not work for derived structures, even in English. Further, the range of cross-linguistic variation in word order and case patterns makes it impossible to give cross-linguistically viable definitions of grammatical relations in terms of phrase structure configurations or case. Grammatical relations must be considered to be primitive notions and must figure in syntactic representations. (Perlmutter (1983), p.xi)

A point of general agreement in this debate is that syntactic constituents must be uniformly continuous. It is this assumption, more than any other consideration, that precludes the assignment of a conventionally articulated hierarchical organization directly to derived structures, as well as basic transitive clauses that exhibit a subject-medial, cross-serial, or scrambled pattern. The following chapters indicate how relaxing the standard continuity requirement yields more perspicuous and useful structural descriptions of a variety of construction types. A brief review of previous proposals in this domain will provide a suitable context for this discussion.

[1] Similar sentiments are expressed by Bresnan (1982b:285).

1.1 Modelling Syntactic Structure

As McCawley (1968, 1982) observes, the widespread preference for continuous constituent analyses is largely a generative innovation which lacks clear formal and empirical motivation. Further, although variants of the constraints that Chomsky (1955) proposes to bar discontinuity are retained in nearly all subsequent generative theories of phrase structure, it is worth noting Chomsky's early studies only provisionally exclude discontinuous constituents.

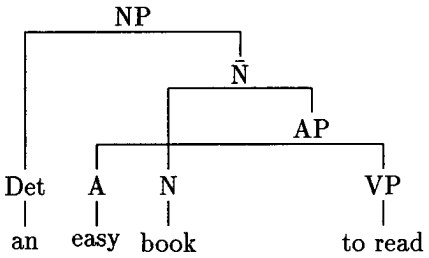
> This [the status of 'long components' in the sense of Harris (1951)] is an important question, deserving a much fuller treatment, but it will quickly lead into areas where the present formal apparatus may be inadequate. The difficult question of discontinuity is one such problem. Discontinuities are handled in the present treatment by construction of permutational mappings from **P** [the level of phrase structure] to **W** [the level of word structure], but it may turn out that they must ultimately be incorporated somehow into **P** itself. (Chomsky (1955), p.190)

In more recent work, Chomsky has reiterated this essentially agnostic position regarding the normative status of standard tree diagrams.

> Still, we can ask whether D-Structures, S-Structures, etc., have the properties of tree structures. Insofar as they are determined by $\bar{X}$ theory, this will be the case. But there are other factors that enter into determining their properties... Furthermore, $\bar{X}$ theory can be constructed so that it does not require that phrase markers have tree properties. It has occasionally been suggested that coordination might be understood in terms of union of phrase markers (in effect, three-dimensional trees with the the conjuncts filling the same position in the associated two-dimensional projection) ... Much more radical departures from tree structures can be, and sometimes have been, proposed. I will not explore these questions here, but merely note that the incompatibility of such proposals with the theory of phrase structure stands as no barrier to them. (Chomsky (1982), pp.14-15)

There is, moreover, an extensive literature concerned with formulating and motivating strategies for extending the notion of constituency to cover various classes of noncontiguous expressions. Thus, while the analytical techniques developed within the American structuralist tradition incorporate a strong preference for continuous, binary-branching structural descriptions, structuralists such as Bloomfield, Wells, Pike, Gleason, Harris and Hockett explicitly recognize a large and varied class of discontinuous constructions. The 'long components' that figure in Harris' (1951) analysis of Semitic consonant templates represent a species of discontinuous morphological constituent. The immediate constituent analyses assigned to English polar interrogatives by Hockett (1954,1958) and Gleason (1955) provide a clear example of syntactic discontinuity.[2] Wells (1947) similarly analyzes a nominal expression like *easy book to read* into the discontinuous components *book* and *easy... to read*, as represented in the diagram below.[3]

1



Wells proposes a parallel treatment of verb-particle constructions in which a phrase like *call the mayor up* is analyzed into the immediate constituents *call...up* and *the mayor*. Yngve (1960) suggests a class of intraposing phrase

[2]See Chapter 2 for further discussion of these constructions.

[3]The occasionally anachronistic labelling conventions illustrated in the following diagrams are generally familiar, though see §2.3.2.2 for discussion of valence-encoding superscripts.

structure rules to characterize the essentially local discontinuity involved in such constructions; variants of this analysis are adopted in Harman (1963) and Huck (1984). A reflex of the discontinuous structuralist analyses of verb-particle and related constructions is likewise preserved in the intraposing transformations that apply to 'complex verbs' in early transformational studies of English. Chomsky (1955,1957), for example, proposes a transformation T^{ob}_{sep}, which applies to the underlying strings in (2) to produce the outputs in (3).[4]

2 a. the police – brought in – the criminal

b. all the people in the lab – consider a fool – John

3 a. the police brought the criminal in

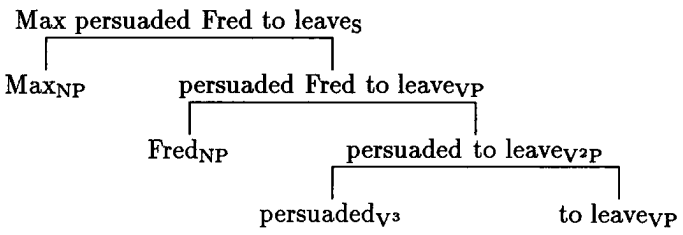
b. all the people in the lab consider John a fool

Although Chomsky assumes that the derived structures associated with the sentences in (3) are continuous, he does not discuss any considerations that lend support to this assumption.

The interaction of nonconcatenative operations with complex predicates has, however, been most systematically explored in extensions of Montague Grammar. In particular, the analyses of control structures developed by Partee (1973), Thomason (1976) and Bach (1979), among others, exploits the clear separation between syntactic rules and associated operations in these systems. The derivational history recorded in (4) illustrates how order of combination and

[4]See also the discussion in Chomsky (1961).

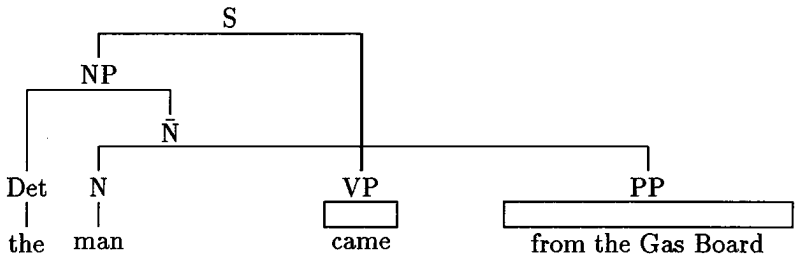
the linear position of a substring may be dissociated in a Montagovian analysis tree.[5]



4

As the medial lines of this diagram show, the sequence *persuaded to leave* is treated as a complex transitive verb phrase which intraposes the direct object *Fred*. Thus, although the verb *persuade* combines with the infinitive before the object, this order is not reflected in the linear order of the resulting string.

Cases involving introposition of a verbal element within a larger nominal constituent are also recognized in the structuralist literature. Thus, Halliday (1961) analyzes sentences like *The man came, from the Gas Board* as consisting of the discontinuous subject *the man from the Gas Board* and the intervening verb *came*. This analysis is diagrammed in (5).

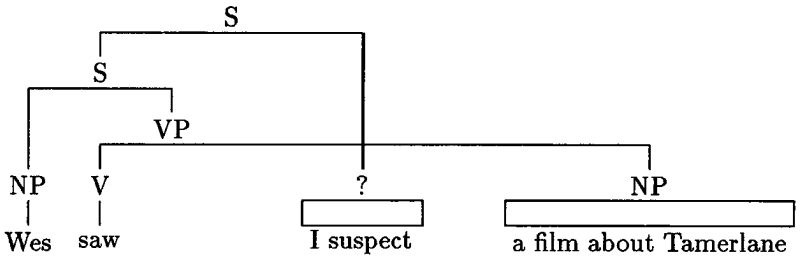


5

[5]This analysis tree suppresses the node annotations that conventionally indicate which operations have applied in the derivation of a nonbasic constituent. Such annotations encode, for example, that *persuaded to leave* is formed by concatenation while the derivation of *persuaded Fred to leave* involves the application of a nonconcatenative 'wrap' operation.

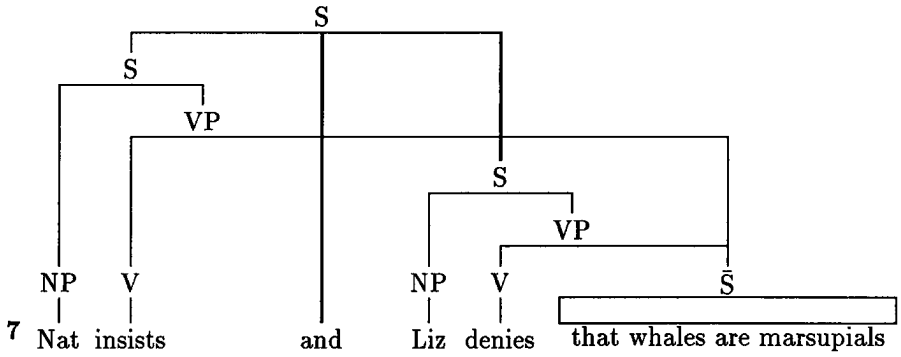
McCawley's (1982,1987) discontinuous analyses of parentheticals, comparatives and and appositive relative clauses draw consciously on this pretransformational structuralist tradition. In particular, the structure McCawley assigns to parentheticals and appositives is similar to the analysis of the structures in (1) and (5). The sentence in (6), containing a parenthetical comment, is suitably representative.

6



The VP-external attachment of the parenthetical element (in this case, inessentially, to a higher S node) reflects the fact that such elements do not form plausible subconstituents with any flanking expression. McCawley also presents an example of the converse case, in which an element can be treated as a part of more than one nearby constituent. As the graph in (7) illustrates, such multidominated configurations also give rise to discontinuity.[6]

[6]Though as discussed in Chapter 2 below, multidomination may arise independently of discontinuity in 'linked trees' of the sort formulated by Engdahl (1986).



(7)

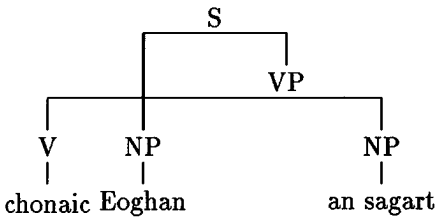
The diagrams in (1)–(7) partially illustrate the diverse strategies employed to diagram discontinuity. A corresponding variety of devices have been proposed to generate such representations, ranging from Bach's (1979) 'right wrap' operation to McCawley's (1982) reordering transformations. However, this family of proposals does not provide a general account of discontinuity which specifies, among other things, where discontinuous constituents are expected to occur, and what factors contribute to induce discontinuity. This is in part due to the fact that discontinuous analyses have been most successfully applied to a seemingly heterogeneous class of construction types that defy description in terms of continuous structural descriptions. In some cases, moreover, discontinuity is explicitly restricted to a class of peripheral constructions, as, for example, by McCawley, who conjectures that discontinuity is a characteristic property of constructions that fall within the somewhat poorly delineated 'stylistic component' of a transformational grammar.

1.2 Sources of Complexity

In what follows I will review empirical motivation for allowing discontinuous constituents, suggest a means of representing and admitting the desired structures, and then suggest a number of practical benefits of this move. Transitive clauses in the VSO languages Irish, Breton, Welsh and Niuean will be argued to instantiate a structure similar to that assigned to English polar questions. Thus the declarative Irish sentence in (8) is associated with the structure in (9).

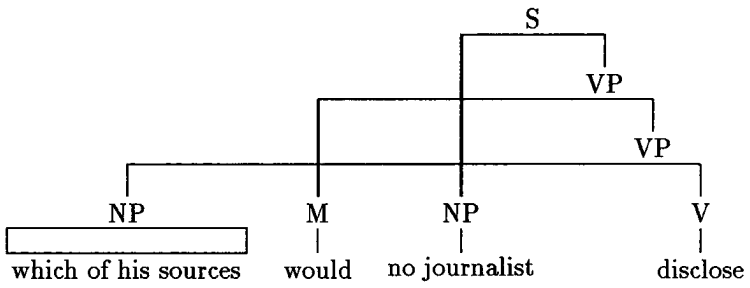
8 *Chonaic* *Eoghan* *an* *sagart.*
saw Owen the priest
'Owen saw the priest.'

9



English *wh*-questions are likewise assigned canonically discontinuous structures, like (10), in which the initial questioned constituent precedes hierarchically superior elements.

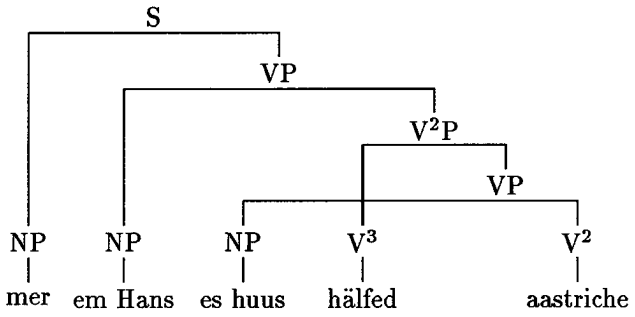
10



Recognizing discontinuous constituents also provides a straightforward means of assigning a conventional hierarchical structure to languages, such as Russian, Yimas, Latin, Yidiɲ and Dyirbal, which exhibit degenerate word order conventions. Likewise, permitting noncontiguous clauses and phrases facilitates the description of cross-serial patterns like those characteristic of subordinate clauses in Dutch and dialects of Swiss German. For example, the diagram in (12) assigns a conventional subject/predicate structure with the Züritüütsch subordinate clause in (11).

11 *mer* *em* *Hans* *es* *huus* *hälfed* *aastriiche*
we the Hans-D the house-A helped paint
'we helped Hans paint the house' [Sh334:1]

12



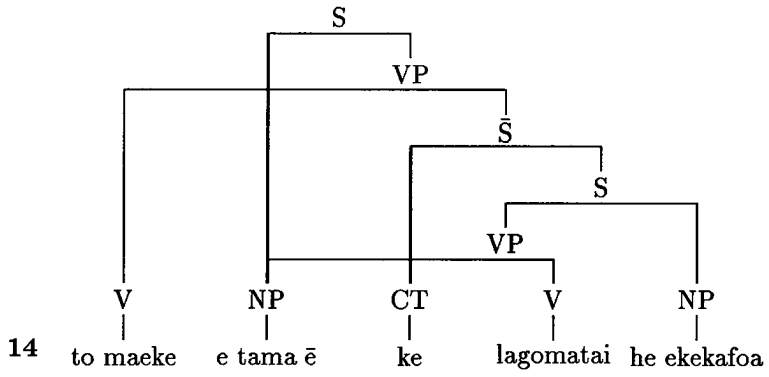
More generally, an examination of word order variation within and across languages supports the conclusion that discontinuous constituents are not confined to a class of syntactically marginal constructions. Instead, discontinuity is a general and predictable consequence of the interaction of a number of identifiable factors; notably the branching direction in a language and the rules or principles that position distinguished elements like syntactic heads and dis-

located constituents. I will suggest that an ID/LP grammar (Gazdar *et al.* 1985, henceforth GKPS), modified to permit the ordering of nonsiblings, is an appropriate device for assigning constituent analyses to different classes of locally discontinuous constructions. As in McCawley (1982), discontinuity results from the dissociation of the precedence and dominance relations that order a phrase structure tree. However, adapting GKPS, this separation of linear order and hierarchical structure can often be effected directly by the 'base' rules of a grammar, rather than by reordering transformations of the sort that McCawley suggests.

Furthermore, relaxing the standard prohibition against multidominated structures provides a perspicuous account of 'raising' constructions in Niuean (Seiter (1980)) which contain constituents that appear to occur simultaneously in two distinct clauses. For example, the diagram in (14) represents the fact that the argument *e tama ē* behaves simultaneously as the direct object of the embedded clause and the matrix subject of (13).

13	*To*	*maeke*	*e*	*tama*	*ē*	*ke*	*lagomatai*	*he*	*ekekafo.*
	Ft	possible	Ab	child	this	Sb	help	Er	doctor

'The doctor could help this child.' [Seiter158:5a]



14

The discontinuous and multidominated structures exhibited above are strongly non-context-free, in the sense that they are not among the structural descriptions strongly generated by a standard context-free grammar.[7] Discontinuity is excluded by the fact that the right side of a context-free production rule $A \rightarrow \phi$ is interpreted as a linear string of symbols. Multidomination is also blocked, as the consequence of the fact that each such rule rewrites a single (occurrence of a) nonterminal, which is interpreted as the unique mother of the symbols introduced by that application of the rule.

These constraints are most transparently retained in extended context-free formalisms such as GPSG. However, structures with crossing and converging branches are also excluded by standard transformational grammars, whose phrase structure components impose various of the constraints characteristic of context-free phrase structure grammars. A similar restriction applies to the

[7]Though notice that there can be a tradeoff between the complexity of structural descriptions and the complexity of the procedure for determining their yield. As the diagram in (4) illustrates, a discontinuous structural analysis can be associated with a context-free derivation tree whose yield is determined in part by the application of nonconcatenative operations that annotate the nodes of the derivation tree. See Weir (1988) for further discussion.

constituent analyses assigned by grammatical formalisms which, like LFG, include a context-free component that determines constituency.[8] Prohibitions against discontinuity and multidomination are indeed characteristic of the extended family of Standard Theory descendants that retain a context-free 'core', augmented by supplementary devices like metarules or bounded metavariables that effectively take the place of classical transformations.

In the following chapters, I will advocate a different division of labour, and suggest that a varied class of constructions can be more revealingly analyzed by a model of grammar that assigns constituent structures that are not subject to the arbitrary restrictions on standard phrase structure descriptions. An examination of phrase structure thus provides a suitable point of departure for this study.

[8] Although the c-structure rules of an LFG depart from a standard context-free formalism in permitting regular expressions to occur on the righthand side of a rule, this modification does not relax either of the representational constraints under discussion.

Chapter 2

Phrase Structure

A basic component of structuralist item and arrangement theories and their generative descendants is a model of phrase structure that identifies a class of legal constituent analyses. A residue of the central role occupied by phrase structure grammars in early models of transformational grammar is the requirement, now standard within generative theories of phrase structure, that such constituent analyses must be representable as phrase structure trees. The normative status accordingly assigned to phrase structure trees has, however, been assumed more often than defended in the linguistic literature. In particular, no explicit empirical motivation has been provided for many of the representational constraints characteristic of trees. The prohibition against discontinuous and multidominated configurations is a clear case in point. The constraints that bar such configurations significantly reduce the class of available constituent analyses, since they effectively ensure that constituents will consist of contiguous, nonoverlapping sequences of elements. Thus, as Chomsky (1955) argues

at some length, a condition of this sort interferes with the assignment of adequate constituent analyses to *wh*-questions, verb-particle constructions, and, more generally, any construction that exhibits a syntactic dependency between nonadjacent components.

Rather than reevaluate the status of standard constraints on phrase structure representations in light of their consequences, subsequent generative accounts have largely sought to develop supplementary devices that overcome the effects of these constraints. To compensate for the restrictions on individual constituent analyses, classical transformational theories admit syntactic descriptions consisting of sequences of constituent analyses. The null terminals that figure in more recent accounts similarly permit an element to be associated with multiple syntactic positions within a structural analysis.[1] Nevertheless, the descriptive limitations that these strategies indirectly circumvent are more satisfactorily overcome through a revision of undermotivated constraints on phrase structure. Specifically, relaxing the constraints that exclude discontinuity and multidomination permits structural descriptions that enjoy empirical advantages over representations that incorporate either multiple constituent analyses or empty elements.

The present chapter sets out (in §2.3.2) a model of phrase structure which, following essentially McCawley (1982), allows discontinuous and multidominated structures. The presentation of this system is preceded by a discussion

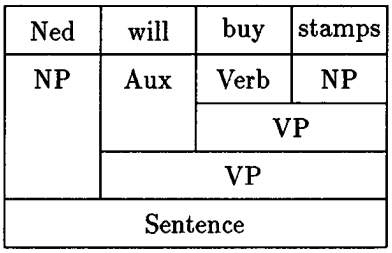
[1]The links employed in Phrase Linking Grammars and current versions of Tree Adjoining Grammar serve a similar cross-referencing purpose.

of previous models of phrase structure which examines the formal and empirical justification for the constraints imposed in these theories. This critical review is of more than purely historical interest. As Heny (1979a) observes, the Standard Theory and its subsequent extensions and revisions represent, in effect, increasingly programmatic refinements of the general theory expounded in Chomsky (1955) (henceforth *LSLT*). This is especially clear in the domain of phrase structure. Although phrase structure analyses of particular constructions are subject to constant revision in generative accounts, the underlying model of phrase structure assumed in these analyses has remained essentially unchanged for the past 30 years. The most comprehensive exposition of this model is presented in *LSLT*. Later studies of phrase structure have, with comparatively few exceptions, been confined to discussions of node labelling conventions or strategies for generating phrase structure trees. Consequently, the representational innovations introduced, often tentatively, in *LSLT* have assumed a normative status without ever having been subjected to thorough scrutiny. An examination of the *LSLT* system and its structuralist precursors clearly identifies the structural assumptions provisionally introduced in transformational models of phrase structure, and the extent to which it is these restrictive assumptions more than any features of natural language that create the need for structural descriptions that include multiple levels or null terminals.

2.1 Immediate Constituent Analysis

The pre-generative tradition of immediate constituent analysis provides an appropriate starting point for the investigation of modern theories of phrase structure. American structuralists, including Bloomfield (1933), Wells (1947), Gleason (1955) and Hockett (1958), explicitly represented the linear order and hierarchical organization of expressions by means of immediate constituent diagrams of the sort illustrated in (1) below.[2] The top line of such diagrams identifies the ultimate constituents of the sentence on the bottom line, with each subsequent line assigned an analysis into immediate constituents by the lines immediately above it.[3]

1



IC diagrams thus provide a single-level segmentation of an expression into discrete constituents, often composed ultimately of morphemes.

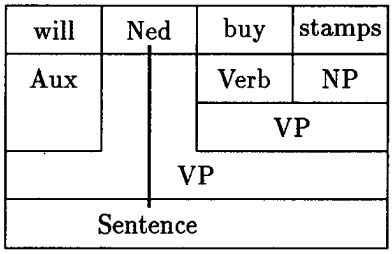
Although the structuralists generally expressed a preference for continuous, binary-branching constituent analyses, they clearly recognized the need to countenance both discontinuous and ternary-branching constructions. Hock-

[2]These structures to some extent represent a more systematic presentation of parsing principles inherited from earlier pedagogical traditions.

[3](1) suppresses intonation, which was sometimes also represented on IC diagrams.

ett (1958:154) and Gleason (1955:142), for example, segment a polar question like *Will Ned buy stamps?* into the primary immediate constituents *Ned* and *will ... buy stamps.* Various means of diagramming discontinuity are explored by these authors, though they are mostly awkward and somewhat unperspicuous. An example of the sort proposed by Hockett (1954:154f) is repeated in (2) below.

2



The bold line here links the two lines on which the subject *Ned* occurs, and is intended to represent the fact that it does not occur as a part of any intervening line.

The mathematical properties of IC diagrams are not investigated to any great extent in the structuralist literature, and their formal status has been a subject of debate among later commentators. Thus, Chomsky (1956) and Postal (1964) identify such diagrams as incompletely formalized precursors of generative phrase markers, while McCawley (1968) suggests that their representation of constituency is closest to that provided by a node admissibility interpretation of phrase structure rules. However, these characterizations apply to at most a subset of the class of IC diagrams, given that neither phrase markers nor the

node admissibility conditions formulated by McCawley (1968) are capable of representing the syntactic discontinuity diagrammed in (2). Moreover, if IC diagrams are inadequately modelled by phrase structure trees, it follows that the grammars that generate such objects cannot provide an adequate formalization of the theory of immediate constituent analysis.[4]

The clear differences between immediate constituent diagrams and phrase structure trees undermine, in particular, the claim that (context-free) phrase phrase structure grammars provide a satisfactory formalization of the theory of immediate constituent analysis. This claim, first presented in Chomsky (1956), has largely been assumed in subsequent work, as the following passage suggests.[5]

> ...it has been shown that almost all of the nontransformational syntactic theories that have been developed within modern linguistics, pure or applied, fall within this framework. In fact, such a [phrase structure] system is apparently what is implicit in modern taxonomic ("structuralist") grammars, if these are reformulated as explicit systems for presenting grammatical information ...(Chomsky (1965), p.67)

Widespread acceptance of this view is likewise reflected in the fact that subsequent debate about the adequacy of immediate constituent or phrase structure analysis has focused far more on properties of the formal grammars introduced

[4]There is another respect in which phrase markers and trees may misrepresent IC diagrams; namely in that both characterizations treat such diagrams as encoding a classificatory part-whole analysis: what Hockett (1954) terms an *item and arrangement* analysis. Although it is not clear that this accurately represents the intended interpretation of IC diagrams, further discussion of this matter is beyond the scope of the present study. See Hockett (1954) for comparison of *item and arrangement* and *item and process* analyses.

[5]Chomsky goes on to refer to an earlier footnote in which he expresses reservations about the interpretation of structuralist accounts as *generative* theories, though he does not seem to doubt that the objects generated by phrase structure grammars adequately model the immediate constituent diagrams developed within the structuralist school.

in Chomsky (1956) than on the substantive linguistic theories that these grammars are intended to model.

The significance of this discrepancy resides in the fact that early transformational objections to monostratal immediate constituent analyses typically exploit representational restrictions that are not truly characteristic of the class of IC diagrams. For example, the arguments that Chomsky (1956) presents to establish the inadequacy of immediate constituent analysis depend on features that are effectively introduced in his formalization of phrase structure grammars. This is most transparent in the case of discontinuous constituents, as argued directly below. However, various other arguments that Chomsky presents are similarly dependent on arbitrary restrictions imposed in his formalization of immediate constituent analysis.

Thus, one of Chomsky's fundamental objections to immediate constituent analysis as modelled by phrase structure grammars concerns their inability to refer to the derivational history of a string. Chomsky (1955,1956,1957) attempts to exploit this putative deficiency by presenting a collection of analyses which, he maintains, cannot be implemented within a phrase structure grammar. The proposed analyses characterize coordination, English passive/active alternations and auxiliary selection in a manner that makes essential reference to the derivational history of a given string. Yet, as Chomsky observes, the application of a standard phrase structure rewrite rule is governed strictly by the form of a string, and insensitive to how the string acquired that form. A conventional

phrase structure formalism can represent a condition like 'rewrite A as ϕ when A is flanked by α and β' by means of the context-sensitive rule $\alpha A\beta \rightarrow \alpha\phi\beta$. Yet there is no corresponding facility for representing a dominance-sensitive condition like 'rewrite A as ϕ when A is immediately dominated by B' (i.e. when A is introduced by a rule that rewrites B). Hence, Chomsky concludes, the desirability of the proposed analyses shows the inadequacy of phrase structure rules, and motivates the introduction of rules that can directly access information about the derivational history of a string.

The force of this class of arguments clearly depends on assessments of the initial plausibility of the ostensibly unimplementable analyses, as well as the status of the claim that these proposals capture significant generalizations that are obscured in any phrase structure description of the same range of phenomena. Both the motivation for these analyses and the justification for the claim that they capture generalizations that cannot be expressed by a phrase structure grammar have since been challenged, by transformationalists as well as by proponents of rival syntactic frameworks. Nonetheless, even if we grant Chomsky the empirical advantages he claims for his analyses, it is not clear that the identified deficiencies of context-free grammars bear directly on the descriptive adequacy of the theory of immediate constituent analysis that such grammars are intended to model.

This is due to the fact that the inability to refer to the derivational history of a symbol lacks a recognizable correlate in theories of immediate constituent

analysis. More specifically, the fundamental distinction between linear and hierarchical contexts is largely an artifact of the proof-theoretic string rewrite interpretation of phrase structure rules. This distinction is not invariably preserved even by alternative interpretations of production rules. For example, on the node admissibility interpretation of phrase structure rules suggested by McCawley (1968), linear and hierarchical configurations provide equally accessible contexts for the application of a rule.[6] Since tree structures provide 'top' as well as left and right contexts, the application of a rule may as legitimately depend on features of its mother as on those of its neighbours. Likewise, as the feature passing conventions of GPSG and related unification-based accounts illustrate, the decomposition of atomic nonterminal symbols into internally structured feature bundles permits the characterization of a restricted amount of derivation sensitivity. Notice, in particular, that the principles that regulate the distribution of features in GPSG are in a sense complementary to the linear environments that characterize context-sensitive grammars, as such features essential govern the local transmission of syntactic information along hierarchical paths in a phrase structure tree.

Another of the grounds on which Chomsky objects to immediate constituent analysis concerns its inability to represent discontinuous constituents. This objection is clearly stated in early discussions of the English auxiliary system.[7]

[6] See McCawley (1968) and GKPS (1985) for discussion of node admissibility conditions.

[7] See also the discussion of verb-particle constructions in Chomsky (1957:75f), summarized below. The term '$[\Sigma, F]$ grammar' is here simply an economical representation of a context-

> This very simple analysis, however, goes beyond the bounds of $[\Sigma, F]$ grammars in several respects. The rule [Afyv $\rightarrow$ vyAfy#, which induces 'affix hopping'], although it is simple, cannot be incorporated within a $[\Sigma, F]$ grammar, which has no place for discontinuous elements. (Chomsky (1956), p.118)

> To put the same thing differently, in the auxiliary verb phrase we really have discontinuous elements—e.g., in (30) the elements *have* ... *en* and *be* ... *ing*. But discontinuities cannot be handled within $[\Sigma, F]$ grammars. (Chomsky (1957), p.41)

However, it is evident that Chomsky's objections cannot be construed as valid criticisms of then-current formulations of the theory of immediate constituent analysis, as such theories typically did admit discontinuity. The diagram in (2) provides a clear illustration of a discontinuous structural description which is explicitly represented by means of an immediate constituent analysis diagram. Since the constituent analysis assigned by this structure is not representable as a conventional phrase structure tree, the theory underlying the construction of such diagrams cannot be adequately modelled by a context-free phrase structure grammar. Further, as remarked earlier, discontinuity is clearly contenanced (though in many cases somewhat less perspicuously represented) by many of the principal advocates of immediate constituent analysis. Thus, the source of the descriptive limitations that Chomsky identifies above lies here with his formalization of the theory of immediate constituent analysis as $[\Sigma, F]$ grammars, and not with the principles of immediate constituent analysis.

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free grammar which exploits the fact that such a grammar is uniquely specified by its set of start states Σ, and its set F of production rules.

Numerous other objections to phrase structure analysis similarly depend on restrictive conditions that are introduced rather than passively represented in Chomsky's formalization of immediate constituent analysis, though the modifications required to deal with these objections often entail more substantive modifications to the standard phrase structure formalism.[8] Thus, in sum, the arguments that Chomsky presents to demonstrate the descriptive inadequacy of phrase structure grammars are most successful in establishing their inadequacy as formalizations of theories of immediate constituent analysis.[9]

2.2 Stringset Theories

Some of the empirical benefits provided by a more satisfactory characterization of the class of IC diagrams are outlined below in §2.2.2. At this point,

[8]For example, Chomsky (1961:15) observes that standard phrase structure grammars are forced to assign overarticulated structural descriptions to potentially unbounded coordinate constructions like *the man was old, tired, tall..., but friendly.* Since such grammars are, by definition, finite, they cannot contain either an infinite number of rules, or rules with an infinite number of righthand expansions. Consequently, phrase structure grammars cannot assign a flat structure to the infinitely many coordinate constructions that form part of any natural language. Instead, they must rely on repeated applications of recursive rules that introduce otherwise unmotivated branching structure. However, it is unclear how the use of transformations obviates this problem. Since published versions of conjunction reduction (e.g. Chomsky (1957:113)) generally apply to pairs of input sentences, iteration of this transformation will produce undesirable subconstituency. To allow these rules to apply simultaneously to indefinitely many conjuncts requires variables that may range over an arbitrary number of input phrase markers (as opposed to more familiar essential variables that range over substrings of arbitrary length). However, extending the standard phrase structure grammar formalism by allowing regular expressions to occur in the expansion of a rule likewise yields the increase in strong generative capacity needed to assign the desired structural descriptions to coordinate structures. Thus, what appears to be essential here is that standard production rules are required to be finite while the structural indices of transformations are not subject to such a requirement. Various strategies for 'base generating' unbounded flat structures that circumvent this restriction on production rules have been proposed, ranging from the introduction of regular expressions into phrase structure rules in LFG to the $\bar{X}$ coordination schemata in Jackendoff (1977) and GKPS (1985).

[9]A similar point is argued by Manaster-Ramer and Kac (1990).

however, it will be instructive to examine the string-based model of phrase structure proposed in Chomsky (1955) and refined in Lasnik and Kupin (1977). Of particular relevance in the present context is the extent to which arbitrary restrictions on constituent analysis imposed within these theories effectively introduce the need for multi-level structural descriptions.[10]

2.2.1 Phrase Markers

The model of constituent analysis presented in Harris (1951) is among the clearest examples of an explicit item and arrangement system, in which morphemes and morpheme sequences of ascending complexity are assigned to distributional classes. The idea of analyzing an utterance in terms of primes and sequences or strings of primes successively built up by concatenation is largely carried over in the notion of a linguistic level developed in *LSLT*. In the *LSLT* system, the distinct constituent analyses assigned to a given phrase are represented by stringsets termed *phrase markers*. Such phrase markers are elements of the level **P** of phrase structure, represented in (3).[11]

[10] Another significant feature of these systems is the degree to which the constraints that bar discontinuity and multidomination are logical independent of the other axioms.

[11] Thus, **P** is, like the other levels proposed in the *LSLT* theory, a concatenation algebra. For exposition of the theory of concatenation algebras that underlies the algebraic theory of levels in *LSLT* see Rosenbloom (1950), esp. Appendix 2, pp. 189-193.

3 $\mathbf{P} = [P, \cdot, =, Gr(P), \mu, \rho, \Phi]$, where

i P is a set of primes

ii '$\cdot$' is a concatenation operator

iii $Gr(P)$ is a set of terminal strings

iv μ is a set of phrase markers

v ρ is a relation on elements of μ

vi Φ is a mapping from μ into $Gr(P)$

The primes of **P** are drawn from a finite vocabulary of symbols, divided into terminal and nonterminal elements.[12] The relation ρ, read 'represents', establishes a hierarchical ordering on phrase markers. The set terminal primes P' is defined in terms of μ, as the set of strings that stand in the represent relation to some other strings.

The sets and relations introduced above are subject to additional constraints, which Chomsky (1955:175f) states as axioms. Relevant axioms are repeated in (4) below.

[12]The mnemonic category symbols S, NP, VP, etc., make up the nonterminal vocabulary, while the terminal vocabulary includes grammatical morphemes like *Past* and *Progressive*, the zero morpheme Ø, the boundary symbol #, along with lexical formatives such as *cotton* and *red*. For discussion of this classification, see Chomsky (1965:65). Chomsky (1965) adds the phonologically empty terminal Δ, and in more recent work (e.g. Chomsky (1981)) considerably expands the inventory of ostensibly distinct phonologically null elements.

4 **A1** ρ is irreflexive, asymmetrical, transitive and nonconnex.

A2 If p is prime, $p \in P'$ iff there are X,Y such that $X \cdot p \cdot Y \in Gr(P)$.

A3 $p \in P'$ or there is an $X \in P'$ such that $(p,X) \in \rho$.

A4 if p is prime and $X \neq \epsilon \neq Y$ then $(X \cdot Y, p_1 \cdot p_2, \ldots, \cdot p_n) \in \rho$ iff there is a $k < n$ such that either:
a. $(X, p_1, \ldots, \cdot p_k) \in \rho$ and $(Y, p_{k+1}, \ldots, \cdot p_n) \in \rho$, or
b. $(X, p_1, \ldots, \cdot p_k) \in \rho$ and $Y = p_{k+1}, \ldots, \cdot p_n$, or
c. $X = p_1, \ldots, \cdot p_k$ and $(Y, p_{k+1}, \ldots, \cdot p_n) \in \rho$.

A5 There is a unique prime p such that for all $X \in Gr(P)$, $(p,X) \in \rho$. This prime is the element *Sentence* (S).

The first axiom defines ρ to be a strict, nonconnected, partial order, while the fifth requires that a unique element, namely S, stand first in that ordering. The third axiom demands that every prime either be a terminal or represent a terminal prime, while the second guarantees that every terminal occurs in some grammatical terminal string.

However, it is the disjunctive fourth axiom that establishes the link between the top-down order imposed by ρ, and the left-to-right order determined by the concatenation operation. This axiom essentially states that a concatenation of symbols $X \cdot Y$ dominates a string of terminal primes σ just in case each of X and Y either dominates or is identical to a contiguous subsequence of σ, and the concatenation of sequences that are dominated by or identical to X and Y exhausts σ. Discontinuity is barred here by the contiguity requirement on the subsequences of σ, while multidomination will be excluded if k and $k+1$ must be distinct in (A4). Elsewhere, Chomsky (1955:183) defines the notion of a *consistent analysis*, which enforces a general single mother requirement at the

level of constituent analyses by restricting constituent overlap to cases in which one element properly contains another.

2.2.1.1 Constructing Phrase Markers

The stringsets that make up μ are generated by the phrase structure rules of a transformational grammar. More precisely, a phrase marker of a given sentence contains all and only the strings that occur as a line in any of the equivalent phrase structure derivations of that sentence. Derivations are *equivalent* just in case they terminate in the same terminal string σ, and also assign isomorphic structural descriptions to σ (e.g. rewrite the same nonterminals as the same strings, but in a different order). (5b) exhibits a simplified phrase marker for sentence (5a) in which grammatical morphemes are supressed.

5 a. Sam adores Gail.

b. {S, NP·VP, NP·V·NP, Sam·VP, Sam·V·NP,
Sam·adores·NP, Sam·V·Gail, NP·adores·NP,
NP·adores·Gail, NP·V·Gail, Sam·adores·Gail}

The set in (5b) is the union of the eight equivalent derivations of (5a) that differ exclusively with respect to the relative order in which the terminals *Sam*, *adores* and *Gail* are introduced.

The algorithm for constructing phrase markers from derivations is thus trivial: given a (possibly singleton) set of derivations D, the phrase marker corresponding to D is formed by taking the union of the members of D. Similarly, defining a procedure for determining the phrase structure tree induced by a

derivation is relatively straightforward. One such procedure is succinctly stated in McCawley (1968:245). Derivation-to-tree algorithms exploit the fact that consecutive lines l_k, l_{k+1} of a phrase structure derivation will differ, if at all, in that l_k contains at most one (typically medial) nonterminal that is rewritten as a string of symbols in l_{k+1}. This is ensured by a characteristic restriction on the form of phrase structure rules; namely that they may rewrite only a single nonterminal symbol at a time. Hence, by starting with the terminal string of a phrase structure derivation and working successively backwards, it is possible to identify which string of symbols a given nonterminal has been rewritten as. Tracing a derivation backwards in this way determines the dominance ordering of the corresponding tree structure; the precedence relation is likewise supplied by the relative order of symbols and substrings within a line.

However, this procedure will only define a unique tree if supplementary restrictions on the form of production rules are imposed. In particular, various authors have noted that rules of the form illustrated in (6) must be excluded.[13]

6 a. $A \rightarrow \phi A$

b. $A \rightarrow A\phi$

The problem with these rules is that they lead to potential ambiguity that cannot be resolved within a derivation. In a derivation containing the successive lines $\ldots AB \ldots$ and $\ldots ACB \ldots$, it is impossible to determine whether A has been rewritten as AB or B as CB. A more general problem with defining

[13]Rules that rewrite a symbol by the empty string raise analogous difficulties.

either trees or phrase markers in terms of phrase structure derivations is that this introduces considerable duplication, since the weak and strong output of a grammar is represented twice: once in the derivation, and redundantly in the associated tree or stringset.

2.2.1.2 Reduced Phrase Markers

Conversely, phrase markers also incorporate redundancy by virtue of the fact that they 'sum up' all of the equivalent derivations generated by a grammar. The reduced phrase markers (RPMs) of Lasnik and Kupin (1977) provide a string-based representation that eliminates much of the redundant information represented in stringsets like (5b). Lasnik and Kupin's basic insight is that strings containing more than one nonterminal symbol can be removed from a phrase marker without any resulting ambiguity, since the information that they express can invariably be recovered by comparing the terminal string of the phrase marker with one or more strings that contain exactly one occurrence of a nonterminal symbol. This procedure can be illustrated with reference to the RPM in (7), corresponding again to the sentence in (5a).

7 {S, NP·adores·Gail, Sam·VP, Sam·V·Gail, Sam·adores·NP, Sam·adores·Gail}

Strings containing a single nonterminal are called *monostrings*; each nonterminal symbol that occurs in a string of (5b) occurs in exactly one monostring of (7). The structural equivalence of (5b) and (7) results from the fact that

the categorial membership of any part of the terminal string in (7) can be determined by comparing the terminal string with some monostring in (7). For example, a comparison of *Sam·adores·Gail* with *NP·adores·Gail*, *Sam·VP* and *S* reveals that *Sam* is a NP, *adores·Gail* is a VP, and *Sam·adores·Gail* is an S. From this, we can deduce that the string *NP·VP* is an S. The general effectiveness of this procedure eliminates the need for strings with more than one nonterminal.

Lasnik and Kupin define RPMs directly in terms of the primitive domination, precedence and *is* a^* relations in (8), rather than derivatively in terms of reductions of full phrase markers.[14]

8 where $\phi = \mathrm{xAz}$; $\phi, \psi \in \mathcal{P}$:

i. y *is* a^* ϕ in $\mathcal{P}$ if $\mathrm{xyz} \in \mathcal{P}$.

ii. ϕ *dominates* ψ in $\mathcal{P}$ if $\psi = \mathrm{x}\chi\mathrm{z}$, $\chi \neq \epsilon, \chi \neq \mathrm{A}$.

iii. ϕ *precedes* ψ in $\mathcal{P}$ if y *is* a^* ϕ in $\mathcal{P}$, and $\psi = \mathrm{xy}\chi$, $\chi = \mathrm{z}$.

The *is* a^* relation incorporates the procedure informally presented above.[15] Dominance and precedence are directly defined on the strings contained within an RPM, and only derivatively specified for occurrences of symbols in a string. The requirement that χ must be distinct from A in (8ii) entails that dominance is irreflexive; precedence is similarly irreflexive, due to the final condition in (8iii). However, dominance is symmetrical in the case that χ is a single nonterminal, a case that figures in the discussion below.

[14] The character $\mathcal{P}$ ranges here over arbitrary sets.

[15] This relation is the converse of Chomsky's (1955:173) *represents* relation ρ, defined in (4).

Yet this more economical representation of constituent structure nevertheless retains many of the characteristics of phrase markers. In particular, RPMs, like phrase markers, provide a consistent analysis; namely one in which constituents overlap just in case one includes the other. This wellformedness condition follows from the definition of RPMs repeated in (9), where A represents a single nonterminal, and z a string of terminals.

9 $\mathcal{P}$ is an RPM if there exist A and z such that

A $\in \mathcal{P}$ and z $\in \mathcal{P}$; and if $\phi, \psi \in \mathcal{P}$,

either ϕ dominates ψ in $\mathcal{P}$,

or ψ dominates ϕ in $\mathcal{P}$,

or ϕ precedes ψ in $\mathcal{P}$,

or ψ precedes ϕ in $\mathcal{P}$.

Partial overlap is excluded by the requirement that every pair of strings in an RPM stand in either a dominance or precedence relation: partially overlapping strings would be ordered by neither relation.[16]

In addition, the *LSLT* prohibition against discontinuity is enforced by the condition that all elements in an RPM other than the terminal string must be monostrings. Nonterminals (aside from S) that dominate noncontiguous terminals cannot occur in monostrings, since they cannot be totally ordered with respect to the terminals that they fail to dominate. For example, the diagram in (28b) below cannot be associated with any wellformed RPM. Although the

[16]These requirements are transparent stringset counterparts of the wellformedness constraints imposed by Wall (1972).

single nonterminal S, and the terminal string *abc* are unproblematic, there is no obvious means of incorporating a monostring that includes the discontinuous nonterminal *A*. Conditions that prohibit discontinuity and multidomination are thus natural, if not necessary, restrictions within a monostring-based theory of phrase structure, as discontinuous and overlapping analyses are not unambiguously representable in terms of stringsets. However, if, as argued below, constructions in natural language instantiate such patterns, it follows that RPMs, as well as possibly other string-based theories, cannot adequately model syntactic structure.

2.2.1.3 Properties of Strings

Moreover, there are various disadvantages associated with string-based models of phrase structure. From a purely practical standpoint, strings and stringsets are extremely cumbersome objects, as the definitions of precedence and dominance in (8) illustrate. Much of the gratuitous difficulty arises due to the awkward and unintuitive way in which simple notions such as an occurrence of a substring must be defined. In *LSLT*, for example, Chomsky exploits a technique due to Quine (1951:297), and defines *occurrence* in the following manner.[17]

10 Z is an *occurrence* of X in Y if there is a W_1, W_2 such that $Y = W_1 \cdot X \cdot W_2 = Z \cdot W_2$

[17]The alternative inscriptional concatenative account that Chomsky (1955:110) considers appears in essential respects to be a notational variant of an arboreal theory.

This definition uniquely identifies an occurrence of a simple substring X in Y with the substring of Y that ends in X. Thus, in Chomsky's example (11a), the second occurrence of *York* is the substring in (11b).

11 a. New·York·City·is·in·New·York·State

b. New·York·City·is·in·New·York

c. in·New·York, is·in·New·York, City·is·in·New·York,...

However, as Chomsky notes, (11b) is also, simultaneously, an occurrence of each of the complex substrings conforming to the pattern in (11c). The use of strings thus considerably complicates the statement of structural relations like c-command that need to refer to particular occurrences of constituents.[18]

A more serious shortcoming concerns the massive redundancy that Lasnik and Kupin's theory shares with the *LSLT* system. Although they define RPMs directly, Lasnik and Kupin do not provide an explicit procedure for constructing RPMs directly from phrase structure rules or any other generating device. Consequently, RPMs are, like phrase markers, parasitic on phrase structure derivations. Given a set of derivations D, the RPM corresponding to D can be defined as the set containing the single nonterminal and terminal string common to each element of D, as well as each monostring that occurs in any member of D.

[18] I am unaware of any attempt to state such relations in terms of the ostensibly normative stringset models of phrase structure, though see Chametzky (1987) for a version of c-command formulated within a modified stringset model.

Since no particular derivation is likely to include all of the required monostrings, RPMs cannot in general be constructed from a single derivation.[19]

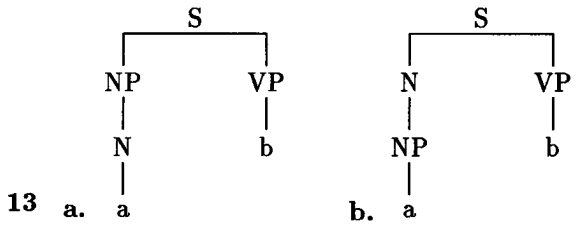
Derivations represent somewhat more information than trees, labelled bracketings or stringsets, since, unlike each of these, derivations encode the order in which strings are rewritten. However, the fact that this additional information never seems to play any significant syntactic role suggests that derivations can (and presumably should) be dispensed with in favour of more parsimonious representations. As we will see below, derivations can be straightforwardly eliminated from the generation of trees. However, it is unclear that an analogous elimination is feasible in the case of RPMs. There is no familiar interpretation of phrase structure rules that would sanction the construction of an RPM. Moreover, given that such stringsets must be defined in terms of more than one derivation, it is difficult to see how a direct specification of RPMs would be formulated.

Notice, incidentally, that the fact that some information is apparently 'lost' in the process of constructing RPMs from derivations does not appreciably minimize this redundancy. Lasnik and Kupin remark that both of the trees in (13) (among others) would be 'associated' with the RPM in (12).[20]

12 {S, NPb, Nb, aVP, ab}

[19]It is intuitively obvious why this is so. Leftmost derivations that consistently rewrite the leftmost nonterminal of a string will typically lack a monostring of the form $A\phi$, while rightmost derivations will lack some monostring of the form ϕA.

[20]In the following trees I have substituted NP for Lasnik and Kupin's A, N for C, and VP for B.



As noted above, the dominance relation in RPMs is symmetric for pairs of strings σ_1, σ_2 that differ only in that a single nonterminal in σ_1 is replaced by a distinct single nonterminal in σ_2.[21] Consequently, there is no way of distinguishing the relative 'height' of NPb and Nb in (12). In this respect, RPMs 'lose' information represented in the derivations they are constructed from, since a phrase structure derivation (and the corresponding tree) would unambiguously indicate which of N and NP had been rewritten first.[22]

Given that there is no reason to define trees off of RPMs, the fact that the 'association' between RPMs and trees is nonunique will never lead to troublesome ambiguity. Moreover, notice that while the examples above suggest that RPMs as objects represent less information than a conventional tree structure, this does not substantially affect the fact that a model of phrase structure that countenances rules, derivations and RPMs represents significantly more extraneous information than an arboreal theory containing just rules and trees. Conditions or conventions that prohibit reference to redundant information do not

[21] Lasnik and Kupin assert that the definition of 'dominates' can be set up in such a way that NP and N either stand in a symmetrical dominance relation or are unordered by dominance. However, the latter alternative entails a revision of the conditions in (9), as NP and N would fail to be ordered either by dominance or precedence.

[22] The current status of the unary left branches in (13) is somewhat unclear; if it turns out that such branches are required for some purpose, this would provide another respect in which RPMs are descriptively inadequate.

eliminate this redundancy, which seems fully analogous to the overlap between rewrite rules and subcategorization frames noted in Heny (1979b:339-40).

2.2.2 Transformational Descriptions

In sum, the normative status of string-based definitions of phrase markers can be seen to owe more to the central role occupied by rewrite rules and phrase structure derivations in early transformational grammars than to the inherent representational properties of strings and stringsets. Likewise, many of the constraints imposed on phrase markers in Chomsky (1955) and Lasnik and Kupin (1977) are effectively artifacts of restrictions on the strong generative capacity of phrase structure grammars. The ultimate source of prohibitions against discontinuity and multidomination in such grammars can, as noted earlier, be traced ultimately to the string rewrite interpretation of phrase structure rules.[23] However, these constraints are not confined to the output of the base component of a transformational grammar, but are rather elevated to the status of general wellformedness conditions by the definition of transformations as functions from phrase markers into phrase markers. This conception of transformations is most clearly articulated in the following passage from Chomsky and Miller (1963).[24]

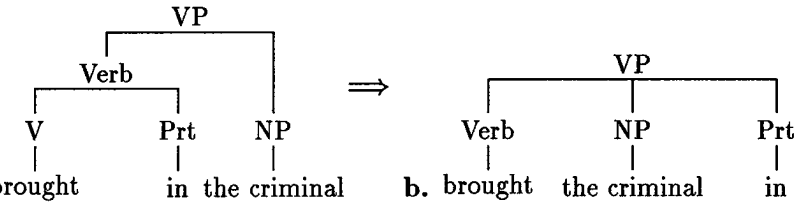
[23]These constraints have, incidentally, been wholly unaffected by the $\bar{X}$ decomposition of parochial phrase structure rules into acategorial, language-independent, templates, since the resulting $\bar{X}$ systems have tended simply to inherit the underlying model of phrase structure associated with rewriting systems.

[24]A similar position is expressed in Chomsky (1961:16,19), although Chomsky vascillates somewhat on this point. Thus, as acknowledged in Chomsky (1955:311), the output of transformations are not necessarily phrase markers in the *LSLT* system.

> It seems evident, therefore, that a transformational rule must apply to a fully developed P-marker, and, since transformational rules must reapply to transforms, it follows that the result of applying a transformation must again be a P-marker, the *derived* P-marker of the terminal string resulting from the transformation. A grammatical transformation, then, is a mapping of P-markers into P-markers. (p.301)

Just as phrase markers consist of sets of strings, transformational descriptions comprise sets of phrase markers. Yet the descriptive limitations of standard phrase structure markers are not wholly overcome by multi-level transformational descriptions. The undermotivated and generally counterintuitive properties of such descriptions are especially clear in connection with various of the constructions that Chomsky identifies as resistant to immediate constituent analysis. Recall that Chomsky (1955,1957) analyzes a verb phrase like *brought the criminal in* as the output of a transformation T^{ob}_{sep} that applies to an underlying structure in which *brought in* is analyzed as a complex verb. The relevant input and output structures are provided in (14), adapted from Chomsky (1961:23).

14



a. **b.**

These diagrams perspicuously illustrate how constituent order variation may determine corresponding constituent structure variation. That is, while the verb phrase of a sentence like *The police brought in the criminal* will be assigned

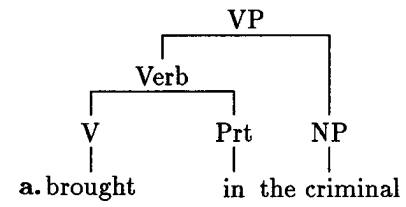
the structure in (14a), the VP of *The police brought the criminal in* will be associated with (14b). The principal justification that Chomsky (1961) offers for the derived structure in (14b) is that it eliminates the superfluous structure that would, he suggests, be assigned by a binary-branching description.

> [14] illustrates a characteristic effect of permutations, namely, that they tend to reduce the amount of structure associated with the terminal string to which they apply. Thus, while [14a] represents the purely binary structure regarded as paradigmatic in most linguistic theories, in [14b] there is one less binary split and one new ternary division; and Prt is no longer dominated by Verb. Although binary divisions are characteristic of the simple structural descriptions generated by the constituent structure grammar, they are much more rarely found in P-markers associated with actual sentences. A transformational approach to syntactic description thus allows us to express the element of truth contained in the familiar theories of immediate constituent analysis, with their emphasis on binary splitting, without at the same time committing us to the arbitrary assignment of superfluous structure required by such theories. (p.23)

Chomsky's argument for the ternary-branching analysis in (14b) amounts in effect to the observation that neither *brought the criminal* nor *the criminal in* form plausible subconstituents.[25] Yet the force of this argument depends crucially on the assumption that constituents must be comprised of contiguous expressions. Relaxing the gratuitous prohibition against discontinuity permits the structurally isomorphic descriptions in (15).

[25] Similar reasoning underlies flat analyses of verb-particle constructions, as well as more recent, typically binary-branching, REST analyses that derive constructions like *brought the criminal in* from *brought in the criminal* by means of a trace-depositing movement rule.

15 **a.**



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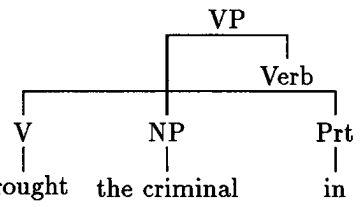


These diagrams, which in essential respects represent the constituent analysis proposed by Wells (1947), directly capture the common intuition that verbs and particles form syntactic constituents.[26]

The motivation for transformational analyses of a varied range of other constructions similarly depends on assuming severe constraints on phrase structure analyses. Consider, for example, information questions, which figure prominently in transformational accounts. As Chomsky (1955) observes, standard phrase markers cannot assign a conventional subject/predicate constituent analysis to interrogatives like (16).

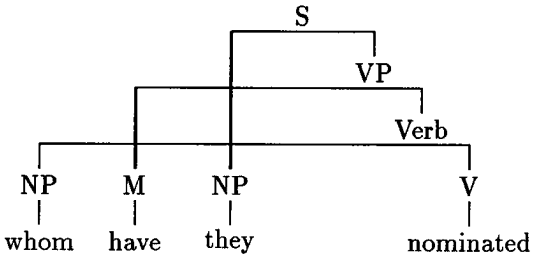
16 Whom have they nominated?

> Investigating various analyses of [16] into two parts, etc., in accordance with the procedures of constituent analysis, it seems that we would not arrive at such conceptions as that of a basic actor-action relation at all. In fact, there seems to be no reasonable way to even begin to construct an intuitively satisfactory P-marker for this sentence. Nevertheless, the subject-verb relation does, clearly, appear in [16], with "they" as the NP subject, and "whom...have nominated" as the verb phrase, with the object "whom" and the verb "have...nominated." But the search for general formal grounds in **P** for such an analysis seems futile and formally unmotivated. (p.304)

[26] A parallel analysis can, if desired, be extended to the other cases of discontinuous dependencies (e.g. putatively discontinuous verbs like *have...en* and *be...ing*) that Chomsky identifies as problematic for phrase structure analysis.

The solution that Chomsky proposes involves associating *wh*-questions with multiple phrase markers, one of which represents a conventional constituent structure. However, the need to resort to multiple representations can again be obviated simply by allowing noncontiguous expressions to be grouped into constituents. Thus, the intuitive structural analysis described in the above passage is unambiguously represented in (17) below.

17



As (17) illustrates, relaxing the *LSLT* prohibition against discontinuity permits single-level representations that essentially combine the underlying constituent structure and the surface constituent order of a multi-level transformational description.

More generally, (15) and (17) indicate how the introduction of discontinuous constituent analyses largely eliminates the need for multiple syntactic representations or, alternatively, null cross-referencing terminals.[27] A more sustained argument for this conclusion is presented below. Further, as McCawley (1968,1982) notes, the task of extending the class of phrase structure descrip-

[27]In contrast, comparison of (14) and (15) illustrates that, while multiple phrase structure trees may often represent much of the same structural information as a representation that directly encodes discontinuity, this approximation is in many cases overarticulated and unrevealing.

tions to include discontinuous structures, which Chomsky dismisses above as "futile and formally unmotivated," is completely straightforward within a graph-theoretic models of phrase structure. Let us accordingly consider graph-based approaches.

2.3 Arboreal Theories

The descriptive limitations of stringsets are characteristic of unidimensional represention of constituent structure, and constrain familiar labelled bracketings as well. In contrast, multidimensional objects, like trees ordered by distinct precedence and dominance relations, are capable of unambiguously representing discontinuous or overlapping constructions. However, the greater descriptive power of doubly-ordered tree structures has rarely been exploited in the generative literature. This is doubtless due, in large part, to the fact that trees, like stringsets, were initially defined in terms of phrase structure derivations, and the fact that trees constructed from the lines of a phrase structure derivation inherit the restrictions associated with stringsets. Later arboreal models, such as those presented in Zwicky and Isard (1963) and Wall (1972), which provide a direct definition of the class of constituent structure trees, nevertheless retain the restrictions characteristic of trees built up from phrase structure derivations. Yet this is an inessential feature of these theories, as the axioms that exclude

discontinuity and inconsistency are logically independent of other axioms and are not required to ensure that trees provide coherent or unambiguous analyses.

2.3.1 Trees

The linguistic objects known as *trees* are standardly defined as rooted, oriented, acyclic, digraphs.[28] The earliest linguistic definition of arboreal structures, proposed by Zwicky and Isard (1963), places additional restrictions on the standard definition of trees, in addition to incorporating some minor terminological changes.[29] The relevant clauses of their (first order) definition of a labelled, ordered, tree are given in (18) and (19).[30]

[28] Where a *digraph* (or *directed graph*) (V,E) consists of a finite set V of *vertices* and a set E of pairs of vertices, termed *arcs*. An arc from u to v is represented by $u \rightarrow v$, in which u is the *predecessor* of v, and v the *successor* of u. A *path* in a digraph is a sequence of vertices $v_1, v_2, \ldots, v_n, n \geq 1$, such that there is an arc $v_i \rightarrow v_{i+1}$ for each $i, 1 \leq i < k$. A pair of vertices v_1 and v_2 are said to be *connected* in a graph just in case either $v_1 = v_2$ or there is a path from v_1 to v_2 (or v_2 to v_1). A connected graph is then one on which every pair of vertices is connected, i.e., one on which it is possible to get from one vertex to any other without repeating any edge or vertex. A digraph is, moreover, *rooted* if there is one vertex, the *root*, that has no predecessor, and which is connected to each vertex. If every vertex other than the root has a unique predecessor, the digraph is *nonlooping*. Moreover, in an *oriented* (or *ordered*) digraph, the successors of each vertex are assigned a right-to-left order.

[29] Vertices are identified as *nodes* and arcs termed *branches*. Successors are called *daughters*, predecessors *mothers*, and successors of the same mother are *sisters*.

[30] Zwicky and Isard also provide a second order definition that takes the immediate precedence and immediate dominance relations as primitive.

18 A *tree* is an ordered quintuple (N, L, D, P, Q), where

N is a finite set of *nodes*

L is a finite set of *labels*

D is a transitive, asymmetric relation on N

P is a transitive asymmetric relation on N

Q is a total function from N into L.

The sets N and L of nodes and labels, the precedence relation P and dominance relation D, and the labelling function Q are constrained by additional conditions, which include (19a)–(19e) below.

19 a. $Rx =_{def} (\forall y \in N)(x \neq y \rightarrow xDy)$

b. $(\exists x \in N)(Rx)$

c. $xIy =_{def} xDy \wedge \neg(\exists z \in N)(xDz \wedge zDy)$

d. $(\forall x, y \in N)(\neg Rx \rightarrow (\exists y \in N)(yIx))$

e. $(\forall x, y \in N)(xPy \rightarrow (\exists z \in N)(zIx \wedge zIy))$

(19a) defines the *root* of a tree as the node that dominates every other node in N; (19b) states that there is exactly one root. (19c) defines the immediate domination relation I. (19d) guarantees consistency, by requiring that every node other than the root be immediately dominated by a unique node. Continuity is enforced by (19e), which restricts the precedence relation to sister nodes.

In Wall's (1972) formulation, the domination and precedence relations are defined as partial orders whose union totally orders the nodes of a tree. The precedence relation is characterized as a strict (irreflexive, transitive and asymmetric) order, while the dominance relation is specified as a weak (reflexive,

transitive and antisymmetric) partial ordering.[31] Since dominance is reflexive, the *single root condition* in (20a) can drop the distinctness qualification in (19a) and require just that a unique node dominate each node in a tree.

20 a. $(\exists x \in N)(\forall y \in N)(xDy)$

b. $(\forall x, y \in N)((xPy \vee yPx) \equiv (\neg xDy \wedge \neg yDx))$

c. $(\forall w, x, y, z \in N)((wPx \wedge wDy \wedge xDz) \rightarrow yPz)$

Wall's remaining conditions achieve some economy in imposing continuity and consistency requirements. His *exclusivity condition* in (20b) states that a pair of nodes stand in a precedence relation whenever neither dominates the other, while the *nontangling condition* in (20c) states that one node precedes another in a tree only if all the nodes dominated by the first node precede all the nodes dominated by the second node. Together, these axioms exclude all tree structures in which branches cross or converge.

2.3.1.1 Linked Trees

The generative literature also contains a number of proposals defining nonstandard arboreal models. Multidomination is admitted either through the relaxation of conditions that ensure consistency, or through the introduction of a supplementary dominance relation. The latter strategy is perhaps most clearly pursued in the model of Phrase Linking Grammar associated with Peters and

[31] The labelling function Q remains *total* but not *onto*, so that while every node must be assigned a unique label, not every label must be assigned to some node.

Ritchie.[32] In the variant of PLG that Engdahl (1986:44f) considers, a *linked tree* is defined as a labelled structure ordered by a pair of distinct dominance relations and a partial precedence function. The definition she provides is repeated below.

21 A linked tree is a finite set N of nodes (vertices) together with binary relations I (of immediate tree domination) and L (of immediate link domination) on N, and functions P (of left-to-right precedence and f (which labels nodes with vocabulary symbols) having domain N and ranges contained respectively in N × N and V_T × V_N satisfying conditions (i)–(v):

(i) *Linear Precedence Ordering of Siblings:*
P(n) is a strict linear ordering of $\{m| < n, m > \in I \cup L\}$
for all n in N,

(ii) *Root:*
there is an r in N such that $< r, n > \in I^*$ for all $r \in N$,

(iii) *Unique Tree Parent:*
I^{-1} is a partial function defined just at members of N – $\{r\}$,

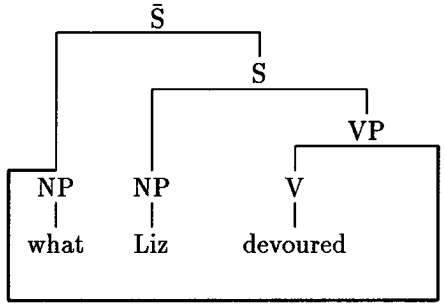
(iv) *Tree Parent Dominates Link Parent(s):*
if $< n, n' > \in L$, then there are $m_0, \ldots, m_p \in N$ $(p > 0)$
such that $m_1 \neq n', m_p = n, < m_0, n' > \in I$, and $< m_i, < m_{i+1} > \in I$
whenever $0 \leq i \leq p$ for all $n, n' \in N$,

(v) *Node Labelling:*
$f(n) \in V_N$ iff there is an n' such that $< n, n' > \in I \cup L$, for all n in N

Conditions (21i)–(21iii) and (21v) are variants of standard arboreal constraints discussed above, while the condition in (21iv) ensures that the tree parent of a multidominated node will be hierachically superior to the link parent.

[32]Discussion of Peters and Ritchie's model of Phrase Linking Grammar is complicated somewhat by the lack of a definitive exposition of the theory. Hence I will provisionally identify the model of grammar summarized in Engdahl (1986) as 'Phrase Linking Grammar', even though it may not necessarily represent the authors' current views.

A linked tree for a representative embedded question is given in (22), in which link domination is represented by the bold line connecting the VP node to the dislocated object.



22

As this diagram illustrates, linked trees can essentially be viewed as variants of REST structural descriptions in which a coindexing relation is explicitly incorporated into the definition of a tree.[33]

The central innovation of PLG appears to be the postulation of distinct link domination and tree domination relations. Yet, the basic motivation for positing two distinct relations, as opposed to relaxing the conventional constraints on a single dominance relation, is not clearly articulated in Engdahl's presentation of PLG. Moreover, insofar as I can tell, neither the constructions she examines, nor the analyses she presents, are directly affected by this choice. Nevertheless, the linked trees of PLG make explicit some of the properties of multidomination structures. For example, linked trees perspicuously represent the fact that such

[33]This correspondence is reinforced by restrictions that Engdahl informally proposes on the distribution of multidominated structures; essentially that they be confined to designated dislocated positions such as an S-peripheral Comp position.

structures fall within the class of *planar graphs*; that is, graphs that can be drawn in the plane in such a way that branches cross only at a node.[34]

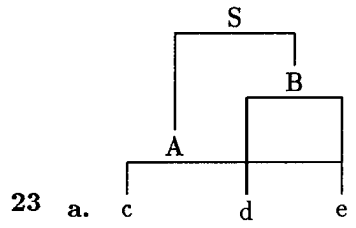
2.3.1.2 Semitrees

Sampson (1975), in contrast, admits multidomination by relaxing the single mother (i.e. nonlooping) condition, arguing that this revision extends the strong generative capacity of the base of a transformational grammar in a useful and revealing manner.[35] Sampson terms the class of structures admitted by this relaxation *semitrees*, and suggests that the use of multidominated semitrees considerably simplifies a number of previous transformational analyses of control, verb phrase ellipsis and pronominalization.

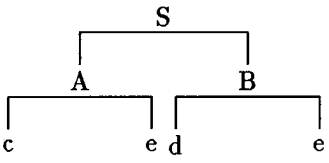
Moreover, Sampson (1975:3) conjectures that the proposed revision

> does not affect the 'weak generative capacity' of a PS grammar: given our definition of 'exponent', the same string 'cede' is the exponent of both [23a] and [23b].

23 a.



b.



[34] A similar property characterizes the discontinuous structures proposed by O'Grady (1987). It may be that the minimal constraints imposed on linked trees are too restrictive. Thus, Yatabe (1987) argues that the the sentence *Who do you think, and who don't you think that John will see?* cannot be represented as a linked tree, since both occurrences of *who* will both be dominated by the VP node in the Right Node Raised clausal complement.

[35] A similar proposal is made by Hudson (1976) in the context of a model of syntax that supplants constituency (i.e. dominance) relations with a dependency relation. Although there are familiar correspondences between dependency grammars and phrase structure grammars consideration of the alternative that Hudson suggests would carry us too far afield.

The yield definition proposed by Sampson (1975:1) is repeated below, with minor terminological modifications.[36]

24 where $\phi,\psi_1,\ldots,\psi_n$ are labelled nodes

i. $\xi(\phi) = Q(\phi)$ if ϕ is a terminal node

ii. $\xi(\phi) = \xi(\psi_1)\cdot\xi(\psi_2),\ldots,\cdot\xi(\psi_n)$ if ϕ is a nonterminal such that for all $1 \leq i \leq n$, $\phi I \psi_i$ and $\psi_i P \psi_{i+1}$

The recursive clause of this definition ensures that the yield of multidominated constituents will, as Sampson desires, be iterated in semitrees.[37]

2.3.1.3 Tangled Trees

The model of phrase structure presented in McCawley (1968,1982) differs from those above in sanctioning discontinuous but not multidominated representations. Specifically, McCawley's axiomatization admits discontinuous trees by replacing Wall's (20b) and (20c) by conditions (25b) and (25c) below. The former states that that P and D are disjoint without requiring that they be exhaustive, whereas the latter condition defines a precedence ordering between nonterminal nodes just in case the nodes they dominate stand in the same relation.

[36] Sampson's 'exponent' corresponds to the more familiar notion 'yield', while his definition assumes an irreflexive dominance relation, which is inessential. The yield function ξ is defined above in terms of the labelling function Q, the immediate dominance relation I, the precedence relation P and the concatenation operator '$\cdot$'.

[37] Although permitting multidomination may not increase weak generative capacity, requiring multidomination can substantially affect weak generative capacity. As Marsh (1987) remarks, mother-and-daughter grammars that admit unboundedly looping semitrees can generate the family of languages $\{x^n : x \in \{a,b\}^+\}$ for any fixed positive integer n.

25 a. $(\forall x, y, z \in N)((xIz \wedge yIz) \rightarrow x = y)$

b. $(\forall x, y \in N)(xDy \rightarrow (\neg xPy \wedge \neg yPx))$

c. $(\forall x, y, z, w \in N)(xPy \equiv ((xDz \wedge yDw) \rightarrow zPw))$

d. $(\forall x, y \in N)(x \in T \equiv (xDy \rightarrow x = y))$

e. $(\forall x, y \in T)(x \neq y \rightarrow (xPy \vee yPx))$

Conditions (25d) and (25e), respectively, define the set of *terminal nodes* T as those nodes that dominate only themselves, and state that the precedence relation totally orders the terminal nodes of a tree.

By adopting the *nonlooping condition* (25a), which states that all nodes must have a unique mother, McCawley excludes inconsistent trees.[38] Thus, although (15b) and (17) are trees, the structures in (22) and (23b) are not. Numerous other proposals make essentially this split: for example the axiomatization in Higginbotham (1985), and the proposals in van Riemsdijk (1982) and Vergnaud and Zubizarreta (1982).

Yet although McCawley restricts the appelation 'tree' to graphs that obey the single mother condition, this essentially terminological decision has no practical consequences, since he does not require that syntactic descriptions must be representable as trees. In particular, multidominated nontrees figure prominently in McCawley's (1982,1987) treatment of RNR constructions in English. Nonetheless, the intended interpretation of these structural descriptions differs

[38] The immediate dominance relation I is defined in (19c) above, although McCawley in fact takes I as primitive and defines D as its minimal reflexive, transitive closure.

from semitrees in that the yield of multidominated nodes is counted only once in the calculation of the yield of any larger structure containing them.[39]

2.3.2 Mobiles

The following chapters explore some empirical consequences of adopting a model of phrase structure that sanctions both discontinuous and multidominated structures. The primitive objects of this model, termed *mobiles*, are, like trees, rooted, acyclic, labelled digraphs, specified in terms of the components in (26).

26 A *mobile* is an ordered quintuple (N, L, D, P, Q), where

N is a finite set of *nodes*

L is a finite set of *labels*

D is a weak partial *dominance* order in $N \times N$

P is a strict partial *precedence* order in $N \times N$

Q is a *labelling* function from N into L.

The weakened conditions that restrict the sets and relations in (26) are summarized in (27). (27a)–(27d) are essentially McCawley's axioms, without the inert nonlooping condition (25a). (27a) is the familiar single root condition. (27b) repeats McCawley's definition of the terminal nodes or *leaves*; (27c) is his condition that the terminals are connected by the precedence relation. (27d) is

[39]This interpretation of multidominated structures can be obtained by replacing Sampson's definition in (24) with a convention that the yield of a structural description is the concatenation of (the labels of) its terminal nodes.

the disjointness condition that McCawley adopts to ensure that nodes ordered by the dominance relation are unordered by precedence. Condition (27e), the *precedence inheritance condition*, restricts precedence to nodes whose descendants stand in the same relation.

27 a. $(\exists x \in N)(\forall y \in N)(xDy)$

b. $(\forall x \in N)(x \in T \equiv (\forall y \in N)(xDy \rightarrow x = y))$

c. $(\forall x, y \in T)(x \neq y \rightarrow (xPy \vee yPx))$

d. $(\forall x, y \in N)(xDy \rightarrow (\neg xPy \wedge \neg yPx))$

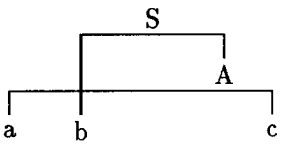
e. $(\forall x, y \in N)(xPy \equiv (\forall z, w \in N)((xDz \wedge yDw) \rightarrow zPw))$

f. $(\forall x \in N)(\exists y \in T)(xDy)$

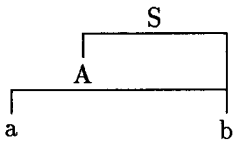
McCawley's conditions are here supplemented by condition (27f), which, like the *LSLT* axiom **A3**, requires every node to dominate a terminal.[40]

The fact that (27d) requires the domination and precedence orderings to be disjoint but not exhaustive permits mobiles with the discontinuous structure in (28a).

28 **a.**



b.



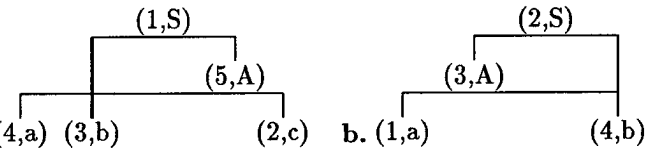
Moreover, relaxation of the nonlooping condition admits converging structures like (28b), in which the node b is immediately dominated by both S and A.

[40] This amounts to an arboreal statement of the condition that ω must be distinct from the empty string ϵ in rewriting rules of the form $\alpha A \beta \rightarrow \alpha \omega \beta$.

2.3.2.1 Representing Mobiles

The only properties that we require of nodes is that they be distinguishable. Hence, we can simply represent such objects as integers, and characterize the nodes of a mobile as a finite subset of the positive integers. Accordingly, the mobiles in (29) provide somewhat more articulated structures corresponding to the 'shorthand' diagrams in (28).

29



The sets and relations in (30) below represent the same structures explicitly in terms of the components specified in (26).

30 a. $N = \{1,2,3,4,5\}$

$L = \{S,A,a,b,c\}$

$D = \{(1,1),(1,5),(1,4),(1,3),(1,2),(5,5),(5,4),(5,2),(4,4),(3,3),(2,2)\}$

$P = \{(4,3),(4,2),(3,2)\}$

$Q = \{(1,S),(5,A),(4,a),(3,b),(2,c)\}$

b. $N = \{1,2,3,4\}$

$L = \{S,A,a,b\}$

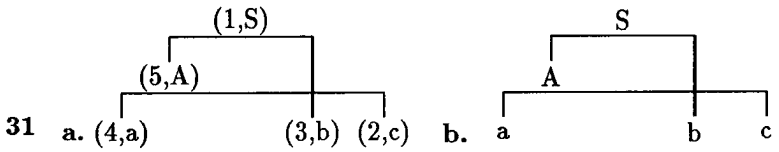
$D = \{(2,2),(2,3),(2,1),(2,4),(3,3),(3,1),(3,4),(1,1),(4,4)\}$

$P = \{(1,4)\}$

$Q = \{(2,S),(3,A),(1,a),(4,b)\}$

Although considerably less perspicuous than the preceeding diagrams, the canonical representations in (30) provide unambiguous specifications of mobiles

that may correspond to a class of diagrams. For example, (29a) and (31a) both represent the structure defined by (30a). Since node 5 does not stand in a precedence relation to any other node (expressed in (29a) and (31a) by the fact that no node is aligned with 5 at the same 'distance' from the root), whether 5 occurs as the 'left' or 'right' daughter of the root is of no consequence.

31 

By extension, the diagrams in (28a) and (31b) will also be treated as equivalent by virtue of the fact that they correspond to the same equivalence class of isomorphic mobiles.

2.3.2.2 Labelling Conventions

Syntactic descriptions will generally be represented by unexpanded diagrams where no ambiguity arises. The terminals of such diagrams will, conventionally, be labelled by words. The syntactic categories that label nonterminals include the traditional inventory of major category labels N, V, A, P, mnemonic for common noun, verb, adjective and adposition, respectively. The remaining mnemonic labels adopted are: Det, Ctz, and M, which abbreviate 'determiner', 'complementizer/subordinating conjunction' and 'modal/auxiliary verb'.

Endowing the set of syntactic category labels with further internal structure represents a means of expressing hypotheses about crosscategorial regularities

which, though not directly relevant to the issues under investigation here, must nevertheless be made sufficiently explicit for the purposes of the following discussion. The mixed $\bar{X}$/categorial notation used below to characterize phrasal categories proceeds from the observation that the bar-level conventions of variants of $\bar{X}$ theory and the type assignment rules of categorial grammars encode essentially complementary information about syntactic constituency. Whereas the bar level of an expression records aspects of its compositional history, type assignments indicate remaining combinatorial options. The central distinction that bar level encodes is *lexicality*, i.e., whether a given label names a lexical item, or a phrasal category.[41] Depending on the number of bar levels allowed, additional distinctions between maximal and various intermediate phrasal categories may also be represented. Standard categorial grammars, in contrast, sort constituents into valence classes, according to the number (and sometimes type) of arguments they may combine with. These classifications are by no means incompatible, and in fact represent opposing perspectives that may be profitably combined.

Accordingly, in what follows I will adopt a hybrid notation that represents features of each classification. Valence is represented in terms of numerical superscripts, while a binary lexical/phrasal distinction is expressed by the presence or absence of the suffix '-P'. Thus V^2 will be the category of transitive verbs, V^2P the category of transitive verb phrases, etc. A pair of abbreviations are

[41] See Kornai and Pullum (1990) for discussion of lexicality and other familiar $\bar{X}$ principles.

also employed: VP for V^1P and S for V^0P. Moreover, if auxiliary and nonauxiliary verbs are distinguished by a diacritic feature ±AUX, the label M can be regarded as shorthand for a complex symbol V^1[+AUX]. As well, the essentially diacritic label $\bar{S}$ is retained for subordinate clauses. Although this brief outline leaves much unspecified, and makes use of a descriptively impoverished notation that will ultimately have to be enriched in various respects, it is articulated enough for present purposes.

2.4 Constituency Diagnostics

To compare the constituent analyses assigned by alternative syntactic descriptions, we require a stock of structural tests. Thus, let us briefly digress to review familiar constituency tests and identify those structural diagnostics that will recur in subsequent discussions.

Since the hierarchical organization of the words of a sentence is less susceptible to direct observation than their linear order, the determination of constituent structure is inevitably somewhat indirect and theory-bound. The most common tests involve syntactic phenomena that exhibit a presumed structure-sensitivity. Restrictions on coordination and substitution procedures provide the most familiar and theory-neutral tests for syntactic constituency. The tests based on these procedures evaluate the constituent status of a given sequence σ of words in a sentence S_1 in terms of the grammaticality of another sentence S_2 in which

σ either occurs as a conjunct or else is replaced by a pro-form. In transformational accounts of coordination and ellipsis, the constraints on these processes are assimilated to a general condition that limits the elements that may occur as terms in a transformational rule to single constituents.[42] This condition gives rise to a family of additional constituency tests that make reference to constraints on classes of movement and deletion transformations.

The resulting diagnostics have been variously formulated and interpreted; sometimes as necessary conditions, sometimes as sufficient conditions, and occasionally as both necessary and sufficient conditions for constituency. Coordination-based tests occupy a prominent role in early transformational studies, though often as a disproof procedure.

> In fact, the possibility of conjunction offers one of the best criteria for the initial determination of phrase structure. We can simplify the description of conjunction if we try to set up constituents in such a way that the following rule will hold:
>
> If S_1 and S_2 are grammatical sentences, and S_1 differs from S_2 only in that X appears in S_1 where Y appears in S_2 (i.e., $S_1 = \ldots X \ldots$ and $S_2 = \ldots Y \ldots$), and X and Y are constituents of the same type in S_1 and S_2, respectively, then S_3 is a sentence, where S_3 is the result of replacing X by $X + \textit{and} + Y$ in S_1 (i.e., $S_3 = \ldots X + \textit{and} + Y \ldots$). (Chomsky (1957), p.36)

This schema asserts that if X and Y are constituents (of the same type), then they can be conjoined, without affirming the converse: i.e., that if X and Y can

[42] Syntactic processes that treat the elements inside a given constituent differently from those that occur outside of it may provide yet another type of indirect evidence for constituency.

be conjoined, then they are constituents. Consequently, while this condition does not provide a means of establishing that a given sequence is a constituent, its contrapositive supplies a useful diagnostic for determining nonconstituency.

The process of pro-form substitution, though not as generally applicable as coordination, offers a positive indication of constituency. Thus, for example, the fact that a wide range of nominal expressions, including definite and indefinite descriptions, relative clauses, etc., can be replaced by an appropriate personal pronoun in English supports the traditional view that they are syntactic constituents. Likewise, restrictions on the classes of sequences that may occur in dislocated positions provide a similar sort of constituency test. On the assumption that only syntactic constituents can be fronted by a movement rule (alternatively, that only a single constituent can occupy designated initial positions), the distibutional properties of a given sequence of words can provide an indication of its constituent status. For example, if we assume that only constituents can be topicalized, the grammaticality of the sentences in (32) suggests that the italicized verb-object seqences form syntactic constituents.

32 a. *Eat pork,* they won't, but *drink wine,* they might.

b. Meg said she would spear eels, and *spear eels* she did.

If we assume that fronting does not alter the constituent status of an expression, this test supports the further conclusion that the initial occurrence of the sequence *spear eels* in (32b) is a also constituent, and, more generally, that nonfinite verb+NP sequences may form syntactic constituents in English.

Notice, however, that each of the examples in (32) contains preposed nonfinite verb forms; topicalization of a finite verb and its direct object is never permitted in English (nor, as far as I know, in any other language).[43]

In contrast, interpretive rules that are sensitive to hierarchical configurations provide more of a general-purpose constituency diagnostic. A central tenet of the syntactic approach to pronominal anaphora developed within the rubric of the Revised Extended Standard Theory is that the antecedent of a reflexive pronoun must be hierarchically superior to the pronoun. More specifically, an antecedent is typically required to *c-command* a dependent reflexive (where a node α is said to c-command a node β just in case every branching node dominating α also dominates β).[44]

Given such a constraint, the anaphoric options of a nominal can be used as evidence of its relative position in a syntactic representation. It follows then that the familiar contrast below motivates the postulation of a constituent that includes a verb and its object but excludes the subject in English.

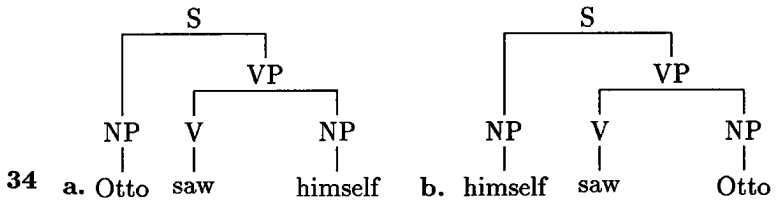
33 a. Otto saw himself.

b. *Himself saw Otto.

The operative structural distinction between these examples is clearly represented in the corresponding trees in (34).

[43]Moreover, as Postal and Pullum (1988) note, not all nonfinite verb phrases may be fronted, as English infinitival constructions introduced by *to* strongly resist preposing.

[44]This antecedent-oriented notion of hierarchical superiority is due to Reinhart (1983), though the converse *in construction with* relation appears somewhat earlier in Klima (1964).



The presence of a VP constituent in these right-branching structures ensures that subject arguments uniformly c-command objects. Hence, *Otto* constitutes an admissible antecedent for *himself* in (33a) but not in (33b).

Another anaphoric asymmetry that is standardly accorded a structural explanation is the contrast between quantificational subjects and objects with respect to the binding of pronouns. As noted by Evans (1977) and Partee (1978), pronouns construed as anaphoric to quantificational noun phrases typically pattern after bound reflexives in requiring c-commanding antecedents. Representative minimal pairs are provided below.

35 a. Everyone$_i$ saw his$_i$ uncle.

b. Who$_i$ saw his$_i$ uncle?

36 a. *His$_i$ uncle saw everyone$_i$.

b. *Who$_i$ did his$_i$ uncle see?

Whereas the quantificational subjects in (35a) and (35b) may serve as the antecedents for possessive pronouns embedded within object position, the quantificational objects in (36a) and (36b) cannot bind pronouns within the subject. The latter cases are examples of what, following essentially Postal (1971) and Wasow (1972), have come to be known as weak crossover violations. Although

there are various and conflicting accounts of this contrast, most of the alternative syntactic analyses rely on the configurational distinction between the (possibly underlying) position of subjects and objects to distinguish the sentences in (35) from those in (36).[45]

Along with constraints on extraction, the locality conditions on bound anaphoric dependencies supply the main structural tests applied in the following chapters. These diagnostics, which are particularly useful in determining the relative position of nominal elements, will be used to probe the configurational structure of a varied range of phrase and clause types, beginning with Celtic transitive clauses.

[45]Postal's (1971) Crossover Constraint and Chomsky's (1974) Leftness Condition are notable exceptions in this regard.

Chapter 3

Constituent Structure in Celtic

The study of phrase structure within generative grammar has predominantly focused more on the form of rules and the structure of rule systems than on the properties of the objects defined by these devices. As well, much of the research directly concerned with the character of syntactic representations is limited by the fact that it articulates essentially substantive universals and constraints while retaining a formal substrate carried over largely intact from early transformational work. For example, a central focus of work on phrase structure has been the search for invariant configurational properties in natural language constructions. The various models of $\bar{X}$ theory are among the most systematic attempts to attribute a degree of common hierarchical structure to expressions both across and within languages. Yet even the general $\bar{X}$ program of decomposing parochial phrase structure rules into acategorial, language-independent templates is basically substantive, if, as has generally been the case, the resulting $\bar{X}$ grammars simply inherit the underlying model of phrase structure

associated with rewriting systems. There is, moreover, a descriptive cost associated with the reluctance to revise the formal universals implicitly incorporated in standard theories of phrase structure. In particular, as McCawley (1982) and O'Grady (1987) among others have recognized, the constraints on these theories significantly interfere with the statement of substantive universals.

The distinguished status generally accorded to subject-medial languages clearly illustrates this point. Of the six possible arrangements of a transitive verb and its nominal subject and object arguments, only SOV, SVO, VOS and OVS lend themselves to a traditional subject/predicate analysis, if the elements of a predicate are required to be contiguous. The fact that a continuity requirement is imposed in familiar generative models of phrase structure effectively precludes the possibility that sentences instantiating the remaining VSO and OSV patterns can contain a surface constituent consisting of the verb and direct object. Hence, orthodox generative accounts are committed to the view that that VSO and OSV languages either fail to instantiate a verb phrase or else realize a VP at a level of representation other than surface structure. This choice is forced by the conflict between the formal universal that all constituent analyses must be representable as trees and the putative substantive universal that all clauses instantiate a binary subject/predicate structure. Adopting the formal universal in this case has further ramifications for a host of issues that depend on the status of verb phrases. These include the locus of $\bar{X}$ principles, and the status of the generalized binary-branching condition implicitly incor-

porated within many versions of $\bar{X}$ theory. As well, the general applicability of configurational definitions of grammatical relations (or functions) is directly affected, as such definitions are keyed to consistent hierarchical distinctions between nominal arguments.

Requiring that syntactic descriptions be representable as conventional tree diagrams leads then to the assignment of distinctive structural analyses for subject-medial languages, since they must either lack constituents instantiated in SVO languages, or else define these constituents surreptitiously at an inscrutable level of representation. Structure-sensitive rules in VSO and OSV languages must likewise reflect the distinctive character of these languages in the qualifications or restrictions on their application. These consequences of adopting trees as normative structures are problematic in several respects. In the first place, as is argued at some length below, both of the available structural alternatives compatible with this choice are empirically unsatisfactory, in that flat ternary-branching analyses are insufficiently articulated while multilevel transformational descriptions are gratuitously overarticulated. Moreover, the typological bifurcation that forces this choice is purely an artifact of the generative prohibition against discontinuity, and has no discernable motivation elsewhere in the grammars of subject-medial languages. Further, the continuity requirement itself lacks any clear empirical basis, as there is no established body of data that supports this constraint.

In contrast, relaxing the constraints on phrase structure that enforce continuity permits, though it does not force, the uniform assignment of subject/predicate constituent analyses, along with the reinstatement of predominantly binary-branching surface structures. More generally, this strategy expands the overall usefulness of structural vocabulary for describing syntactic constructions and phenomena in languages that differ markedly from paradigm SVO cases. This achieves a considerable measure of economy, as it not only reduces the types of structures required but also the motivation for various supplementary non-structural primitives. For example, since discontinuous structures may assign a common hierarchical structure to languages with differing word orders, they facilitate the general application of standard configurational definitions to subject-medial and other seemingly problematic language types. Thus, the adoption of such structures undermines to some degree the argument that cross-linguistic diversity effectively forces the recognition of primitive grammatical relations.

Hence, languages that instantiate subject-medial orders present clear test cases not only for the competing formal and substantive universals above, but also for a variety of related issues. Although the status of OSV as a dominant order remains somewhat controversial (but see Derbyshire and Pullum 1981,1986), there are well-described languages, and even subfamilies, that exhibit a dominant, or even invariant, VSO order. Greenberg's (1966) 30-language sample contains six languages from five language families which are identified as instantiating a dominant VSO order: Berber, Biblical Hebrew (Afro-Asiatic),

Maori (Austronesian), Maasai (Nilo-Saharan), Welsh (Indo-European) and a dialect of Zapotec (Oto-Manguean). The more comprehensive sample of Hawkins (1983) likewise lists Celtic and Polynesian among the subfamilies whose members predominantly conform to a VSO order.

In the following sections I will argue that discontinuous analyses provide the most parsimonious and empirically adequate structural descriptions of VSO clauses in Celtic. This claim is supported by an investigation of the domains delimited by structure-sensitive processes in the Celtic languages, in conjunction with an examination of the word order patterns in finite and ostensibly nonfinite clauses. The recurrence of familiar structure-sensitive asymmetries, especially those involving anaphoric options, is taken as evidence against a flat, ternary-branching analysis, and favouring representations that recognize a verb phrase constituent. Transformational analyses that define a continuous verb phrase at an underlying level of representation are subsequently considered and rejected on the grounds that they postulate syntactically inert structures which simply introduce the need for corrective principles. In contrast, the proposed discontinuous alternative characterizes appropriate hierarchical domains without reference to undermotivated structures. Moreover, by relaxing representational constraints that have the effect of allowing word order variation to dictate the range of possible constituent analyses, such structures confine structural variation largely to the principles that govern constituent order. Thus, theories that

permit such discontinuous representations incorporate stronger substantive constraints on hierarchical structure without sacrificing empirical adequacy.

3.1 VSO Clause Structure

The Celtic languages are by and large paradigm examples of VSO languages, as this order is the dominant pattern in transitive clauses of each language. Moreover, the word order conventions of this subfamily show a high degree of synchronic and diachronic consistency. In particular, the predominantly head-initial phrasal pattern and VSO clausal order exhibited by the modern languages can be traced at least as far back as the various Old and Middle Celtic languages. As Hawkins (1983), citing Friedrich (1975), remarks

> The most stable Indo-European subfamily with respect to word order is probably Celtic ...which has had throughout its recorded history almost maximal cross-categorial harmony: predominantly noun-initial, predominantly verb-initial, and prepositional orders. (p. 258)

This stability makes the Celtic languages a suitable choice for testing hypotheses about the hierarchical structure of VSO languages and, by extension, subject-medial languages in general.

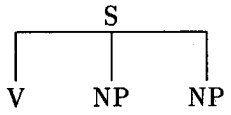
Generative descriptions of Celtic and other VSO languages have tended to pursue one of two dominant strategies. Since neither of the available V-SO or VS-O binary parses of a VSO clause provide an intuitively plausible constituent

analysis, many descriptions of VSO languages from the 1970's invoke the phrase structure rule in (1).[1]

1 $S \rightarrow V\ NP\ NP$

This rule assigns transitive clauses the flat, tripartite analysis in (2), which neither defines a verb phrase constituent, assigns a privileged status to binary-branching constituent analyses, nor distinguishes the hierarchical position of subjects and objects.

2



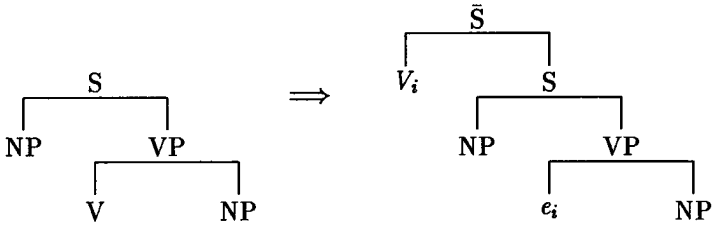
In contrast, more recent transformational studies attempt to reduce the typological isolation of VSO languages by assigning them an underlying level of representation, like the input structure in (3), at which verb phrases are instantiated and a binary-branching condition is typically satisfied.[2] This level is generated either by familiar base rules or by principles obtained through the $\bar{X}$ 'decomposition' of such rules. The surface VSO order is then derived through the application of appropriate movement rules, yielding the output structure in (3).[3]

[1] See, e.g., Awbery (1976) [Welsh], Craig (1977) [Jacaltec], Anderson and Chung (1977) [Breton and Polynesian], McCloskey (1979) [Irish].

[2] See, e.g., Jones and Thomas (1977) [Welsh], Harlow (1981) [Welsh], Emonds (1980), Sproat (1985) [Welsh], Choe (1986) [Berber and Celtic], Chung and McCloskey (1987) [Irish].

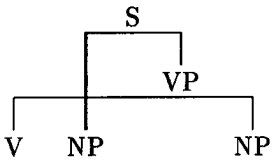
[3] These diagrams collapse some inessential variation in node labelling conventions, and reflect the lack of a consensus regarding the nature of the operative transformational mapping (e.g., whether this involves an adjunction or substitution operation).

3



However, in what follows I will argue that both of the above alternatives are unsatisfactory, and suggest that Irish, Welsh and Breton, arguably the most thoroughly described of the modern Celtic languages, instantiate discontinuous verb phrase constituents of the sort illustrated in (4). The particular analysis that I will present is something of a composite, combining elements of the ID/LP format of GPSG with proposals (variously formulated in Curry (1961), McCawley (1968,1982), Bach (1979), Dowty (1982), Pollard (1984), Huck (1984), among others) for generating discontinuous constituents.[4]

4



Such structures, which simultaneously represent what amounts to underlying constituency and surface word order, are articulated enough to characterize structure-sensitive phenomena in VSO languages without requiring multiple levels of representation. In addition, the dissociation of structure and order that permits the generation of discontinuous structures achieves a measure of economy in capturing word order regularities of VSO languages.

[4]This diagram also illustrates the fact that numerical subscripts will generally be suppressed where possible.

3.1.1 VP-Preposing in Celtic?

Various authors have noted the recurrence of structure-sensitive phenomena in individual Celtic languages. The interpretive asymmetries that are generally ascribed (directly or indirectly) to the presence of a verb phrase in SVO languages similarly characterize Celtic languages with independent reflexive pronouns. Moreover, just as English permits fronting of nonfinite verbs and their direct objects, Celtic typically allows clefting of verbal nouns along with their direct objects. Let us consider the latter phenomenon first, beginning with a review of the clefting options of Breton verbal noun constructions as described by Anderson and Chung (1977) and Press (1986). Anderson and Chung provide examples (repeated in (27) below) indicating that any major clausal constituent can occur initially in a matrix sentence in Breton. Examples like (5) suggest, moreover, that exactly one constituent may precede the initial particle *e/a*.[5]

5 **Hiziv* *e* *Kemper* *e* *tebro* *Yannig* *krampouezh.*
today in Quimper Pt eat-Ft-3Sg Johnny crepes
(Johnny will eat crepes in Quimper today.) [AC:39]

Yet, as (6) shows, the verbal noun in a periphrastic sentence may occupy this initial position, either alone or together with a nonpronominal direct object.

[5]Example sentences drawn from secondary sources are followed by the page and, where applicable, corresponding example number. Orthographic differences between sources have not been regularized. The following abbreviations occur in the attributions: A: Awbery (1976), AC: Anderson and Chung (1977), JT: Jones and Thomas (1977), M: McCloskey (1979), M̄: McCloskey (1983), LL: Lehman and Lehman (1975), P: Press (1986), S: Sproat (1985), St: Stenson (1981).

6 a. *Klask a ra Yann ul levr.*
seek-Vn Pt do John a book
'Seek John does a book.' [P191:17]

b. *Klask ul levr a ra Yann.*
seek-Vn a book Pt do John
'Seek a book John does.' [P191:18]

In light of the illformedness of (5), the grammaticality of the examples in (6) suggests that the initial elements form a single constituent. This conclusion is reinforced by the near-minimal pair in (7).

7 a. *Lenn ul levr brezhoneg a ran bemdez.*
read-Vn a book Breton Pt do-1Sg every-day
'Read a Breton book I do every day.' [AC22:42c]

b. **Lenn Yannig a ra ul levr brezhoneg bemdez.*
read-Vn Johnny Pt do a book Breton every-day
(Johnny reads a Breton book every day.) [AC23:43b]

The cleftlike constructions in (5)–(7) clearly pattern after the corresponding English sentences containing a preposed nonfinite VP. Similarly, as Jones and Thomas (1977) note, a range of verbal noun constructions may occur initially in Welsh clefts. A representative example involving a verbal noun and its nominal argument is given in (8).

8 *Palu'r ardd wnaeth John.*
dig-Vn+the garden did John
'It was dig the garden that John did.' [JT293:27]

In addition, various particle-initial verbal noun constructions may be clefted in Welsh. However, while this latter option is also available in Irish, simple verbal noun constructions consisting of a verbal noun and direct object may not be

clefted. This is illustrated by the ungrammatical Irish reduced cleft counterparts of the wellformed sentences in (6b) and (7a).[6]

9 a. **Leabhar a chuartach a rinne Seán.*
book Pt seek-Vn Pt did Sean
(Seek a book Sean did.)

b. **Leabhar gaeilge a léamh a rinne Seán.*
book Irish Pt read-Vn Pt do Sean
(Read an Irish book Sean did.)

An account for this contrast between Irish and Welsh and Breton is suggested in §3.2.2.2 below. A more fundamental question that arises at this point concerns the categorial status of the verbal noun constructions that figure in the examples above, given that clefting diagnostics test constituency but not category. Although verbal nouns are the nearest Celtic approximation to the nonfinite verbs of other branches of Indo-European (and other language families), they nevertheless exhibit clear nominal properties. In dialects of Irish, verbal nouns follow a nominal declensional pattern, occur with articles and adjectives, govern genitive nominals, and require possessive pronominal objects. Nominal syntactic properties also characterize verbal nouns in Welsh and Breton, which, despite their more verbal nature, retain the ability to occur with articles and prenominal possessive pronouns. This hybrid categorial character of verbal nouns significantly undermines the parallel between the clefting examples above and VP-preposing in English. Moreover, even if we accept that verbal noun constructions are a species of nonfinite verb phrase, this entails

[6]Prefixing an initial copula *ba* in these examples does not improve their status.

nothing about the structure of finite clauses, as finite verbs do not cleft.[7] Thus, in order to probe the hierarchical organization of VSO clauses, it is necessary to examine other structural diagnostics, for example the domains delimited by rules of anaphoric construal.

3.1.2 Anaphoric Asymmetries

Despite the lack of a contiguous VO or OV sequence in finite clauses, the syntactic conditions on the binding of reflexive pronouns in Irish show the familiar distinction between subjects and nonsubjects that, in SVO languages, is commonly attributed to configurational properties. Like their English counterparts, the subjects of finite clauses in Irish may control reflexive objects, though objects may not control reflexive subjects. This basic contrast is illustrated in (10).

10 a. *Chonaic Seán é féin.*
saw Sean him self
'Sean saw himself.'

b. **Chonaic sé féin Seán.*
saw he self Sean
(Himself saw Sean.)

As these examples show, reflexive pronouns are bipartite in Irish, consisting of either a personal or possessive pronoun and the emphatic particle *féin*.[8]

[7] A more detailed discussion of the categorial character of Celtic verbal nouns is provided in §3.2.3.

[8] It is worth noting here that the ungrammaticality of (10b) cannot be explained in terms of a morphological gap, as has sometimes been claimed for similar sentences in English, since nominative reflexive pronouns are morphologically wellformed, and allow an emphatic or honorific use. Accordingly, (10b) is grammatical on an interpretation on which *sé féin* is not construed as anaphoric to *Seán*, but rather refers to, say, the head of a household.

A complementary contrast is characteristic of the anaphoric options of quantified and interrogative antecedents. In Irish as in English, universally quantified NPs in subject position can bind pronouns embedded within the object, whereas universally quantified objects cannot bind pronouns embedded within subject position. The examples in (11) illustrate this asymmetry: in the grammatical (11a), the declarative quantifier *chuile dhuine* 'every person' is the subject, while in the ungrammatical (11b) it is the object.

11 a. *Chonaic chuile dhuine a mháthair.*
saw every person his mother
'Every person$_i$ saw his$_i$ mother.'

b. **Chonaic a mháthair chuile dhuine.*
saw his mother every person
'His$_i$ mother saw every person$_i$.'

Furthermore, the contrast in grammaticality between the two possible interpretations for sentence (12) shows that interrogative quantifiers like *cén dhuine* 'which person' pattern after the universals in (11).

12 *Cén duine a chonaic a mháthair?*
which person Pt saw his mother
'Which person$_i$ saw his$_i$ mother?'
*Which person$_i$ did his$_i$ mother see?

Thus, although direct questions and relatives are typically ambiguous in Irish, the reading on which *cén duine* is interpreted as an object antecedent is unavailable for (12).

Moreover, it is clear that there is not a consistent correlation between the anaphoric options of a given noun phrase and its linear position. In Irish, as in

English, questioning either a subject or object results in a configuration in which the interrogative NP precedes either a subject or object reflexive. Yet, as (13) illustrates, sentence-initial subjects and objects pattern after their postverbal counterparts.

13 a. *Cé chonaic é féin?*
who saw him self
'Who saw himself?'

b. **Cé chonaic sé féin?*
who saw he self
(Who did himself see?)

Likewise, since the grammaticality of the string in (12) depends on whether *cén dhuine* is interpreted as subject or object, we cannot appeal to linear order, which remains constant.[9]

Awbery (1976) reports parallel asymmetries involving reflexive and reciprocal pronouns in Welsh. A representative minimal pair is given in (14).

14 a. *Gwelodd Wyn ef ei hun.*
saw Wyn him 3SgM self
'Wyn saw himself.'

b. **Gwelodd ef ei hun Wyn.*
saw him 3SgM self Wyn
(Himself saw Wyn.)

[9]Invoking phonologically null elements here does not obviously favour a linear analysis, as the question arises for such elements whether their linear order or hierarchical position is responsible for the observed anaphoric asymmetries. In contrast, an account that attributes these asymmetries to a difference between grammatical subjects and objects will be able to make the distinctions required for English and Irish, though at the cost of introducing supplementary, and possibly redundant, primitives.

Further, while Breton lacks independent reflexive and reciprocal pronominal forms, the lexical reflexive *en em* is similarly subject-sensitive.[10]

15 *Ar* *vugale* *en em* *vag.*
the children self feed-3Pl
'The children feed themselves.' [P162]

The examples in (10)–(15) illustrate the same effects that are generally ascribed to the canonically right-branching clausal structure of SVO languages. Hence, to the extent that the asymmetrical interpretive options of subjects and objects provide a reliable diagnostic for configurational structure in SVO languages, the recurrence of these effects supports the postulation of a finite verb phrase constituent in Irish and Welsh. Although this conclusion conflicts with the flat structure in (2), it is compatible with either the transformational analysis represented in (3) or the discontinuous structural description in (4).[11] Accordingly, let us next consider each of these alternatives in turn.

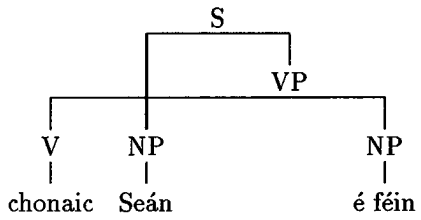
[10]Though this property of reflexive morphemes is perhaps less securely attributable to configurational properties.

[11]There are two obvious strategies for maintaining an account that assigns a ternary-branching structure to transitive clauses in Celtic. On the one hand, separate rules of anaphoric construal can be adopted for subject-medial languages. However, this alternative simply propagates the distinction between subject-medial and other languages to the domain of syntactic rules. Moreover, by allowing clause structure as well as the structure-sensitivity of rules to vary considerably across languages, this position incorporates an unjustifiably pessimistic view of the prospects of formulating substantive universal constraints on hierarchical structure and rule typologies. A less drastically bifurcationist alternative would involve a wholesale reformulation of the various phenomena whose analyses make essential reference to the articulated constituent structures assumed for SVO languages. In either case, the apparent economy achieved through the simplification of constituency relations for VSO or SVO languages is more than offset by the complications this analysis introduces for the description of syntactic phenomena.

3.1.3 Celtic Clause Structure

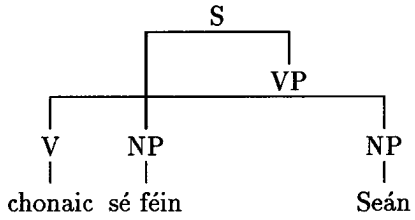
Admitting discontinuous structures provides a direct and parsimonious means of defining finite verb phrase constituents in Irish, as such structures can assign the desired subject/predicate analysis to surface strings without recourse to auxiliary structures. Thus, for example, the diagram in (16) represents the binary subject/predicate constituent structure conventionally assigned to SVO languages.[12]

16



Similarly, an isomorphic hierarchical arrangement is assigned to the sentence in (17).

17



The uniform branching structure represented in (16)–(17) perspicuously represents the structural features that determine the distinctive anaphoric options of subjects and objects. In these diagrams subjects invariably occur imme-

[12]Further, as we will see below, the distinctive crossing pattern in this diagram is a predictable consequence of the predominantly head-initial, but right-branching structure of Irish clauses.

diately dominated by S, while objects are immediately dominated by the VP node. Hence, while *Seán* asymmetrically c-commands the reflexive *é féin* in and (16), the converse is true in (17). Moreover, the assignment of a consistent subject/predicate analysis to transitive clauses in Irish and English provides a suitable input for the application of standard configurational definitions of grammatical relations. A side benefit of adopting structures of the sort exhibited above is then that they potentially eliminate the need to recognize such relations as primitive in Celtic and other VSO languages. More generally, these constituent analyses contribute to reducing the typological isolation of subject-medial languages by according them a relatively conventional hierarchical structure, while largely confining variation to verifiable differences in word order.

3.2 The Underlying SVO Analysis

Before considering strategies for defining and generating discontinuous constituent analyses, let us return to the family of transformational analyses schematically represented in (3). Jones and Thomas (1977) and Emonds (1980) present early and largely programmatic versions of what can, adapting Sproat (1985), be termed the 'Underlying SVO Analysis'. As this label suggests, these accounts attribute an articulated SVO d-structure to VSO languages, and derive the observable surface order through the application of a verb-movement rule.[13] The

[13]The analysis of Breton proposed by Gazdar and Sag (1981) implements a relatively similar intuition within the framework of Generalized Phrase Structure Grammar, as they posit a

REST analyses of Sproat (1985) and Choe (1986) similarly attribute a configurational d-structure to VSO languages, and derive their surface order through the application of movement rules.[14] Since they each posit a configurational underlying structure, these variants of the Underlying SVO Analysis are compatible with the recurrence of structure-sensitive processes and, in particular, with the anaphoric asymmetries noted in (10)–(14).

Since Sproat's account is the most clearly articulated and widely accepted of this family of analyses of Celtic word order, let us review the mechanics of this analysis. Sproat departs from Jones and Thomas essentially in positing a pair of movement rules rather than a single rule, and in suggesting a means of triggering these rules. The existence of these rules and their obligatory application in finite clauses depends on three central assumptions. First, Sproat adopts a model of $\bar{X}$ theory (credited to Stowell 1981) on which verbs and inflectional morphemes are base generated in distinct positions. Verbs originate in the head position of verb phrases, while inflectional morphemes are independently generated as the head of an inflectional phrase. Second, Sproat adopts a version of Chomsky's (1981:256) 'Rule R', which demands that a head verb and inflectional affixes must merge in tensed clauses. Finally, the necessity of verb raising, as opposed to affix lowering or 'hopping', follows from a restriction on the directionality

nonsurfacing 'phantom' VP category that feeds a metarule which derives the surface VSO order.

[14]These accounts are extremely close in spirit and execution, to the point that both assume, for example, that the requisite movement processes are triggered by constraints imposed on the inflectional systems of VSO languages. However, they permute different constituents in the course of a derivation. Whereas Sproat, like Jones and Thomas and Emonds, adopts a process of verb preposing, Choe advocates subject intraposition.

of Case assignment in Celtic. Unlike English, which contains inflectional heads that may assign Case in either direction, inflectional elements in VSO languages are constrained to assign Case rightward. Thus, in order to govern the subject, the inflectional head of a clause must move to a sentence-initial position, where it attracts the nonfinite verb. In contrast, lowering of the inflectional head into the base generated position of the nonfinite verb would result in the inflectional head occurring to the left of the subject. Since this would lead to a Case Filter violation, Sproat argues, verb raising is the only viable option in Celtic.[15]

This analysis is transparently designed to distinguish the constituent order of finite clauses from that of nonfinite clauses. Finite verbs will occupy a sentence-initial position, while nonfinite verbs remain in their base-generated medial position and the relative order of all other clausal constituents stays constant. More generally, Sproat's account, like Jones and Thomas' before it, incorporates two central claims. The first is that Celtic languages, or Welsh and Irish at least, instantiate nonfinite verbal categories. Following Jones and Thomas (1977) and McCloskey (1980,1983), among others, Sproat identifies Celtic verbal noun constructions as nonfinite verbs, despite their unequivocal nominal properties. The second crucial claim is that these nonfinite constructions preserve to some degree the underlying constituent order that serves as the input to the verb-movement rule.[16] These testable claims provide a basis

[15]For discussion of the principles of Case Theory that Sproat assumes, see Chomsky (1981); for discussion of further matters involving Case theory and directionality, see Travis (1984).

[16]Though, as we will see below, Sproat hedges somewhat on this question.

for choosing between a discontinuous and transformational analysis of Celtic. Recall that the constituent analysis in (4) combines the underlying constituent structure and surface linear order of the structures in (3). What essentially differentiates these analyses is the fact that the transformational analysis in (3) also countenances an underlying order and derived constituent structure. In order to establish that this additional structure is not simply an artifact of undermotivated constraints on phrase structure, an advocate of the Underlying SVO Analysis must provide evidence that the posited d-structure word order or s-structure constituency figure in some way in the grammar of individual Celtic languages. In contrast, a discontinuous account is committed to the view that phenomena should never make essential reference to an underlying order or derived constituent structure.

Although verb raising rules play a prominent role in transformational descriptions of polar questions in English, as well as verb-second patterns in Germanic and other language families, the transformational literature contains no systematic attempt to identify syntactic processes that provide stable diagnostics for the hierarchical position of verbal elements.[17] In the absence of such diagnostics, the choice between the above analyses turns on the evidence for an underlying word order distinct from VSO.

To a largely unacknowledged extent, the Underlying SVO Analysis repre-

[17]A general lack of hierarchical accountability is in fact built into the standard shorthand notation for stating classical transformational rules. The popular 'structural description/structural change' rule format refers exclusively to segmentations of terminal strings, and places no restrictions on derived or, for that matter, underlying constituent structure.

sents an attempt to extend to Celtic the line of argumentation presented in Bach's (1962) and Bierwisch's (1963) SOV analyses of German. In each case, a class of subordinate constructions is identified as instantiating an underlying order, with the matrix order derived by a verb-fronting rule. However, a comparison of the two cases reveals significant differences. The distribution of constructions instantiating the posited underlying order is considerably more restricted in Celtic than in Germanic. Whereas finite clauses in Germanic conform to an SOV order when embedded under, e.g., an appropriate subordinating conjunction, Celtic finite clauses do not ever preserve an underlying order. Instead, dependent finite clauses in Celtic conform even more rigidly than matrix clauses to a VSO order. Partly as a consequence, the postulation of an underlying order does not in any way simplify the description of Celtic. On the contrary, this order simply introduces the need for a corrective movement rule to derive the dominant surface pattern. This is again in contrast to the Germanic case, where positing an alternation in verb position provides an economical account of the positioning of negative elements and separable prefixes. No analogous phenomena have been documented in Celtic. Rather, since the posited verb movement rule applies before other dislocations and has no discernable effect on other syntactic processes, the structure it applies to remains invisible or at least inaccessable to the syntactic rules of individual Celtic languages.

Furthermore, the basic usefulness of this rule is significantly undermined by the fact that it attempts to relate constructions with a relatively tenuous

connection. In particular, it is thoroughly unclear at this synchronic stage of Irish and Welsh that finite and ostensibly nonfinite clauses belong to a common syntactic category. A parallel question arises with respect to finite verbs and the verbal noun constructions that they are taken to be derived from. However, as this issue is to some degree independent of the question of order, let us consider each question in turn, beginning with an examination of Celtic word order conventions.

3.2.1 Celtic Finite Clause Order

Despite considerable variation within and across languages, the word order patterns of Celtic finite clauses do not support the postulation of an order distinct from the surface order. Deviations from this order are not only subject to distributional restrictions, but also fail to feed any syntactic rules, apart from the corrective movement rules required on some accounts to derive a VSO order. Irish, which along with Manx and Scots Gaelic comprises the Goidelic branch of Celtic, conforms most rigidly to a VSO order. Finite transitive clauses in Irish are uniformly VSO, although some deviation from this norm occurs in verbal noun constructions, relative clauses, questions and clefts. In contrast, the Brythonic languages Welsh and Breton both tolerate substantially more variation in finite clauses. At one extreme is Breton, in which cleftlike structures have essentially supplanted the basic VSO sentence pattern in matrix clauses, though this basic order is retained in a wide range of subordinate constructions.

Falling somewhere in between is Welsh, which makes use of both basic and cleftlike matrix declaratives, while exhibiting somewhat restricted options in embedded constructions. Consequently, although VSO order shows the widest distribution in each language, the alternatives to this pattern are confined to distinct syntactic environments. Moreover, there appear to be no cases where the postulation of an underlying order yields an economical description of surface variation.

3.2.1.1 Irish

Let us begin with the word order conventions of modern Irish. Finite clauses of all sorts in Irish conform to a rigid VSO pattern, as McCloskey (1983) and Stenson (1981), among others, have shown. Sentence (18a) illustrates the typical VSOX order of matrix clauses in Irish, while (18b) shows that the same relative order is observed in polarity questions introduced by the interrogative particle *an*.

18 a. *Chonaic Seán an sagart inné.*
saw Sean the priest yesterday
'Sean saw the priest yesterday.'

b. *An bhfaca tú an fear sin ?*
Q see you the man that
'Did you see that man.' [St25:21c']

c. *Ní fhaca mé é.*
Neg see I him
'I didn't see him.'

Example (18c) both exhibits the characteristic order in negatives, and demonstrates that the norm VSO order is also characteristic of transitive clauses with pronominal arguments.

Precisely the same ordering possibilities are preserved in object complement clauses in Irish, as the sentences in (19) show.

19 a. *Deir sé go dtuigeann Eoghan an scéal.*
says he that understands Owen the story
'He says that Owen understands the story.'

b. *Fiafraigh de an bhfaca Síle an capall.*
ask-Imp of-him Q see Sheila the horse
'Ask him if Sheila saw the horse.'

c. *Síleann siad nach dtuigeann sé é.*
think they that-Neg understand he it
'They think that he didn't understand it.'

VSO order is likewise obligatory in adverbial clauses, both affirmative and negative, as the examples in (20) illustrate.

20 a. *má fheiceann sé an sagart*
if sees he the priest
'if he sees the priest'

b. *mura bhfaca sé an sagart*
if-Neg saw he the priest
'if he didn't see the priest'

Further, both indirect relative clauses and information questions, i.e., those relative clauses and questions containing resumptive pronouns, show a rigid VSO constituent order.

21 a. *an scríbhneoir a molann na mic léinn é*
the writer Pt praise the students him
'the writer who the students praise' [M6:6]

b. *Cén t-údar a molann na léirmheastóirí é?*
which author Pt praise the critics him
'Which author do the critics praise?' [M53:7]

The resumptive object pronoun *é* follows the subject of its clause in (21a), as well as in (21b).

As various authors have noted, this invariance makes modern Irish an exception to Greenberg's (1966) Universal 6, which states that "languages with dominant order VSO have SVO as an alternate, or as the only alternative, basic order". Inverting the subject and verb in any of the sentences in (18)–(21) yields an ungrammatical result; example (22) is representative.

22 **Seán chonaic an sagart inné.*
(Sean saw the priest yesterday.)

3.2.1.2 Welsh

As in Irish, matrix declarative and polar interrogative clauses in Welsh may instantiate a 'bare' VSO pattern, exemplified in (23a) and (23b).

23 a. *Palodd John yr ardd.*
dug John the garden
'John dug the garden.' [JT291:14i]

b. *Welodd John y ddamwain.*
saw John the accident
'Did John see the accident?' [JT299:49c]

c. *Phalodd John ddim o'r ardd.*
dug John Neg of+the garden
'John didn't dig the garden.' [JT323:161i]

Example (23c) contains a form of the general purpose medial negative element *did*, which requires the following object to occur within a prepositional phrase.[18]

In written Welsh and formal registers of the spoken language, matrix clauses may be introduced by an aspectual or illocutionary particle. The quasi-emphatic declarative particle *mi* (with dialectal variants *fi* and *i*) enjoys the widest distribution, and is the only presentential particle that Jones and Thomas (1977:8,362f) identify as occurring in 'spontaneous speech'.

24 a. *Mi balodd John yr ardd.*
Pt dug John the garden
'John dug the garden.' [JT293:25]

b. *Mi welodd John y ddamwain.*
Pt saw John the accident
'John saw the accident.' [JT299:49c]

Less common are the interrogative particle *a* and the negative particle *ni*, whose use is illustrated below.[19]

25 a. *Ni redodd John i ffwrdd.*
Neg run John away
'John didn't run away.' [JT318:128ii]

b. *A oedd John yn chwerthin.*
Q was John in laugh-Vn
'Was John laughing?' [JT358:326]

Example (25b) instantiates a periphrastic sentence pattern used to express progressive aspect in Welsh, which is discussed at some length in later sections.

[18] See Jones and Thomas (1977:317-363) for a fuller discussion of the various negative elements in Welsh.

[19] Although negative and interrogative particles have largely passed out of most dialects, the mutation they characteristically induce is nevertheless retained, as the spirantized initial consonant of *phalodd* in (23c) above shows.

As the examples in (24) indicate, the norm VSO constituent order is preserved following an illocutionary particle; a similar order is characterisic of embedded finite clauses introduced by subordinating particles. Moreover, although particle-initial clauses historically form the base for a variety of cleftlike dislocation structures, Jones and Thomas (1977:291) report that particles may often be omitted from clefts, questions and relative clauses. A representative minimal pair is repeated in (26).

26 a. *John a balodd yr ardd.*
John Pt dug the garden

b. *John balodd yr ardd.*
John dug the garden
'It was John who dug the garden.' [JT291:14ii,16]

As in Breton, objects and adverbials may freely occur initially in such structures. Further, since the constituents following an initial focused element observe a strict VSO pattern, the description of dislocation structures in Welsh is not simplified by assuming any other underlying order.

3.2.1.3 Breton

Breton differs from both Irish and Welsh in that cleftlike structures have largely replaced simple transitive matrix clauses. As the sentences in (27) show, any phrasal constituent may occur initially in a root clause in Breton.

27 a. *Yannig a zebro krampouezh e Kemper hiziv.*
Johnny Pt eat-Ft-3Sg crepes in Quimper today
' **Johnny** will eat crepes in Quimper today.' [AC11:18]

b. *Krampouezh a zebro Yannig e Kemper hiziv.*
crepes Pt eat-Ft-3Sg Johnny in Quimper today
'Johnny will eat **crepes** in Quimper today.' [AC12:19a]

c. *E Kemper e tebro Yannig krampouezh hiziv.*
in Quimper Pt eat-Ft-3Sg Johnny crepes today
'Johnny will eat crepes **in Quimper** today.' [AC12:19b]

d. *Hiziv e tebro Yannig krampouezh e Kemper.*
today Pt eat-Ft-3Sg Johnny crepes in Quimper
'Johnny will eat crepes in Quimper **today**.' [AC12:19c]

In each of the syntactic free variants in (27) a different sentential constituent occupies the pre-particle focus position. Anderson and Chung report that such fronting is not, however, obligatory, and that particle-initial sentences like (28) are grammatical, though stylistically infelicitous.[20]

28 *E tebro Yannig krampouezh e Kemper hiziv.*
Pt eat-Ft-3Sg Johnny crepes in Quimper today
'Johnny will eat crepes in Quimper today.' [AC13fn6]

Although matrix clauses in Breton do not exhibit a rigid constituent order, the arrangement of the constituents following the mutating particle nevertheless conforms to a VSO pattern. A similar order is characteristic of a range of Breton constructions introduced by illocutionary and subordinating particles. Just as in Irish, negated sentences in Breton are introduced by a negative particle.[21]

[20]The form of the initial particle and the mutation induced on the initial consonant of the verb in these examples is sensitive to the grammatico-thematic status of the focused element. Sentences with focused nominal subjects and objects require the particle *a*, which is homophonous with the third person singular pronoun. In contrast, *e* occurs in sentences containing focused locative and temporal adjuncts, as well as sentences in which no element precedes the particle.

[21]Moreover, as the example above illustrates, such negative particles cooccur with a medial negative element *ket* in Breton.

29 *N'* *o deus* *ket* *gwelet* *ar* *wazed* *an* *ti-se.*
Neg 3Pl Neg seen the men that house
'The men haven't seen that house.' [P201:67]

In contrast to positive declaratives, negative sentences generally conform to a particle-initial pattern. Indeed, Anderson and Chung (1977:13) state categorically that "in negative clauses no other element precedes the verb". However, while Press (1986:201) identifies the examples in (30) as grammatical

30 a. *Ar* *wazed* *n'* *o deus* *ket* *gwelet* *an* *ti-se.*
the men Neg 3Pl Neg seen that house

b. *An* *ti-se* *n'* *o deus* *ket* *gwelet* *ar* *wazed.*
that house Neg 3Pl Neg seen the men
'The men haven't seen that house.' [P201:68-9]

he reports that the VSO and SVO orderings are favoured, and that the OVS variant (30b) requires additional contrastive stress and must be set off by an intonational break.

Subordinate clauses exhibit considerably less variation than matrix declaratives, though even the constituent order of embedded clauses is not completely rigid. While the VSO order instantiated in (31a) is preferred in object complement clauses introduced by the particle *e*, major sentential constituents may in fact precede the verb and particle, as in (31b).

31 a. *Me* *'lavar* *deoc'h* *e* *oa* *ar* *mar'ch-se* *re* *gozh.*
I tell-1S to-you-Pl Pt was-3S the horse too old

b. *Me* *'lavar* *deoc'h* *ar* *mar'ch-se* *a* *oa* *re* *gozh.*
I tell-1Sg to-you-Pl the horse Pt was-3S too old
'I tell you that the horse was too old.' [P210:100-1] *Y*

Nonetheless, VSO order is preferred in all dependent clauses, and obligatory in some. For example, adjunct clauses introduced by the subordinating conjunctions *ma* 'if' and *pa* 'when' show a strict VSO order, as the examples in (32) illustrate.

32 a. *pa welo da vamm-gozh da gaier-notennou*
when see-Ft-3Sg your grandmother your notebook
'when your grandmother sees your notebook' [AC13:21a]

b. *Plijet e vo tad ma lahour mat e vab?*
pleased Pt be-Ft-3Sg father if works hard his son
'Will father be pleased if his son works hard?' [AC13:21b]

VSO order is also typically required of coordinate clauses introduced by the conjunction *pe* 'or', while indirect relative clauses are, like subordinate adjuncts, rigidly VSO. Representative examples are given in (33).

33 a. *C'hwi a yelo pe e kavo Lan hoc'h arc'hant.*
you-Pl Pt go or Pt find-fut Lan your money
'You'll go or Lan will find your money.' [P205:84]

b. *ar c'hazh a gavas va c'hi anezhañ*
the cat Pt find-Ps my dog of-him
'the cat which my dog found' [P207:92]

Given the variation exhibited above, VSO is not the only conceivable dominant order for Breton. Nonetheless, as Anderson and Chung argue, a case for identifying VSO as the basic order of finite clauses can be made on the basis of its wider distribution. VSO is the only constituent order that can occur in all types of matrix and embedded clauses, and is preferred, if not required, in

some subordinate clause types.[22] Further, they note that each of the possible alternative orders in (27) can be derived from a basic VSO order by means of a single application of an optional topicalization rule. If Breton is assigned an underlying VSO order, and a topicalization rule is posited that is blocked in certain subordinate environments, the distribution of the various constituent orders follows directly. In contrast, an analysis that adopts a different basic order must obligatorily prepose the verb (but no other constituent) in specified subordinate clauses, in order to account for their rigid VSO order. In addition, multiple applications of reordering rule(s) would also be required to ensure that the relative order of verb-subject-object is respected among non-initial constituents of a clause. Anderson and Chung conclude, therefore, that Breton can most profitably be regarded as instantiating a basic VSO order.

More generally, the examples in (18)–(33) support a similar, though somewhat more theory-neutral conclusion, namely that Celtic finite clauses do not exhibit word order alternations that support the postulation of a underlying structure distinct from VSO. This is most transparently true in the case of rigidly VSO Irish, which does not show systematic alternations between the order of matrix and dependent clauses. However, the description of finite clauses

[22]This claim has recently been challenged by Varin (1979), who identifies SVO as the dominant order of modern Breton. However, Timm (1989) provides textual and elicited evidence suggesting that Breton retains a predominantly XVSO structure, where X may be a subject, object, or adverbial.

in Welsh and Breton is likewise complicated rather than simplified by the postulation of a distinct underlying order.[23]

3.2.2 Nonfinite Clauses in Celtic

Advocates of the Underlying SVO Analysis essentially concede this point by locating the critical alternation in the contrast between the characteristic order of finite and nonfinite clauses. Thus Sproat, for example, discusses four subordinate constructions that he suggests exhibit the predicted nonfinite SVO order. The first case involves periphrastic clauses of the sort illustrated in (34b).

34 a. *Gwelodd* *Siôn* *ddraig.*
saw-3Sg John dragon

b. *Gwnaeth* *Siôn* *weld* *draig.*
did-3Sg John see-Vn dragon
'John saw a dragon.' [S176:3]

[23]Notice as well that the dislocation rule operative in Breton resists classification in terms of the influential taxonomy of movement rules suggested in Chomsky (1986a). Chomsky essentially posits two distinct types of movement processes: those that move lexical heads into unoccupied head positions, and those that move phrasal categories into free phrasal positions (sometimes identified in terms of the macrocategory 'specifier'). The examples in (5) and (27) suggest that there is only one dislocated 'topic' position in Breton that phrasal constituents can be moved into. Moreover, (6a) and (7b) indicate that while lexical heads can also occur initially, they cannot cooccur with with a preposed phrase. This restriction follows if Breton instantiates a unique anticipatory position which allows either a lexical or phrasal occupant but not both (assuming for the purposes of the present argument that dislocation can be profitably analyzed as movement to an anticipatory initial position). Yet this entails that the topic slot is neither exclusively a head position nor a phrasal position, which is inconsistent with the view that movement involves promotion into a preallocated position with a fixed and determinate bar level.

Sproat suggests that these sentences exemplify VSO and AuxSVO orderings, whose derivations differ in that verb movement has occured in (34a), while auxiliary insertion has taken place in (34b).[24]

However, the contrast in (34) does not in and of itself support the postulation of an underlying SVO order.[25] The claim that *Siôn weld draig* constitutes a nonfinite clause in (34a) is simply unsupported. Indeed, Sproat provides no empirical motivation for treating this sequence as a constituent of any category. A parallel deficiency recurs in the discussion of the two other Welsh constructions that Sproat identifies as instantiating an SVO order. Representative examples of verbal noun constructions embedded under a subordinating conjunction and volitional verb are repeated in (35a) and (35b), respectively.

35 a. *cyn i Siôn weld y car newydd*
before to John see-Vn the car new
'before John sees the new car' [S205:73d]

b. *Dymunai Wyn i Ifor ddarllen llyfr.*
wanted Wyn to Ifor read-Vn book
'Wyn wanted Ifor to read a book.' [A37:14]

Sproat proposes that these examples contain embedded nonfinite clauses in which the preposition *i* functions as a Case marker sanctioning the occurrence of an overt nominal subject. Again, however, he provides no evidence to sup-

[24] While Sproat discusses the motivation for verb movement at some length, he does not provide an explicit formulation of either the verb-movement rule or the rule of auxiliary insertion involved in the derivation of the sentences above.

[25] Rather, these examples perspicuously illustrate the interdependence of Sproat's claims about order and categorial status. Notice, in particular, that treating verbal noun constructions in periphrastic sentences as nominal rather than verbal categories is consistent with an alternative analysis that attributes maximally regular and consistent word order conventions to Welsh. That is, if *weld draig* in (34b) is analyzed as an object noun phrase, then both of the above sentences will conform to the norm VSO order.

port the contention that *Siôn weld y car newydd* and *Ifor ddarllen llyfr* form constituents, let alone clauses, in (35). Also unsupported is the assumption that the preposition *i* occurs as a sister to these putative constituents, rather than forming a constituent with the initial NPs *Siôn* and *Ifor*.

Nonfinite constructions with pronominal 'subjects' provide a measure of support for this latter alternative, since in these cases the preposition and ostensible subject are realized as an inflected preposition, (i.e. a preposition that incorporates its pronominal argument). This is illustrated in (36) below, in which *iddo*, the inflected form of the preposition *i* corresponds to the sequence *i Ifor* in (35b).[26]

36 *Dymunai* *Wyn* *iddo* *ddarllen* *llyfr.*
wanted Wyn to-him read-Vn book
'Wyn wanted him to read a book.'

Thus, the available evidence suggests that the NP-Vn-NP sequences above do not form constituents and hence cannot be taken to instantiate a distinctive nonfinite clausal order in Welsh.

3.2.2.1 Verbal Nouns in Irish

Furthermore, even if we were to accord clausal status to the subordinate constructions in (34) and (35), it is clear that the word order alternations they exhibit are not characteristic of Celtic nonfinite constructions in general, and hence cannot be attributed to a general rightward condition on Case assignment.

[26] I am indebted to Richard Sproat for bringing this example to my attention.

Consider for example the Irish examples below, which Sproat identifies as providing additional confirmation of his Case-theoretic version of the underlying SVO account.[27]

37	a.	*Dúirt*	*sé*	[*Séamas*	*a*	*dhúnadh*	*an*	*dorais*].
		said	he	James	Pt	close-Vn	the	door-G
	b.	*Dúirt*	*sé*	[*Séamas*	*an*	*doras*	*a*	*dhúnadh*].
		said	he	James	the	door	Pt	close-Vn

'He said for James to close the door.' [M41:100a,54:fn23]

Although the embedded NP-Vn-NP and NP-NP-Vn orders in these sentences contrast with the rigid VSO finite clause order illustrated earlier, they form part of a larger pattern that is thoroughly inconsistent with Sproat's account.

McCloskey (1983:54fn23) identifies (37b) as a construction type that is restricted to the southern dialects, and (37a) as its counterpart in the northern dialects. However, Stenson (1981:164fn28) notes that both of the structures in (37) are ungrammatical in the southern Galway dialect, and suggests that sentences like (37b) may be a residue of a previous diachronic stage of various southern dialects.[28]

> A few examples of sentences like [37b] occur in literature from the first half of this century, but it does not seem to be a productive structure in the spoken language today. Breandán ó Buachalla informs me that the structure is preserved marginally in some Munster dialects, and DeBhaldraithe (1948:47) cites a few such examples for Cois Fhairrge (mostly from elderly or conservative speakers). I have

[27] Subordinate VNPs are bracketed for perspicuity in the following Irish examples.

[28] It may be significant that McCloskey's source for (37b) is *Graiméar Gaeilge na mBráithre Críostaí* 'The Christian Brothers' Irish Grammar', a standard if somewhat conservative reference.

never encountered sentences of either type, and all speakers whom I have questioned, ranging in age from 21 to 65, firmly reject them.

Even though it is unclear whether the differences among nonfinite constructions represent a genuine synchronic dialect split, let us tentatively identify three Irish 'dialects': northern Ulster, Munster and Galway, and consider first intransitive verbal noun constructions, which show the least dialectal variation. Nominal arguments of intransitive verbal nouns in Irish, and to some degree Celtic generally, are subject to the grammatico-thematic requirement that they must correspond to a logical object. The paradigm in (38) indicates that verbal nouns corresponding to unaccusative intransitive verbs (in the sense of Perlmutter 1978) may occur either with or without a preposed argument.

38 a. *Ba mhaith liom [(Áine) a bheith anseo].*
was good with-me Anne Pt be-Vn here
'I would like (Anne) to be here.' [St72:62b,c]

b. *Ba mhaith liom [(Proinnsias) a theacht].*
was good with-me Francis Pt come-Vn
'I would like (Francis) to come.' [St82:78a]

Likewise, the examples in (39) show that the verbal noun counterpart of a transitive verb may occur with a direct object argument.

39 a. *Ba mhaith liom [Áine a fheiceáil].*
was good with-me Anne Pt see-Vn
'I would like to see Anne.' [St72:62a]

b. *Tá Pádraig ag iarraidh [amhrán a chasadh].*
is Patrick Pt try-Vn song Pt sing-Vn
'Patrick is trying to sing a song.' [St82:79a]

Stenson (1981:72) interprets these sentences as indicating that either subjects or objects may occur initially in a verbal noun construction. However, the sentences in (40) show that the subject arguments of canonical unergative verbal nouns, like *shiúl* 'walk' or *ghlaoch* 'call', may not occur within this construction type.[29]

40 a. **Ba* *mhaith* *liom* [*Áine* *a* *shiúl*].
was good with-me Anne Pt walk-Vn
(I would like Anne to walk.)

b. **Ba* *mhaith* *liom* [*Áine* *a* *ghlaoch*].
was good with-me Anne Pt call-Vn
(I would like Anne to call.)

The sentences in (38)–(40) illustrate that an O-*a*-Vn order is exhibited by a class of verbal noun complements (henceforth VNPs) that occur embedded under canonical control verbs. These nouns appear, moveover, to be syntactically unaccusative, as logical subjects are barred from occurring in any position within the VNP. Although the fact that only objects may occur in VNPs is consistent with Sproat's analysis, their characteristic position is not. Recall that the movement of inflectional features and the subsequent attraction of the nonfinite verb is triggered by a rightward restriction on Case assignment. As Sproat (1985:204f) observes, this process should not affect nonfinite inflectional heads, which he assumes to be incapable of assigning Case for independent reasons. Consequently, he argues, subject-initial orders are predicted in nonfinite clauses

[29]Like (39a) above, the sentences in (40) are grammatical on the interpretation in which *Áine* is construed as the object.

whenever the subjects receive Case from some other source. However, object-initial orders are not similarly expected, as initial objects would undermine the crucial claim that Case is assigned uniformly rightward in Irish.[30] Thus, the ordering restrictions on intransitive VNPs in Irish are precisely the opposite of what Sproat's account predicts.

Transitive VNPs are similarly problematic in all but the Munster dialect. The prohibition against subjects prevents verbal noun counterparts of transitive verbs from occurring with both a subject and object argument in the Galway dialect, as illustrated in (41).

41 a. **Ba* *mhaith* *liom* [*tú* *Áine* *a* *phósadh*].
was good with-me you Anne Pt marry-Vn

b. **Ba* *mhaith* *liom* [*tú* *a* *phósadh* *Áine*].
was good with-me you Pt marry-Vn Anne
(I would like you to marry Anne.) [St72:63c,d]

Ungrammaticality results both when the subject and object precede the verbal noun, as in (41a), and when the subject precedes and the object occurs postverbally, as in (41b).[31] Finally, while the archaic SVnO pattern attributed to the Munster dialect does not conflict with Sproat's analysis, the SOVn order in Ulster is problematic, as it again violates the rightward constraint on Case assignment. Taken together, these examples clearly discredit the view that the ordering patterns in Irish in any way reflect abstract Case requirements.

[30] Sproat (1985:206f) recognizes that O-Vn orders pose a challenge to his analysis, though his arguments that VNPs are not verb-final seem entirely beside the point.

[31] The remaining logical possibility, namely an O-Vn-S order, is not discussed by Stenson, though it is presumably also illformed.

3.2.2.2 Complement Quasi-Clefts

Furthermore, although the constituent order of Irish VNPs differs from the VSO order characteristic of finite clauses, a more detailed examination of finite and ostensibly nonfinite constructions provides evidence that finite clauses reflect the more basic order. One of the most salient properties of verbal noun constructions in Irish is the presence of the leniting particle *a* (henceforth *a*L). The configuration NP-*a*L-X occurs in a wide range of cleftlike constructions in Irish that McCloskey (1979), among others, analyzes as dislocation structures.[32] Thus, in addition to actual clefts, simplex direct relatives and questions also conform to an NP-*a*L-X order.[33] Representative examples are provided in (42), in which the initial *mh* in *mholann* 'praise' shows the lenition mutation induced by the preceeding particle.[34]

42 a. *an* *scríbhneoir* *a* *mholann* *na* *mic* *léinn*
the writer *a*L praise the students
'the writer who the students praise' [M6:6]

[32]Here, as elsewhere, I adopt the transformational idiom as a relatively neutral *lingua franca*, without intending a substantive committment to any transformational analysis. Thus, the terms 'dislocation structures' and 'extraction structures' are used in an essentially *de dicto* sense to denote the class of sentences that are typically characterized in terms of processes like *wh*-movement, relative deletion, etc.

[33]Direct relatives are those that contain a 'gap' as opposed to a resumptive pronoun. The restriction to relative clauses and questions formed on simplex sentences is necessary since, as McCloskey (1979:16ff) observes, the leniting particle *a*L and the eclipsing particle *a*N are only reliable indicators of the presence of a gap and pronoun, respectively, in monoclausal sentences. A more complicated pattern is characteristic of embedded clauses. McCloskey (1979:13ff) notes as well that various adverbial constructions that are clearly not extraction structures are also introduced by the particle *a*L, though this does not significantly undermine the reliability of the *a*L/*a*N alternation as a diagnostic for 'movement' vs. 'pronominalization' in simplex clauses.

[34]These examples are actually ambiguous, as the extracted argument can be interpreted either as the subject or direct object of the finite verb.

b. *Cén* *scríbhneoir* *a* *mholann* *na* *mic léinn?*
which writer *a*L praise the students
'Which writer do the students praise?'

In contrast, the corresponding indirect relative and question in (21) above contain the particle *a*N, which induces eclipsis on the following consonant (though in the case of *m* there is no visible mutation).[35]

Like the VNPs above, the direct questions and relatives in (42) deviate from the norm VSO order in that they contain an initial NP separated from the rest of the clause by the leniting particle *a*. Thus, the presence of the particle *a*L, which serves as a relatively reliable diagnostic for nominal extraction in monoclausal structures, supports the view that VNPs exhibit a derived constituent order.[36] Syntactically, VNPs pattern most closely after reduced, (i.e., copulaless) matrix clefts of the sort illustrated in (43).

43 a. *Pádraig* *a* *bhuail* *an* *liathróid.*
Patrick *a*L hit the ball
'It's Patrick who hit the ball.' [St40:56a]

[35]The indirect resumptive pronominalization strategy is not available for matrix clefts, as McCloskey (1979:110f) remarks. Resumptive pronouns likewise lead to ungrammaticality in VNPs. Conversely, unreduced matrix clefts often occur with a postcopular pronominal augment, which neither VNPs nor relative clauses nor questions allow.

[36]Although Chung and McCloskey (1987:201) analyze Irish relative clauses in terms of *wh*-movement, McCloskey (1979) argues at some length that the derivation of questions and relative clauses in Irish involves deletion rather than movement. This difference is, however, irrelevant to the point being made here, since the questioned or relativized constituent occupies a dislocated (i.e., clause-external) position under either analysis. It is of no particular importance in the present context whether this configuration is derived through movement or, as McCloskey argued earlier, is directly generated by phrase structure rules that position a clefted constituent in apposition to a clause. The basic/dislocated distinction is simply intended to capture the difference between simple declarative clauses, and derived constructions like relative clauses, clefts and questions. Which of these configurations verbal noun phrases pattern after is the central empirical question at issue here.

b. *An liathróid a bhuail Pádraig.*
the ball *a*L hit Patrick
'It's the ball that Patrick hit.' [St41:56b]

Both constructions deviate from the norm VSO order by virtue of containing an initial constituent, which is set off from the rest of the clause by the particle *a*L (or in some cases the lenition it induces).

Furthermore, a quasi-cleft analysis of VNPs supplies an explanation for various other respects in which VNPs pattern after matrix clefts. For example, Sproat (1985:207) observes that there are semantic restrictions on the class of objects that can occur initially in verbal noun constructions. An ineligible object that he considers is *seachtain* 'week' in (44).

44 a. *Mhair an féile seachtain.*
lasted-3Sg the festival week
'The festival lasted a week.'

b. **Ba chóir don fhéile* [*seachtain a mhairstean*].
was right for-the festival week *a*L last-Vn
(It would be right for the festival to last a week.) [S207:80a,b]

Although *seachtain* is an appropriate object for the finite verb *mhair* 'to last' in (44a), it cannot occupy the pre-particle slot in the verbal noun construction in (44b). Significantly, both the reduced and unreduced matrix clefts in (45) exhibit the same restriction.

45 a. **Ba seachtain a mhair an féile.*
was week *a*L lasted-3Sg the festival

b. **Seachtain a mhair an féile.*
week *a*L lasted-3Sg the festival
(It was a week that the festival lasted.)

Moreover, treating VNPs as the embedded counterparts of reduced cleft structures accounts for shared properties of these constructions, other than their deviant order and the lack of an initial copula. As McCloskey (1979:90f) notes, indefinites can occur preverbally in reduced clefts, but not in their unreduced counterparts. This restriction is illustrated by the contrast in (46).

46 a. **Is* *capall* *mór* *bán* *a* *chonaic* *mé.*
Cop horse big white *a*L saw I

b. *Capall* *mór* *bán* *a* *chonaic* *mé.*
horse big white *a*L saw I
'It was a big white horse that I saw.' [M90-1:96a,98]

Likewise (47) shows that VNPs pattern after reduced rather than unreduced clefts in freely permitting initial indefinites.

47 *Ba* *mhaith* *liom* [*capall* *mór* *bán* *a* *fheiceáil*].
was please-Vn with-me horse big white *a*L see-Vn
'I would like to see a big white horse.'

Nevertheless, there are important differences between matrix clefts and VNPs in each of the three dialects considered above. Galway is perhaps the most straightforward case. The fact that transitive verbs in matrix clefts may occur with both of their nominal arguments, while verbal nouns may only occur with one argument represents the most salient difference between matrix clefts and VNPs in the Galway dialect. This distinction appears to be due to an irreducible difference between the argument structure of Galway finite verbs and verbal nouns. Whereas the class of finite verbs includes unergative and unaccusative intransitives, in addition to transitives, verbal nouns are syntac-

tically monadic unaccusative predicates. Hence, clefts containing finite verbs may contain subject and object arguments, while VNPs will consist maximally of a transitive or intransitive verbal noun and its logical object (and possible modifiers). However, this restricted argument structure should not be treated as an invariant property of verbal noun constructions, as it is precisely with respect to this feature that the Munster and Ulster dialects are reported to differ from Galway Irish. Recall that each of the examples in (37) contains a transitive verbal noun occurring with a subject and object argument.

Although verbal noun constructions in these dialects are thus similar in transitivity to matrix clefts, they nevertheless exhibit other clear ordering differences. VNPs are generally closer to their finite counterparts in Munster, though they conform to a more restricted pattern. As the examples in (43) show, either a subject or object can precede the transitive verb in a matrix cleft. In VNPs, however, subjects obligatorily precede, and objects follow, transitive verbal nouns. Consequently, (48a), the OVS counterpart of (37a), is ungrammatical in Munster.

48 a. **Dúirt sé an dorais a dhúnadh Séamas/Shéamuis*].
said he the door-G aL close-Vn James/James-G

b. **Dúirt sé* [*an doras Séamas a dhúnadh*].
said he the door James aL close-Vn
(He said for James to close the door.)

A subject-object order is likewise obligatory in Ulster VNPs, as the illformedness of (48b) shows.

The quasi-cleft analysis must presumably permit a single dislocation in Munster and iterative dislocation in Ulster to account for these patterns. However, notice that the Underlying SVO Analysis does not achieve any economy in describing constituent order in Munster and Ulster. Although transitive constructions in Munster can be argued to realize the posited underlying order, the object-initial intransitives do not. Attributing an SVO order to the Ulster dialect again incorrectly predicts a VO order for intransitives, and requires an intraposition rule to insert objects of transitive verbal nouns between the noun and its subject. As well, an account that treats VNPs as instantiating an underlying order provides no immediate explanation of the formal and semantic parallels between (reduced) clefts and VNPs.

Furthermore, notice that the restrictions on VNP preposing illustrated in (9) provide additional, albeit circumstantial, evidence in support of the hypothesis that verbal noun constructions in Irish are dislocation structures. It is a familiar observation that constituents containing a dislocated element themselves resist extraction. Various accounts have been proposed for this effect, including, e.g., the Freezing Principle of Wexler and Culicover (1980). Although a host of other factors conspire to determine extraction options, 'freezing' effects are of some diagnostic value, especially in connection with near-minimal constructions, such as the Breton, Welsh and Irish VNPs in (6)–(9) above. The characterization of NP-inital Irish VNPs as extraction structures will interact with any constraint that bars recursive dislocation to block fronting of these constructions. In con-

trast, the consistently Vn-initial counterparts in Breton and Welsh, which do not pattern after dislocation structures, should be unaffected by whatever condition is assigned responsibility for freezing effects. Thus, the hypothesis that Irish VNPs are dislocation structures, while verbal noun constructions in Welsh and Breton instantiate a basic pattern, provides an account of the striking contrast in (6)–(9).

3.2.3 Nonfinite VPs in a VSO Language

The preceding discussion supports the claim that word order variation in Celtic, or in Irish and Welsh at least, does not support the postulation of an underlying order distinct from VSO. Let us next consider whether the attested differences between finite clauses and VNPs are productively viewed as word order alternations within a common syntactic category. This question hinges to a considerable extent on the analysis of the verbal nouns that occur within VNPs. As their traditional label suggests, Celtic verbal nouns are diachronically, if not also synchronically, nouns. Like the nonfinite verbs of other branches of Indo-European, Celtic verbal nouns are historically descended from oblique neuter nouns. The Old Irish examples in (49), from *Scéla Mucce Meic Dathó* 'The Story of MacDatho's Pig', are suitably representative.

49 a. *do* *chungid* *in* *chon*
to ask-Vn-DSg the hound-GSgM
'to seek the hound' [LL 1975:3]

b. *do* *airiuc* *thuile* *dôib*
to find-Vn-DSgNt wish-GSgF to-them
'to entertain/show hospitality toward them' [LL 1975:17]

The verbal noun constructions in these examples occur as prepositional objects, whose verbal noun heads *chungid* and *airiuc* occur in the case governed by the dative preposition *do*.

The various particle-initial periphrastic forms in the modern languages are contemporary descendents of structures of this sort. In particular, the constructions associated with progressive aspect in Irish and Welsh originated as prepositional phrases containing VNP objects, headed by prepositional ancestors of the aspectual particles *ag* and *yn*. A pair of modern Irish 'progressive phrases' (ProgPs) are bracketed in (50), while a corresponding Welsh construction is identified in (51).

50 a. *Tá* *sé* [*ag* *cuartú* *madaidh*].
is he Pt seek-Vn dog-Gen
'He is looking for a dog.' [M̄35:86a]

b. *Bhí* *siad* [*mo* *bhualadh*].
were they my beat-Vn
'They were beating me.' [M̄35:87a]

51 *Y* *mae* *Siôn* [*yn* *gweld* *draig*].
Pt is-3Sg John Pt see-Vn dragon
'John is seeing a dragon.' [S177:4a]

Verbal nouns, and the broad class of constructions that contain them, still reflect this nominal ancestry in the modern languages. In dialects of Irish, verbal nouns decline like nouns and govern (postnominal) genitive nominal objects. Thus, for

example, *dorais* in the VNP in (37a), and *madaidh* in the progressive phrase in (50a) both occur in the genitive case. Likewise, in Breton and Welsh as well as Irish, verbal nouns freely occur with articles and adjectives, and govern genitive possessive pronominal objects. The prenominal possessive *mo* in (50a) provides an illustration from Irish; Welsh and Breton examples are presented below.

Treating Celtic VNPs as noun phrases is not only consistent with their morphology and internal structure, but is also compatible with a maximally uniform description of word order patterns, since it provides a means of extending the dominant analytic pattern to periphrastic constructions. For concreteness, consider example (34b), repeated below as (52).

52 *Gwnaeth* *Siôn* *weld* *draig.*
did-3Sg John see-Vn dragon
'John saw a dragon.'

If *weld draig* is analyzed as a noun phrase in the above sentence, this example will conform to a canonical VSO order. Along with regularizing periphrastic and analytic patterns, this analysis eliminates the need for supplementary verb-movement and auxiliary-insertion rules.

Notwithstanding these nominal properties, generative descriptions of verbal noun constructions have tended to favour assigning them to verbal and/or clausal categories.[37] This classification of VNPs is of crucial importance to variants of the Underlying SVO Analysis that adopt a verb-fronting rule, since it

[37] An exception is Anderson (1981), who, retracting an earlier position, classifies Breton VNPs as noun phrases.

supplies the nonfinite verbs that are taken to be raised by this rule. Hence, proponents of the Underlying SVO Analysis typically attempt to establish the verbal credentials of verbal nouns. Jones and Thomas (1977), for example, provide an inconclusive discussion of similarities in subcategorization that hold between finite verbs and verbal nouns in Welsh. A more sustained argument is presented by Sproat (1985), who, in contrast, attempts to undermine the positive parallels between verbal nouns and phrases other than verb phrases. In this and other relevant respects, the line of argumentation that Sproat pursues is closely modelled on McCloskey's (1983) analysis of progressive constructions in Modern Irish. Accordingly, let us briefly digress to review the structure of McCloskey's argument.

To establish the constituent status of ProgPs, McCloskey first establishes that only a single phrasal constituent can occupy the focused preverbal position in Irish clefts, and then shows that a Progressive Phrase such as *ag cuartú madaidh* in (50a) may occur in this position. After concluding that Progressive Phrases must also be phrasal categories, McCloskey next considers their categorial status. Starting from the hypothesis that all phrasal categories can be successfully assimilated to one of the maximal projections sanctioned by the version of $\bar{X}$ theory he assumes, McCloskey proceeds to eliminate candidates. Adjective phrases are rejected outright as implausible, while $\bar{S}$s are eliminated because ProgPs uniformly disallow subjects. The more intuitively plausible candidates PP and NP are also dismissed. Although ProgPs and PPs show a simi-

lar distribution, McCloskey argues against the identification of these categories on the grounds that the particle *ag* exhibits allomorphic variation that distinguishes it from the related, though phonologically invariant, preposition *ag*.[38] Moreover, he exploits the distributional similarities that link ProgPs and PPs in arguing against the identification of ProgPs and NPs. McCloskey then adopts the remaining possibility; namely that ProgPs are a species of verb phrase.

Sproat similarly begins by using a cleft diagnostic to support the claim that Welsh verbal nouns and their ostensible complements form constituents. From the fact that sequences like *wedi gweld y ci*, consisting of a particle followed by a VNP, may occur in the focus position of a cleft such as (53), Sproat concludes that VNPs like *gweld y ci*, are constituents, indeed that they are maximal projections of some category.

53 *Wedi gweld y ci y mae'r y dyn.*
Pf see-Vn the dog Pt is-3Sg the man
'?It's having seen the dog that the man is.' [S178:8b]

Sproat's attempt to establish the categorial identity of VNPs likewise proceeds essentially by a process of elimination. The four possibilities that Sproat explicitly considers are: VNP = PP, VNP = NP, VNP = VP and VNP = $\bar{S}$. Sproat again rejects the first candidate on the grounds that phonological differences distinguish the progressive particle *yn* from the preposition *yn* in particle-VNP sequences. Specifically, as Awbery (1976:18) notes, prepositional *yn*, unlike per-

[38] McCloskey (1983:27) also remarks that the fact that *ag* is omitted under certain conditions argues against the identification of ProgPs and PPs, though the absence of *ag* is equally problematic for the analysis he adopts, which treats the particle as a category-changing affix.

fective *yn*, induces nasal mutation on the initial consonant of the following word. Since the identification of VNPs with NPs is the most credible alternative to the analysis that Sproat ultimately adopts, he constructs a number of arguments to show that apparent similarities between VNPs and NPs are superficial in nature.

3.2.3.1 Nominal Traits of Welsh Verbal Nouns

Sproat first acknowledges two respects in which VNPs resemble noun phrases. Like noun phrases, and unlike finite clauses, pronominal objects within verbal noun phrases take the form of possessive pronouns. This is illustrated in (54), in which the object *ei* of the verbal noun in (54a) is identical to the form that occurs in the possessive construction (54b), and unlike the accusative personal pronoun *ef* in (54c).

54 a. *Y mae hi yn ei weld.*
Pt is he Pg 3Sg see-Vn
'She sees him.'

b. *ei gafr*
'his goat'

c. *Gwelodd Siôn ef.*
saw-3Sg John him
'John saw him.'

Likewise, extraction from VNPs patterns in some respects more closely after extraction from NPs than after extraction from finite clauses, as the examples in (55) show.

55 a. *Dyma'r bachgen y mae hi wedi ei weld.*
here+the boy Pt is she Pf 3Sg see-Vn
'Here's the boy she has seen.' [S187:22b]

b. *Dyma'r bachgen y gwelaist ti ei lun.*
here+the boy Pt saw-3Sg you 3Sg picture
'Here's the boy whose picture you saw.' [S186:21b]

c. *Dyma'r bachgen a welasoch (* ei) chwi.*
here+the boy Pt saw-2Sg 3Sg you-Pl
'Here's the boy you saw.' [S187:22c]

Whereas the resumptive possessive pronominal clitic *ei* marks extraction out of the VNP in (55a) and the noun phrase in (55b), a possessive clitic is neither required nor permitted in (55c).

Sproat presents a pair of arguments to show that these apparent similarities are deceptive. The first turns on interpretive differences between VNPs and derived nominals like *distrywiad* 'destruction'. Sproat observes that the possessive argument of a derived nominal may be interpreted either as the logical subject or object of the corresponding verb, while the pronominal argument of VNPs are uniformly interpreted as objects. Thus, for example, the possessive pronoun *ei* is interpreted as the logical subject in (56a), and as the logical object in (56b).

56 a. *ei ddistrywiad o'r dref*
'his destruction of+the town'

b. *ei ddistrywiad gan Siôn*
'its destruction by John'

In contrast, *Siôn* in (57a) can only be construed as the object argument of the semantically transitive verbal noun *gweld* 'seeing'. Further, this grammatico-thematic restriction ensures that the verbal noun counterparts of unergative

verbs cannot occur with an expressed nominal argument.[39] Since the single argument of an unergative predicate like 'run' is, by assumption, a logical subject, it cannot cooccur with a verbal noun, resulting in the ungrammaticality of (57b).

57 a. *gweld Siôn*
see-Vn John
'the seeing of John'

b. **fy ngherdded*
my run-Vn
(my running) [S184-5]

Sproat asserts that this semantic difference is explicable on an account that treats VNPs as VPs or as clauses with null subjects, since in either case the argument can only be a direct object.

The second argument is an attempt to undermine the apparent similarity in the extraction strategies illustrated in (55), by drawing attention to differences between the constructions exemplified by (55a) and (55b). Sproat credits Jones and Thomas (1977:308-9) with the observation that in spoken Welsh the pronominal clitic can be dropped from sentences like (55a), though the mutation it induces (the *w* of *weld* in this case) may be retained. However, this deletion is not possible in noun phrases, as (58b) indicates.

58 a. *Dyma'r bachgen y mae hi wedi weld.*
here+the boy Pt is she Pf see-Vn
'Here's the boy she has seen.' [S187:23b]

[39] Thus the argument structure, though not the order, of Welsh verbal nouns patterns after verbal nouns in the Galway dialect.

b. **Dyma'r bachgen y gwelaist ti lun.*
here+the boy Pt saw-3Sg you picture
(Here's the boy whose picture you saw.) [S186:24b]

Hence, Sproat concludes, VNPs are not noun phrases.

An additional argument that he offers in passing concerns the fact that verbal nouns, unlike common nouns or derived nominals, can be clefted. This is illustrated by the examples in (59).

59 a. *Gweld a wnaeth Siôn y ty.*
see-Vn Pt did-3Sg John the house
'John saw the house.' [S188:25b]

b. **Distrywiad a welais Sión o'r dref.*
destruction Pt saw-1Sg John of+the city
(I saw John's destruction of the city.) [S188:26]

Having thus argued against the possibility that VNPs are prepositional phrases or noun phrases, Sproat turns to evidence that bears on the choice between the remaining alternatives VP and $\bar{S}$.

3.2.3.2 The Categorial Status of Verbal Nouns

Rather than review this comparison, let us instead examine Sproat's arguments in greater detail. Consider first the initial constituency argument based on clefting. Recall that Sproat argues that VNPs are constituents by demonstrating that they may occur as subsequences of expressions that the clefting diagnostic classifies as constituents. This is clearly insufficient proof; to establish that VNPs are themselves constituents, Sproat must show that VNPs, not some constituent in which they occur, can be clefted. Nowhere does Sproat demon-

strate that there is a constituent break between aspectual particles and verbal nouns, let alone that verbal noun phrases are maximal phrasal constituents.[40] Moreover, there is a critical inconsistency in Sproat's interpretation of the cleft-ing diagnostic. The evidence that VNPs are maximal projections is just the purported fact that they can be clefted, in conjunction with the assumption that only maximal projections can be clefted. However, Sproat elsewhere observes that verbal nouns can occupy the preverbal position of a cleft construction. Yet this presumably entails that verbal nouns are also maximal projections, which is incompatible with Sproat's treatment of them as lexical heads of nonfinite verb phrases.

Furthermore, the conclusion that Sproat draws from the contrast in (59) is somewhat misleading. Sproat suggests that the fact that verbal nouns may cleft in Welsh provides further confirmation of their verbal character. However, the ability to cleft is not in fact characteristic of incontrovertible (i.e., finite) verbs in Welsh.

60 **Gwelodd* *a* *Siôn* *y* *ty.*
saw-3Sg Pt John the house
(John saw the house.)

Rather, as (60) shows, finite verbs pattern with common nouns and derived nominals, and contrast with verbal nouns, in resisting clefting.

The arguments that Sproat presents to establish the syntactic category of

[40]Thus, if, as McCloskey (1983:39f) argues for their Irish counterparts, particle-verbal noun sequences are lexical constituents in Welsh, VNPs would not form constituents of any category.

verbal noun constructions are similarly inconclusive. Consider, for example, the curious claim that verbal nouns are not nouns, essentially because their interpretation differs systematically from that of derived nominals. The basic problem here is that while Sproat's semantic observations suggest that derived nominals must be distinguished from verbal nouns, they do not in any way bear on questions concerning the categorial status of verbal nouns. Sproat (1985:185) seems to imply that the nonsynonymy is problematic if verbal nouns and derived nominals are both derived from the corresponding verbs. In the first place, classifying verbal nouns as nominal categories does not carry any commitment to an analysis on which verbal nouns are derived from verbs. Deriving verbal nouns from verbs is independently a highly questionable synchronic analysis, given that the verbal nouns in modern Celtic languages are descended from oblique nouns that have acquired verbal properties in varying degrees. Moreover, as McCloskey (1979:54fn21) notes, there are many verbal nouns that, in most Irish dialects at least, lack finite verb counterparts.[41]

Further, even if we were to adopt this analysis for Welsh verbal nouns, there is no particular reason to expect the output of the nominalization process to exhibit the interpretive range characteristic of derived nominals. Numerous languages possess distinct nominalization processes with semantically regular outputs, or viewed from another perspective, nominals with distinctive interpretations. For example, suffixation of *-er* to English verb stems typically yields

[41] Some examples he provides are: *urnaí* 'praying', *osnaíl* 'sighing', *caint* 'talking'.

an agentive nominalization, while nominals formed on *-ee* are canonically interpreted as patients. Both differ from derived nominals ending in *-ion* and *-ing*, which admit of a broader range of interpretations. Consequently, the possessive NP argument in *John's destroyer* may correspond to the object, though not the subject of the verb *destroy*, while the possessive in *John's destruction* may correspond to either subject or object. Nevertheless, this difference does not indicate a difference in syntactic category between *destroyer* and *destruction*, or raise any problems for an account that assigns both to the same category. The interpretive restrictions that distinguish verbal nouns from derived nominals are, likewise, completely irrelevant to the determination of their syntactic category.

Moreover, even if we were to grant that the semantic differences that Sproat observes bear in some way on syntactic category, it is unclear how these observations are meant to counteract the similarities between the pronominal arguments of nouns and verbal nouns. Indeed, the pronominal forms in the derived nominals in (56) reinforce the syntactic generalization that Sproat is attempting to undermine, namely that the occurrence of possessive proclitics is restricted to nominal categories. Sproat's discussion of the distribution of resumptive proclitics in (55) and (58) is similarly inconclusive. The synchronic facts he reports can be summarized as follows. Extraction from a VNP is like extraction from a noun phrase and unlike extraction from a finite clause in that a resumptive possessive pronominal clitic may occur. Nevertheless, extraction from a VNP

is like extraction from a finite clause and unlike extraction from a noun phrase in that the clitic may be omitted. Moreover, depending on the register and the source consulted, the mutation induced by a deleted particle may or may not be preserved. There simply appears to be no firm grounds for identifying VNPs more closely with verb phrases than noun phrases on the basis of conflicting evidence of this sort.

3.2.3.3 Descriptive Adequacy of the $\bar{X}$ Categorial Inventory

In sum, the arguments that Sproat presents to establish the constituent structure and categorial identity of clauses containing verbal nouns range from inconclusive to mutually inconsistent. Absent from his discussion is any systematic attempt to document positive correlations between the morphology, internal structure, syntactic behaviour or distribution of verbal nouns and that of finite verbs. This lacuna is not an oversight, but rather reflects a genuine lack of parallels between finite verbs and verbal nouns in Welsh. Hence, Sproat is driven to follow McCloskey (1983) in determining the categorial identity of verbal noun constructions by a process of elimination. Starting from an initial list that includes NP, VP, PP and $\bar{S}$, they successively eliminate candidates that differ in some respect from VNPs. Since VNPs exhibit properties that distinguish them from NPs, PPs and $\bar{S}$s, each of these alternatives is discarded. The VNP = VP alternative is not subjected to similar scrutiny, as neither McCloskey

nor Sproat countenances surface finite verb phrases. As a consequence, VNPs and Irish progressive phrases are identified as VPs, essentially by default.

This sort of default reasoning is extremely dubious, however, as it can easily be converted into a demonstration that progressive phrases and VNPs in Irish and Welsh belong to each of the above categories, simply by varying the order in which candidate categories are compared. What essentially assures this is the fact that Irish and Welsh verbal nouns are presently categorial hybrids which exhibit an inconsistent mixture of properties. If Celtic verbal nouns follow the general Indo-European pattern, they may ultimately develop into full-fledged verbal categories. The unstable distribution of proclitics in extraction structures may in fact provide preliminary evidence of such an evolution. However, an adequate synchronic description of these constructions cannot anticipate this development. In particular, it must represent the fact that the internal structure and distribution of VNPs in Welsh and Irish remains closer to that of nouns than verbs. Furthermore, although both McCloskey and Sproat identify phonological differences that distinguish the progressive morphemes *ag* and *yn* from the corresponding prepositions, the distribution of Irish progressive phrases containing VNPs is still, as McCloskey (1983:27) acknowledges, 'largely parallel' to that of prepositional phrases. Since expressions with an inconsistent constellation of synchronic and diachronic properties cannot readily be assimilated to any of the familiar phrasal categories AP, NP, PP, VP, a process of elimination argument can be constructed for any arbitrary three categories.

Thus, what McCloskey and Sproat inadvertantly provide is a *reductio* of the theory of syntactic categories that they assume, specifically the premise that verbal nouns can be assimilated to some member of the $\bar{X}$ inventory. To clarify the fact that this problem reflects a basic inadequacy that cannot be overcome by the addition of a supplementary feature 'patch', let us digress for a moment to consider the patently diacritic feature [± DEV] that McCloskey proposes to distinguish verbal nouns from other verbal forms. The introduction of this feature does not appreciably improve matters, since it leads to redundancy and/or inconsistency within an account that employs the standard binary features [±V,±N]. Unless nominal properties are consistently associated with the feature value [+DEV], assigning this value to verbal nouns will not account for their nominal character. On the other hand, associating nominal characteristics with [+DEV] categories amounts in effect to defining a distinguished [+N] feature with a limited distribution, namely one that can be assigned just to [+V,-N] categories. Yet such apparently contradictory feature specifications raise obvious interpretive questions. Further, even if it should turn out that [+V,-N,+DEV] categories can be supplied with a coherent interpretation, the single binary-valued feature is incapable of describing the fact that verbal nouns in different Celtic languages may exhibit nominal qualities in varying degrees.

Breton verbal nouns provide an instructive minimal contrast with their Irish cognates. Reflecting a similar ancestry, Breton verbal nouns again show char-

acteristic nominal properties, including the ability to occur with articles, as in (61a), and preposed possessive pronouns, as in (61b).

61 a. *an debriñ avaloù*
the eat-Vn apples
'the eating of apples' [P76]

b. *Ne garfen ket ho tegemer em zi-me.*
Neg like-Cd1Sg Neg your receive-Vn in-my house-me
'I wouldn't like to receive you in my house.' [P101]

Nonetheless, verbal nouns in Breton have progressed further than their counterparts in Irish from a nominal to a verbal category, and combine traits characteristic of English gerunds and infinitives. Forms like *ro* in (62) below are similar in many syntactic respects to the corresponding English bare infinitive *give*. Thus, Press (1986:126) reports that Breton verbal nouns, like their nonfinite English counterparts, are used as (familiar or singular) imperatives, and also occur as the present habitual third person singular conjugation of verbs. As well, these forms can function as all-purpose main verbs in sentences containing preposed arguments. These three uses of the verbal noun are illustrated in the sentences in (62).

62 a. *Ro al laezh da Vari.*
give-Vn the milk to Marie
'Give the milk to Marie.'

b. *Al laezh a ro da Vari.*
the milk Pt give-Vn to Marie
'He/She gives the milk to Marie (habitually).'

c. *Ni a ro al laezh da Vari.*
we Pt give-Vn the milk to Marie
'We give the milk to Marie.' [P126]

In addition to these suggestive formal and functional parallels, Breton verbal nouns exhibit other verblike traits. Lexical reflexives in Breton are formed by placing the leniting particle *en em* in front of the main verb of a sentence. Thus, while the particle occurs before the finite verb in analytic constructions like (15), it precedes the verbal noun, rather than the tensed auxiliary verb in the periphrastic construction in (63).

63 *En em vagañ a ra ar vugale.*
self feed-Vn Pt do the children
'The children feed themselves.' [P162]

Perhaps significantly, these verbal characteristics of verbal nouns correlate with a strict VO order in verbal noun constructions. This is exemplified in the examples in (64).

64 a. *Hi a blijfe dezhi* [*debriñ ur grampouezhenn vras*].
she Pt please to-her eat-Vn a crepe big
'She'd like to eat a big crepe.' [P166]

b. *Plijout a rafe deomp* [*ober un dro e Montroulez*].
please-Vn Pt Aux to-us do-Vn a walk in Morlaix
'We'd like to go for a walk in Morlaix.' [P166]

Thus, the VO order in the more verblike verbal nouns in Breton contrasts with the typically OV pattern in the corresponding Irish constructions above.

Comparison of these examples with their Irish and Welsh counterparts illustrates the high degree of synchronic variation within the class of Celtic verbal noun constructions. The relatively conservative verbal nouns in Irish retain the greatest number of incontrovertibly nominal traits. On the other hand, Breton verbal nouns exhibit the clearest verbal properties, while those in Welsh

have something of an intermediate status. Thus, although Celtic verbal nouns appear to be evolving towards verbal categories by gradually acquiring verbal properties, this categorial transmutation is clearly proceeding at a different pace in the individual languages. The standard $\bar{X}$ features [±N] and [±V] provide a vocabulary for describing the endpoints of this process, though the intermediate stages seem to defy classification in terms of this impoverished system. Likewise, it is unclear how a single binary feature like [±DEV] could capture the full range of synchronic and diachronic variation attested within Celtic verbal nouns. Instead, hybrid expressions like verbal nouns may indicate the need for a more thorough revision of current feature-based theories of syntactic category, perhaps in the direction of a gradient or scalar model that recognizes families of categories with varying degrees and/or varying combinations of nominal and verbal properties.

The Breton examples clarify a further point which is more directly relevant to the central claim of this paper, namely that there is not a stable correlation in Celtic between nonfinite verbal properties and deviation from finite clause order. Given the invariant VO order in Breton, the OVn and SOVn patterns in Irish verbal noun constructions cannot be treated as part of a general finite/nonfinite alternation in Celtic. On the contrary, the contrast between Irish and Breton reveals a correspondence between verbal properties and the serialization patterns characteristic of finite verbs and their direct objects. Thus, Irish VNPs, which exhibit the clearest nominal properties, also show the greatest deviation from

finite clause order. The more verblike VO counterparts in Breton pattern like finite verbs, which canonically precede their direct objects. There is, moreover, little to recommend the view that the emergence of transitive verbal nouns in dialects of Irish is a byproduct of the accretion of verbal qualities, given that the SVO pattern in Munster appears to be a remnant of a previous stage of the language at which verbal nouns would have been less verbal in character.

3.3 Conclusion

To summarize the previous subsections, there is at present no clear evidence supporting the recognition of a class of nonfinite clauses in Celtic which instantiate an underlying SVO order. In particular, verbal noun constructions are excluded, as they do not exhibit either the requisite ordering or categorial properties. Hence, relating finite clauses and verbal noun constructions in Celtic by means of a verb-movement rule is an unwarranted syntactic complication, and one which rests on a basic categorial misanalysis. Further, since verbal nouns are the closest Celtic approximation to nonfinite verbs, it follows that the Celtic languages do not instantiate any category that could be affected by a verb-movement rule of the sort postulated by advocates of the Underlying SVO Analysis. This leaves such accounts without any empirical motivation, and confirms the suspicion that the multiple levels of representation and movement rule(s) they incorporate are purely artifacts of constraints on phrase structure.

Thus, existing descriptions of Celtic provide no evidence for either an underlying constituent order or derived constituent structure. This gap clearly undermines transformational accounts and provides a measure of support for the discontinuous alternative presented above, which recognizes only the equivalent of underlying constituency and surface order.[42]

Strategies for admitting the discontinuous analyses of Celtic clause structure suggested earlier are provided in Chapter 8 below. The proposed descriptions assign a uniform branching structure to transitive clauses cross-linguistically, and, in particular, do not distinguish the structure of subject-medial languages. The uniform subject/predicate structure is obtained through the dissociation of precedence and dominance relations within representations. A similar factoring out of the hierarchical and linear information expressed by phrase structure rules permits the recognition of discontinuous descriptions. Two features distinguish this decomposition from related proposals in the REST and GPSG frameworks. To begin with, the domains of hierarchical and ordering conditions are decoupled in order to admit discontinuous representations. As well, the context-sensitive serialization rules that restore a uniform branching structure are of a somewhat novel sort, in that they key order to hierarchical structure. However, the basic discontinuous analysis proposed is not new, but rather amounts to a reinstate-

[42]It is interesting to note in this connection that transformational analyses commonly hedge on the status of the undermotivated d-structure order and s-structure constituency. Sproat, for example, consistently represents d-structure configurations by means of linearly unordered tree diagrams (p.174 and p.201), while remaining noncommittal about the output of the Celtic verb-movement rule (p.199fn3).

ment of the immediate constitent descriptions of polar interrogatives suggested by structuralists such as Hockett (1958) and Gleason (1955), among others.

What specifically induces discontinuity in the Celtic languages is the fact that they instantiate predominantly head-initial but right-branching phrasal constituents. The former property is a general characteristic of VSO languages, as the typological profiles presented by Greenberg (1966) and Hawkins (1983) indicate. Thus, for example, the VSO implicational universals proposed by Greenberg, repeated in (65) below, largely express a correlation between dominant verb-initial order and the initial positioning of other 'meaningful' elements.[43]

65 VSO Implicational Universals

U3 Languages with dominant VSO order are always prepositional.

U6 Languages with dominant VSO order have SVO as an alternative, or as the only alternative, basic order.

U10 Question particles specified in position by reference to a particular word in the sentence do not occur in languages with dominant order VSO.

U12 If a language has dominant order VSO in declarative sentences, it always puts interrogative words or phrases first in interrogative word questions.

U16 In languages with dominant order VSO, an inflected auxiliary always precedes the main verb.

U17 With overwhelmingly greater than chance frequency, languages with dominant order VSO have the adjective after the noun.

[43]Further statistical tendencies follow from the identification of VSO languages as prepositional, namely that the genitive tends to follow the governing noun (Universal 2), and that question particles typically occur initially (Universal 9).

At least half of these universals (e.g., U3, U16 and U17) can be collapsed into a general ordering convention, given a suitable characterization of an endocentric construction. Thus, if nouns, verbs and adpositions are designated as phrasal heads, the fact that nouns precede modifying adjectives and genitives, adpositions precede their arguments, and finite verbs precede nonfinite verbs and direct objects can be subsumed under a single condition that positions heads initially. If, moreover, (following Bresnan (1976), Jackendoff (1977), Gazdar (1982), and others), finite clauses in VSO languages are identified as endocentric verbal categories, the generalization that finite verbs precede subjects also falls under the head-initial requirement.

What essentially distinguishes rigidly VSO languages within the class of head-initial languages is the fact that their relative ordering of subject and object nominals conforms to the cross-linguistically unmarked SO pattern. This can be enforced by a condition that associates relative height with left-to-right order within an endocentric phrase. Discontinuity then arises in VSO languages as a result of the conflict between the generally right-branching phrasal structure and the left-peripheral placement of verbal heads.

Chapter 4

Discontinuity and Multidomination in Niuean

The word order alternations in the languages considered so far have largely been attributable to whatever extraction or dislocation processes are involved in the formation of cleft structures. Moreover, much of the remaining variation is either conditioned by phonological factors, as in the case of the contrast between the preverbal clitic pronouns and postverbal inflected prepositions in Breton, or show sensitivity to gross distinctions in syntactic category, as in the characteristic difference between the positioning of direct object pronouns in verbal and nominal constructions in Irish. Although these factors interact differently with the matrix/subordinate distinction in each language, the finite/nonfinite split seems to play no particularly prominent role in determining the range of word order options. As we will see directly below, essentially the same considerations govern the word order variation in Niuean, another VSO language. This casts further doubt on the Case-driven variant of the Underlying SVO Analysis. Further, the existence of structure-sensitive asymmetries in a language that fails

to exhibit even the degree of constituent order variation characteristic of Irish calls into question the viability of any version of the SVO Analysis.

In addition, Niuean exhibits a class of word order alternations that involve the promotion of an embedded subject or direct object into the subject or object position of a higher clause. Seiter (1980) reports that all four possible promotion patterns are attested, as subordinate subjects and objects may be advanced into a superordinate subject position of certain aspectual and aspectual verbs like *kamata* 'begin', while embedded subjects and objects may raise into the object position of concessive verbs like *toka* 'let'. A remarkable property of these displaced nominals is that they participate in clausebound processes that operate within the subordinate clause, as well as in processes that are otherwise strictly confined to the higher clause. In the proposal presented below, the dual citizenship of these elements is captured by allowing raised nominals to occur simultaneously within a pair of subjacent clauses. Moreover, the lexical restrictions and locality conditions characteristic of raising configurations are treated as a consequence of the fact that these constructions represent cases of lexically governed multidomination.

4.1 Discontinuity in Niuean

Let us first consider the basic clause structure of Niuean, which provides an instructive contrast with the Celtic languages discussed above.[1] Niuean combines the basically head-initial order characteristic of Polynesian, with a consistent ergative/absolutive case marking system. Thus, verbs typically occur either initially within a clause, or follow a sequence of aspectual particles or auxiliaries. Nouns likewise occur to the left of adjectives, quantifiers, demonstratives and possessives, though they follow articles and case marking particles. Adpositions and adjectives also precede their arguments. Of primary interest in the present context is the fact that finite clauses conform to a norm VSO order in a wide range of syntactic environments. Moreover, despite its surface ergative case marking pattern, Niuean exhibits familiar, ostensibly structural, asymmetries.

4.1.1 Word Order

Niuean is a paradigm example of a rigidly VSO language, as this order is exhibited by matrix and embedded clauses, as well as relative clauses and sentence nominalizations. The sentences in (1) illustrate the rigidly VSO order of Niuean matrix declarative clauses.[2]

[1] Pawley (1966) identifies Niuean and Tongan as the sole members of a Tongic subgroup, distinct from the Samoic-Outlier and East Polynesian groups that comprise the majority of the estimated thirty-odd Polynesian languages. Niuean and Tongan are spoken principally in New Zealand, and on and the islands of Niue and Tonga, respectively.

[2] These examples are drawn from Seiter (1980) [Sr].

1 a. *Hele e au e ika.*
cut Er I Ab fish
'I'm cutting up the fish.' [Sr3:1b]

b. *To lagomatai he ekekafo a ia.*
Ft help Er doctor Ab he
'The doctor will help him.' [Sr29:73b]

(1a) exemplifies a verb-initial order, while the verb complex in (1b) contains the aspectual particle *to*, which expresses future tense.

The same constituent order is observed in finite subordinate clauses embedded under the aspectual particle *kua*, as well as in subjunctive complements embedded under *ke*.[3]

2 a. *Iloa e Stan kua fakatau tuai e koe e falaoa.*
know Er Stan Pf buy Pf Er you Ab bread
'Stan knows you bought the bread.' [Sr126:103c]

b. *Ne teitei nī ke fakagoagoa e ia a koe.*
Ps almost Em Sb fool Er he Ab you
'He almost fooled you.' [Sr134:123a]

Furthermore, the relative order of verb, subject and object and oblique is preserved in direct relative clauses, as the example in (3) shows.

3 *e fifine ne gahua a au ma-ana*
Ab woman Nf work Ab I for-her
'the woman who I work for' [Sr91:5b]

Clefts and information questions, which are formally similar to relative clauses, likewise show a verb-subject-object order. This is clearest in the sentences inolving clefted or questioned obliques, which invariably contain resumptive pronouns formed on *ai*.

[3]Such subjunctive complements often correspond to English infinitives.

4 a. *Ko ia ne age e au ki ai e motokā.*
Pd him Nf give Er I to him Ab car
'It's him I gave the car to.' [Sr102:38a]

b. *Ko hai ne foaki age e koe ki ai e mena fakaalofa?*
Pd who Nf give Dir Er you to him Ab thing love
'Who did you give the gift to?' [Sr111:64b]

The same order is observed in topicalized structures, which, as the examples in (5) show, may either contain the resumptive pronoun *ai* or personal pronouns, such as *ia* 'she'.

5 a. *Ko e fifine ia, to āhi atu ki ai.*
Pd Ab woman that Ft visit Dir to her

b. *Ko e fifine ia, to āhi atu ki ia.*
Pd Ab woman that Ft visit Dir to her
'As for that woman, we'll go visit her.' [Sr117:78a,b]

Nominalized clauses introduced by the particles *ke he* also follow a rigid VSO pattern, as (6) shows.

6 *Ne tutala a mautolu ke he tāmate e Tofua e kulī.*
Ps talk Ab we-Ex about kill Er Tofua Ab dog
'We talked about Tofua's killing the dog.' [Sr119:82a]

Finally, it is worth noting that Niuean is probably more faithfully described as exhibiting a rigidly predicate–subject–object order, since adjectives, predicate nominals and predicate locatives all occur initially in verbless sentences.

7 a. *Ne lahi e fale haana.*
Ps big Ab house his
'His house was big.' [Sr17:45b]

b. *Ko e ekekafo a ia.*
Pred Ab doctor Ab he
'He was a doctor.' [Sr54:136a]

c. *Hā* *he* *fale* *gagao* *a* *ia.*
Pred in house sick Ab she
'She's in the hospital.' [Sr54:138a]

The preceding examples illustrate the rigidly VSO order of Niuean matrix and subordinate clauses. Although a verb may be preceded by an aspectual or auxiliary particle, and elements may intervene between a verb and subject or a subject and object, the relative order verb-subject-object is invariant within a clause. Seiter (1980:56f) reports that the main deviations from a canonical VSOX order involve the placement of the oblique constituents. Thus, locative and temporal adverbials may occasionally precede subjects and direct objects, while indirect objects can precede objects, though not subjects. However, Seiter (1980:58) insists that "in no case can a direct object, middle object or indirect object ever precede the subject of its clause." This invariant order within Niuean clauses precludes SVO and VOS alternatives, and, in fact, any surface constituent order that would allow a continuous verb phrase.[4]

In the absence of alternative relative orders, a distinct underlying arrangement cannot be motivated for Niuean on the basis of systematic alternations between matrix and subordinate or finite and nonfinite clauses. Nor does the postulation of an underlying structure simplify the statement of any class of syntactic rules of Niuean. The examples in (3) show that relative clauses formed by the 'pronominalization' strategy preserve the rigidly VSO relative order. Likewise, those in (4) and (5) show the same for clefts, questions and topicalization

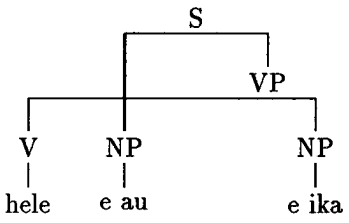
[4]Thus Niuean, like Irish, counterexemplifies Greenberg's Universal 6.

structures containing resumptive pronouns. Thus, however these structures are derived, it is clear that the operative rules are most simply described as applying to embedded clauses with a VSO order. Consequently, any distinct underlying order for these examples will be effectively syntactically inert, as it will neither surface, nor feed any syntactic rule.

4.1.2 Configurational Phenomena

The rigidly VSO surface order of Niuean transitive clauses, in conjunction with the fact that there are no syntactic rules that must apply to a different constituent order, support the conclusion that there is no empirical motivation for positing an underlying order for Niuean distinct from VSO. Consequently, Niuean clauses cannot contain continuous verb phrases at any level of syntactic representation. However, recognizing discontinuous constituents permits the assignment of the articulated structure in (8) to a transitive clause like (1a).

8



The clausebound syntactic rules of Niuean provide a measure of support for the hierarchical structure represented in (8), as these rules exhibit asymmetries of the sort that are commonly ascribed to configurational factors in generative descriptions of languages with more congenial SVO word orders.

4.1.2.1 Pronominal Anaphora

Reflexivization is a case in point. As in most languages, reflexive constructions in Niuean exhibit a clear subject/nonsubject asymmetry. Seiter (1980:78ff) reports that the reflexive particle *nī* optionally follows nonsubject personal pronouns that are construed as anaphoric to a clausemate subject. Direct and indirect objects, as well as benefactive and other oblique arguments may be marked as reflexive by *nī*, as (9a)–(9c) show. Likewise, in (9d), *nī* functions as a possessive reflexive marker. [5]

9 a. *Kitia he tama fifine a ia nī he fakaata.*
see Er child female Ab her Rf in mirror
'The girl sees herself in the mirror.' [Sr78:214a]

b. *Ne fakafano mai e au e tohi ki a au nī.*
Ps send Dir Er I Ab letter to Ab me Rf
'I sent a letter to myself.' [Sr78:214c]

c. *Taute e au e pasikala afi ma-aku nī.*
fix Er I Ab bicycle fire for-me Rf
'I am fixing the motorcycle for myself.' [Sr78:215a]

d. *Ne taute e Sione e motokā nī haana.*
Ps fix Er Sione Ab car Rf his
'Sione fixed his own car.' [Sr79:216]

Like English reflexives, *nī*-marked reflexive arguments require antecedents within the same clause, as (10) illustrates. Thus, although the subordinate subject *e ia* 'she' may antecede *ia nī* in (10a), the matrix subject *e au* 'I' in cannot control the embedded reflexive in (10b).

[5] Although *nī* is also optional in this use, Seiter (1980:79) reports that when it occurs it must immediately follow the possessed noun, in this case, *motokā*.

10 a. *Ne manako au ke fakafano e ia*
Ps want I Sb send Er she
e tohi ki a ia nī.
Ab letter to Ab her Rf
'I wanted her to send a letter to herself.' [Sr79:218a]

b. **Ne manako au ke fakafano mai e ia*
Ps want I Sb send Dir Er she
e tohi ki a au nī.
Ab letter to Ab me Rf
(I wanted her to send a letter to myself.) [Sr79:218b]

Furthermore, reflexive subjects cannot be controlled by clausemate objects, as (11) shows.

11 a. **Kitia e ia nī e tama fifine he fakaata.*
see Er her Rf Ab child female in mirror
(Herself sees the girl in the mirror.) [Sr79:217a]

b. **Ko e tele kia e koe nī a koe?*
Prs kick Q Er you Rf Ab you
(Is yourself kicking you?) [Sr79:217b]

c. **Matakutaku a ia nī i a ia.*
frightened Ab he Rf Ag Ab him
(Himself is frightened of him.) [Sr79:217c]

Seiter (1980:78) further asserts that only subjects control reflexive arguments. Although this stronger claim is consistent with the examples he provides (none of which contain nonsubject antecedents of *nī*-marked arguments), Seiter does not support his position with any examples whose ungrammaticality can be attributed to illegitimate nonsubject antecedents. Nevertheless, the examples in (9)–(11) establish at least that subjects can control reflexive nonsubjects and that nonsubjects cannot control reflexive subjects.

4.1.2.2 Defining Grammatical Relations in a VSO Language

The structure in (8) perspicuously represents structural differences that, on standard configurational accounts of anaphora, determine the asymmetrical binding options of subjects and objects. Moreover, the fact that such binary-branching descriptions associate distinctive hierarchical positions with nominal arguments facilitates a straightforward extension of configurational definitions of grammatical relations/functions to Niuean and other VSO languages. Discontinuous analyses like (8) permit the identification of subjects as constituents satisfying the configurational description [NP,S] (i.e. as noun phrases immediately dominated by a sentence). Likewise, on the assumption that direct objects are invariably the penultimate arguments of a verb, the description [NP,VP] can be maintained as a general cross-linguistic classification of direct object nominals.[6]

The potential usefulness of configurational definitions is enhanced in Niuean by the fact that the case marking pattern of the language precludes the identification of nominals bearing a given grammatical relation on the basis of morphology. Niuean follows an ergative pattern in which subjects of intransitives and objects of transitives occur with the same case particles: *e* for common noun phrases, and *a* for proper nouns and pronouns, while subjects of transitive clauses occur with a different particle: *he* for common noun phrases, and *e*

[6]Categorial extensions of these descriptions may be necessary to allow, e.g., constituents other than sentences to have subjects, or constituents other than noun phrases to qualify as subjects and objects.

for proper nouns and pronouns. Further, grammatical relations cannot be consistently correlated with surface linear position, as relativization, clefting and control typically disrupt the canonical VSO transitive clause order. Deviation from the norm order is similarly characteristic within raising constructions.[7]

Further, although the availability of configuration definitions of grammatical relations does not establish that such relations cannot be considered to be primitive constructs, it does significantly undermine arguments to the effect that grammatical relations must be recognized as primitive notions. More generally, notice that the doubts expressed by grammatical relation-based models of grammar regarding the viability of configurational definitions implicitly assume relatively conventional assumptions about the representation of phrase structure. Relaxing the constraints that enforce continuity directly allows the extension of configurational definitions of grammatical relations to subject-medial languages.

4.2 Interclausal Promotion in Niuean

Seiter (1980,1983) provides a detailed description of an extensive class of word order alternations in Niuean that he attributes to a pair of related raising rules. The first process, which he terms 'Raising', promotes the subject or direct object of a subjunctive complement into the subject or direct object position of an immediately superordinate clause. Raising comprises two subcases: Subject

[7]Moreover, as discussed below, raised nominals retain properties associated with the grammatical relation they bear in subordinate clauses that they have seemingly been raised out of.

Raising and Object Raising, distinguished in terms of the characteristic destination of the raised constituent. Representative examples involving Subject Raising are given in (12).[8]

12 a. *To maeke [ke lagomatai he ekekafo e tama ē].*
Ft possible Sb help Er doctor Ab child this
'The doctor could help this child.' [Sr158:3a]

b. *To maeke e ekekafo [ke lagomatai e tama ē].*
Ft possible Ab doctor Sb help Ab child this
'**The doctor** could help this child.' [Sr158:4a]

c. *To maeke e tama ē [ke lagomatai he ekekafo].*
Ft possible Ab child this Sb help Er doctor
'The doctor could help **this child**.' [Sr158:5a]

Sentence (12a), in which both nominal arguments occur in the embedded clause, serves as the input to the rule. In (12b), the embedded subject *e ekekafo* has been promoted into the matrix clause. Likewise, in (12c) the complement object *e tama ē* has been advanced. The alternations in clause structure illustrated in (12) are governed by a closed class of verbs, including the modal *maeke* 'possible' and emphatic negative *fakaai* 'not', along with the aspectual verbs and predicative adverbials *kamata*, 'begin' *mahani* 'usual', *teitei* 'almost' and *fetamakina* 'nearly'.

The constructions in (13) provide a corresponding minimal triple for the Object Raising rule.

[8]Embedded clauses are here bracketed for perspicuity. Moreover, although Seiter typically associates different raising constructions with identical English glosses, the counterparts of raised elements occur in boldface in the examples below.

13 a. *To nākai toka e au [ke kai he pusi e ika].*
Ft not let Er I Sb eat Er cat Ab fish
'I won't let the cat eat the fish.' [Sr196:76a]

b. *To nākai toka e au e pusi [ke kai e ika].*
Ft not let Er I Ab cat Sb eat Ab fish
'I won't let **the cat** eat the fish.' [Sr196:77a]

c. *To nākai toka e au e ika [ke kai he pusi].*
Ft not let Er I Ab fish Sb eat Er cat
'I won't let **the fish** be eaten by the cat.' [Sr196:78a]

(13a) is the input to the rule. (13b) involves promotion of the embedded subject *e pusi*, while in (13c) the lower object *e ika* is advanced into the matrix clause. Object Raising is governed by an even smaller class of verbs, including *toka* 'let', *fakaatā* 'permit', and *manako* 'want'.

The locality conditions on these upward-bounded advancements distinguish them from the unbounded 'Tough Movement' rule that Seiter posits.[9] A further difference concerns the targets of the respective rules. While embedded subjects and objects can be promoted by either rule, Tough Movement, unlike Raising, applies as well to obliques, which are invariably resumed by a pronominal 'copy'. Examples that illustrate the characteristic result of Tough-moving an oblique are given below. The configurations that result from local tough-movement of subjects and objects are indistinguishable from application of Subject Raising.

14 a. *Uka [ke heke a Lefu he vaka].*
difficult Sb ride Ab Lefu Lc canoe
'It is difficult for Lefu to ride in the canoe.' [Sr225:22a]

[9]Although bounded, Raising is nevertheless iterative, as the examples in (38) below indicate.

b. *Uka* *he* *vaka* [*ke* *heke* *ai* *a* *Lefu*].
difficult Lc canoe Sb ride in-it Ab Lefu
'The canoe is difficult for Lefu to ride in.' [Sr225:22b]

Seiter identifies only two predicates that govern Tough Movement: the antonyms *uka* 'difficult' and *mukamuka* 'easy'. In order to clarify the similarities and differences that hold among these rules, let us consider them individually in somewhat greater detail.

4.2.1 Subject Raising

The actual rule that Seiter formulates to account for the alternations in (12) is stated in the grammatical relation idiom of Relational Grammar rather than in the configurational terms favoured within transformational and other more structurally-oriented models of grammar. Seiter characterizes Subject Raising as a rule that directly "turns a complement SU or DO into the SU of the governing verb (p. 159)." There are various ancilliary consequences of this sort of relation-changing rule in the framework Seiter assumes; the most notable being the demotion of the embedded clause to *chômeur* status. However, what I will attempt to focus on here is the relatively theory-independent content of this analysis, rather than the specifics of its implementation. The central claim of Seiter's proposal is that a nominal promoted by Subject Raising bears two distinct grammatical relations in the same derivation. Within RG, the Stratal Uniqueness Law (SUL) of Perlmutter and Postal (1977) requires that these different relations must hold at distinct) stages or *strata* in a derivation.

Seiter's analysis is consistent with this requirement, as raised nominals are taken to originate as direct objects or subjects and then assume the status of a subject or object at a later stratum. Nevertheless, I will argue below that this constraint is excisable, as the Niuean constructions Seiter discusses provide it with no direct empirical confirmation.

Seiter's argument for a Subject Raising analysis consists principally of a demonstration of the inadequacy of a number of alternative proposals. The grounds for rejecting these alternatives involve considerations of relative simplicity: in each case, Seiter argues that the competing analyses introduce complications and obscure significant generalizations in the grammar of Niuean. These arguments invariably exploit the fact that the raised arguments in sentences like those above behave, in some respects, as constituents of both the higher and lower clauses. Specifically, Seiter documents that a variety of rules and processes that are normally clausebound in Niuean treat raised arguments as elements of both the matrix and embedded clause. This leads him to conclude that a raised nominal cannot be located exclusively in either clause. Since the SUL excludes the possibility of interclausal constituent sharing, Seiter accounts for the contradictory properties of a raised argument by invoking the sequential derivational stages in a relational network.

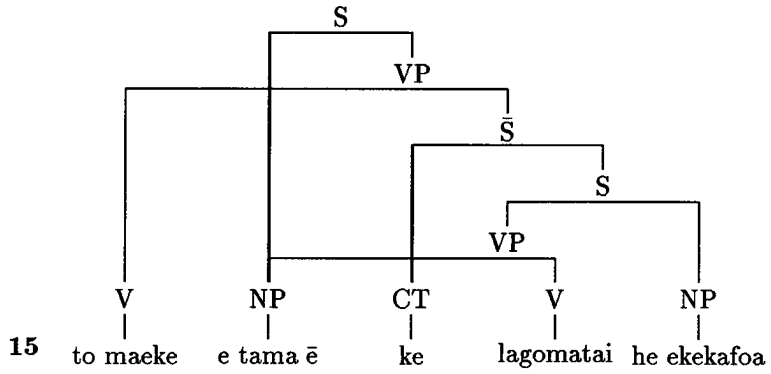
Given that the force of Seiter's simplicity arguments depends, in large part, on the plausibility of the counterproposals he rejects, and the degree of independent motivation for the analyses they complicate, it is worth reviewing his

discussion of these alternatives. Seiter terms the first proposal he considers the 'Initial Analysis'. This analysis treats raised nominals like *e ekekafo* in (12b) as arguments of the higher clause that bear no grammatical relation in the embedded sentence. The second alternative, dubbed the 'NP Shift Analysis', treats raised elements as arguments of the lower clause that have been shifted within that clause past the subjunctive particle *ke*. These proposals are essentially complementary, in that they place raised arguments uniquely within the higher and lower clause, respectively. The remaining position he considers is one in which a pair of identical underlying arguments are generated, with the lower copy deleted by some version of an Equi rule.

4.2.1.1 Multidominated Raised Subjects

Each of these families of proposals is examined in some detail below. However, notice that these accounts do not exhaust the space of possible analyses and, in particular, exclude the possibility that raised nominals occur simultaneously within multiple clauses. This omission is significant, given the extent to which Seiter's arguments for his own position depend on the deficiencies of the structural alternatives he considers. For a concrete example of the sort of multidominated structural description that is compatible with Seiter's observations regarding the dual citizenship of raised nominals, consider (16), corresponding to the subject-raising example (12c).[10]

[10]There are a number of arbitrary and perhaps even inconsistent features of this diagram, though none of them substantially affect the central points under consideration. The internal



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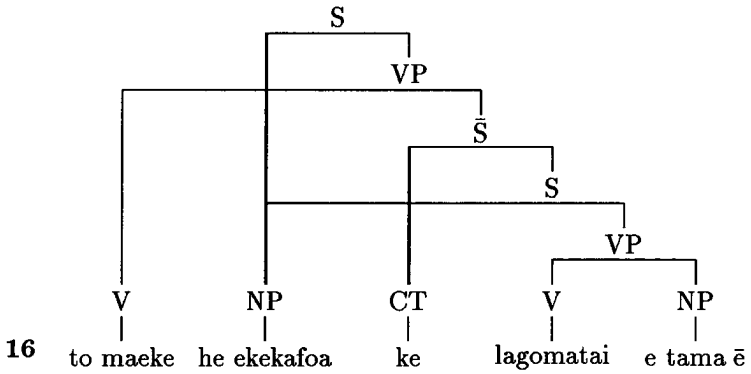
In this representative example of object-to-subject raising, the raised nominal *e tama ē* is analyzed as occurring simultaneously in the object position of the embedded clause and the subject position of the higher clause. This dual association accounts directly for the participation of *e tama ē* in clausebound processes in both sentences.

An essentially parallel analysis of subject-to-subject cases similarly accounts for the properties of raised nominals like *he ekekafoa* in (12b).



16

structure of case-marked noun phrases is uniformly suppressed. Similarly, the aspectual particles preceding matrix verbs are simply grouped with the verbs. However, the subordinator *ke* is treated as a complementizer rather than as an element within the verb complex.

However, let us put off further investigation of these analyses and turn directly to a discussion of the phenomena that motivate the dual association represented by multidomination in the above diagrams.

4.2.1.2 The Initial Analysis

Seiter's attacks on the Initial and Shift Analyses present a concise statement of the distinctive properties of raising constructions. Seiter argues that the Initial Analysis leads to immediate complications in the statement of processes including case marking, agreement and quantifier float. The effect on the formulation of case marking conventions is the most straightforward. As noted earlier, nominal and pronominal case marking in Niuean follows a relatively consistent ergative/absolutive pattern: subjects of intransitive verbs and objects of transitives occur with an absolutive case particle, in contrast to subjects of transitives, which bear an ergative marker. Unlike split intransitive systems (e.g., Lakota), in which the arguments of monadic predicates may pattern with either the transitive subject or object, the arguments of intransitives are almost uniformly absolutive. However, adoption of the Initial Analysis will disrupt this otherwise orderly system. If a raised argument like *e tama ē* is treated as an element of the matrix clause in (12c), and the complement treated as an intransitive clause, then an otherwise unattested clause type must be recognized: namely an intransitive with a single, ergative argument. That is, *ke lagomatai*

he ekekafo in (12c) would be an embedded clause containing a transitive verb *lagomatai* and its single ergative argument *he ekekafo.*

Similarly, the statement of agreement rules is greatly complicated if raised nominals are not considered a part of the complement clauses in (12). Although verbal agreement is not a general and productive process in Niuean, intransitive verbs of motion have suppletive plural forms in *ō*, while locative predicates may have reduplicative plurals. A pair of representative examples illustrating suppletive number agreement are given in (17).

17 a. *To fano a au apogipogi ke Queen Street.*
Ft go Ab I tomorrow to Queen Street
'I'm going to Queen Street tomorrow.' [Sr163:12a]

b. *To ō a tautolu apogipogi ke Queen Street.*
Ft go Ab we-Pl tomorrow to Queen Street
'We're going to Queen Street tomorrow.' [Sr164:12b]

This agreement is typically clausebound, as the examples in (18) indicate.

18 a. *Fia manako a lautolu ke fano a au ki Ausetalia.*
want want Ab they Sb go Ab I to Australia
'They want me to go to Australia.' [Sr65:168a]

b. **Fia manako a lautolu ke ō a au ki Ausetalia.*
want want Ab they Sb go-Pl Ab I to Australia
(They want me to go to Australia.) [Sr65:168a]

In the wellformed (18a), the embedded verb *fano* 'go' agrees in number with the first person singular subject *a au* of the complement clause. The ungrammaticality of (18b), in which the plural *ō* replaces *fano*, shows that an embedded verb may not agree with the subject of a higher clause (in this case, the third person plural pronoun *a lautolu* 'they').

A verb of motion or locative predicate embedded under a raising verb is unexceptional in agreeing with a clausemate subject, as the sentences in (19) illustrate. Thus, the singular *hake* 'go up' in (19a) agrees with the singular demonstrative *e tagata nā* 'that person', while *nofo* in (19b) agrees with the third person singular *a ia*.

19 a. *Kua kamata tuai e tagata nā ke hake motokā.*
Pf begin Pf Ab person that Sb go-up car
'That person has begun to go up by car.' [Sr164:15a]

b. *Ai maeke a ia ke nofo e nofoa nei.*
Ng possible Ab he Sb sit Ab chair this
'He can't sit on this chair.' [Sr165:16a]

However, such verbs also agree with a subject that has seemingly been raised out of the complement clause. In (20a), the plural *ō hake* agrees with the 'raised' plural demonstrative *e tau tagata nā*, which occurs to the left of the clausal subordinator *ke*. Likewise, in (20b) the reduplicative *nonofo* agrees with the displaced third person plural pronominal *a laua*.

20 a. *Kua kamata tuai e tau tagata nā ke ō hake motokā*
Pf begin Pf Ab Pl person that Sb go-up-Pl car
'Those people have begun to go up by car.' [Sr164:15b]

b. *Ai maeke a laua ke nonofo e nofoa nei.*
Ng possible Ab they-Du Sb sit-Pl Ab chair this
'They can't sit on this chair.' [Sr165:16b]

An analogous pattern is characteristic of reduplicative object agreement, which although also normally a clausebounded process, affects raised and unraised nominals alike. The sentence pair in (21) gives the singular and plural forms of the verb *hala* 'to cut'.

21 a. *Kua hala e ia e lā akau.*
Pf cut Er he Ab branch tree
'He cut down the branch.' [Sr166:17a]

b. *Kua hahala e ia e tau lā akau.*
Pf cut-Pl Er he Ab Pl branch tree
'He cut down the branches.' [Sr166:17b]

This agreement process is triggered by the object of a verb embedded under a raising predicate, irrespective of whether the object occurs in that clause, as in (22a), or whether it has been promoted to the higher clause, as in (22b).

22 a. *Kua kamata e akau [ke hala e Pita].*
Pf begin Ab tree Sb cut Er Pita
'The tree had begun to be cut down by Pita.' [Sr166:18a]

a. *Kua kamata e tau akau [ke hahala e Pita].*
Pf begin Ab Pl tree Sb cut Er Pita
'The trees had begun to be cut down by Pita.' [Sr166:18a]

The examples in (17)–(22) suggest that the agreement processes of Niuean treat raised nominals as though they belong (at some derivational stage) to the clauses out of which they are ostensibly raised. Since this possibility is explicitly excluded by the Initial Analysis, adoption of this position considerably complicates verbal agreement in Niuean. Rather than being a local process that is sensitive only to the number specifications of clausemate subjects and objects, agreement must be allowed to depend on the grammatical features of the arguments of a designated set of embedding verbs.

Moreover, Seiter argues that the Initial Analysis results in other, formally similar complications elsewhere in the grammar of Niuean; specifically affecting rules of quantifier float and instrumental advancement. In each case, an

otherwise clausebound rule must be extended to accommodate participation by a raised nominal. Hence, Seiter concludes that the Initial Analysis is inferior to an analysis that recognizes an association between raised elements and the lower clause.

4.2.1.3 The NP Shift Analysis

Nevertheless, Seiter argues that raised nominals cannot be treated as constituents of the lower clause that are 'shifted' past the subjunctive marker by a reordering rule that does not affect clause membership or grammatical relations. Again, his first objection is that this analysis has immediate and undesirable consequences for the statement of nominal case marking conventions. The descriptive problem concerns the fact that raised subjects of embedded transitive clauses occur with absolutive markers, whereas their unraised counterparts occur in the ergative. This alternation can be illustrated with reference to the sentences in (12a) and (12b) above, as well as those in (23) below.

23 a. *Kua* *kamata* [*ke* *hala* *he* *tama* *e* *akau*].
Pf begin Sb cut Er child Ab tree

b. *Kua* *kamata* *e* *tama* [*ke* *hala* *e* *akau*].
Pf begin Ab child Sb cut Ab tree
'The child has begun to cut down the tree.' [Sr158:3b,4b]

In the input structure (23a), the subject *he tama* occurs with the ergative marker *he*, while the output (12b) contains the absolutive form *e tama*. Thus, the Shift Analysis cannot associate case marking directly with the grammatical relation

(or corresponding structural configuration) of an argument. Rather, either case adjustment must be built into the 'shift' rule, or the class of subjects of embedded transitive clauses must be bifurcated into those that precede (absolutive), and those which follow (ergative) the subjunctive subordinator *ke*. All else being equal, these conditions are presumably unwelcome additions to the grammar of Niuean.

A further difficulty that Seiter identifies arises in connection with an alternation between subjects of relative clauses and preposed possessives. The examples in (24) provide a representative illustration of this alternation.

24 a. *e mena ne tunu ai e koe e moa.*
Ab thing Nf cook in-it Er you Ab chicken

b. *e mena haau ne tunu ai e moa.*
Ab thing your Nf cook in-it Ab chicken
'the thing you cooked the chicken in' [Sr97:20a,b]

In place of the ergative subject *e koe* in the relative clause in (24a), the noun phrase in (24b) contains the possessive pronoun *haau*. Seiter (1980:97f) reports that this alternation is not restricted to pronouns, and that possessive forms of common and proper nouns may also escape from relative clauses. Moreover, as (25) indicates, absolutive subjects, inanimate as well as animate, also alternate with preposed possessives.

25 a. *e motu ne fano ki ai e vaka*
Ab island Nf go to it Ab canoe

b. *e motu he vaka ne fano ki ai*
Ab island Lc canoe Nf go to it
'the island which the canoe went to' [Sr97:22a,b]

However, Seiter notes that nonsubjects never alternate with preposed possessives.

26 a. *e taga ne tuku ai (e ia) e uga*
Ab bag Nf put in-it Er he Ab crab

b. **e taga he uga ne tuku ai (e ia)*
Ab bag Lc crab Nf put in-it Er he
'the bag in which (he) put the coconut crab' [Sr98:24a,b]

27 a. *e namu ne gagau a ia*
Ab mosquito Nf bite Ab him

b. **e namu haana ne gagau*
Ab mosquito his Nf bite
'the mosquito which bit him' [Sr98:25a,b]

In the illformed examples in (26b) and (27b), the possessives *he uga* and *haana* correspond to the direct objects of the relative clauses in (26a) and (27a).[11]

Moreover, this process is clearly downward bounded, as the following examples show that only the highest subject contained in a relative clause can alternate with a possessive form.

28 a. *e mena ne manako a koe ke taute e Sione*
Ab thing Nf want Ab you Sb do Er Sione

b. *e mena haau ne manako a ke taute e Sione*
Ab thing your Nf want Ab Sb do Er Sione

[11] As Seiter (1980:150fn7) notes, additional evidence of the subject-sensitivity of this phenomenon comes from the fact that (27b) is wellformed on the pragmatically odd interpretation 'the mosquito which he bit', in which *haana* is interpreted as a raised subject.

c. *e mena ha Sione ne manako a koe ke taute
Ab thing Lc Sione Nf want Ab you Sb do
'the thing you want Sione to do' [Sr99:26a-c]

The highest subject *e koe* in the relative clause in (28a) may alternate with the possessive pronoun *haau*, as in (28b). However, the embedded subject *e Sione* does not enjoy a similar freedom, as the ungrammaticality of (28c), containing the possessive *ha Sione* indicates.

Thus, Seiter argues, the behaviour of raised elements in relative clauses should provide a reliable indication of their subjecthood. In particular, the fact that the raised argument *e tau leoleo* in the relative clause in (29a) alternates with the possessive *he tau leoleo* in (29b) suggests that *e tau leoleo* occupies the highest subject position in (29a).

29 a. *e tagata ne kamata e tau leoleo ke kumi ai*
Ab man Nf begin Ab Pl police Sb search him

b. *e tagata he tau leoleo ne kamata ke kumi ai*
Ab man Lc Pl police Nf begin Sb search him
'the man who the police are beginning to look for' [Sr178:42a,43a]

This conclusion is reinforced by the examples in (30) if, as Seiter (1980:212fn11) proposes, *fiha* is to be analyzed as a stative predicate that takes a relative clause complement.

30 a. *Fiha e vala talo kua maeke a koe ke kai?*
how-many Ab piece taro Pf possible Ab you Sb eat

b. *Fiha e vala talo haau kua maeke ke kai?*
how-many Ab piece taro your Pf possible Sb eat
'How many pieces of taro can you eat? [Sr178-9:42b,43b]

Again, a raised nominal, in this case *a koe*, is able to possessor-raise out of the relative clause, yielding the grammatical sentence (30b).

Seiter constructs a formally similar argument for the surface subjecthood of raised nominals on the basis of a process of possessive preposing within nominalizations. As the examples in (31) indicate, either a subject or object in a nominalization can occur in the possessive.[12] While the possessives *haaku* and *haana* in (31a) and (31b) correspond, respectively, to intransitive and transitive subjects, *haaku* in (31c) corresponds to a direct object.

31 a. *e* *pākia* *haaku* *he* *pilu* *nā*
Ab injured my Lc knife that
'my being injured on that bush knife'

b. *e* *uta* *haana* *i* *a* *au* *ki* *Alofi*
Ab take his Lc Ab me to Alofi
'his taking me to Alofi'

c. *e* *kotofa* *haaku* (*e* *lautolu*) *ke* *fakamatala*
Ab choose my Er they Sb speak
'my being chosen (by them) to speak' [Sr179:44a-c]

The oblique marking on the ostensibly direct object in (31b) is due to a regular absolutive/oblique alternation within nominalizations. While objects occur in the absolutive in nominalizations containing ergative subjects, they follow an oblique preposition/case marker (homophonous with the locative) in nominalizations containing a possessive subject. This obligatory alternation is illustrated by the examples in (32). The nominalization in (32a) contains an ergative

[12]Seiter (1980:120) reports that "oblique NPs in nominalized sentences may never be placed in the possessive," though he does not support this claim with any illformed examples. Thus, as described by Seiter, the possessive alternation is a more general phenomenon than the Tongan pattern discussed in Churchward (1953), which is apparently restricted to direct objects.

subject and absolutive object. However, as the contrast in (32b) indicates, an absolutive object cannot cooccur with a possessive subject.[13]

32 a. *e tele e au a ia*
Ab kick Er I Ab him

b. *e tele haaku *(i) a ia*
Ab kick my Lc Ab him
'my kicking him' [Sr121:89a-c]

Although either subjects or objects may occur in the possessive, only possessive subjects can be preposed to an initial position within a nominalization, as the contrast between (33a,b) and (33c) shows.

33 a. *hāku a pākia he pilu nā*
my Pt injured Lc knife that
'my being injured on that bush knife'

b. *hāna a uta i a au ki Alofi*
his Pt take Lc Ab me to Alofi
'his taking me to Alofi'

c. **hāku a kotofa (e lautolu) ke fakamatala*
my Pt choose Er they Sb speak
(my being chosen (by them) to speak) [Sr180:45a-b,46]

Rearticulated VV sequences in a postnominal possessive pronoun correspond to long vowels in the counterpart preposed form. Moreover, the absolutive particle *e* is uniformly replaced by the particle *a*. However, what is of central interest here is that a raised argument not only can occur in the possessive in a nominalization, but can also prepose, as the examples in (34) show.

[13] 'Locative' marking presumably leads to ungrammaticality or nonsynonymy in (32a).

34 a. *To maeke a au [ke āhi he kapitiga haaku].*
Ft possible Ab I Sb visit Er friend my
'It will be possible for me to be visited by my friend.'

b. *Kua oti tei e maeke haaku ke āhi he kapitiga haaku.*
Pf finish Pf Ab possible my Sb visit Er friend my

c. *Kua oti tei hāku e maeke ke āhi he kapitiga haaku.*
Pf finish Pf my Ab possible Sb visit Er friend my
'The possibility of me being visited by my friend is through.' [Sr180:47a-c]

This reinforces Seiter's conclusion that raised NPs are subjects of the higher clause that they are advanced into. Yet this contradicts the central claim of the Shift Analysis, which treats raised elements as constituents of the lower clause. This incompatibility, Seiter argues, establishes the inadequacy of the Shift Analysis.

Notice, however, that Seiter's arguments against the Initial and Shift Analyses support somewhat stronger conclusions than he draws. His objections to the Shift Analysis argue against any description that treats the derived location of a raised nominal as a dislocated position. Likewise, the arguments against the Initial Analysis extend directly to any account that generates the raised argument in the higher clause. Consider, for example, the analysis of tough movement proposed in Chomsky (1977) and refined in Chomsky (1982), according to which the derivation of a predicate like *easy to please* involves either movement of an overt *wh*-element that subsequently deletes, or movement of a null operator. The null operator version of this account assigns the analysis represented in (35) to English sentences containing adjectives of the *tough* class.

35 Louise$_i$ is easy [Op$_i$ to please t$_i$]

Op$_i$ is here the empty operator, while *t$_i$* is the coindexed trace of *wh*-movement. The fact that *Louise* is interpreted as the object of *please* results from further coindexing of the subject and operator in (35).

It is evident that channelling agreement information along local links in a chain of coindexed elements will allow an analysis along these lines to describe the suppletive and reduplicative agreement patterns noted above. In particular, a mechanism that requires coindexed elements to share the same specifications for grammatical features will be able to characterize the 'long-distance' agreement effects illustrated in (20) and (22b). For example, the plural agreement between *e tau tagata nā* and *ō hake* in (20a) can be mediated through a sequence of null conduits that link *e tau tagata nā* with a 'trace' that serves as the subject of *ō hake*. However, such a convention represents an essentially *ad hoc* means of enforcing a close association between a subject and a subordinate argument position, an association that is more directly and perspicuously represented by an analysis in which raised nominals remain constituents of a complement clause.[14]

On the other hand, an analysis that treats a raised argument as having itself undergone *wh*-movement faces all of the theory-internal problems that led to the abandonment of this account for English *tough* constructions in the first place. Among the complications that arise is the fact that direct movement of

[14]More generally, this alternative illustrates how a locality requirement can be effectively circumvented by the extensive use of inscruitible null relay points whose properties and distribution are governed solely by theory-internal conditions.

an embedded object to a superordinate subject position will violate whatever constraints block this movement in languages that restrict raising to subjects. The basic problem here is that movement of an embedded object to the subject of a higher clause without passing through the subject position of the lower clause does not conform either to the paradigm of argument or nonargument movement. The particular manner in which this problem manifests itself depends on details of execution that are of limited general interest. Moreover, since the difficulties for a movement analysis arise in a more acute form in connection with Object Raising, let us turn directly to Seiter's description of this process.

4.2.2 Object Raising

Seiter's arguments for the existence of derived raised objects follow closely the form of the arguments he presents to establish derived subjects. First he notes that such arguments uniformly occur in the absolutive case, which is the case associated with direct objects. The alternation in the transitive clauses in (13), repeated in (36) below, indicates that both embedded ergative subjects and absolutive objects occur in the absolutive, when raised into the superordinate sentence.

36	a.	*To*	*nākai*	*toka*	*e*	*au*	[*ke*	*kai*	*he*	*pusi*	*e*	*ika*].
		Ft	not	let	Er	I	Sb	eat	Er	cat	Ab	fish
	b.	*To*	*nākai*	*toka*	*e*	*au*	*e*	*pusi*	[*ke*	*kai*	*e*	*ika*].
		Ft	not	let	Er	I	Ab	cat	Sb	eat	Ab	fish

c. *To nākai toka e au e ika [ke kai he pusi].*
Ft not let Er I Ab fish Sb eat Er cat
'I won't let the cat eat the fish.' [Sr196:76a,77a,78a]

For example, the ergative *he pusi* 'the cat' in (36a) alternatives with the absolutive form *e pusi* in (36b). The latter form cannot plausibly be considered to be the subject of the higher transitive clause, as it already contains the ergative argument *e au*.

Seiter next argues that object-raised nominals undergo rules that are restricted to subjects and objects. In particular, raised arguments participate in the alternation he terms quantifier float, which is confined to subject and object nominals.[15] The quantifier *oti* and head noun *puaka* of the raised argument *e tau puaka* in (37a) can be separated, as in the synonymous (37b).

37 a. *To nākai toka e au e tau puaka oti [ke fagai he tama].*
Ft not let Er I Ab Pl pig all Sb feed Er child

b. *To nākai toka oti e au e tau puaka [ke fagai he tama].*
Ft not let all Er I Ab Pl pig Sb feed Er child
'I won't let all of the pigs be fed by the child.' [Sr202:90]

Moreover, Seiter shows that Object Raising may feed Subject Raising, which, he has argued, applies exclusively to subjects and objects. This possibility is illustrated by the sentences in (38).

38 a. *Kamata [ke toka e ia a au*
begin Sb let Er he Ab I
[ke fakaholo e motokā haana]].
Sb drive Ab car his

[15]For arguments supporting this classification of quantifier float see the discussion in Seiter (1980:65ff).

b. *Kamata* *a* *au* [*ke* *toka* *e* *ia*
begin Ab I Sb let Er he

[*ke* *fakaholo* *e* *motokā* *haana*]].
Sb drive Ab car his
'He's beginning to let me drive his car.' [Sr203:91]

In the input structure (38a), the argument *a au* has undergone Object Raising from the most deeply embedded subjunctive clause. Following a subsequent application of Subject Raising, it occurs in the matrix clause in (38b).

Lastly, Seiter observes that possessive marking, which is restricted to the subject or object of a nominalized verb, may apply to a nominal that has been object-raised.

39 a. *e* *toka* *a* *ia* [*ke* *vagahau* *atu* *ke* *he* *matakau*]
Ab let Ab him Sb speak Dir to Lc group

b. *e* *toka* *haana* [*ke* *vagahau* *atu* *ke* *he* *matakau*]
Ab let his Sb speak Dir to Lc group
'his being allowed to speak to the group' [Sr203:92]

Nevertheless, these possessive arguments cannot prepose, as the ungrammaticality of (40) attests.

40 * (*e*) *hāna* *a* *toka* [*ke* *vagahau* *atu* *ke* *he* *matakau*]
Ab his Ab let Sb speak Dir to Lc group
(his being allowed to speak to the group) [Sr203:93]

Recall that the contrast in (33) suggested that only possessive subject nominals can be preposed to initial position. Thus, the examples above provide an indirect argument that the original raised argument is an object. The possessive alternation in (39) argues that *a ia* is either a subject or object, while the fact

that its possessive form cannot prepose in (40) indicates that it is not a subject. Hence, Seiter concludes, it is an object.

Other subject-sensitive processes supply additional support for this conclusion. For example, the process that possessor-raises the highest subject of a relative clause does not apply to object-raised nominals; irrespective of whether the ergative subject of the clause is expressed. Thus, the object-raised nominal *a maua* in (41a) cannot be possessor-raised in (41b).

41	a.	*e*	*motu*	*ne*	*toka*	(*e*	*ia*)	*a*	*maua*	*ke*	*nonofo*	*ai*
		Ab	island	Nf	let	Er	he	Ab	2DuEx	Sb	stay-Pl	on-it
	b.	**e*	*motu*	*ha*	*maua*	*ne*	*toka*	(*e*	*ia*)	*ke*	*nonofo*	*ai*
		Ab	island	of	2DuEx	Nf	let	Er	he	Sb	stay-Pl	on-it
		'the island which he let us stay on'										

In sum, examples (36)–(41) suggest that object-raised arguments undergo rules that apply indifferently to subjects and objects, but resist processes that pick out subjects. Consequently, the simplest account is one that treats them as derived objects. Nonetheless, Seiter (1980:200ff) presents the familiar battery of arguments to show that such derived objects retain an association with the lower clause in which they originate.

4.3 Lexically Governed Multidomination

As the above examples illustrate, Niuean instantiates all of the possible combinations of interclausal promotions to and from subject and object position. Of these, only the subject-to-subject cases are straightforwardly analyzable in

terms of a canonical raising transformation of the sort that figures in standard varieties of EST and REST accounts. The object raising cases are especially resistant to this line of analysis, since various of the constraints imposed on raising transformations are introduced largely to exclude this option.[16] The problem, in its essentials, stems from a conflict between the existence of interclausal alternations involving direct objects and the standard REST characterization of nominal movement rules. In particular, movement of a nominal into direct object position does not conform to either of the two sanctioned patterns. Unlike argument movement, which advances an element into a dethematized subject position, and nonargument movement, which promotes a nominal into a dislocated (nonargument) position, the destination of raising to object is a subcategorized and thematically active position.

There are various ways of resolving this conflict. For example, the surface position of an object-raised NP can be identified as a nonargument position in the lower clause, and the rules of case assignment, control, possessor-raising etc., reformulated so that they endow occupants of this dislocated position with suitable object-like properties. This is essentially the position advocated in Massam (1985). On the other hand, the viability of a raising to object analysis can be defended, on the grounds that the constraints that block these advancements are insufficiently well motivated even in the languages where they have been assumed to hold. This latter view is argued at length in Postal and Pullum

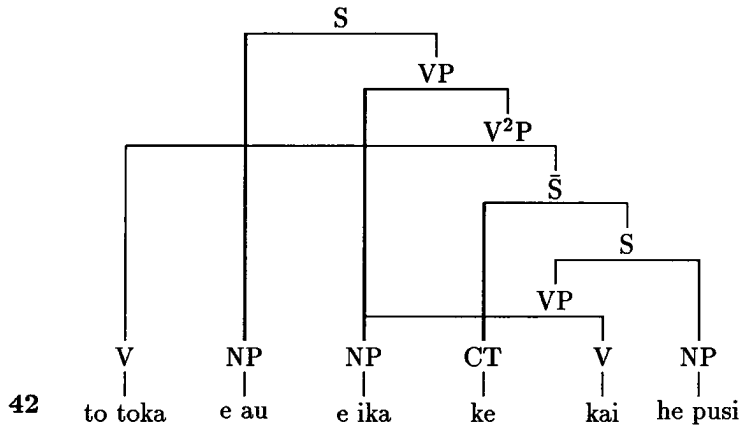
[16] See, e.g., Massam (1985) and Postal and Pullum (1987) for discussion.

(1987). However, both of these approaches are faced with a residual descriptive problem; namely that of accounting for the differences between Niuean raising and the variant of this process that occurs in more familiar languages.

One way of avoiding this difficulty would be to deny that the derivation of the class of Niuean raising constructions involves movement of any sort. Recall, however, that locating a raised constituent in just the higher or lower clause was what led to the basic descriptive inadequacy of the Initial and Shift Analyses. Thus, any satisfactory 'base-generated' account will require some means, other than movement, for expressing the relation between a raised nominal and the distinct clauses with which it is syntactically associated. Perhaps the most direct means of representing the dual citizenship of such arguments is to generate them as arguments of both clauses. Structural analyses of representative examples of subject-to-subject and object-to-subject raising are presented in (16) and (15) above. Let us next consider an extension of this analysis to object-raising cases.

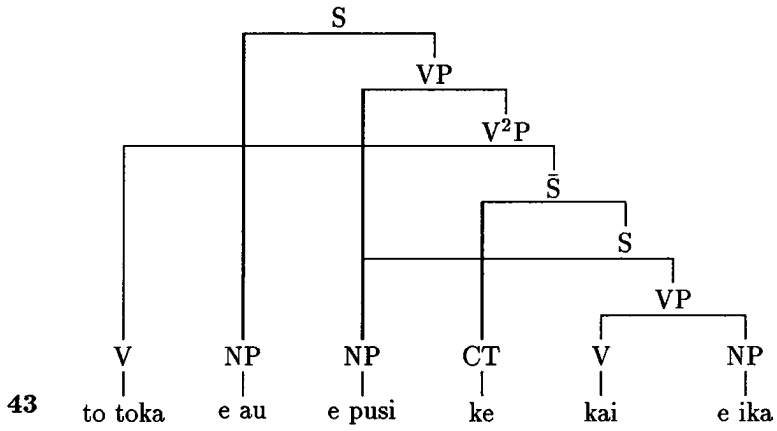
Sentence (13c), repeated in (36c), exemplifies object-to-object raising; the structure assigned to the positive (i.e. *nākai*-less) counterpart is exhibited in (42).[17]

[17]Omitting the negative element *nākai* serves the purpose of simplifying the structures below, while avoiding irrelevant issues concerning the syntactic category of the particle.



42

(13b), repeated in (36b), illustrates subject-to-object raising; the multidominated structure associated with the corresponding positive assertion is diagrammed in (43).



43

Treating raised arguments as multidominated constituents provides a straightforward explanation of the fact that they are affected by the clausebound processes of both the matrix and embedded sentences.

However, multidomination raises a number of new questions, specifically concerning the manner of resolution of mutually incompatible demands imposed by

the distinct clauses. For example, a nominal that occupies the subject position of both an embedded transitive clause and of a higher intransitive will be subject to apparently contradictory case marking requirements. Due to the ergative case marking pattern of Niuean, subjects of transitive sentences are canonically ergative, while subjects of intransitives are absolutive. As (12b), repeated as (44), suggests, this conflict is resolved in favour of the superordinate clause.

44	*To*	*maeke*	*e*	*ekekafo*	[*ke*	*lagomatai*	*e*	*tama*	*ẽ*].
	Ft	possible	Ab	doctor	Sb	help	Ab	child	this

'The doctor could help this child.' [Sr158:4a]

Although the unraised subject of the lower clause occurs in the ergative in (12a) and (12c), it shows up with an absolutive case marker in the subject-raised (44). The contrast between (36a,c) and (36b), provides evidence of a similar resolution, since a transitive subject also acquires absolutive case when it is object-raised.

What these examples suggest is that shared arguments must satisfy the requirements of the highest clause that they belong to in cases of disagreement. There is of course nothing logically necessary about a principle of this sort. It is imaginable that multidomination would be blocked whenever the case requirements of the distinct predicates are not mutually satisfiable, much as free relatives and topic chains in various languages must satisfy a general case congruence requirement.[18] However, if the demands of one predicate are to preempt

[18]See, e.g., the discussion of Germanic free relatives in Groos and van Riemsdijk (1981) or the discussion of Yidiɲ topic chaining in Dixon (1977).

those of another, it is not altogether surprising that the higher of the two should prevail. Notice moreover, that this is also true in the domain of word order, as the position of shared arguments is invariably determined by the requirements of the higher clause. Thus, the shared nominal in (43) occurs in the position appropriate for the matrix subject, rather than in the characteristic embedded object position. Likewise, the shared object in (42) occupies the higher of the two available object slots.

4.3.1 Distributional Restrictions and Locality Constraints

A model of phrase structure that admits multidominated structures is provided in Chapter 2 above. Before specifying a class of sanctioning rules, it will be useful to informally consider the nature of the principles that determine the distribution of multidominated structures. Notice that strategies for generating such structures can exploit the fact that raising is governed by a closed class of predicates in Niuean. In particular, it is possible to restrict multidominated (final) subjects to arguments of complements to *maeke* and the few other impersonal verbs (i.e. *fakaai*, *kamata*, *mahani*, *teitei* and *fetamakina*) that Seiter lists. Likewise, multidominated (final) objects will invariably occur as an argument of a complement to *toka*, *fakaatā* or *manako*. Let us designate these two verb classes V_s and V_o. Then the principles that determine the distribution of raised nominals can be summarized as in (45).

45 i. The subject/object of a complement to V_s may occur as the subject of V_s

ii. The subject/object of a complement to V_o may occur as the object of V_o

Configurational definitions provide a suitable vocabulary for stating such conditions in structural terms. First of all the [NP,S] and [NP,VP] provide definitions of subject and object. Next the contextual definition of exocentricity adopted above supplies a headedness relation $h(x, y)$, read 'x is the head of y'. The corresponding description H(y) is interpreted as denoting the head of a phrase y. Given these definitions, the general description 'complement of x' and its specializations 'subject of x' and 'object of x' can be specified as below, where x is a verb or other suitable predicate.

46 i $\quad \text{CPL}(x) \equiv [\text{X},\text{V}^n\text{P}] \wedge h(x,\text{V}^n\text{P})$

ii $\quad \text{SUB}(x) \equiv [\text{NP},\text{S}] \wedge h(x,\text{S})$

iii $\quad \text{OBJ}(x) \equiv [\text{NP},\text{VP}] \wedge h(x,\text{VP})$

The four cases sanctioned by the conditions in (45) then go into this notation as the equations in (47).

47 i subject-to-subject raising: $\text{SUB}(\text{V}_s) = \text{SUB}(\text{H}(\text{CPL}(\text{V}_s)))$

ii object-to-subject raising: $\text{SUB}(\text{V}_s) = \text{OBJ}(\text{H}(\text{CPL}(\text{V}_s)))$

iii subject-to-object raising: $\text{OBJ}(\text{V}_o) = \text{SUB}(\text{H}(\text{CPL}(\text{V}_s)))$

iv object-to-object raising: $\text{OBJ}(\text{V}_o) = \text{OBJ}(\text{H}(\text{CPL}(\text{V}_s)))$

These equations can be interpreted as mildly nonlocal ID rules that sanction lexically governed multidomination in Niuean. The optionality of raising then follows from the existential interpretation of the structural information rep-

resented by ID rules, i.e. the fact that a structure is admitted whenever it conforms to some ID rule (as opposed to every LP statement).

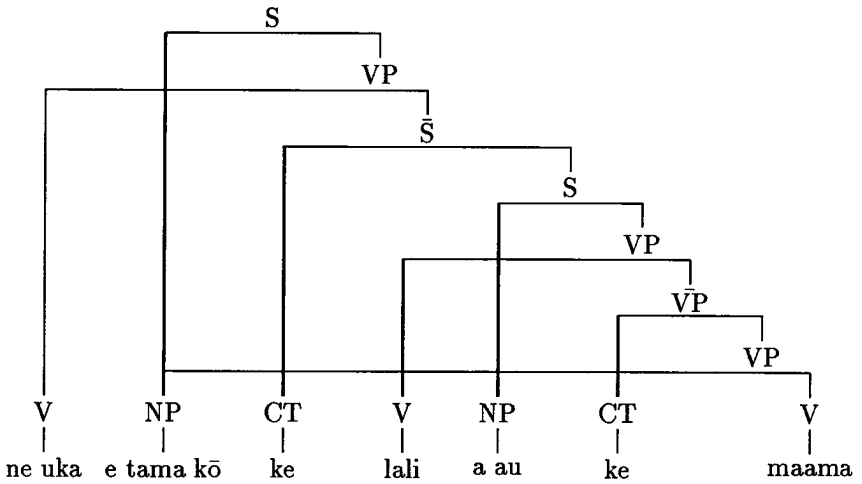
Although a more general treatment of the distribution of multidominated elements is required to describe Right Node Raising and other converging coordinate structures, the above conditions appear to permit an adequate description of cases of lexically governed multidomination. Thus, let us focus next on some of the empirical consequences of adopting principles of this form. The primary benefit of such lexically restricted conditions is that they severely constrain the distribution of multidominated elements, thereby representing the fact that multidomination is a marked option (at least outside of coordinate constructions). In particular, the requirement that a shared constituent be an argument of a predicate and a complement to that predicate has the effect of restricting constituent sharing to subjacent clauses. This locality constraint is desirable since, as Seiter (1980:233) observes, promotions that do not involve resumptive pronominal 'copies' are upward bounded. Thus, as the contrast in (48) illustrates, raising an embedded object like *e tama kō* across two clauses into matrix subject position leads to ungrammaticality.

48 a. *Ne uka ke lali a au [ke maama e tama kō].*
Ps hard Sb try Ab I Sb understand Ab child that

b. **Ne uka e tama kō [ke lali a au [ke maama]].*
Ps hard Ab child that Sb try Ab I Sb understand
'It was hard for me to try to understand that child.' [Sr233:35]

Unlike the grammatical raising structures discussed above, the illformed (48b) contain a constituent which is shared between the matrix clause and a subordinate noncomplement.

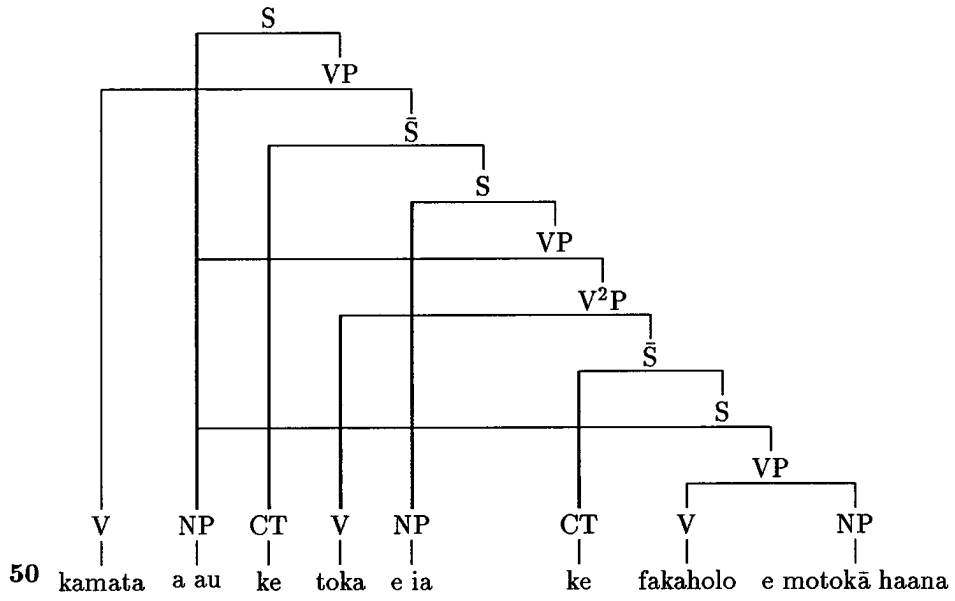
The alocality that leads to ungrammaticality in (48b) is perspicuously represented by the structural description in (49).



49

The particular analysis of control structures is unimportant here: it is immaterial whether the most deeply embedded complement is treated as a subjectless VP, as in (49), or as a clause with a multidominated subject, or even as a clause with a null subject, as assumed in most orthodox REST accounts. What is essential, however, is that the raised nominal *e tama kō* is shared by the matrix predicate *uka* and the most deeply embedded verb *maama* without serving as an argument of the intervening verb *lali*. This alocal pattern is not sanctioned by the conditions in (45) and hence a grammar that incorporates (suitable impementations of) these conditions will not admit structures like (49).

In contrast, these conditions will permit iterative or cumulative multidomination structures in which a raised nominal occurs within a sequence of subjacent clauses. An example of such iterative advancement was encountered in (38b); the corresponding mobile is given below.



As in (49), the structure in (50) contains a raised element, *a au*, that occurs as the subject of the matrix verb *kamata* and the most deeply embedded verb *fakaholo*. However, unlike (49), the raised nominal in (50) also occurs as the object of the intervening verb *toka*. Thus, the conditions above sanction sharing between the two pairs of subjacent clauses and license the resulting mobile and associated sentence.

4.3.2 Alocal Resumptive Strategies

These examples suggest that locality constraints incorporated in (45) correctly characterize the distribution of multidominated nominals. However, it is worth noting there are other significant properties that distinguish Tough Movement examples like (48b) from Raising examples like (38b). As (51a) shows, a resumptive pronoun strategy sanctions long distance promotion in clauses containing *uka*. Yet (51b) indicates that this strategy is not similarly available for canonical raising constructions.[19]

51 a. *Ne* *uka* *e* *tama* *kō* [*ke* *lali* *a* *au*
Ps hard Ab child that Sb try Ab I
[*ke* *fakamaama* *ki* *ai* *ha* *mena*]].
Sb explain to him Nsp thing
'That child was hard for me to try to explain anything to.' [Sr233:36b]

b. **Kua* *kamata* *e* *tau* *tagata* [*ke* *fia* *manako* *a*
Pf begin Ab Pl person Sb want want Ab
tautolu *ki* *ai* [*ke* *nonofo* *mo* *e* *mafola*]].
1-Pl-Ex to them Sb live-Pl with Ab peace
We have begun to want people to live in peace [Sr205:98b]

Likewise, as noted above, this difference also affects the mobility of oblique arguments. Thus, Tough Movement of the locative in (14b), repeated as (52a), is wellformed, provided that the resumptive *ai* occurs in the oblique raising site. In contrast, obliques resist both Subject and Object Raising, irrespective of whether they are resumed by *ai*. Accordingly, (52b) is ungrammatical with or without a resumptive pronoun.

[19] An interesting question concerns the status of the wellformed English gloss of (51a), which may plausibly be assigned a structure like (49).

52 a. *Uka* *he* *vaka* [*ke* *heke* *ai* *a* *Lefu*].
difficult Lc canoe Sb ride in-it Ab Lefu
'The canoe is difficult for Lefu to ride in.' [Sr225:22b]

b. **Maeke* *nakai* *e* *tehina* *haau*
poss Q Ab brother your
[*ke* *falanaki* *a* *mautolu* *ki* *aí*]?
Sb trust Ab 1-Pl-Ex to him
(Can your little brother be trusted by us?) [Sr224:20b]

This contrast is reminiscent of the contrast noted in McCloskey (1979:110f) with respect to the distribution of resumptive pronouns in Modern Irish. McCloskey observes that while such pronouns may occur in relative clauses and questions, they are barred from formally similar topicalization and cleft constructions. This phenomenon certainly bears further investigation, as it distinguishes among closely related and in other respects formally indistinguishable construction types. However, rather than speculate about the class of structures that support resumptive pronoun strategies, let us turn instead to a consideration of embedded clauses in Germanic.

Chapter 5

The Syntactic Complexity of Germanic

Let us next consider the structure of a class of Germanic subordinate clauses that have recently been a principal focus of investigations into the syntactic complexity of natural language. Huybregts (1976) presents the first argument that the class of context-free grammars are incapable of weakly generating the complement clauses of a Germanic language, specifically Dutch, which he identifies as conforming to a strict cross-serial pattern.[1] Both Pullum and Gazdar (1982) and Bresnan, Kaplan, Peters and Zaenen (1982) (henceforth BKPZ) dispute Huybregts' description of Dutch subordinate clauses, and produce context-free grammars that generate what these authors identify as appropriate stringsets. BKPZ argue nevertheless that the linguistically correct structural descriptions for these constructions are strongly non-context-free, and conclude that the

[1] Among the other constructions that have been claimed to instantiate non-context-free patterns are English comparatives (Chomsky (1959)), noun incorporation in Mohawk (Postal (1964)), and the English *such that* construction (Higginbotham (1984)). Pullum and Gazdar (1982) and Pullum (1985) provide a critical review of this literature, and argue persuasively that each of the putative demonstrations contains a formal or empirical flaw.

description of Dutch therefore exceeds the descriptive capacity of the class of context-free grammars. A more direct demonstration of the (weak) non-context-freeness of Germanic subordinate clauses is subsequently provided by Huybregts (1984) and Shieber (1985), who exploit the fact that Züritüütsch, a dialect of Swiss German, combines syntactic case government with the cross-serial pattern characteristic of Dutch.[2]

The present relevance of the demonstrations presented by Huybregts and Shieber resides in the fact that these results establish the strong non-context-freeness of Züritüütsch subordinate clauses as a corollary. This in turn supports the assignment of non-context-free structural descriptions to such constructions. I will argue that dissociating order and structure in the manner suggested above yields a perspicuous and hierarchically uniform analysis of subordinate clauses in a range of Germanic languages. In particular, this dissociation permits the assignment of a constant constituent structure to classes of subordinate clauses in English, Standard German, Dutch and Züritüütsch. Moreover, these analyses reveal the indirectness of the relation between the complexity of structural descriptions and that of associated stringsets.

[2]Culy (1985) argues that the interaction of a pair of recursive compounding processes in Bambara yield a similarly non-context-free pattern.

5.1 Complexity of Complement Clause Stringsets

However, before proposing a candidate analysis for the family of constructions in question, it will be useful to review the characteristic ordering patterns that these constructions exhibit. Comparison of Züritüütsch clauses with their English Dutch and Standard (High) German counterparts is instructive, as it helps to bring out the syntactic and semantic similarities that hold across these constructions, despite the considerable diversity in word order patterns. In what follows, I will focus on the subclass of subordinate control constructions that figure in the familiar investigations of the complexity of Dutch and Swiss German.[3] For ease of reference, let us term these constructions 'Object Infinitive Constructions' (OICs).

5.1.1 Subordinate Constituent Order

The complexity of OIC stringsets varies markedly across Germanic languages, depending on their word order conventions. Embedded clauses in English instantiate the simple linear pattern schematized in (1).

1 $NP_1\ V_1\ NP_2\ V_2 \ldots NP_n\ V_n$

[3]These invariably consist of embedded clauses that contain (a subconstituent with) equal numbers of noun phrases and verbs. No restrictions are placed on the noun phrases, other than that expletives are conventionally excluded. Exactly one of the verbs is finite, while the rest are bare infinitives. Moreover, all but one of the verbs belongs to the class of perception or causative verbs that select an NP object and infinitival complement. The remaining verb may be either a transitive or intransitive verb that does not select an infinitival, depending on the particular demonstration.

The initial verb, V_1, is here the finite member of the series, while the final verb V_n can, without loss of generality, be confined to an intransitive infinitive. $V_1,\ldots,V_{n-1}$ are drawn from a class of perception and causative verbs that includes *see*, *hear*, along with *let*, *make*, *help*, etc. These verbs are all 'object oriented' in the sense that they govern object-affecting processes, typically described in terms of rules of object control, object raising or clause union.

Some representative examples that conform to the pattern in (1) are given below in (2).

2 a. John saw the children swim

b. John saw Marie help the children swim

c. John saw Peter let Marie help the children swim

The constituent order in these subordinate clauses is the same as the order characteristic of the corresponding matrix sentences. Moreover, viewed as strings, these constructions display a simple paired structure that does not exceed the complexity of the regular languages.

5.1.1.1 German

The German equivalents of the clauses in (2) exhibit a more complex pattern, represented in (3)

3 $NP_1\ NP_2 \ldots NP_n\ V_n\ V_{n-1} \ldots V_1$

Examples that illustrate this pattern are given in (4).

4 a. *Hans die Kinder schwimmen sah*
Hans the children-A swim saw

b. *Hans Marie den Kindern schwimmen helfen sah*
Hans Marie the children-D swim help saw

c. *Hans Peter Marie den Kindern schwimmen helfen lassen sah*
Hans Peter Marie the children-D swim help let saw

These translations of the English sentences above contain sequences of noun phrases, followed by a similar number of verbs. The pairs of sequences display a nested structure in which the noun phrases are matched with correspondingly embedded verbs. More specifically, the ith NP in an NP sequence is construed as the controlling 'subject' of the verb that occurs i elements in from the right edge of the verb sequence. Moreover, each noninitial NP_i behaves syntactically as well as semantically as the direct object of the verb that occurs $i+1$ places in from the right.

The syntactic nature of the latter relation between object noun phrases and corresponding verbs can be illustrated by considering the concord in (4) above. Despite the lack of adjacency, the dependency between noun phrases and the verbs that they are interpreted as objects of is syntactically encoded in German, due to the morphological case system of the language. Thus, the plural NP, *die Kinder*, is obligatorily accusative in (4a), since the corresponding finite verb *sah* governs accusative objects. In contrast, the dative form *den Kindern* is required in (4b,c), as it is matched with the verb *helfen*, which governs the dative case. Failure to observe the case requirements of an embedded verb leads to ungrammaticality, as the illformed examples in (5) show.

5 a. **Hans* *den* *Kindern* *schwimmen* *sah*
Hans the children-D swim saw

b. **Hans* *Marie* *die* *Kinder* *schwimmen* *helfen* *sah*
Hans Marie the children-A swim help saw

Although the unbounded center-embedded pattern that these sentences illustrate exceeds the capacity of a finite state grammar, such a nested structure is readily generated by a context-free grammar.

5.1.1.2 Dutch

OICs in Dutch conform to a similarly segregated pattern, schematized in (6).

6 $NP_1\ NP_2 \ldots NP_n\ V_1\ V_2 \ldots V_n$

Clauses instantiating this pattern exhibit cross-serial rather than nested dependencies. Thus each NP_i in the noun phrase sequence is matched (in the role of controller) with the corresponding V_i (as well as possibly functioning as the object of V_{i-1}). The Dutch constructions in (7) are synonymous with their counterparts in (2) and (4) above.

7 a. *Jan* *de* *kinderen* *zag* *zwemmen*
Jan the children saw swim

b. *Jan* *Marie* *de* *kinderen* *zag* *helpen* *zwemmen*
Jan Marie the children saw help swim

c. *Jan* *Peter* *Marie* *de* *kinderen* *zag* *laten* *helpen* *zwemmen*
Jan Peter Marie the children saw let help swim

In each of these examples, the first NP *Jan* is construed as the subject of the initial verb *zag*, the second NP as the object of the first verb and the controlling subject of the second verb, etc.

5.1.2 Cross-Serial Dependencies in Dutch and Züritüütsch

If all and only grammatical OICs in Dutch instantiated the cross-serial pattern in (7), an infinite subset of Dutch subordinate clauses could, as Huybregts (1976) proposes, be mapped into an xx language. Since xx languages are demonstrably non-context-free, and context-free languages are closed under homomorphism, it would then follow that Dutch is likewise not a subset of the context-free languages. However, Pullum and Gazdar (1982) and BKPZ both assail the soundness of this demonstration, arguing that the paradigm in (7) is incomplete in two respects. First of all, the placement of the finite verb in these examples is not confined to the initial position in the verb sequence. As the grammatical example in (8) shows, *zag* may also occur finally in a singly-embedded verb sequence.[4]

8	*Jan*	*de*	*kinderen*	*zwemmen*	*zag*
	Jan	the	children	swim	saw

More generally, Pullum and Gazdar and BKPZ observe that the crossed associations in (7) are not syntactically enforced, so that the elements within the

[4] Johnson (1988:121) identifies a doubly-embedded example (his 16f) as grammatical, though I have not been able to confirm this with native speakers or published descriptions of Dutch. Thus, while it is possible that this option may exist in some Dutch dialect, it does not appear to form part of the standard language.

sequences *Jan Peter Marie de kinderen* and *laten helpen zwemmen* in (7c) are freely permutable without loss of grammaticality. Although the resulting sentences are nonsynonymous, the lack of a robust nominal case system in Dutch, in conjunction with the absence of agreement on infinitivals, ensures the well-formedness of clauses like (9a).

9	*Marie*	*de*	*kinderen*	*Peter*	*Jan*	*zag*	*helpen*	*laten*	*zwemmen*
	Marie	the	children	Peter	Jan	saw	help	let	swim

'Marie saw the children help Peter let Jan swim'

In contrast, the examples in (5) indicate that similar permutation of German OICs does not invariably preserve grammaticality. The variable ordering options of finite verbs, along with the permutability of medial members of the noun phrase and verb sequences in Dutch effectively invalidate Huybregts' demonstration, since they undermine the strategy of mapping Dutch OICs into an xx language.

Nevertheless, both Huybregts (1984) and Shieber (1985) construct a formally similar argument based on Züritüütsch, a dialect of Swiss German that combines the rigidly cross-serial pattern characteristic of Dutch with a nominal case system. Examples of the subordinate constructions that figure in Shieber's discussion are repeated in (10) below.

10	a.	*mer*	*em*	*Hans*	*es*	*huus*	*hälfed*	*aastriiche*
		we	the	Hans-D	the	house-A	helped	paint

'we helped Hans paint the house' [Sh334:1]

b. *mer de Hans es huus lönd aastriiche*
we the Hans-A the house-A let paint
'we lelt Hans paint the house' [Sh334:2]

There are two pairs of crossed dependencies in each these examples. (10a), for example, contains the dative noun phrase *em Hans*, which is intuitively associated with the verb *hälfed*, which governs the dative case. The accusative NP *es huus* is similarly paired with *aastriiche*, which governs the accusative.

These associations are syntactically relevant, since, as in Standard German, they play a role in determining the wellformedness of a complement clause. Thus, as (11a) shows, pairing the dative NP *em Hans* with the accusative-governing verb *lönd* leads to ungrammaticality. Matching the dative *em huus* with the accusative-governing *aastriiche* yields the similarly illformed sentence in (11).

11 a. **mer* *em* *Hans* *es* *huus* *lönd* *aastriiche*
we the Hans-D the house-A let paint [Sh335:3]

b. **mer* *de* *Hans* *em* *huus* *lönd* *aastriiche*
we the Hans-A the house-D let paint [Sh335:4]

Shieber reports that this requirement is robust, and is maintained even as the number of noun phrases and associated verbs increases. A triply-embedded minimal pair he provides is repeated in (12).

12 a. *mer* *d'chind* *em* *Hans* *es* *huus* *lönd*
we the children-A the Hans-D the house-A let
hälfe *aastriiche*
help paint
'we let the children help Hans paint the house' [Sh335:5]

b. **mer* *d'chind* *de* *Hans* *es* *huus* *lönd*
we the children-A the Hans-A the house-A let
hälfe *aastriiche*
help paint
(we let the children help Hans paint the house) [Sh335:5]

Unlike the wellformed (12a), the ungrammatical clause in (12b) matches the accusative object *de Hans* with *hälfe*, which governs the dative case.

This syntactic dependency crucially distinguishes Züritüütsch from Dutch, since it ensures that arbitrary permutations of the NP and V sequences will not preserve grammaticality. Shieber's proof exploits this property in mapping a subset of Swiss German into an xx language. He observes first that some of the sentences in the language represented by (13) are grammatical in Züritüütsch.

13 Jan säit das (d'chind)* (em Hans)* es huus haend wele laa* hälfe* aastriiche

Notice that these sentences will have all dative NPs preceding any accusative NPs, and all verbs that govern the dative case preceding any verbs that govern the accusative. Shieber procedes to specify an infinite subset L of (13) whose sentences satisfy the additional conditions in (14).

14 i The number of dative-governing verbs equals the number of dative NPs and the number of accusative-governing verbs equals the number of accusative NPs.

ii An arbitrary number of verbs can occur in a sentence.

Notice that the complement clauses of Swiss German, in particular, include an infinite subset of (13) that satisfy these requirements.

Given any language L, defined as above, we can define $\mathcal{F}(L)$, the image of L under the homomorphism specified in (15).

15

$$\begin{aligned}
\mathcal{F}(\text{d'chind}) &= a \\
\mathcal{F}(\text{em Hans}) &= b \\
\mathcal{F}(\text{laa}) &= c \\
\mathcal{F}(\text{häfte}) &= d \\
\mathcal{F}(\text{Jan säit das mer}) &= w \\
\mathcal{F}(\text{es huus haend wele}) &= x \\
\mathcal{F}(\text{aastriiche}) &= y \\
\mathcal{F}(s) &= z \quad \text{otherwise}
\end{aligned}$$

Shieber next intersects the resulting language $\mathcal{F}(L)$ with the regular language $r = wa^*b^*xc^*d^*y$. Given the constraints on L imposed above, $\mathcal{F}(L) \cap r = wa^mb^nxc^md^ny$. However, this language is demonstrably non-context-free. Thus, since r is regular, and the context-free languages are closed under intersection with regular languages, the fact that $\mathcal{F}(L) \cap r$ is non-context-free entails that the same is true of $\mathcal{F}(L)$. However, given that $\mathcal{F}(L)$ is the image of L under a homomorphism, and that context-free languages are closed under homomorphism, it follows that L is also non-context-free. Yet, since the conditions that defined L hold for Züritüütsch, this dialect of Swiss German must also be weakly, and as a corollary strongly non-context-free. Thus Züritüütsch, and the class of natural languages generally, are not properly contained within the context-free languages.

5.2 Representing Germanic OICs

The discovery of non-context-free constructions establishes the context-sensitive languages (or some subset of this class) as the current lower bound on the complexity of natural language stringsets. No natural language construction has been shown to fall outside this family of languages.[5] At the same time, however, the corresponding context-sensitive grammars constitute a significant upper bound, in that the are the most complex of the formal grammars ranked by the Chomsky Hierarchy for which there is known to be an effective decision procedure.[6] However, what is of central importance in the present context is the fact that the Huybregts/Shieber results establish the existence of a class constructions whose constituent structure is not representable by means of context-free phrase structure trees.

5.2.1 A Unified Constituent Analysis

In contrast, model of phrase structure that partially dissociates precedence and dominance relations facilitates the assignment of a conventionally articulated constituent analysis to problematic cross-serial patterns.[7] In particular,

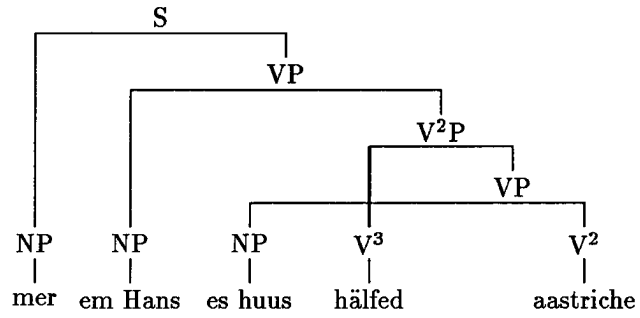
[5]Nor is a weak generative capacity argument for this conclusion likely, given that the usual demonstration of the simple existence of non-context-sensitive languages takes the form of a diagonalization proof that shows that there are, roughly speaking, 'more' languages over a given alphabet than there are context-sensitive grammars available to generate them. For discussion see Hopcroft and Ullman (1979:224,228), Wall (1972:236-238).

[6]That is, for any member G of the class of context-sensitive grammars, there is an effective, mechanical means of determining whether or not an arbitrary string x is generated by G.

[7]Chapter 8 outlines a modified ID/LP grammar that generates such structural descriptions.

this dissociation permits the structures in (16) and (17), which can be associated with the Swiss German sentences in (10) above.

16



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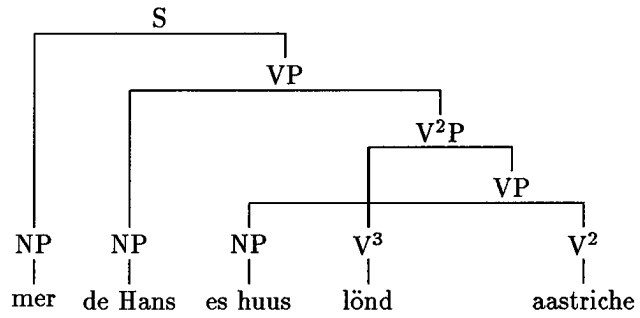
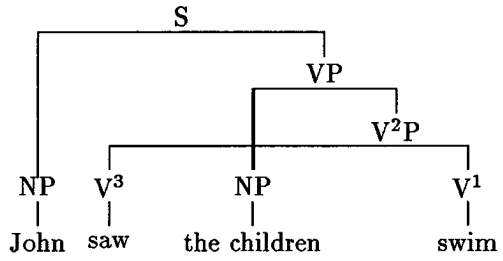


In each of these diagrams the noninitial noun phrases occupy the configurational position associated with direct objects; namely [NP,VP]. The NPs that occur in these positions exhibit typical object properties and, in particular bear the case governed by the head of the VP that dominates them.

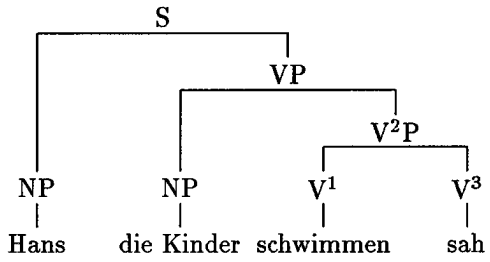
Moreover, the decoupling of structure and order allows a unified structural analysis for this family of constructions. The representative English example in (2a) can be associated with the structural description in (18).

18



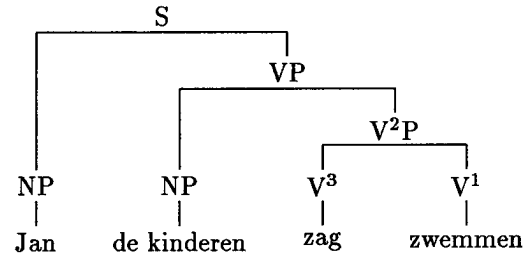
The nested structure of the Standard German counterpart in (4a) is likewise representable by means of the tree in (19).

19



The hierarchical structure assigned by (19) is isomorphic to the structure represented in (18). The two diagrams are distinguished only in the linear order they impose. Likewise, these structures differ from the Dutch structure in (20), corresponding to sentence (7a), wholly in the linear order they impose.[8]

20



[8]Though such singly-embedded examples may also instantiate the nested order represented in (19).

These diagrams effectively localize the variation in OICs, as they confine differences to observable contrasts in word order.[9] The hierarchical invariance characteristic of these diagrams clearly contrasts with accounts that, explicitly or implicitly, assume a stable correspondence between the complexity of stringsets and associated structural descriptions, and consequently typically introduce a radical distinction between the hierachical structure of the English examples and their Dutch and German counterparts. Thus, current REST analyses (e.g. Higginbotham (1983)) assign (2a) an essentially right-branching structure in which a verb like *saw* occurs with a degenerate clausal complement.[10] In contrast, generative descriptions of the Dutch examples in (7) predominantly group the final verbal sequence together as a constituent. There is substantially less agreement concerning the structure of the initial sequence of noun phrases; whereas BKPZ also recognize a nominal 'spine', Evers (1975) assumes a flat arrangement, and Haegeman and van Riemsdijk (1985) assign a right-branching structure. Nevertheless, each of these alternatives postulates a difference in (surface) constituent structure between (2c) and (7c) that is essentially dictated by their different word orders.

[9] In terms of the model of grammar articulated below, this amounts to postulating a constant set of structure-inducing ID rules and characterizing variation by means of distinct LP rules.

[10] Though proponents of contemporary variants of Raising to Object treat both the NP and infinitive following *saw* as verbal sisters.

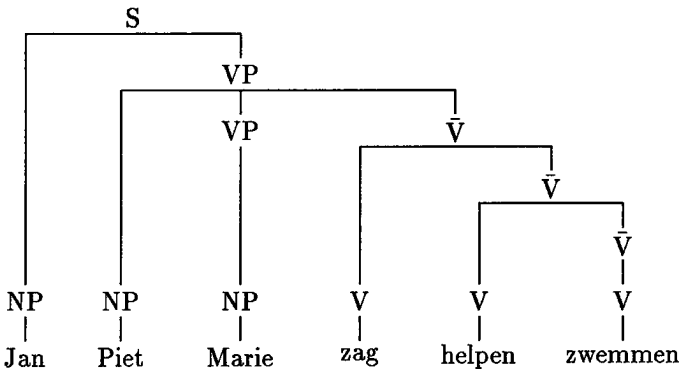
5.2.2 Cross-Serial Dependencies as Functional Control

Candidate rules that generate the structures above are proposed in Chapter 8; at this point let us examine some alternative proposals for overcoming the descriptive limitations of phrase structure trees. The account of Dutch subordinate clauses presented by BKPZ supplements a strongly context-free constituent-structure that determines linear order with an accompanying f-structure which establishes the dependencies between noun phrases and verbs. Likewise, Haegeman and van Riemsdijk (1985) analyze the discontinuous dependencies exhibited by complement clauses in Züritüütsch in terms of multiple, noncongruent, phrase structure trees. Despite evident differences in execution, these analyses are alike in introducing a mechanism for introducing complex verbal predicates, together with a means of allowing the elements of such predicates to share nominal arguments.Let us consider each account in turn.

BKPZ assign the sentence in (21) the strongly context-free constituent structure (c-structure) in (22).

21 Jan Piet Marie zag helpen zwemmen.

22



The highest VP in this structure introduces the recursive daughters VP and V̄. Any additional NPs would occur under the VP daughter, while the matching verb would be introduced by a further expansion of V̄. Thus, this analysis segregates the sequences of noun phrases and verbs in (21) into two separate 'spines'. The verbal spine in (22) thus resembles the right-branching verbal structure that Evers (1975) derives through the application of verb raising rules, though the recognition of a nominal spine attributes a more articulated structure than Evers' description.[11]

The c-structure in (22) is directly generated by the annotated context-free phrase structure rules in (23).

23 i. $S \rightarrow \underset{(\uparrow \text{SUBJ}) = \downarrow}{\text{NP}} \quad \underset{\uparrow = \downarrow}{\text{VP}}$

ii. $\text{VP} \rightarrow \left(\underset{(\uparrow \text{OBJ}) = \downarrow}{\text{NP}} \right) \left(\underset{(\uparrow \text{VCOMP}) = \downarrow}{\text{VP}} \right) \left(\underset{\uparrow = \downarrow}{\bar{\text{V}}} \right)$

[11]The evidence that BKPZ present in support of this two-spine structure involves coordination and constraints on the relative order of NPs and PPs, though see Manaster-Ramer (1987) for discussion.

iii. $\bar{V} \rightarrow V \left(\begin{array}{c} \bar{V} \\ (\uparrow \text{VCOMP}) = \downarrow \end{array} \right)$

iv. $NP \rightarrow N$

Despite their formulation in an $\bar{X}$ idiom, the categorial component of these rules obeys few of the constraints that have been proposed in connection with $\bar{X}$ systems. The deliberately exocentric rule in (23i) does not introduce a head daughter. Expansions sanctioned by (23ii) may likewise fail to include a head, as they allow verb phrases to be rewritten either as a noun phrase or as the empty string.[12] Rules (23iii) and (23iv), though consistently endocentric, nevertheless violate other familiar constraints on $\bar{X}$ schemata. (23iii) introduces a nonhead $\bar{V}$ constituent that is nonmaximal (i.e. nonphrasal). (23iv) allows a phrase to be rewritten by a lexical head, without passing through an $\bar{N}$ projection. This contrasts with verb phrases, which can only dominate a V if they are rewritten by a $\bar{V}$, irrespective of whether the constituent below the $\bar{V}$ branches.[13]

The permissive character of these rules leads Huybregts (1984) to object that the analysis of subordinate clauses proposed by BKPZ

> entails that in Dutch maximal projections are the projections of no lexical head, rendering X-bar theory completely vacuous. (p.97fn17)

While this objection is perhaps overstated, it does recognize the extent to which the substantive constraints on the output of the rules in (23) are shifted to the

[12] Although the latter option would presumably also be blocked by Kaplan and Bresnan's *Valid Derivation* condition.

[13] In the terminology suggested by Kornai and Pullum (1990), (23i) violates *lexicality*, *succession* and *centrality*, while (23iii) violates *maximality*.

wellformedness conditions on the feature structures (f-structures) induced by the functional annotations. In particular, these conditions require matching between the number of noun phrases and verbs in any structure generated by the rules in (23). Moreover, the cross-serial dependency between a noun phrase and the corresponding verb, i.e., that the noun phrase is interpreted as the subject or object of the verb, is represented on the associated f-structure. The fact that the f-structure associated with a given NP may occur as the argument of more than one grammatical function within a larger f-structure is essentially what allows BKPZ to describe the discontinuous dependencies in sentences like (21) without introducing discontinuous constituent structures.

The f-structure associated with (22) is provided below to illustrate some properties of f-structures, their relation to c-structures, and the manner in which constraints are enforced.

24

$$\begin{bmatrix}
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'JAN'} \\ \text{NUM} & \text{SG} \end{bmatrix} \\
\text{PRED} & \text{'SEE} < (\uparrow \text{SUBJ})(\uparrow \text{OBJ})(\uparrow \text{VCOMP}) > \text{'} \\
\text{TENSE} & \text{PAST} \\
\text{OBJ} & \boxed{1}\begin{bmatrix} \text{PRED} & \text{'PIET'} \\ \text{NUM} & \text{SG} \end{bmatrix} \\
\text{VCOMP} & \begin{bmatrix}
\text{SUBJ} & \boxed{1} \\
\text{PRED} & \text{'HELP} < (\uparrow \text{SUBJ})(\uparrow \text{OBJ})(\uparrow \text{VCOMP}) > \text{'} \\
\text{OBJ} & \boxed{2}\begin{bmatrix} \text{PRED} & \text{'MARIE'} \\ \text{NUM} & \text{SG} \end{bmatrix} \\
\text{VCOMP} & \begin{bmatrix} \text{SUBJ} & \boxed{2} \\ \text{PRED} & \text{'SWIM} < (\uparrow \text{SUBJ}) > \text{'} \end{bmatrix}
\end{bmatrix}
\end{bmatrix}$$

This structure is determined by the functional annotations on the rules in (23), in conjunction with the lexical entries for *Jan*, *Piet*, *Marie*, *zag*, *helpen* and *zwemmen*.[14]

Two mechanisms for 'sharing' information are of particular importance. The first of these is functional control, encoded by the boxed integers in (24). These equate the value of an embedded subject function with that of a functionally superordinate object. Informally, this notation indicates that *Piet* functions as the subject of *helpen*, as well as the object of *zag* in (21), while *Marie* acts both as the object of *helpen* and as the subject of *zwemmen*. Identification of these grammatical functions is determined by the lexical entries for the verbs *helpen* and *zag*. Consider the entry for *helpen* in (25).

25 *helpen:* V $(\uparrow \text{PRED}) = \text{'HELP} < (\uparrow \text{SUBJ})(\uparrow \text{OBJ})(\uparrow \text{VCOMP}) >'$
$(\uparrow \text{VCOMP SUBJ}) = (\uparrow \text{OBJ})$

The first line of this entry simply identifies the syntactic category and semantic argument structure of *helpen*. However, the second line contains a functional control equation that equates the object of *helpen* with the subject of its verbal complement. Such equations are the primary mechanism for characterizing control within LFG; compare the (partial) entry for *persuade*, in (26), adapted from Kaplan and Bresnan (1982:220).

[14] A concise exposition of the LFG formalism appears in BKPZ (pp.624ff), as well as in Kaplan and Bresnan (1982) and Johnson (1988); here I will restrict attention to those features that figure crucially in the BKZP analysis.

26 *persuade:* V (↑ PRED) = 'PERSUADE < (↑ SUBJ)(↑ OBJ)(↑ VCOMP) >'
(↑ VCOMP SUBJ) = (↑ OBJ)

Thus, as Johnson (1988:125) notes, the BKPZ analysis assimilates cross-serial constructions to object control structures; treating them, in effect, as recursive object control structures.

The second mechanism for sharing f-structures involves the functional equations ↑=↓ and (↑ VCOMP = ↓), which occur among the annotations on the rules in (23). These equations permit distinct c-structure nodes to be associated with the same f-structure. For example, the S node in (22), the highest VP and $\bar{V}$ nodes, and the leftmost V node are all associated with the full (outermost) f-structure in (24). This functional convergence expresses the fact that *Jan*, which occurs as a daughter of S in (22), is interpreted as the subject of *zag*, even though this relation is not encoded in any way in the c-structure in (22). Moreover, a similar convergence is repeated at each level of VCOMP embedding, so that a general correspondence is established between the NP and verb spines in (22).[15]

5.2.3 Functional Constraints on Constituent Structure

The degree of flexibility in the mapping between c-structures and f-structures is of considerable theoretical significance. If the mapping is too loose, either ungrammatical sentences will be generated, or grammatical sentences excluded.

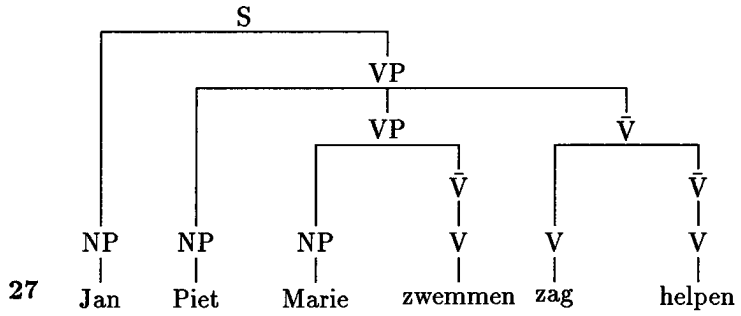
[15]For a more thorough exposition of the BKPZ analysis, see BKPZ (1982); Johnson (1988).

Nevertheless, the relation cannot be too strongly 'structure-preserving' without undermining the basic LFG division of labour. As Kaplan and Bresnan (1982) acknowledge:

> the mechanisms of our formal system...presuppose and and also help to establish a very close, systematic connection between the two levels of representation. Our claim of formal distinctness would of course be meaningless if this close connection turned out to be an isomorphism...(p.218).

BKPZ (1982) claim moreover that the grammatical fragment proposed for Dutch cross-serial dependencies is properly calibrated, in that it "generates no examples where the numbers of subcategorized objects and predicates are not properly matched" (p.633).

Nevertheless, as Johnson (1988) observes, the functional annotations that guarantee matching do not entirely suffice to block the generation of illformed subordinate clauses. Specifically, Johnson notes that these annotations do not directly regulate the nonterminal branching or terminal order permitted within a c-structure. Since there is no requirement that the verb sequence be dominated by the highest $\bar{V}$ node, "the BKPZ grammar generates verbal elements in a left-branching sequence of right-branching structures of verbal elements, clearly overgenerating" (p.128). Consequently, the c-structure below is also generated by the BKPZ fragment, and associated with the earlier f-structure in (24).

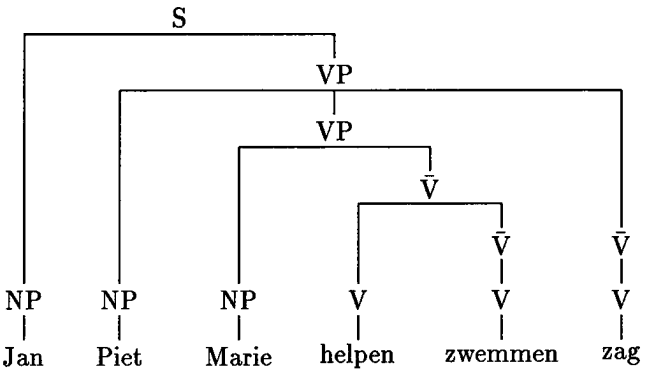


27

The flexible branching options that the BKPZ grammar allows permit the finite verb *zag* to occur medially within a verb cluster. Yet this is an undesirable consequence, as the yield of (27) is not a grammatical Dutch sentence.

In order to block the generation of structures like (27), Johnson introduces a diacritic feature *inverted* that essentially indicates whether a c-structure constituent occurs within a left- or right-branching structure. Constructions are then marked for directionality of branching, with OICs in particular requiring right-branching complements. This prevents recursive left-branching complements in which the VP daughter of the highest VP node dominates elements from both spines. Johnson then argues that an c-structure with the problematic yield of (27) will not be in conformance with f-structure wellformedness conditions on the distribution of the *inverted* feature.

However, as Johnson notes, a c-structure like (28) does not violate the branching constraint he imposes.



28

Johnson views this as a desirable result, since he considers the associated sentence to be grammatical. Nevertheless, the yield of (28) does not appear to be a wellformed sentence of any standard or well documented dialect of Dutch. Consequently, Johnson's revision exhibits fundamentally the same problem as the original BKPZ proposal, in that the freedom it permits within the verb spine admits ungrammatical strings.

There are, moreover, a number of curious features of Johnson's proposal. In the first place, the structures in (27) and (28), which are assigned to illformed sentences, obey more of the $\bar{X}$ constraints discussed above than (22), which is associated with a wellformed Dutch example.[16] As well, the relatively clear separation of functional and constituent structure information in the BKPZ model is compromised to some degree, as the *inverted* feature makes the wellformedness of f-structures sensitive to a purely configurational property of c-structures.[17]

[16] Though this difference may not necessarily be retained as the number of verbs and noun phrases is increased.

[17] A parallel cross-pollination is introduced by the *inverted* feature of GPSG, which smuggles information about linear order into ID rules, which otherwise, introduce only hierarchical structure.

5.2.4 Reanalysis

While these objections are not necessarily conclusive, they raise a more general question that neither BKPZ nor Johnson explicitly address; namely whether the necessary restrictions on Dutch OICs are appropriately handled by the grammatical structures that regulate feature cooccurrence, or whether they are more satisfactorily stated as wellformedness conditions on constituent structures. Notice that the basic intuition implemented within the BKPZ analysis is essentially neutral with respect to this question. That is, the sharing of arguments that LFG countenances within f-structures could instead be tolerated within c-structures. This latter alternative is, in fact, explored in Haegeman and van Riemsdijk (1985) in connection with formally similar *double infinitive constructions.*[18] Just as Peters and Richie's model of Phrase Linking Grammar preserves standard constraints on dominance by introducing two distinct domination relations, Haegeman and van Riemsdijk retain the conventional wellformedness conditions on structural descriptions by assigning sets (or sequences) of descriptions to a given string. One distinguished description, which we can identify as the *base analysis*, is generated by the base component of a grammar. The additional descriptions, which can be characterized as *reanalyses*, are obtained by means of a Reanalysis rule that manipulates nonterminal nodes.

The resulting 'multidimensional' structure may then serve as input to further, non-string-vacuous rules. For example, Haegeman and van Riemsdijk pro-

[18] It may be, as Johnson suggests, that OICs are a subcase of double infinitive constructions.

pose a rule of inversion that permutes a pair of verbal sisters, thus producing the alternation in (29).

29 a. *dat* *ik* *hem* *zien* *wil*
that I him see want

b. *dat* *ik* *hem* *wil* *zien*
that I him want see
'that I want to see him' [HvR426:22a,b]

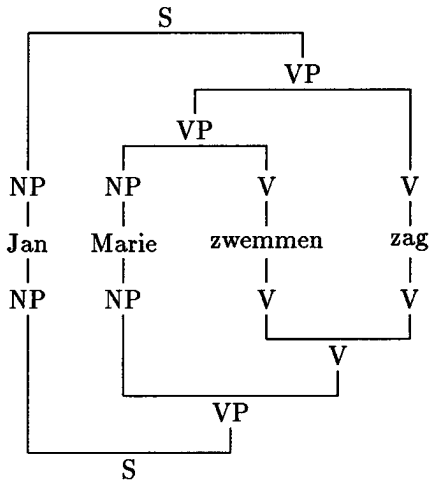
However, they argue that the verbs *wil* and *zien* occur as sisters only in the reanalyzed structure assigned to (29a). Rather than review this argument, let us instead consider the parallel alternation between the pair of OICs in (30).

30 a. *dat* *Jan* *Marie* *zwemmen* *zag*
that Jan Marie swim saw

b. *dat* *Jan* *Marie* *zag* *zwemmen*
that Jan Marie saw swim
'that Jan saw Marie swim'

Generalizing the structures assigned to the sentences in (29) to these cases yields the complex structural description in (31). By convention, the top tree represents the base analysis, and the bottom tree the output of Reanalysis.[19] For ease of reference, let us refer to the multidimensional objects advocated by Haegeman and van Riemsdijk as M-markers.

[19]The base constituent *Marie zwemmen* is analyzed as a verb phrase in (31), though nothing hinges on this, other than the height of the top tree.



31

The bottom but not the top constituent analysis assigned by (31) to (30a) meets the environment of a verb permutation rule that inverts sisters. Notice, moreover, that the two structures in (31) assign the noun phrase *Marie* to distinct constituents. Whereas *Marie* is the unique argument of the VP (or possibly S) in the base analysis, it occurs in the bottom dimension as the direct object of a restructured verb, headed, presumably, by the finite verb *zag*. Thus, Reanalysis provides one means of representing the sharing of arguments within a configurational description, as a nominal may occur simultaneously within distinct constituents in different 'dimensions'.

As Haegeman and van Riemsdijk recognize, the constituent analyses that result from the application of Reanalysis cannot be represented in terms of standard phrase markers.

> Adoption of such a device leads inexorably to a conception of phrase structure that is beyond the expressive power of trees... The output of Reanalysis is a string of formatives that cannot be represented in terms of one tree diagram, but must be represented multidimen-

> sionally. Such a multidimensional representation can be represented graphically by associating a set of trees with the reanalyzed sentence. (p.420)

Thus, M-markers correspond more closely to a full transformational derivation than to any of the discrete constituent analyses that occur as a stage in such a derivation. Given that a transformational derivation of a sentence consists essentially of an ordered set of trees, the M-markers that result from Reanalysis represent the limiting case of a derivation in which all stages share a common terminal string.

Notice however that the relaxation of the wellformedness conditions on constituent analyses informally proposed by Haegeman and van Riemsdijk is not accompanied by any compensating formal restrictions. In particular, their proposal retains the notion of an intrinsically ordered derivation, as the Reanalysis rule must apply before verb inversion in the derivation of (29b) and (30b) above. Yet unlike standard transformational derivations, which consist of sequences of phrase markers, the derivation underlying (29a) consists of a sequence of M-markers. If, as Haegeman and van Riemsdijk suggest, M-markers are defined as sets (or sequences) of phrase markers, a derivation that incorporates M-markers will amount effectively to a sequence of derivations. The additional complexity this introduces leads directly to corresponding complications in the statement of transformational rules, whose application which must be relativized to a particular analysis represented by a given M-marker. The application of the inversion rule, for example, appears to be governed by the requirement that at least one

constituent analysis meet the conditioning environment of the rule. Whether such an existential interpretation of rule applicability can be maintained in the general case will depend on, among other things, the nature of the wellformedness conditions imposed on M-markers, and the character of the class of devices that generate and manipulate them.

Moreover, in addition to introducing derivations within derivations, M-markers incorporate considerable redundancy, particularly at lower and higher levels of structural analysis. Each dimension of a given M-marker will typically have its own sequence of identical preterminals, and a common root (though there is nothing explicit in Haegeman and van Riemsdijk that ensures this). Although treating this property as an accidental feature misses a clear generalization, building the similarity in some way into the definition of an M-marker only sanctions a redundant representation. This redundancy is directly attributable to the strategy of using collections of wellformed phrase structure trees to overcome the descriptive limitations of individual trees. Other problems with M-markers concern their reliance on string-vacuous rules, and the fact that, although they allow an unbounded number of additional dimensions, the analyses proposed by Haegeman and van Riemsdijk never seem to require reference to more than two distinct dimensions.

5.2.5 Complex Predicates and Constituent Sharing

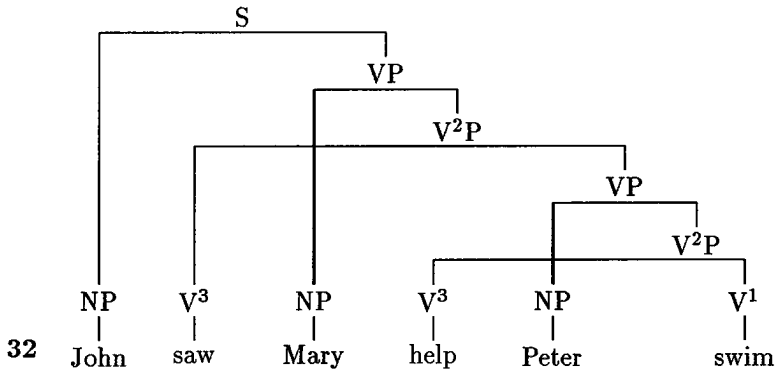
There are two discernible strategies incorporated within the analyses summarized above. On the one hand, a mechanism for admitting constituent sharing is introduced to express the intuition that the embedded arguments in OICs serve as objects in one clause, and as subjects in a lower clause. A point on which there is even more general agreement in the competing analyses of Evers, BKPZ and Haegeman and van Riemsdijk concerns the recognition of verb complexes. Each analysis recognizes the need to combine verbs to form larger verbal constituents, though they differ in terms of how and where this is accomplished. A similar proposal is avanced by Pullum and Gazdar (1982) in the following programmatic remarks.

> One line we think worth exploring would be based on the notion of the lexicon as an infinite set of forms generated by a recursive procedure....What needs to be examined is whether Dutch could be said to have an indefinitely extensible set of verbs with meanings like 'see write', 'let see write', 'help let see write' etc. (p.501fn13).

The analysis of control presented in Bach (1979) likewise incorporates general mechanisms for forming complex predicates that subsequently share nominal arguments. Bach recognizes a category of syntactically complex transitive verb phrases like *consider foolish, persuade to leave, appeal to be aggressive*, etc., which combine with their arguments by means of a nonconcatenative WRAP operation. Moreover, the resulting VP can then occur as the complement of an

object control verb to form a further transitive verb phrase. Thus, iterating this process yields a syntactic variant of the recursive lexical procedure considered by Pullum and Gazdar. Essentially the same procedure can be applied to OICs in Dutch and German, with the variation in these constructions confined to the principles that determine order.

Bach (1984) and Pollard (1984) present categorial and Head Grammar executions of this strategy that generate a class of cross-serial subordinate clauses in Dutch and Swiss German. Similarly, the diagrams in (16)–(20) illustrate a phrase structure implementation of the same basic recursive object control analysis. Similar analyses are available for more complex examples, such as the doubly-embedded examples in (32)–(34).



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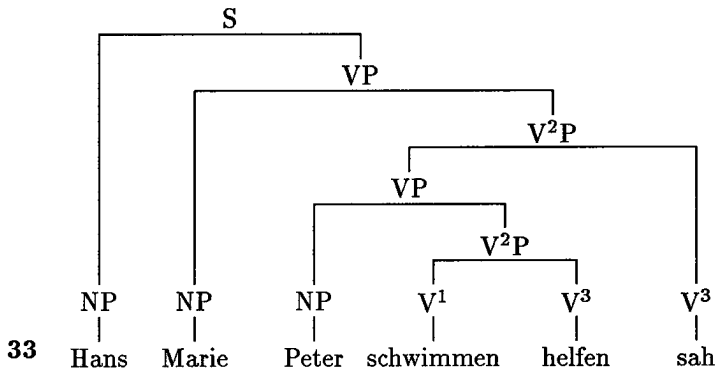

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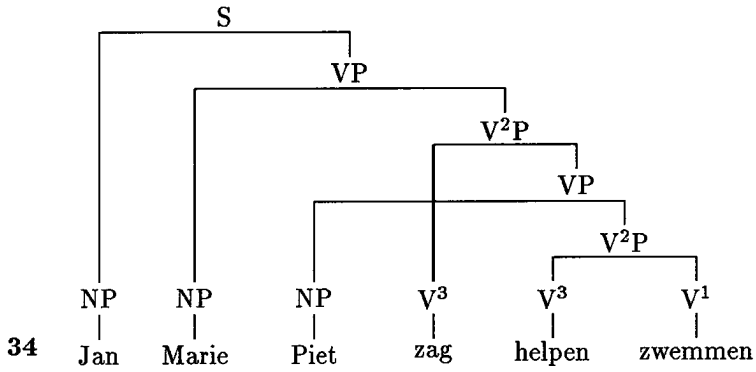
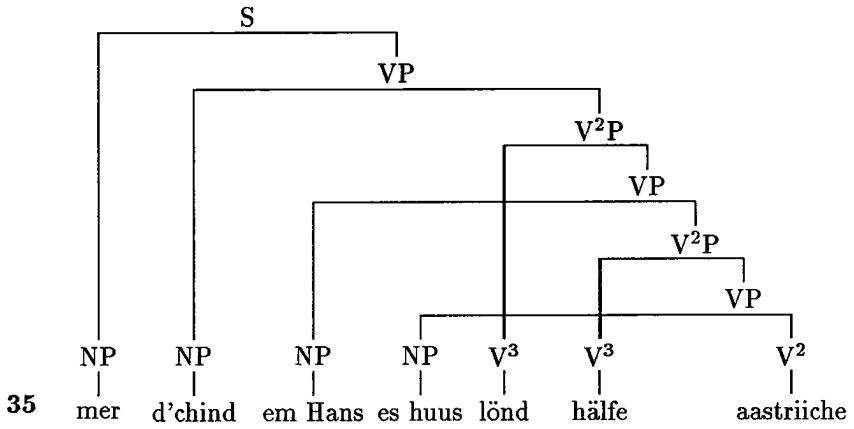


34

Permitting discontinuous syntactic constituents permits the assignment of a isomorphic hierarchical structure in the diagrams above. This structural similarity can be captured by means of order-free variants of familiar phrase structure rules, with the distinct linear patterns in (32)–(34) determined independently by serialization rules.

A similar strategy extends to the counterpart non-context-free constructions in Swiss German that figure in Shieber's proof. Representative examples are diagrammed in (16) and (17) above, as well as (35) below.



These structures are again characterized by a high degree of hierarchical similarity which can be succinctly expressed by rules that define unordered constituent structures.

5.2.6 Summary

The diagrams proposed above associate a uniformly articulated constituent structure with a family of 'object-oriented' subordinate clauses which exhibit cross-linguistic differences in constituent order. A similar structure can likewise be assigned to the corresponding matrix clauses in the West Germanic languages discussed, given that there is at present no clear evidence that variation between matrix and subordinate orders reflects differences in constituent structure. Thus, the recognition of discontinuous constituents contributes directly to constraining structural variation within languages as well as across cognate constructions.

Chapter 6

Configurationality and Structural Ergativity

Generative analyses of languages with degenerate word order conventions has largely been dictated by the basic premise that constituent order variation reflects concomitant variation in constituent structure. Thus, with comparatively few exceptions, generative accounts have attributed either extremely variable or minimally articulated constituent analyses to free word order languages. Both alternatives amount to a typological quarantine, as they radically distinguish the structure of free word order languages from the structure conventionally associated with familiar 'configurational' languages which are taken to instantiate a relatively articulated and stable hierarchical structure.

Cross-linguistic variation in thematic structure is another phenomenon which is often treated as symptomatic of deep structural differences. Dyirbal is perhaps the paradigm case of a 'deep ergative' language, as it exhibits grammatico-thematic asymmetries in the formation of topic chains and reflexive constructions that have been interpreted as evidence of an inverted argument structure.

Marantz (1984) and Levin (1983), following essentially Dixon (1972), assign hierarchical superiority to affected objects in transitive clauses and subjects of intransitives. In contrast, subjects of transitive clauses are analyzed as occurring (or at least originating) within a verb phrase constituent. This 'ergative' constituent analysis clearly differs from the 'nominative' structure associated with most familiar languages, in which subjects of transitive and intransitive clauses are immediately dominated by S, while affected direct objects occur as daughters of VP.

However, the empirical support for absolute typological distinctions between configurational and nonconfigurational languages, or between nominative/accusative and deep ergative languages remains suspect. In particular, existing studies of nonconfigurational languages do not identify any phenomenon, apart from variable constituent order, which is incompatible with the assignment of a conventional constituent structure. Even this consideration is inconclusive, as the recognition of discontinuous constituents provides a means of extending an articulated hierarchical structure to languages with free word order. Moreover, admitting such discontinuous analyses directly facilitates the application of universal definitions of grammatical relations and structure-sensitive semantic interpretation routines to nonconfigurational languages. In sum, countenancing discontinuity permits the characterization of free word order phenomena directly in linear terms, rather than in terms of structural alternations with an incidental ordering reflex.

Likewise, the case for recognizing deep ergative languages rests on the assumption that topic chaining strategies and the interpretation range of lexical reflexives are directly sensitive to the hierarchical configuration of a nominal or the argument structure of a predicate. As is argued at some length in §6.2 below, the value of topic chains and reflexivization as structural diagnostics is not clearly established in published discussions of Dyirbal.

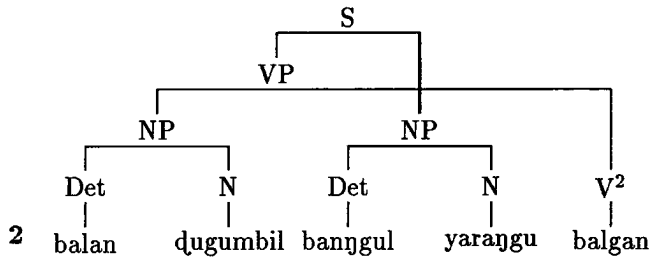
6.1 Free Word Order

As McCawley (1982) observes, a uniform hierarchical structure can be associated with the scrambled variants of Latin clauses if such clauses are assigned possibly disconcontinuous constituent analyses. This basic strategy can be extended to any language that exhibits relatively free word order patterns. To take an extreme example, the Dyirbal sentence in (1a) and its thoroughly intercalated variant in (1b) are both assigned a conventional branching structure in the diagrams below.[1]

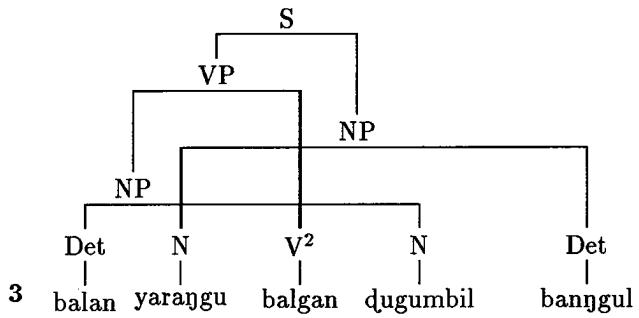
1	a.	*balan*	*ɖugumbil*	*banŋgul*	*yaraŋgu*	*balgan*
		there-Ab	woman-Ab	there-Er	man-Er	hit-Nf
	b.	*balan*	*yaraŋgu*	*balgan*	*ɖugumbil*	*banŋgul*
		there-Ab	man-Er	hit-Nf	woman-Ab	there-Er

'man hits woman' [D68:79]

[1] (1b), which illustrates scrambling on the scale of the slightly more complex example in (5b) below, does not occur in Dixon's corpus, though it is presumably wellformed if, as Dixon maintains, clause-internal permutation preserves grammaticality.



2



3

The constituent structure represented in these diagrams is in fact isomorphic; what essentially distinguishes (2) from (3) them is just the linear ordering they impose.

6.1.1 Constraints On Permutation

Any account of free word order phenomena must characterize the class of permutable elements, and the domain within which they may be freely ordered. Let us consider each issue in turn, in order to identify relevant restrictions on the sort of radical discontinuity represented in (2). It will be useful at the outset to adopt a tentative taxonomy for classifying the word order conventions of different languages. Let us restrict attention to languages in which order is pragmatically rather than syntactically distinctive. Because the most

familiar examples of free word order languages allow apparent free permutation of words as well as phrases, there has been a tendency to collapse these two ordering options. This is clearly reflected in the sorts of rules proposed to generate free order languages. Hale's W* grammars are a clear case in point, as they essentially concatenate strings of words. Likewise, the scrambling rule proposed by Ross (1967) applies indifferently to lexical and phrasal clausemates, while the liberation metarules suggested by Pullum (1982) free lexical as well as phrasal categories.[2] Nevertheless, the assumption that a language may allow free ordering of arbitrary words and parts of a single clause deserves critical reexamination.

6.1.1.1 Free Word Order in Dyirbal

The strongest arguments for recognizing genuinely free word order come from descriptions of Pama-Nyungan languages such as Dyirbal and Warlpiri, which are reported to exhibit extraordinary ordering freedom. Thus, let us begin by examining the word order conventions of Dyirbal. Although Dyirbal is entirely suffixing, and verbs exhibit a tendency to occur finally, the remarkably free constituent order reported by Dixon (1972) militates against assigning a dominant order to the language. Dixon states explicitly at various points in his grammar that any permutation of the words in a Dyirbal sentence yields a fully grammatical sentence. A representative passage is repeated below.

[2]For further discussion of these rule systems, see Chapter 8.

> It should be noted that it is the order of WORDS in sentences that is free, not just the order of phrases (emphasis in original, p.125).

Nevertheless, Dixon (1972:291) identifies a number of ordering tendencies in Dyirbal that yield a norm, or at least statistically most frequent, OSXV order, which is illustrated in (4).[3]

4	*bayi*	*ɖaban*	*baŋgul*	*yaraŋgu*	*baŋgul*	*ɖiraŋgu*	*ɖurgaŋu.*
	there-Ab1	eel-Ab	there-Er1	man-Er	there-In1	spear-In	spear-Nf

'man is spearing an eel with a multi-prong spear' [D93:243]

Although Dixon frequently remarks on the exceptional freedom of Dyirbal word order, he provides few examples that illustrate a lack of ordering restrictions in the language, and nearly all of his example sentences conform to the norm OSXV pattern.

The sentences in (5) constitute the main illustration of the degree of word order freedom possible in Dyirbal clauses.

5	a.	*bayi*	*waŋal*	*baŋul*	*yaraŋu*	*bulganu*
		there-Ab1	boomerang-Ab	there-G2	man-G	big-G
		baŋgun	*ɖugumbiru*	*buran.*		
		there-Er2	woman-Er	see-Nf		

b.	*bayi*	*yaraŋu*	*ɖugumbiri*	*buran*	*waŋal*	
	there-Ab1	man-G	woman-Er	see-Nf	boomerang-Ab	
	baŋgun	*baŋul*	*bulganu.*			
	there-Er2	there-G2	big-G			

'woman saw big man's boomerang' [D107:321]

[3]The elements that Dixon glosses as 'there' in the following examples are determiners that indicate the noun class and deictic status (i.e. here/there, visible/invisible) of a noun phrase. Only the *yala-* series, which identifies noun phrases that are here and visible, allow a deictic use. The determinerless, pidgin English sentence glosses are repeated verbatim from Dixon's grammar. The following abbreviations occur in the Dyirbal attributions: D: Dixon (1972), D̄: Dixon (1977).

Example (5a) exhibits the norm OSV pattern with continouous preverbal subject and object arguments. In contrast, the apparently synonymous (5b) contains noncontiguous parts of the subject and object scattered freely throughout the sentence. Notice in particular that the discontinuous constituents in (5b) are thoroughly intercalated rather than nested.

6.1.1.2 Permutation and Ellipsis

As Hale (1983) observes, languages that tolerate free word order exhibit a range of other common features, including comparatively free 'argument drop' or ellipsis. Another way of stating this correlation is that extremely free word order tends to be restricted to languages in which single words may constitute autonomous phrases. This formulation of Hale's descriptive generalization suggests the possibility that cases of apparent free word order can in fact be treated as examples of free phrase order, given that the permutable words independently qualify as phrases. For example, Dixon's grammatical description indicates that each of the parts of the subject and object of a Dyirbal sentence can stand alone.[4]

> If it does not contain a pronoun, a N[oun] P[hrase] will as a rule contain a noun and noun marker, and can contain any number of adjectives... However, it is perfectly normal for NPs in Dyirbal to contain only a marker, or only a noun, or only an adjective, or else just adjective, or marker and adjective. (Dixon (1972), p.60)

[4]Dixon (1972:61) reports that even dependent genitives may freely occur without a head noun.

Thus, any reasonable substitutional criterion will clearly classify as phrases the words that make up the nominal arguments of a sentence like (5). Hence, the free word order illustrated by this example can be construed as somewhat less exceptional free phrase order.

Nonetheless, Dyirbal does not provide a fully suitable test case. Since all lexical categories are phrasal, there are no exclusively lexical elements whose ordering options provide a control group. However, the contrast between Yidiɲ and Diyari provides the requisite comparison. Yidiɲ, an Australian language formerly spoken in North Queensland, is reported to combine a relatively fixed constituent order with a restricted amount of intercalation. Dixon (1977:268f) identifies a number of ordering preferences in Yidiɲ that he treats as pragmatic, though they are widely observed. Ergative, absolutive and instrumental noun phrases, as well as all varieties of pronominals, canonically occur preverbally. Further, pronouns tend to precede nonpronominal NPs, while among the full noun phrases, ergatives usually precede absolutives, which typically precede instrumentals. Datives, purposives and other obliques usually follow the verb, except when they are pronouns. A pair of typical sentences that exemplify the norm order that these preferences induce are given in (6).

6 a. *waguɖaŋgu guda:ga bunɖa:ɲ*
man-Er dog-Ab bite-Ps
'The man bit the dog.' [D̄256:332]

b. *ŋanɖi:ɲ bama:l guga:l mayi:gu.*
we-A person-Er call-Ps food-Prp
'The people called us for food.' [D̄260:361]

Dixon (1977:247) reports that deviations from this norm order are relatively rare, in marked contrast to the pattern in neighbouring Dyirbal.

These ordering tendencies appear to be operative even in clauses containing nominals that are split by intervening material from the same clause. In each of the examples that Dixon presents, some part of a discontinuous NP invariably occurs in the position that a full contiguous constituent would normally occupy. As well, the subconstituents of a split NP typically preserve their norm relative order.[5] This is illustrated by the examples in (7) and (8) below, which contain split absolutive arguments. The sentences in (7) each contain a generic noun or classifier occurring in the customary postverbal position, with the the head (or qualifying) noun postposed.

7 a. *ŋayu* *miɲa* *bugaŋ* *gangu:l.*
1Sg-N animal-Ab eat-Pr wallaby-Ab
'I am eating Wallaby.' [D̄270:403]

b. *ŋaɲḍi* *mayidi* *ḍula:l* *baŋga:mu.*
1Pl-N vegetable-Ab-Em dig-Ps potato-Ab
'We'd certainly been digging the potatoes.' [D̄240:270]

Likewise, (8) presents examples in which a deictic, possessive, and head noun, respectively, precede the verb, while the remainder of the noun phrase occurs postverbally.

8 a. *ŋayu* *ŋuŋu* *wawa:l* *munil.*
1Sg-N that-Ab see-Ps vine-Ab
'I saw that Munil vine.' [D̄270:404]

[5]Specifically Dixon reports (p.249) that possessors usually follow nouns, quantifiers tend to follow, while deictics are freely ordered and able to occur on either side of a head noun. This minimal order is respected in the split constructions in (7) and (8).

b. *ŋaɲaɲ giŋa:ŋ bugaŋ gula.*
1Sg-A fever-Er eat-Pr body-Ab
'The fever is eating my body away.' [D̄257:343]

c. *ŋayu bama wawa:ɖiŋu ɖambu:l.*
1Sg-N person see-AP-Ps two-Ab
'I (unexpectedly) saw two people.' [D̄270:402]

Each of these examples deviates from the norm SOV order only in that a single part of the object occupies a postverbal position. The sentences in (9) and (10) introduce additional complications to this simple pattern. Two elements occur postverbally in (9a), though not in the expected noun-quantifier order. This is also the one example of a split absolutive subject that Dixon discusses.[6]

9 *bama galiŋ ŋabi gaɖa.*
person-Ab go-Pr many-Ab white man-Ab
'Lots of white men are going.' [D̄270:405]

Further, (10) contains the sole case of a split purposive cited by Dixon.

10 *miŋa:gu yiŋu gadaŋ ɖaba:ngu.*
animal-Prp this-S come-Pr eel-Prp
'This [person] is coming for eels.' [D̄270:406]

Since such obliques normally follow the verb, the preverbal classifier *wiŋɓŋ* introduces a novel violation of the norm order.

Split ergatives arguments are conspicuously absent from Dixon's corpus. Recognizing this gap, Dixon (1977) observes

> Split ergative NPs do not occur in the author's corpus (but it must be remarked that ergative NPs are typically less complex—involving

[6]Perhaps significantly, the split subject is the argument of a canonically unaccusative predicate.

> fewer words—than absolutive NPs). They MAY be possible, but informants were not too happy with them. (emphasis in original, p.270)

To summarize the pattern in (7)–(11), absolutive and some oblique arguments appear to be able to be split up within a clause, with one part occurring in the norm location, and another occurring in a peripheral initial or final position. Some caution must be exercised in characterizing these constructions, however, as Dixon does not present a complete paradigm. In particular, he does not indicate whether multiple split NPs may occur in the same clause or whether a nominal may be split into more than two parts. As well, the locality constraints on splitting are not clearly identified. Nevertheless, Dixon's examples all observe the restriction on splitting proposed above; namely that the parts of split nominals must independently qualify as wellformed noun phrases.

This condition is vacuously satisfied in Yidiɲ, as in Dyirbal, since all elements of noun phrases are obligatorily marked for the appropriate case. Nonetheless, an examination of comparable constructions in Diyari, a South Australian language, supports the posited correlation between splitting and phrasal autonomy. Like Yidiɲ, Diyari appears to exhibit a relatively fixed order within phrases, while tolerating the splitting of constituents. Austin (1984:147) reports that Dyirari has a norm SOV order which is observed in transitive clauses except in "rare and ... pragmatically marked circumstances," such as responses to questions. Again like Yidiɲ, noun phrases can be optionally split up, with one part occurring in its expected position, and the rest following towards the end of a

clause. Yet, in contrast to Yidiɲ, each of the parts of Diyari NP may occur with their own nominal affix, or the entire a constituent may share one phrase-final case marker.

These options are illustrated in the sentences below. Whereas both elements of the subject *kintala-li nunkani-yali* are marked for ergative case in (11a), the locative affix *-ni* attaches to the full object *kana palpa* in (11b).

11 a. *kintala-li* *nunkani-yali* *nana* *mata-na* *wara-yi.*
dog-Er 3Sg-Er 1Sg-O bite-Part Aux-Pr
'HIS DOG bit me.' [A94:102]

b. *ŋani* *kana* *palpa-ni* *yata-na* *wara-ya*
1Sg-S person some-Lc speak-Part Aux-Pr
'I spoke to some of the people.' [A57:32]

Collectively marked phrases like *kana palpa-ni* clearly represent the unmarked construction, as Austin (1984:94) reports that the distributively marked NP in (11a) conveys emphasis or contrast.

Moreover, Austin also remarks that while distributively case marked phrases may be split apart, as in (12), this option is not available for collectively marked constituents.

12 *mankada-li* *nana* *nayi-na* *wara-yi* *palpa-li.*
some-Er 1Sg-A see-Part Aux-Pr some-Er
'Some girls saw me.' [A94:102]

Thus, precisely the class of nominal subconstituents that constitute NPs in their own right can occur within a discontinuous noun phrase in Diyari. Similar facts are reported for Warlpiri by Hale (1983) and Nash (1986).

6.1.2 Locality Constraints on Constituent Permutation

The preceding discussion supports the conclusion that apparent free word order invariably involves free ordering of single-word phrases, where phrasehood may be determined with respect to morphological criteria. Another assumption which is incorporated in Ross' scrambling rule and retained in much subsequent work is that clausal boundaries constitute an absolute barrier to free permutation. This restriction appears to be generally if not universally observed.[7] Thus, while the order of the elements within subordinate and coordinate clauses are basically free, Dixon (1972:76) reports that scrambing across different clauses is generally prohibited. Both clausal subordination and coordination take the form of paratactic 'topic chains' containing a shared absolutive noun phrase. Thus, from the intransitive sentences in (13) either the subordinate chain in (14a) or the coordinate chain in (14b) can be formed.

13 a. *bayi* *yara* *walmaɲu.*
there-Abl man-Ab got up-Nf
'man got up' [D67:72]

b. *bayi* *yara* *wayɲḍin.*
there-Abl man-Ab went uphill-Nf
'man went uphill' [D67:73]

14 a. *bayi* *yara* *walmaɲu* *wayɲḍili.*
there-Abl man-Ab got up-Nf went uphill-Prp
'man got up (in order) to go uphill' [D68:75]

[7]Though Barnett (1983) presents evidence, based on the prose of Cicero and the verse of Plautus, that indicative but not subjunctive and infinitival clauses are opaque to scrambling in Latin.

b. *bayi* *yara* *walmaɲu* *wayɲḏin.*
there-Ab1 man-Ab got up-Nf went uphill-Nf
'man got up and (then) went uphill' [D67:74]

Unlike the finite verbs in coordinate constructions, verbs that occur in subordinate constructions occur with nonfinite 'purposive inflection' (which is often homophonous with the dative case marking in nominals) in place of a regular tense suffix.

An additional difference concerns the fact that subordinate but not coordinate chains allow recursion. This process is illustrated by the examples in (15).

15 a. *balan* *ḏugumbil* *baŋgul* *yaraŋgu* *wawun*
there-Ab2 woman-Ab there-Er2 man-Er fetch-Nf
nayinbagu *walmbilŋaygu.*
girl-Pl-D get up-AP-Prp
'man fetched the woman to get the girls up' [D74:130]

b. *balan* *ḏugumbil* *baŋgul* *yaraŋgu* *wawun*
there-Ab2 woman-Ab there-Er2 man-Er fetch-Nf
nayinbagu *walmbilŋaygu* *bangum* *wuḏugu* *burbiŋaygu.*
girl-Pl-D get up-AP-Prp there-D3 fruit-D pick-AP-Prp
'man fetched woman to get girls up to pick fruit' [D75:133]

These examples exemplify other interesting aspects of topic chains, notably the antipassive affix *-ŋay* which allows transitive predicates to participate in clause chaining, which will be discussed directly below.

However, the feature of these constructions that is relevant in the present context is the fixed ordering patterns they exhibit. Dixon (1972:76) insists that "VCs [verb complexes] and implicated [i.e. dative] NPs must occur in their

iterative order (although a VC may occur before or after or in the middle of its associated implicated NP)." Yet, Dixon (1972:291) reports that the relative order of a finite and subordinate verb is subject to some variation: "It is even quite common for an implicated VC to precede the VC (with tense-inflected verb) of a higher verb...". The one example he cites in which the expected order of a finite and subordinate verb is reversed is repeated below.

16 *bayi* *yara* *biligu* *ḍiŋgaliŋu.*
there-Abl man-Ab climb-Prp run-Nf
'man runs [to the tree] to climb [it]' [D291:680]

Notice, however, that this sentence does not involve scrambling of a tensed and subordinate clause, so much as free ordering of a main verb (*ḍiŋgaliŋu*) and its ostensible nonfinite complement (*biligu*). Thus, the description that Dixon provides suggests that scrambling is basically clausebound in Dyirbal, as the relative order of subordinate and coordinate clauses is relatively rigid, and mixing of tensed clauses is unattested.

6.1.3 Summary

The constraints on free ordering identified in the previous subsections suggest the relevance of phrasal and clausal constituents in the syntax of purportedly nonconfigurational languages. However, these constraints are essentially neutral with respect to the degree of articulation within phases and clauses. The diagrams in (2) and (3), which provide hierarchically isomorphic analyses of scrambled variants, indicate how admitting discontinuity facilitates the assign-

ment of a conventional branching structure to radically scrambled sentences. Such articulated structures are compatible with existing syntactic descriptions of free word order languages, as there are relatively few phenomena which have been argued to motivate a different branching structure. The most prominent case of this sort concerns the structural ergativity of Dyirbal.

6.2 Structural Ergativity in Dyirbal

The idea that languages may instantiate an inverted argument structure in which agentive 'subject' nominals occur within the verb phrase while affected 'objects' occur as daughters of S has recently gained comparatively wide acceptance among generativists. Dixon (1972) argues at some length that Dyirbal is such a 'deep' ergative language, on the grounds that syntactic rules of the language consistently identify subjects of intransitive verbs and objects of transitive verbs. Largely on the basis of the syntactic behaviour of nominals in topic chains and relative clauses, he proposes that the constituent structure of transitive sentences in Dyirbal is radically distinct from that of nominative languages, in that an ergative 'subject' and its verb form a subconstituent that excludes the absolutive object. Marantz (1984) and Levin (1983) likewise suggest that the interpretation of valence-changing operations in Dyirbal provide confirmation of its structural ergativity.

Since this conclusion is clearly incompatible with the view that the clauses of

natural languages conform to a basic subject/predicate structure, I will consider below the phenomena that are argued to support it. I will argue that the arguments presented by Dixon, as well as those due to Marantz and Levin, do not support the conclusion that Dyirbal is structurally ergative. Dixon's demonstration fails to establish that topic chains link together nominals that occur in identical hierarchical configurations. Moreover, a wide range of alternative accounts are compatible with the constructions that Dixon discusses; the one I will outline below is that different processes may define different natural classes of nominals with respect to a fixed constituent structure. The Marantz/Levin defense of structural ergativity is similarly inconclusive, as it relies essentially on an empirically unsupported typological distinction.

6.2.1 Topic Chaining and Deep Ergativity

The formation of topic chains of the sort discussed earlier follows an apparently ergative/absolutive pattern, as such chains typically require a common absolutive noun phrase. The sentences in (14) are relatively straightforward, as they involve the combination of a pair of intransitive clauses. Since the subject *bayi yara* occurs in the absolutive case in both of the component sentences in (13), it can freely occur as the topic of either the coordinate or subordinate structure in (14).

Topic chains can similarly be formed from sequences of transitive and intransitive sentences (in either order) provided that the subject of the intransitive

clause and the absolutive NP of the transitive clause are identified as the common argument. Thus, from the sentences in (17), the chain in (17c) can be formed.

17 a. *balan* *ḍugumbil* *baŋgul* *yaraŋgu* *balgan.*
there-Ab2 woman-Ab there-Er1 man-Er hit-Nf
'man hits woman' [D68:79]

b. *balan* *ḍugumbil* *baḍiɲu.*
there-Ab2 woman-Ab fall down-Nf
'woman falls down' [D68:80]

c. *balan* *ḍugumbil* *baŋgul* *yaraŋgu* *balgan* *baḍigu.*
there-Ab2 woman-Ab there-Er1 man-Er hit-Nf fall down-Prp
'man hits the woman, (causing her to) fall down.' [D68:81]

In contrast, a simple chain cannot identify an ergative subject with either an absolutive subject or direct object. There are two basic strategies for combining dissimilar arguments of two predicates. Either the antipassive affix *-ŋay* is suffixed to a noninitial transitive verb, or *-ɲura* is added to a noninitial intransitive.

The two strategies are illustrated below. From (17a) and (18a), we can derive (18b), in which the antipassive suffix is suffixed to the the transitive verb *balgan*, and the common argument *bayi yara* occurs in absolutive case.[8]

18 a. *bayi* *yara* *baniɲu.*
there-Ab1 man-Ab come here-Nf
'man came here' [D130:416]

[8]Examples in which an intransitive is antipassivized were encountered earlier in (15).

b. *bayi* *yara* *banijnu* *bagun* *ɖugumbilgu* *balgalŋajnu.*
there-Ab1 man-Ab come-Nf there-D2 woman-D hit-AP-Nf
'man came here and hit woman' [D130:421]

Similarly, by suffixing *-jnura* to the intransitive verb in (18a), we can combine this sentence with (17a) to form a chain in which the shared NP is ergative.

19 *balan* *ɖugumbil* *baŋgul* *yaraŋgu* *balgan* *banijnura.*
there-Ab2 woman-Ab there-Er2 man-Er hit-Nf come-*jnura*
'man hit woman (and then immediately) came here' [D131:422]

These examples show that either an absolutive or ergative argument can serve as the common argument of a topic chain, though only absolutive arguments can be 'missing' from the noninitial predicates of a chain. Moreover, Dixon (1972:131) notes that when the topic is repeated in the second clause of a sentence like (19), it occurs in the absolutive case.

Dixon clearly demonstrates that in Dyirbal (unlike Yidiɲ, cf. Dixon (1977)), the restrictions on the formation of topic chains cannot be formulated as a morphological condition. Although Dyirbal pronouns follow a nominative rather than ergative pattern, pronominal chains obey the same restrictions that govern the formation of chains with full noun phrases. Thus, despite the fact that the first person pronouns differ morphologically in the sentences in (20), the topic chains in (21) can be formed directly.

20 a. *ŋaɖa* *banijnu.*
1Sg-N come here-Nf
'I came here.' [D131:423]

b. *ŋayguna* *baŋgun* *ɖugumbiru* *balgan.*
1Sg-A there-Er2 woman-Er hit-Nf
'woman hit me' [D130:424]

21 a. *ŋaɖa baniɲu baŋgun ɖugumbiru balgan.*
1Sg-N come-Nf there-Er2 woman-Er hit-Nf
'I came here (and was) hit (by) woman' [D131:425]

b. *ŋayguna baŋgun ɖugumbiru balgal baniɲu.*
1Sg-A there-Er2 woman-Er hit-Nf came here-Nf
'I (was) hit (by) the woman (and) came here' [D130:426]

In contrast, notwithstanding the identity of the nominative pronouns in (20a) and (22), the chains in (23) are both illformed.

22 *ŋaɖa balan ɖugumbil balgan.*
1Sg-N there-Ab2 woman-Ab hit-Nf
'I hit woman' [D131:427]

23 a. **ŋaɖa baniɲu balan ɖugumbil balgan.*
1Sg-N come here-Nf there-Ab2 woman-Ab hit-Nf
(I came here and hit woman) [D132:428]

b. **ŋaɖa balan ɖugumbil balgan baniɲu.*
1Sg-N there-Ab2 woman-Ab hit-Nf come here-Nf
(I came here and hit the woman) [D132:432]

In order to combine (20a) and (22), it is necessary to affix either *-ŋay* to the transitive verb or *-ɲura* to the intransitive stem, just as for nonpronominal NPs. The two options are illustrated in (24).

24 a. *ŋaɖa baniɲu bagun ɖugumbilgu balgalŋaɲu.*
1Sg-N come here-Nf there-D2 woman-D hit-AP-Nf
'I came here (and) hit woman' [D132:429]

b. *ŋaɖa balan ɖugumbil balgan baniɲura.*
1Sg-N there-Ab2 woman-Ab hit-Nf come here-*ɲura*-Nf
'I hit woman (and then immmediately) came here' [D132:433]

These examples suggest that the conditions on topic chaining are sensitive to the

argument structure of chained clauses rather than to the morphological marking on a shared topic.

Additional support for this conclusion comes from the fact that dative arguments can serve as the topic in a coordinate chain, and apparently must be involved in an iterative subordinate chain.[9] Dative topics were already illustrated in the sentences in (15) above; a further example, which is ambiguous between a coordinate and subordinate interpretation, is given below.

25	*balan*	*ɖugumbil*	*baŋgul*	*yaraŋgu*	*gigan*	*bagun*
	there-Ab2	woman-Ab	there-Er1	man-Er	tell-Nf	there-D2
	nayinbagu	*daymbalŋaygu*	*bagun*	*bunigu*	*mabalŋaygu.*	
	girl-Pl-D	find-AP-Prp	there-D2	fire-D	light-AP-PrP	

'man told woman to light fire and find girls', or
'man told woman to find girls (so they should) light fire' [D77:144]

The absolutive *balan ɖugumbil* can either be interpreted as the 'agentive' topic of each of the conjuncts *bagun nayinbagu daymbalŋaygu* and *bagun bunigu mabalŋaygu*, or just as the topic of the first, with the second, iterated, chained clause formed on the dative *bagun nayinbagu.*[10]

6.2.1.1 Conditions on Topic Chains

Let us now briefly summarize the chaining possibilities illustrated in the above examples. A common absolutive argument can be the topic of a coordinate chain that includes any of the following: a basic intransitive predicate, a ba-

[9] Dixon(1972:146).

[10] Dixon suggests (1972:69) that a dative NP is obligatory in antipassivized chains with purposive inflection, which accounts for the fact that datives are required in iterative chains.

sic transitive predicate, or an intransitive predicate derived by antipassivization.[11] A subordinate chain can be formed from any coordinate chain through the substitution of the purposive inflection *-i* or *-gu* for the tense suffix of nonitial verbs.[12] The main qualification is that clauses with derived intransitive verbs must contain a dative argument in order for the verb to bear purposive inflection. As noted directly above, such datives can serve as the topic for coordinate chains and must occur in iterated subordinate chains. Thus, only ergative NPs (and, presumably, the homophonous instrumentals) cannot serve as the topic of basic and antipassivized chains. Conversely, only ergatives can be the topic of chains whose noninitial verbs bear the affix *-ɲura*.

This summary suggests that while chains may differ in terms of the arguments they allow as topics, all chains restrict the suppressed or repeated arguments of noninitial clauses to absolutive NPs. Although the dative and absolutive NPs that can serve as topics in chains consisting of basic and antipassivized predicates do not form any recognizable natural class, the arguments that they 'control' do. Exactly the same class of arguments may be suppressed in noninitial verbs marked by *-ɲura*, which otherwise differ in allowing ergative topics, which cannot participate in any other topic chain. Thus, while the restriction on admissible topics basically distinguishes ergative from nonergative

[11]Dixon (1972:145) presents arguments that antipassivized predicates are intransitive.

[12]Though Dixon (1972:68) reports that the first verb in a chain may, occasionally, occur with purposive inflection.

NPs, the possible 'controlled' arguments are positively identified as the class of absolutives.

While it is certain that the conditions on chain formation, which cut across the class of ostensible subjects, do not provide evidence for the postulation of a conventional verb phrase constituent, it is less clear what positive conclusions they do support. That is, the existence of rules that identify a class of nominals in a given language does not in any direct way establish their structural or grammatical status. There is no general inductive principle that allows us to conclude, on the basis of common participation in some possibly prominant syntactic process, that a set of nominals occupy a common, possibly prominent position in a syntactic representation. Rather, what is required is a rule or process that can be shown independently to pick out a certain class of nominals. Given such a process, the properties of nominals of unknown status can be effectively probed. On the other hand, it is unclear what to conclude from the fact that nominals pattern together with respect to a rule or construction with uncertain properties.

If topic chains can be assimilated to some familiar, structure-sensitive construction, then it will be clearer how to interpret the constraints they impose. In order for chains to support the view that absolutives uniformly occur as the highest nominal in a clause, outside an inverse VP constituent comprised of a verb and its ergative argument, chaining must be characterized as some sort of subject-sensitive rule. From a generative standpoint, there are at least three

obvious candidate analyses: namely control, raising and conjunction. In light of the current lack of consensus regarding the status of constructions that involve raising to and/or from object position, the availability of a raising analysis could not be interpreted as providing any convincing indication of the structure of chained clauses. As well, the fact that *-ŋay* and *-ɲura* suffixation is obligatory under certain conditions eliminates another plausible alternative, as they clearly distinguish topic chains from sentences truncated by discourse ellipsis, which are not subject to any similar condition.[13] Moreover, though control and conjunction provide a more reliable indication of constituent structure, I will argue that neither of these analyses clearly support the identification of Dyirbal as syntactically ergative.

Mel'čuk (1979) and, to some extent, Dixon (1972) analyze topic chains essentially as control-like structures in which an argument of noninitial clauses is either deleted or phonologically null. This structural diagnosis, in conjunction with the standard assumption that only subjects can be suppressed in control structures, leads to the expectation that the missing argument in a noninitial clause will be a syntactic subject. Thus, the fact that only the absolutive arguments of transitive and intransitive clauses can be controlled supports the view that that these arguments must be subjects. Moreover, by treating absolutives as syntactic subjects and ergative NPs as direct objects, the requirement that

[13]cf. Dixon (1972:70).

transitive clauses must be antipassivized in order for an ergative argument to be controlled follows as well.

However, in order to treat topic chains as control structures, it is necessary to adopt a significantly modified notion of control. In the first place, since the absolutive argument of any predicate can control the suppressed absolutive of a noninitial clause, a novel type of control process must be recognized that is, unlike more familiar varieties, not lexically governed by any particular set of verbs. Moreover, the subjects of finite clauses must be included among the class of controllable arguments if tensed coordinate chains are to be assigned the basic same analysis as purposive subordinate chains. Further, the rule or principle that is responsible for deleting or suppressing controlled subjects must be optional, given that all or part of a topic may be repeated through a topic chain. All of these properties distinguish the putative control process in Dyirbal from its counterparts in languages like English. As well, the fact that a pair of topics can apparently run through a discourse in what Dixon (1972:71) terms a 'leapfrog fashion' is a peculiar, and otherwise unattested feature of a control structure.

Some of these characteristics seem less exceptional if topic chains are treated as coordinate structures: for example, as conjoined inverse verb phrases consisting of verbs and their ergative arguments. This is the position taken by Comrie (1978). Again, such an analysis attributes an inverted 'ergative' argument structure to Dyirbal clauses, and accounts for the obligatory role of antipassive in

deriving conjoinable clauses. Unlike the control analysis, the coordination proposal can also account for the fact that tensed verbs may occur in topic chains, as conjunction of constituents containing finite verbs is unproblematic. Similarly for sentences in which a topic is repeated, which can be treated as cases of sentence conjunction. However, the cost of being able to handle such sentences is the need for an auxiliary principles that determine when the absolutive arguments of two conjoined sentences can be coreferential, which may necessitate reintroducing a notion like control.

The generality of a coordination account is likewise undermined by the fact that the ergative argument of a transitive clause can serve as the topic for the transitive clause and an intransitive clause marked by *-pura*, which would seem to indicate that not all chains can be treated as conjunctions of inverse VPs. Within a control analysis, *-pura* could presumably be treated as an obviative or switch reference marker, though then the contrast between ergatives, which only control clauses with this affix, and datives, which never control such clauses, would have to be accounted for in some way. A more general problem is that neither of the analyses outlined above account for the striking differences among topic chains, the most notable being that chains of purposive clauses can be iteratively extended, while sequences of tensed clauses cannot.

Of course, it may be possible to formulate an account involving control and/or coordination that can adequately describe topic chains in a way that depends upon assigning an inverted argument structure to the component clauses.

However, in the absence of such an analysis, the phenomenon of topic chaining does not in any obvious way support the identification of Dyirbal as a deep ergative language. Nonetheless, it would be suggestive if the conditions on topic chains in other languages that contain similar structures could be shown to be generally subject-oriented. Yet even this much is unclear. In Yidiɲ, for example, all varieties of subordinate chains are formed on an absolutive pattern as in Dyirbal, while coordinate chains are subject to what appear to be largely pragmatic constraints. Thus, the ambiguous chain in (27) can be formed from (26a) and either (26b) or (26c).

26 a. *ŋayu* *bama* *banɖa:r.*
1Sg-N person follow-Ps
'I followed the person.' [D̄390:905]

b. *bama* *wanda:ɲ.*
person fall down-Ps
'The person fell down.' [D̄390:906]

c. *ŋayu* *wanda:ɲ.*
1Sg-N fall down-Ps
'I fell down.' [D̄390:908]

27 *ŋayu* *bama* *banɖa:r* *wanda:ɲ.*
1Sg-N person follow-Ps fall down-Ps
'I followed the person and he fell down' or
'I followed the person and I fell down' [D̄390:907]

This possibility is not restricted to chains with pronoun topics, as Dixon (1977:392) provides similar examples involving nonpronominal noun phrases.

6.2.1.2 The Ergative/Accusative Dichotomy

In the preceeding subsection I have argued not that topic chains fail to pick out subject nominals, but rather that their subject sensitivity has yet to be demonstrated. The fact that Dixon does not attempt such a demonstration can be largely attributed to the way in which he initially distinguishes ergative from accusative languages. Pure ergative languages are defined as those whose syntactic rules identify subjects of intransitive verbs with objects of transitive verbs, while strict accusative languages are taken to be those in which subjects of intransitives and subjects of transitives are treated alike. Further, Dixon assumes without supporting argument that the nominals identified within a language should both occur as daughters of S. Thus, subjects of intransitive predicates invariably occur as [NP,S]. In an accusative language, subjects of transitives are likewise defined as [NP,S], while objects of transitives are [NP,VP]. Conversely, in an ergative language, objects of transitives are classed as [NP,S], while subjects of transitives occupy the configurational position defined as [NP,VP].

There are two things to notice about this typological bifurcation. In the first place, it employs an undifferentiated notion of syntactic rule which does not rank rule types according to their reliability as a diagnostic of syntactic function. As a result, it is unclear what the structural reflexes of an ergative or accusative syntax should be. Moreover, Dixon's ergative/accusative distinction is not applicable to the vast majority of languages, whose rules do not uniquely

and consistently group intransitive subjects with either transitive subjects or objects. Dixon is aware of this, and remarks that

> The obvious answer to our quandary concerning a choice between the tree structures for transitive sentences... is of course not to group either NP with V_{tr} [the transitive verb], that is, simply not to recognise a VP node. (Dixon (1977), p.395)

Notice however that we are only driven to this position by the essentially arbitrary decision to treat the NP identified by a language as daughters of S. A viable alternative that dispenses with this unmotivated move would involve holding clause structure constant, and distinguishing languages in terms of which classes of nominals they identify on this fixed structure. According to this classification, a pure ergative language would be one whose rules identified the innermost arguments of a predicate, while an accusative language would contain rules that refer exclusively to the outermost nominals. Since intransitives are the limiting case of a predicate, their subjects qualify either as innermost and outermost arguments, and hence figure in the nominal identification scheme of both ergative and accusative languages. This simple alternative also provides a straightforward means of dealing with inconsistency, as different rules or rule types can be allowed to pick out different classes of noun phrases within or even across languages. The specification of what counts as a 'predicate' in this account will depend on assumptions regarding the structure of ditransitive clauses. Any account must be able to capture the fact that the alternation between nominative and ergative systems primarily concerns subject

and object nominals. This can be accomplished under present assumptions by combining verbs first with oblique objects with oblique arguments and classifying transitive and intransitive verbs (or verb phrases) as applicable predicates. If, alternatively, direct objects combine first with their direct object, the term 'predicate' can be allowed to range over all verbal projections. Although there seems to be no clear evidence at this point bearing on the choice between these analyses, both provide plausible alternatives to the classification that Dixon assumes.

6.2.2 The Marantz/Levin Ergativity Hypothesis

There is a second sort of argument, due originally to Marantz (1984), that is intended to establish the deep ergativity of Dyirbal. Marantz explicitly rejects the earlier arguments based on topic chaining, on the grounds that they are methodologically as well as empirically flawed. His objections are summarized in the following passages.

> Previous investigators (see, in particular, Dixon 1972 and Mel'čuk 1979) have attempted to show that Dyirbal, among other languages, is truly ergative—that is, that the sole syntactic dependent of an intransitive verb and the theme or patient of a transitive verb are syntactic subjects. The methododology employed by these linguists is to demonstrate that the sole argument of the intransitive verb and the theme/patient of the transitive verb both exhibit subject properties. Readers of previous proofs of ergativity were, therefore, persuaded that ergative languages exist to the extent that they believed that the properties identified as subject properties must necessarily single out subjects.
>
> Since topic chains resemble control constructions in English, and only subjects in English are controlled, one might argue that the con-

> ditions on the Dyirbal topic chain constructions indicate that Dyirbal absolutive NPs are subjects and therefore Dyirbal is ergative. Nevertheless, the present theory does not demand that the coreferent NPs in constructions like the Dyirbal topic chain be restricted to subjects. The theory does make demands about structures of control, but the Dyirbal topic chain only superficially resembles such structures. (Marantz (1984), pp. 197-9)

The methodological problem with previous demonstrations is thus that they rely on a questionable notion of subject properties, while the empirical problem concerns the fact that the construction in which they are purportedly argued to exhibit such properties is insufficiently similar to familiar control structures.[14]

6.2.2.1 Reflexive Ambiguity in an Accusative Language

The line of argumentation that Marantz proposes rests on the intuitively plausible assumption that valence-affecting operations such as passivization, causativization and reflexivization will yield characteristically different results in languages with distinct argument structures. More precisely, Marantz offers one argument, along with various analyses that incorporate this assumption. The argument concerns the interpretations associated with reflexive morphemes. Marantz takes as a point of departure the assumption that affixation of a reflexive morpheme detransitivizes a verb, invariably by suppressing its external

[14]It is worth noting in this connection that Marantz's criticisms, at least as they apply to Dixon's position, are to some degree undermined by an apparent misinterpretation. As noted above, Dixon does not at any point identify a collection of subject properties, and argue that that Dyirbal absolutives instantiate them. Rather, his rule-oriented typology classifies a language as ergative just in case *all* of the syntactic rules of the language pick out nominals in what he terms S and O function. As a consequence, Dixon does not suggest that topic chains pattern significantly after (subject-sensitive) control structures, but simply observes that the rules he formulates to describe such chains consistently distinguish absolutive arguments.

(i.e. logical subject) argument. As he notes, this assumption leads one to expect that the meaning of reflexive predicates will reflect systematic differences in the association of structural positions and thematic roles. Since subjects are canonically agents in accusative languages, the sole argument of a reflexivized transitive in an accusative language will typically be intepretable as a semantic theme. Conversely, in ergative languages with a consistently inverted argument structure, i.e., thematic subjects and agentive direct objects, the surviving argument should be interpretable as a semantic agent.

Thus, intuitively, reflexive predicates should allow a characteristically passive interpretation in an accusative language, and an antipassive interpretation in an ergative language. Although Marantz does not include a discussion of lexical reflexives in accusative languages, Levin (1983) provides examples that illustrate the interpretive range attributed to such languages. Representative French and Russian examples are repeated below. The sentences in (28) introduce the basic transitive verbs *laver* and *myt'* 'to wash', while (29) and (30) illustrate, respectively, the true reflexive, and passive use of the detransitivized *se laver* and *myt'sja*.[15]

28 a. *La* *mère* *lave* *les* *enfants.*
the mother washes the children

b. *Mat'* *moët* *detej.*
mother-N wash-Impf children-A
'The mother washes the children.' [L101:3.30]

[15]See Grimshaw (1981) for persuasive evidence that *se*, in contrast to the other preverbal clitics in French, functions as a detransitivizing affix rather than a nominal argument.

29 a. *Les enfants se lavent.*
the children Rf wash

b. *Deti mojutsja.*
children wash-Impf-Rf
'The children wash themselves.' [L101:3.32]

30 a. *L'usine se conduit là.*
the-factory Rf builds there

b. *Zavod stroitsja tam.*
factory-N build-Impf-Rf there
'The factory is being built there.'

Levin and Marantz suggest that the characterization of both reflexivization and passiviation as detransitivizing operations that suppress the logical subject of a predicate accounts for the passive use of reflexive predicates in (30).[16]

Moreover, they claim as a further virtue of this treatment of reflexive morphology that it attributes an implicit ambiguity to a sentence like those in (29). In fact, (29a) is potentially ambiguous between a passive and reflexive interpretation. However, (29b) does not exhibit a parallel ambiguity, as only imperfective reflexive predicates with animate subjects allow a passive interpretion in Russian. Likewise, the perfective counterpart of (30b), *Zavod postroitsja tam*, is ungrammatical, as it permits neither a reflexive nor a passive construal. Although the requisite qualifications can presumably be built into an account of

[16]The actual syntactic implementations proposed by Levin and Marantz are stated in slightly different forms, though they appear to be notational variants. Levin, following Burzio (1981), treats both morphemes as contributing the feature specifications [+T,-A] to a predicate, where the feature ±T corresponds to whether a verb (or the verb phrase it heads) assigns a thematic role to its d-structure subject, while ±A correlates with whether a verb assigns accusative Case to its d-structure object. Marantz's feature [±log sub] corresponds to Burzio's ±T; likewise the feature [±transitive] is the counterpart of ±A.

the sort that Marantz and Levin advocate, it is nevertheless unexpected within a theory that "predicts a homophony between the reflexive and passive forms of a verb (Marantz 1984:210)." A more problematic feature of this prediction is that the homophony it postulates is invariably unidirectional. Whereas reflexive constructions often permit a passive interpretation, it is rarely if ever the case that passive constructions allow a reflexive use. Thus, for example, the passive sentences in (31) are, like (29a) syntactically intransitive, though, unlike (29a), they do not show the predicted passive/reflexive ambiguity.

31 a. *Les enfants ont été lavés.*
the children have been washed-Pl

b. *Deti byli mytu.*
children-N were washed
'The children were washed.'
'*The children washed themselves.'

It is unclear how exactly this systematic asymmetry would be accommodated within the Marantz/Levin account, or any analysis that treats reflexive and passive forms as homophonous.[17]

[17]The mechanism that Marantz (1984:142ff,212f) introduces to associate the logical subject role of a reflexivized predicate with its syntactic subject may allow him to stipulate the requisite distinction, though Levin seems to lack a comparable option. Marantz has what he calls the *by*-features of a reflexive affix assign the logical subject role to its reflexive pronoun features. This role is subsequently transferred to the syntactic subject (through some largely unspecified process), when the subject serves as antecedent for the reflexive features. If subjects can bind reflexive but not passive features, the necessary distinction could be enforced, though at the cost of extending the already murky notions of assignment, binding and antecedence in somewhat arbitrary and ill-defined ways.

6.2.2.2 Reflexive Ambiguity in an Ergative Language

Nonetheless, let us accept as a descriptive observation that reflexive morphemes in familiar Indoeurpoean languages, and possibly more generally in accusative languages, typically allow a passive interpretation. We can then ask whether the interpretive options of lexical reflexives in ostensibly ergative languages differ in some respect. Both Marantz and Levin maintain that they do, and argue that Dyirbal predicates with the reflexive suffix *-ɾiy* (or one of its numerous alternates) illustrate the characteristically distinct interpretations associated with lexical reflexives in an ergative language. Marantz cites the minimal pair in (32), and suggests that it is significant that the theme rather than the agent argument is suppressed in (the second gloss in) (32b).

32 a. *bala* *yugu* *baŋul* *yaraŋgu* *buyban.*
there-Ab4 stick-Ab there-Er1 man-Er hide-Nf
'man hides stick' [D90:215]

b. *bala* *yara* *buybayiɾiɲu.*
there-Ab1 man-Ab hide-Rf-Nf
'man hides himself.' [D90:216]
'man hides (something)' [Marantz 212:6.26b]

Marantz proposes that the suppression of themes follows directly if reflexives are assumed to suppress logical subjects, and subjects are canonically interpreted as themes in Dyirbal.

However, Marantz's argument hinges on a pair of enthymematic premises. The first is that reflexive predicates in ergative languages, or at least those in Dyirbal, generally exhibit the ambiguity attributed to *buybayirriɲu* in (30b).

As well, the argument depends on this ambiguity being confined to ergative languages, since otherwise the availability of an agentive reading for a reflexive predicate will not provide a reliable diagnostic for argument structure. Let us consider each of these assumptions in turn. Observe first of all that the initial gloss in (32b) is repeated from Dixon's grammar; the second is supplied by Marantz (1984:212). Since Marantz does not identify a source for his translation, we must assume that the ambiguity he attributes to (32b) is licensed by Dixon's remarks to the effect that *-ɾiy* may generally combine with a verb to yield an intransitive predicate with or without a nonreflexive meaning.

> Reflexive forms sometimes carry a reflexive meaning... In other cases, the reflexive affix appears just to derive an intransitive from a transitive stem, without carrying any reflexive meaning...It appears that all verbs can form both true reflexives (if such forms would be semantically plausible) and false reflexives. (Dixon (1972), p.90)

Yet, it is worth noting that Dixon does not actually attribute ambiguity to any particular reflexive form. Moreover, the interpretations he assigns to false reflexives clearly bring out their distinctive aspectual interpretation. Thus, Dixon (1972) distinguishes the sentences in (33) in the following manner.

> Since people do not eat themselves, the unmarked interpretation of [33a] would be that it is a false reflexive, referring to *the eating of a regular meal.* If one did want to refer to a man chewing his finger, say (as a contemplative accompaniment, not in hunger), one would be sure to include *-ɖilu* (emphasis added, p.90).

33 a. *bayi* *ɖaŋgaymaɾiŋu.*
there-Abl eat-Rf-Nf
'He eats.' [D90:223]

b. *bayinḍilu* *ḍaŋgaymaɾiŋu.*
there-Abl-Self eat-Rf-Nf
'He eats himself.' [D90:224]

Thus, even if we grant that (32b) is sytactically ambiguous, it is by no means clear that the understood theme is freely interpretable as an arbitrary hidable object. Rather, extrapolating from Dixon's comments would lead us to expect that the suppressed theme must be something that a man might regularly or habitually hide.

Dixon's remarks elsewhere reinforce the impression that false reflexives are associated with a habitual or potential meaning.

> A verb in *-ŋay* form, plus unmarked tense inflection, refers to an ACTUAL action; one in reflexive form, plus unmarked tense inflection, refers to the potentiality of some action taking place...
>
> Similarly, *bayi wugayiɾiŋu bagum ḍigagu* [lit. there-Abl give-Rf-Nf there-Dat3 cigarettes-Dat] means 'he gives out cigarettes'— the Dyirbal verb has an 'habituative' meaning in this instance, exactly like 'gives' in the English gloss. In contrast, *bayi wugalŋaŋu bagum ḍigagu* [lit. there-Abl give-AP-Nf there-Dat3 cigarettes-Dat] would mean 'he is (now) giving out cigarettes'. (Dixon (1972), p.91)

That is, the interpretation of reflexive and antipassivized predicates are not truly 'homophonous'; moreover, the interpretive overlap is again apparently unidirectional, as Dixon provides no indication that antipassivized predicates can optionally be understood reflexively.

Let us next consider whether the object-suppressing dispositional reading associated with reflexive predicates is unique to ostensibly ergative languages. To begin with, notice that a dispositional interpretation of lexical reflexives

is freely available within the prototypical accusative languages that Levin discusses. This extends even to inherently reflexive verbs in French and Russian, as the examples in (34) show.

34 a. *Elle se habille bien.*
she Rf dresses well

b. *Ona odevaetsja so vkusom.*
she-N dress-Impf-Rf with style-In
'She dresses well/with style.'

However, given that these sentences are interpreted statively, and that the subjects of stative predicates exhibit few canonical agentive properties, they do not unambiguously reveal the argument orientation of the reflexive morphemes *se* and *-sja*.

The semantic status of the surface subjects of reflexive verbs interpreted as quasi-reciprocals is somewhat clearer. Consider the examples in (35).

35 a. *Le garçon se bat.*
the boy Rf fight

b. *Mal'čik derëtsja.*
boy-N fight-Impf-Rf
'The boy fights (habitually).'
'*The boy is fought (habitually).'

These sentences are appropriate to describe an actively pugnacious child, rather than one that is frequently picked on. That is, the subjects *le garçon* and *mal'čik* are interpreted as volitional, as opposed to passive participants. Nevertheless, the thematic status of the syntactically suppressed argument of a reciprocal

predicate is sufficiently indeterminate to leave reasonable doubt concerning their object-orientation.

This indeterminacy does not arise in the case of 'transitively understood' reflexive predicates of the sort illustrated in (36b) and (37b) below.

36 a. *Naša sobaka kusaet detej.*
our-N dog-N bite-Impf children-A
'Our dog bites children.'

b. *Naša sobaka kusaetsja (*detej)*
our-N dog-N bite-Impf-Rf (children-A)
'Our dog bites.'
'*Our dog is bitten.'

37 a. *Byk bodaet krest'jan.*
bull-N butt-Impf farmer-A
'The bull butts the farmer.'

b. *Byk bodaetsja (*krest'jan)*
bull-N butt-Impf-Rf farmer-A
'The bull butts.'
'*The bull is butted.'

The subjects *nasa sobaka* and *byk* in (36b) and (37b) correspond to the respective subjects in (36a) and (37a), as the English glosses suggest. Yet, this interpretation requires that the mopheme *-sja* suppress the object of the transitive predicates in (36a) and (37a). Thus, sentences (36b) and (37b) are incontrovertibly object-suppressing. In addition, sentences of this sort are canonically dispositional. As Babby (1975:322) remarks, "their most common use is to denote a characteristic activity of the subject."[18]

[18]Levin (1983:103fn28) acknowledges that *-sja* may have the effect of suppressing the object of a transitive verb (adding the features [+T,-A] in her terms), and suggests that this represents

In short, transitively understood reflexives in Russian pattern in all relevent respects with Dyirbal false reflexives. Given that Russian qualifies as an accusative language, this entails that the agentive interpretation of reflexive predicates cannot be taken to be confined to ergative languages. Yet, it follows then that the availability of an agentive construal for a reflexive predicate cannot be considered a reliable diagnostic for inverted ergative argument structure. This then fatally undermines the argument that Marantz (1984:211) identifies as "perhaps the most convincing demonstration of the existence of ergative languages".

6.2.2.3 Passives and Antipassives

The remaining analyses of Dyirbal constructions that Marantz presents do not argue for, as much as assume, Dyirbal's deep ergativity. His analysis of the antipassive *-ŋay* is representative. Marantz observes that a passive transformation that demotes the subject of a transitive verb and advances its object to the vacant subject slot would look like an object-demoting antipassive construction in a truly ergative language. Due to the inverted argument structure attributed to an ergative language, the familiar passive operation will demote the theme subject, and advance the agentive object. Marantz further suggests

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another use of the reflexive morpheme. What Levin does not seem to appreciate is that permitting an additional 'use' of *-sja* essentially vitiates her argument, as it falsifies the claim that reflexives uniformly suppress external arguments/logical subjects. Without this crucial assumption, an argument of the sort that she and Marantz present cannot get off the ground, as there is no determinate relation posited between structure and interpretation.

that Dyirbal may be analyzed in this manner, though he explicitly shies away from providing any supporting arguments.

> From the[se] correspondences ...it should be clear that the fact that a verb form in a given language can be analyzed as a passive under the assumption that the language is ergative does not provide evidence that the language is in fact ergative. The verb form could be an antipassive and the language in question a nominative-accusative type B language. Although it provides no evidence for the existence of ergative languages, I will run through an analysis of passivization in Dyirbal and Central Arctic Eskimo on the assumption that these languages are ergative. (Marantz (1984), p.201)

Because Marantz recognizes the existence of a separate antipassive construction in accusative languages, he cannot claim to have eliminated one construction in favour of another. Moreover, given the existence of languages, even within the Australian languages (i.e. Diyari (Austin 1984)), that contain both passives and antipassives, it is unclear what gain in economy or understanding results from the treatment of *-ŋay* constructions as passives. That is, the plausibiliy of analyzing *-ŋay* constructions as passive depends on Dyirbal's being ergative, and not conversely.

6.2.3 Evidence for a VP in Dyirbal?

Before concluding this chapter, I will first present circumstantial evidence in support of the position that transitive verbs and their absolutive arguments form a verb phrase constituent in Dyirbal. One common test for constituency involves substitution of pro-forms. Thus, the existence of pronouns and the pro-VP *do* has been interpreted as evidence for noun phrase and verb phrase constituents

in English. Essentially parallel arguments can be made for NPs and VPs in Dyirbal. Although the language does not have any distinct third person personal or possessive pronominals, it does contain an interrogative series whose members can be substituted for nominals consisting of determiners, adjectives and nouns, much as *who* and *what* are the interrogative pronominal counterparts of noun phrases in English. Likewise, though Dyirbal does not have a declarative pro-VP corresponding to English *do*, it does possess the transitive and intransitive interrogative pro-forms *wiyamal* and *wiyamay* which, when they occur as main predicates, mean 'do what'. The use of these forms is illustrated in (38).

38 a. *bayi* *yara* *wiyamaŋu.*
there-Abl man-Abl do-what
'What was the man doing.' [D55:14]

b. *ŋinda* *bayi* *yara* *wiyaman.*
2Sg-N there-Abl man-Abl do-what
'What did you do to the man.' [D55:15]

These examples suggest that the interrogative pro-forms in Dyirbal can question either intransitive verbs, or transitive verb phrases consisting of a verb and direct objects: that is verb phrase constituents. Although *wiyamal* and *wiyamay* also allow an adverbial use, it is perhaps significant that there is no pro-form meaning 'who do' or 'what do' that can be used to question sequences consisting of ergative subjects and their verbs, even though these are assigned constituent status in Dixon's account.

6.2.3.1 Noun Incorporation

The formation of participial compounds is a productive process which similarly cuts across the class of absolutive nominals, as it creates compounds corresponding to a verb and its object, but never to a verb (transitive or intransitive) and its subject. Participles are formed from verb roots by the addition of the suffix *-muna*. Adding this affix to a verb like *bundul*, which Dixon (1972:83) glosses as 'hit with a long flexible object, e.g. spank with the flat of the hand' gives the participle ***bundulmuna*** '(one who) habitually spanks'. Forms of this sort serve a basically adjectival function. Moreover, deverbal participles can, unlike Dyirbal verbs, incorporate the direct object of the nominalized verb. Thus, from *bundulmuna* and *ɖugumbil* 'woman', the compound *ɖugumbilbundulmuna* '(one who) habitually spanks women' can be derived. This also may serve an adjectival function, as in (39), although discourse ellipsis may (as usual) delete the modified subject.

39 *bayi* *yara* *ɖugumbilbunɖulmuŋa* *baniŋu.*
there-Ab1 man-Ab woman-spanking come-Nf
'The man who habitually spanks women is coming.' [D83:169]

Dixon (1972:85) reports as well that a verbal stem alone may function as a participle, though such participial stems must incorporate a direct object nominal. A representative contrast is repeated in (40).

40 a. *ŋayguna* *baŋgul* *yarabalgaru* *buran.*
1Sg-A there-Er1 man-murdering see-Nf

b. **ŋayguna baŋgul yaraŋgu balgaru buran.*
1Sg-A there-Er1 man-Er murdering see-Nf
'He, who habitually murders men, saw me.' [D85:184-185]

The incorporated object *yara* in (40a) can be distinguished from the free argument *yaraŋgu* in (40b) by the lack of case marking. The relevant property of this incorporation process is that it is, according to Dixon, restricted to objects. This evidence of a tighter bond between verbs and direct objects than between verbs and their subject is expected on an account that treats verb-object sequences as a syntactic constituent, and somewhat unexpected if verbs and subjects are grouped together.

6.2.3.2 Imperatives

Dyirbal also contains both affirmative and negative imperative constructions. The positive forms are derived by deleting the final *-l* or *-y* of a verbal stem. Imperative verbs occur either without expressed subjects, in which case they are most naturally interpreted as second person, or with appropriately case marked pronouns. A selection of the examples that Dixon provides are repeated in (41).

41 a. *(ŋinda) bani!*
2Sg-N come-Imp
'(You) come!' [D111:332,335]

b. *ŋinda bayi yara balga!*
2Sg-N there-Ab1 man-Ab hit-Imp
'You hit the man!' [D111:336]

c. *balan ɖugumbil ɲinayma!*
there-Ab2 woman-Ab sit-Imp
'You sit down with (or marry) the woman!' [D111:338]

Negative imperatives are formed by adding a particle and verbal suffix, whose form varies according to dialect. Examples from the majority Dyirbal dialect are given in (41).

42 a. *yinda* *galga* *wurbam*!
2Sg-N Neg-Imp speak-Imp
'Don't you speak.' [D111:341]

b. *bala* *yuga* *galga* *galgam* *balay*!
there-Ab4 stick-Ab Neg-Imp leave-Imp there
'Dont leave the stick there!' [D112:344]

Both positive and negative imperatives are formed on an nominative pattern: subjects of transitive and intransitive verbal roots may be omitted, while objects are unaffected. Thus, the process or processes responsible for imperative formation in Dyirbal distinguish subjects from nonsubjects, rather than ergative from absolutive arguments.

There are various other suggestive yet inconclusive strands of evidence for a VP constituent dispersed through Dixon's grammar. For example, the only idiom that I have found in his examples and texts is *mana bagal*, literally 'pierce ear, i.e. whisper', which consists of a verb and direct object.[19] If, as has sometimes been claimed (e.g. by Marantz (1984), but cf. also Bresnan (1982b)) the existence of verb-object but not verb-subject idioms in a language correlates with the presence of a verb phrase constituent, then the idiom in Text XV might be significant. Further, although there is no subject-verb agreement in Dyirbal, the nominative case marking patterns of first and second person

[19]Dixon (1972:381)

pronouns exhibit a clear subject/nonsubject distinction. Nevertheless, this is again somewhat inconclusive, given that nonpronominal noun phrases follow an ergative pattern, and the interrogative series (in the Dyirbal and Mamy dialects, at least) has different forms for subjects of intransitives, subjects of transitives and direct objects.

6.2.4 Conclusion

The preceding discussion is not intended to establish that Dyirbal is structurally accusative, so much as demonstrate the highly inconclusive character of arguments advanced to support the claim that it is structurally ergative. Given the deficiencies of these arguments, there is at present no principled basis for distinguishing the hierarchical structure of Dyirbal from that of more familiar configuration languages.

Chapter 7

Derived Discontinuity in English

A common goal within the extended family of post-*Aspects* approaches to syntax is the development of grammatical formalisms that approximate the empirical coverage of standard transformational grammars without exploiting the full descriptive apparatus of classical transformations. Analyses of unbounded dependencies have come to occupy a prominent role in these investigations, since they involve precisely the sort of alocal alternations that provide the clearest motivation for devices that mediate between fully formed structures. However, although there are substantive differences concerning the nature and output of valence changing operations like passivization and causativization, there is considerably less disagreement about the constituent structure analysis of unbounded dependencies. For example, the authoritative LFG, GB and GPSG accounts of these constructions presented in, respectively, Kaplan and Bresnan (1982), Chomsky (1981) and GKPS (1985), assign nearly isomorphic constituent analyses to an embedded clause such as *who Max denounced.* In particular, each

of the above accounts locates the displaced object in a dislocated initial position, and provides some mechanism for matching this element with the phonologically null trace that occurs in the direct object position. Where Bresnan and Kaplan introduce bounded domination metavariables for this purpose, Chomsky adopts a coindexing convention, and GKPS use the foot feature SLASH in conjunction with conditions that govern the distribution of foot features.

While these differences in execution reflect general differences in the inventory of devices that each theory makes available, they nevertheless yield intertranslatable, and even structurally isomorphic constituent analyses across a relatively wide range of constructions. Similarly, although the general model of constituent structure advocated in Steedman (1985) departs radically from familiar 'item and arrangement' models, Steedman nevertheless also locates the primary constituent split between *who* and *Max denounced* in the embedded question above. The model of Phrase Linking Grammar presented in Engdahl (1986) likewise positions dislocated interrogative elements so that they are (tree-) dominated by the highest node in their clause. In sum, the postulation of hierarchically dislocated positions is a point on which there is a broad consensus across diverse syntactic frameworks.

An assumption that is implicit in these accounts is that word order alternations invariably reflect concomitant differences in constituent structure. This view is, in fact, unavoidable for a theory that assigns exclusively context-free structural descriptions, or sets of such descriptions. However, relaxing this

arbitrary constraint on the representation of constituent analyses introduces various other possibilities. One clearly articulated alternative is defended by McCawley (1982), who proposes a bifurcation of the class of classical movement transformations. Ostensibly stylistic rules like Parenthetical Placement, Right Node Raising and Heavy NP Shift are classified as permutation or *reordering* rules which rearrange constituent order without affecting constituent structure. Thus, unlike classical transformations, such permutations map a class of typically continuous trees into a class of canonically discontinuous trees. The remaining *relation-changing* transformations comprise a heterogeneous class of operations including passivization, causativization and topicalization, all of which are assumed to alter syntactic relations, constituency and also possibly word order.

A significant proportion of this class of transformations can, as proponents of LFG have shown, be treated as lexical rules that mediate between lexical entries rather than syntactic representations. What remains then of the transformational component once stylistic and valence-affecting operations are removed is essentially just movement rules like verb fronting and nominal preposing, whose status as structure-changing rules is never explicitly established by McCawley. Since McCawley's mappings preserve hierarchical structure, their discontinuous outputs provide a single-level representation of underlying constituency and surface word order. Such discontinuous tree structures faciliate the statement of syntactic generalizations and also largely eliminate the need for discrete syntac-

tic levels of representations, as many generalizations that refer to distinct levels in a transformational account will be statable in terms of the partially independent precedence and dominance relations that order a discontinuous tree. In particular, the statement of conditions on bound anaphora, and constraints on extraction from complex nominals is considerably simplified if the output of a movement rule may be represented as a discontinuous structure.[1]

7.1 Constituent Dislocation

Generative descriptions of declarative/interrogative alternations are notoriously variable, reflecting changing views of clausal structure, the English auxiliary system, and node labelling conventions. However, nearly all accounts have assumed that the constituent structure of questions differs from the structure of the corresponding declaratives. In particular, generative analyses canonically assign a polar question like (1b) a constituent structure in which the position of the initial auxiliary *will* is higher than in a declarative clause such as (1a).

1 a. Meg will leave.

b. Will Meg leave?

Similarly, the initial interrogative elements in the information questions (2b) and (2c) are typically analyzed as occurring in a dislocated structural position

[1]It appears, moreover, that the characterization of reordering operations as actual rules that apply to a syntactic structure is inessential. Instead, the devices that sanction unbounded dependencies can be incorporated as clauses of a general recursive definition of wellformed tree structures, rather than as rules that apply in the derivation of individual expressions.

which is superior to that of the corresponding noninterrogative subject and object in (2a).

2 a. Alice discovered raccoons in the basement.

b. What did Alice discover in the basement?

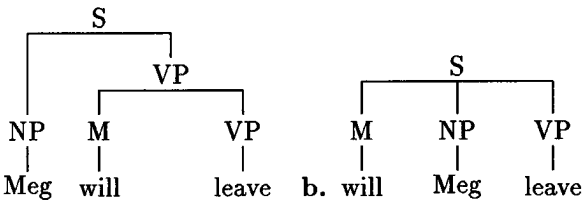
c. Who discovered raccoons in the basement?

A structural difference between dislocated and nondislocated elements is taken to hold in a variety of other constructions, including topicalizations, and even some cases of bounded rightward movements. Before examining the consequences of this conception of 'rule governed' word order alternations, let us briefly review a representative sample of generative analyses that distinguish the constituent structure of the sentences in (1) and (2).

7.1.1 Subject-Auxiliary Inversion

Working within a modified *LSLT* framework, Katz and Postal (1964) adopt a flattening inversion transformation that maps the underlying phrase marker (3a) into the derived phrase marker represented in (3b).

3 **a.**



b.

This singulary transformation preposes an auxiliary element and daughter-adjoins it, along with the verb in this example, under S.

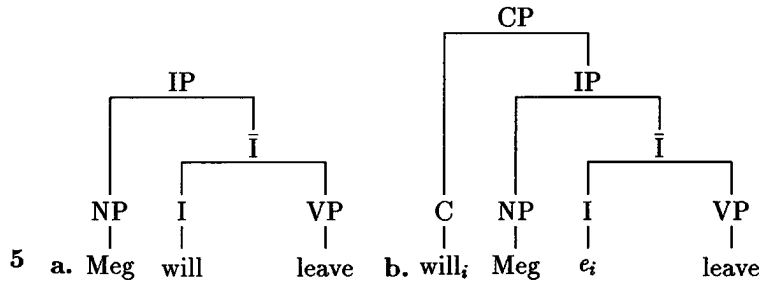
The Subject-Aux Inversion metarule proposed in GKPS (1985:62) induces a similar structural distinction between declarative clauses, which are assigned a binary analysis into noun and verb phrases, and ternary-branching polar questions. The GKPS rule, repeated in (4), expresses a relation between immediate dominance rules that introduce verb phrases and those that sanction inverted sentences. For every ID rule that rewrites a verb phrase V^2[-SUBJ] by a string (or multiset) W, there is a corresponding rule that admits an inverted clause V^2[+INV,+SUBJ] consisting of W, along with a subject NP and an invertible auxiliary element.

4 $V^2[\text{-SUBJ}] \rightarrow W \Longrightarrow V^2[\text{+INV,+SUBJ}] \rightarrow W, NP$

The order of the elements introduced by the derived rule is then determined by the appropriate LP rules.

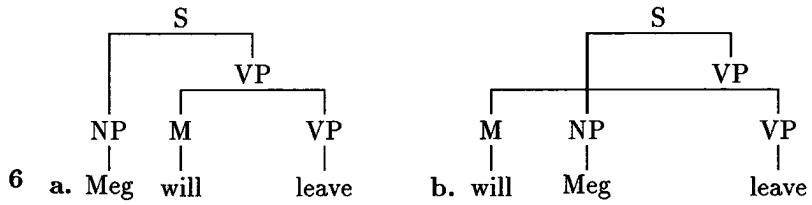
Likewise, while the structural analyses proposed within many current REST accounts are uniformly (or at least maximally) binary branching, such accounts associate distinct hierarchical structures with the sentences in (1). Thus, in e.g., Chomsky (1986a), the modal *will* occurs as the head of an inflectional phrase in (1a), but in the head position of the superordinate complementizer phrase in (1b). Illustrative substructures associated with the sentences in (1) are provided in (5).[2]

[2]For a fuller exposition of this analysis, see Chomsky (1986a). No position is taken here concerning various unresolved issues having to do with the status of the maximal CP projection in (5b) and the presence or absence of a complementizer projection in (5a), as these matters have no direct bearing on the questions under discussion.



5 **a.** Meg will leave **b.** will$_i$ Meg e_i leave

A rather different characterization of the alternation in (1) is suggested in the work of American structuralists such as Hockett and Gleason. While the IC diagrams they propose for declarative sentences are structurally similar to the representation in (3a), the analyses assigned to interrogatives like (1b) cannot be expressed as wellformed continuous trees, stringsets or labelled bracketings. However, the discontinuous structure associated with polar questions is unambiguously representable in terms of the graph in (6b).



6 **a.** Meg will leave **b.** will Meg leave

Unlike the later transformational analyses, the descriptions in (6) confine the structural difference between polar questions and declaratives to the linear ordering of constituents. The binary hierarchical arrangement of constituents remains constant across these different sentence types, while the order of the subject and auxiliary element varies.

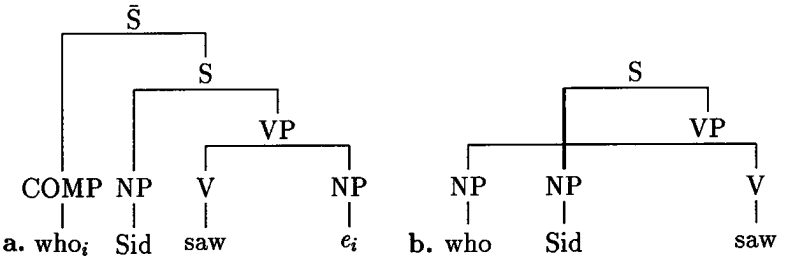
7.1.2 Nominal Preposing and Postposing

There are, however, few grammatical processes that provide a reliable diagnostic for the hierarchical position of verbal elements. The distinct constituent structures proposed for polar questions in (3)–(6) are thus, to a large extent, reflexes of conflicting views of phrase and clause structure that are not susceptible of direct verification. The situation is perhaps somewhat more tractable in the case of word order alternations involving nominals, where essentially the same range of options arise. Thus, consider an embedded information question like *who Sid saw* in (7).[3]

7 Helga wondered who Sid saw.

The space of possible structural analyses for this complement is largely the same as for the polar question in (1b). Counterparts of the candidate analyses discussed in (5) and (6) above are given in (8).

8



The EST structural description in (8a) is similar, modulo node labels, to the analysis of the inversion structure in (5b). Moreover, this representation is also

[3]The choice of a subordinate construction allows us to ignore complications related to the application of auxiliary inversion in matrix questions.

isomorphic to the constituent structures assumed within current versions of LFG (Kaplan and Bresnan (1982)) and GPSG (GKPS (1985)). The structuralist alternative in (8b) has few contemporary advocates, though it is a straightforward generalization of McCawley's (1982) treatment of bounded dependencies.[4]

These distinct structural descriptions interact with a number of syntactic processes in English that are conditioned by, or at least significantly correlated with, configurationally defined domains. In particular, the principles of construal that determine the possible antecedents for a given pronominal, and certain of the island constraints that restrict the displacement of noun phrases seem sensitive to hierarchical relations. The first of these processes figured in the earlier arguments for a verb phrase in Irish; a slightly expanded treatment of anaphora along the same lines is provided below. The discussion of island constraints will focus mainly on constraints on displacement from within noun phrase constituents. Since these are subject to somewhat less idiosyncratic and cross-linguistic variability, they are more plausibly attributed to structural causes than other putatively configurational conditions.

The basic line of argumentation pursued in subsequent sections takes as a point of departure the premise that a characterization of anaphoric construal and extraction islands that makes essential reference to configurational domains can provide a diagnostic for constituent structure. In particular, an account de-

[4]The remaining possibility, namely a ternary-branching counterpart of (3c), is most plausibly associated with flat 'predicate-argument' grammatical models, like Fillmore's Case Grammar or models of Relational and Arc Pair Grammar.

veloped to deal with anaphora and extraction in clauses that have not undergone a given movement rule can be applied to clauses which have undergone the rule in order to determine whether the alternation ascribed to the rule in question affects configurational domains. More specifically, structure-sensitive phenomena can be used to probe the hierarchical arrangement of sentences like those in (9) below.

9 a. Who did Helga deny that Sid saw?

b. A rumour spread quickly that Olga had emigrated.

c. Ken believes, but Gus doubts, that alligators eat dogs.

Example (9a) is an instance of a (potentially) unbounded dependency construction, in which the interrogative object *who* has been preposed to sentence-initial position. In contrast, the sentences in (9b) and (9c) illustrate bounded, rightward displacements. (9b) involves extraposition of the sentential complement *that Olga had emigrated* from the subject noun phrase, while (9c) is a case of what Ross (1967) terms Right Node Raising.

The principal question addressed below is whether such nominal displacements preserve or alter the configurationally defined domains to which anaphora and extraction phenomena are sensitive. Let us turn now directly to an examination of the interaction of the structural descriptions in (8) with anaphoric and extraction processes in English.

7.2 Bound Anaphora

In English, as in many other languages, subjects and direct objects of active transitive predicates exhibit asymmetric anaphoric options. The sentences in (10) illustrate the familiar contrast between subjects and objects with respect to the control of reflexives. Whereas any suitable subject noun phrase in subject position can control reflexive objects, direct objects cannot control reflexive subjects.[5]

10 a. Kim$_i$ nominated herself$_i$.

b. *Herself$_i$ nominated Kim$_i$.

This asymmetry is commonly ascribed to the structural difference between subjects and objects in the standard 'subject/predicate' constituent analyses of English clause structure. Configurational approaches to anaphora define the anaphoric domain of a potential antecedent in terms of its position on a phrase structure tree, and attribute the asymmetric anaphoric options of subjects and objects to the fact that subjects are attached higher than objects in a constituent structure tree. For ease of reference, let us adopt Reinhart's antecedent-oriented terminology and identify the set of nodes dominated by the mother of a node α as the *c-command* domain of α. Moreover, α will be said to *c-command* any node within that domain.

[5]The diacritics are intended to mark grammaticality on the anaphoric reading informally represented by coindexing. Recall that the illformedness of the corresponding Irish examples provided evidence that the illformedness of sentences like (10b) extended to languages containing a morphologically appropriate subject reflexive form.

11 α *c-commands* β iff (i) neither α nor β dominates the other, and (ii) every branching node that properly dominates α dominates β.

The contrast between (10a) and (10b) follows then from a requirement that the antecedent of a bound reflexive must be higher than the reflexive. Moreover, as was recognized by Evans (1977) and Partee (1978), among others, a formally similar constraint applies to quantificational antecedents. Noun phrases containing the determiners *every*, *no*, etc. must generally occur higher in a structure than any pronominal that is construed as dependent on them. Violation of this requirement typically results in ungrammaticality, as (12) illustrates.

12 a. No suspect$_i$ trusts his$_i$ lawyer.

b. *His$_i$ lawyer trusts no suspect$_i$.

Example (12a) shows that quantificational noun phrases that occur as subjects may antecede possessive pronouns embedded within a direct object. Yet, as (12b) indicates, possessive pronouns embedded within the subject cannot be construed as anaphoric to a quantificational object.

Notice that a unified account of the contrasts in (10) and (12) can be obtained if reflexive pronouns and quantificational noun phrase antecedents are classified as elements that participate only in bound variable anaphoric dependencies, and hierarchical superiority is identified as a necessary condition for such anaphora.[6] These assumptions provide a clear diagnostic for the structural position of a

[6]This is essentially the position defended in Partee (1978), Reinhart (1983) and Blevins (1989); see these works for further discussion.

displaced nominal, since the nominal should be able to antecede any pronouns dominated by its mother node.

7.2.1 Binding in Interrogatives

Examples (13a) and (13b) show that the interrogative quantifier *who* may serve as an antecedent for object reflexives and pronouns embedded within the object when the quantifier occurs (or, alternatively, originates) in subject position.

13 a. Who$_i$ incriminated himself$_i$?

b. Who$_i$ called his$_i$ lawyer?

This pattern is expected on nearly any account, as *who* will c-command the reflexive and possessive pronoun when it occupies either subject position or a higher dislocated initial position. However, the anaphoric options of an interrogative matrix object or embedded subject presents a useful test case for competing hypotheses about derived constituent structure. An account that assigns a uniformly right-branching structure to English questions will, in the absence of supplementary restrictions, lead one to expect preposed objects and subjects to c-command, and hence antecede, the pronominals that they precede. In contrast, an analysis that associates typically isomorphic structural analyses with questions and declaratives will predict that preposing should not affect the anaphoric domain of an object or embedded subject.

7.2.1.1 Cross-Over Phenomena

As examples (14a) and (14b) show, interrogative object quantifiers pattern straightforwardly after their noninterrogative counterpart in (12).

14 a. *Who$_i$ did himself$_i$ incriminate?

b. *Who$_i$ did his$_i$ lawyer represent?

c. *Who$_i$ did he$_i$ think would call?

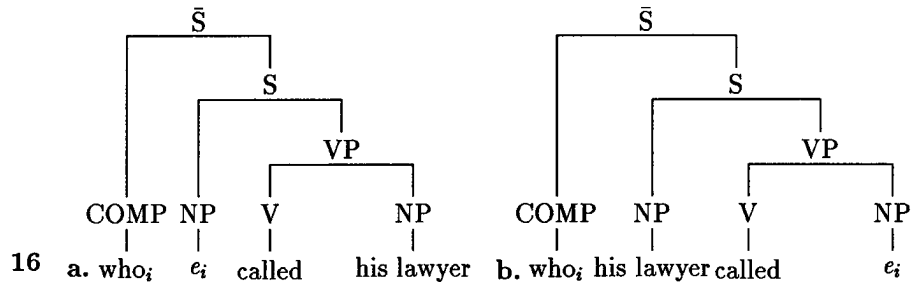
Although *who* precedes *himself* and *his* in these examples, it cannot be interpreted as the antecedent of either pronominal. The fronted subject in (14c) is similarly unable to antecede the following subject *he*.[7] Nonetheless, on conventional generative assumptions about the derived constituent structure of matrix questions, the contrast between (13) and (14) cannot be attributed directly to the structural differences that were invoked to distinguish (10a) from (10b) and (12a) from (12b). This can be seen by comparing, for example, the EST structural descriptions (circa Chomsky 1977) in (16) for the embedded *wh*-questions in (15).[8]

15 a. who$_i$ called his$_i$ lawyer

b. *who$_i$ his$_i$ lawyer called

[7]Examples of the sort illustrated in (14) are cases of what, following Postal (1971), have come to be known as *crossover* violations. (14b) is often characterized as a 'weak' violation, in contrast to the 'strong' case in (14c): the diacritic '*?' is commonly pressed into service as a means of associating a deviance between marginality and illformedness to cases of 'weak' crossover. However, given the clear ungrammaticality of (14b), there seems to be no intelligible sense in which (14c) can be described as a stronger violation, or as a less grammatical construction.

[8]Subordinate clauses are chosen again to abstract away from complications introduced by auxiliary inversion.



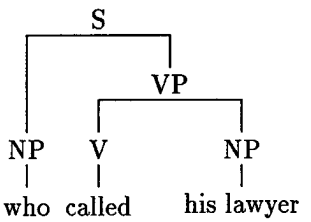
The respects in which these structures differ from their current REST counterparts have to do mainly with node labelling conventions and are not pertinant to the present discussion. What is essential is just that dislocated subject and object interrogatives uniformly occupy a hierarchically superior sentence-initial position.

Analyses of the sort exemplified in (16) clearly place both subject and object pronouns within the anaphoric domain of an initial interrogative noun phrase. Thus, in order to prevent the subject in (15b) from being interpreted as anaphoric to the preposed interrogative object, additional constraints must be invoked. A variety of restrictions have been proposed in the literature, ranging from Postal's (1971) prohibition against extracting a noun phrase past an anaphoric pronoun, through the directionality and biuniqueness conditions on binding proposed in Chomsky (1976), Higginbotham (1980) and Koopman and Sportiche (1982). However, these proposals are each essentially corrective in nature, as they attempt to block an anaphoric construal that is expected on standard structural analyses. Thus, the basic assumption that *wh*-questions instantiate a continuous, right-branching derived constituent structure not only

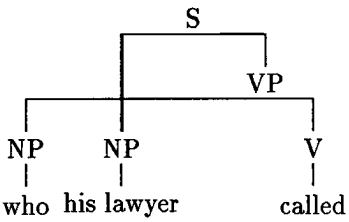
necessitates supplementary constraints, but also obscures the generalization that subjects may control reflexive objects and bound pronouns that occur within the object, while objects cannot antecede reflexive subjects and bound pronouns within the subject.

On the other hand, a unified account of the contrasts noted above can be provided if the structural descriptions assigned to *wh*-questions are isomorphic to those associated with the counterpart declaratives. That is, if sentence-initial interrogative elements are not uniformly assumed to c-command the rest of a clause, objects will invariably occur in the anaphoric domain of subjects, while subjects remain outside of the anaphoric domain of objects. The structural differences that determine the distinct anaphoric options in the subordinate clauses in (15) are illustrated in the descriptions in (17).

17 **a.** who called his lawyer



b. who his lawyer called



Just as in declaratives, the subjects of these clauses asymmetrically c-command direct objects, which accounts for their characteristically different anaphoric options.

7.2.1.2 Connectedness Effects

The structures in (16) and (17) make certain other divergent predictions. In particular, they lead to differing expectations about which nominals can antecede a pronominal contained within a preposed constituent. According to the constituent analyses in (16), a genitive pronoun or reflexive should fall outside of the anaphoric domain of the noun phrases it precedes. In contrast, the descriptions in (17) predict subject/object asymmetries parallel to those above. A pronoun within a preposed subject should remain outside of the domain of a quantificational object, while a pronoun within a preposed object should be able to select a following subject antecedent. The examples in (18) below indicate that pronouns within preposed interrogative objects can be construed as anaphoric to quantificational subjects, while pronouns in interrogative subjects cannot be interpreted as dependent on quantificational objects.

18 a. Which of his$_i$ animals would no zookeeper$_i$ eat?

b. Which rumour about himself$_i$ did each candidate$_i$ disparage?

c. *Which of his$_i$ animals would eat no zookeeper$_i$?

d. *Which rumour about himself$_i$ disparaged each candidate$_i$?

Notice that the problem that (18a) and (18b) present is roughly complementary to the difficulties raised by the sentences in (14). Whereas the latter examples are unexpectedly ungrammatical, those in (18a) and (18b) are unexpectedly wellformed. Thus, most of the supplementary principles that exclude anaphoric

dependencies in (14) cannot be used to sanction the admissible anaphora in (18).

Moreover, just as (14a) and (14b) have declarative counterparts, the anaphoric options of the subjects and objects in (18) mirror those of the corresponding declarative sentences in (19).

19 a. No zookeeper$_i$ would eat any of his$_i$ animals.

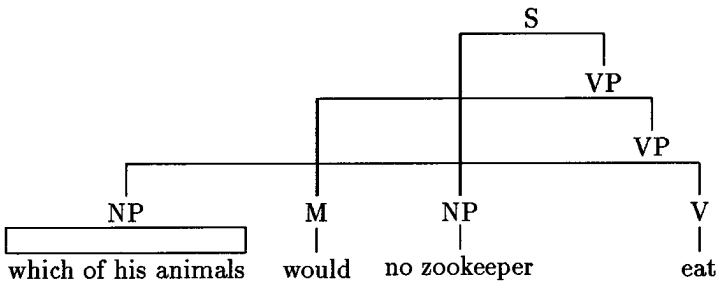
b. Each candidate$_i$ disparaged some rumour about himself$_i$.

c. *None of his$_i$ animals would eat any zookeeper$_i$.

d. *Some rumour about himself$_i$ disparaged each candidate$_i$

These examples reinforce the descriptive generalization that subjects may bind objects and bind into objects, while the converse is not generally possible. Yet, in order to assign uniform hierarchical superiority to subjects in English, the familiar continuous right-branching analysis of questions must be abandoned in favour of structures in which a preposed constituent may precede nodes that c-command it. The mobiles in (20) and (21), corresponding to the minimal pair in (18a) and (18c), are representative in perspicuously representing the operative structural subject/object asymmetry.

20



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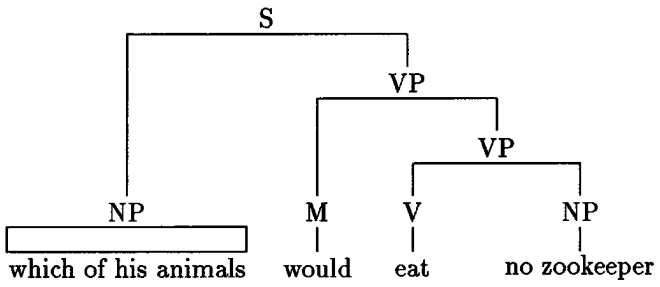


7.3 Island Preservation

However, the relaxation of familiar constraints on phrase structure is only one of a number of available alternatives. Any account that assigns multiple structural descriptions to a sentence can identify some structure other than the derived surface structure as the level at which configurational constraints on bound anaphora must be satisfied. In particular, a transformational analysis that nominates an underlying structure at which interrogatives occur *in situ* as the operative level will be able to account for the contrasts in (6)–(15). This position is most explicitly advocated in van Riemsdijk and Williams (1982), who identify their NP-structure as the relevant level, though for the class of cases discussed above, a conventional d-structure would do as well. Another strategy pursued in the transformational literature involves undoing the effects of movement, and 'reconstructing' the underlying constituent structure at an ostensibly syntactic level derived from the surface structure.

It seems reasonable to require that theories that invoke discrete, fully articulated levels should provide motivation for each of the distinct relations repre-

sented on such structures. Both a discontinuous and transformational account appeal to d-structure constituent structure to account for bound anaphora. Similarly, both recognize s-structure word order. However, they differ in that the transformational account also posits an underlying word order and a derived surface constituent structure that the discontinuous analysis does not countenance. There appear, moreover, to be empirical consequences of positing a derived constituent structure, even if it is effectively ignored for the purposes of determining anaphoric construal.

7.3.1 The Complex Noun Phrase Constraint

Like anaphoric domains, definitions of extraction islands typically refer exclusively or principally to constituent structure configurations. The Complex NP Constraint (CNPC) of Ross (1967) is representative in this regard, as it bars extraction of a constituent from a sentence dominated by an internally complex noun phrase, without referring to the linear position of the extracted constituent within the dominating phrase. This prohibition is intended to account for contrasts of the sort illustrated in (22) and (23) below.

22 a. Max heard a rumour that Felix bought a viper.

b. *What did Max hear a rumour that Felix bought?

23 a. Phil met a woman who climbed Mount Everest.

b. *What did Phil meet a woman who climbed?

The ungrammaticality of (22b) is attributed to the fact that *what* is extracted from the sentential complement to the noun *rumour*. Similarly, the illformedness of (23b) is ascribed to the fact that *what* has been extracted from within a relative clause.

Extraction from a complex noun phrase in subject position is equally ill-formed, as the examples in (24) and (25) show.

24 a. A rumour that Stalin denounced Marr spread quickly.

b. *Who did a rumour that Stalin denounced spread quickly?

25 a. The firemen who rescued the lizard perished.

b. *What did the firemen that rescued perish?

(24b) is another instance of extraction from the sentential complement of a noun, while (25b) is the corresponding example involving movement from a relative clause.

7.3.1.1 Extraction and Extraposition

As Ross recognizes, this constraint interacts with the analysis of bounded rightward movement rules in English that postpose a heavy clausal constituent. Consider, for example, the rule of Extraposition from NP, illustrated in (26) and (27).

26 a. Lois heard a report that Stalin denounced Marr today.

b. Lois heard a report today that Stalin denounced Marr.

27 a. Ned found an economist who speaks Georgian yesterday.

b. Ned found an economist yesterday who speaks Georgian.

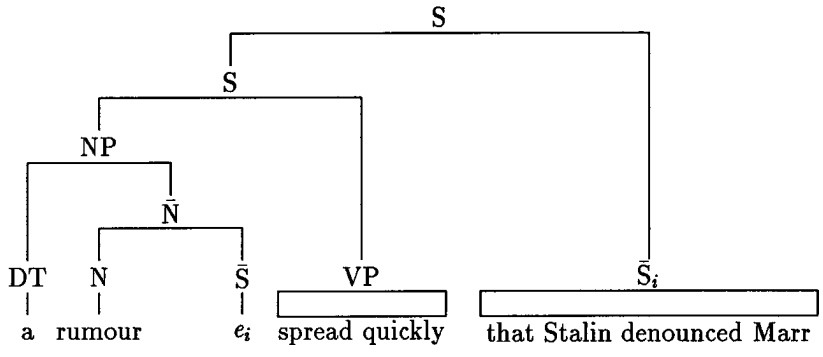
The examples in (26b) and (27b) involve extraposition of clausal material from the object NPs past the temporal adverbials *today* and *yesterday*. Similarly, the result of extraposing the sentential complement and relative clauses from the subjects in (24a) and (25a) is given in (28).[9]

28 a. A rumour spread quickly that Stalin denounced Marr.

b. The firemen perished who rescued the lizard.

Ross formulates extraposition as an operation that moves the complement or relative clause out of the dominating NP to a Chomsky-adjoined position dominated by S. The principal modification introduced in subsequent transformational accounts concerns the presence of a 'trace' in the extraction site. Thus, Stowell (1981) and Rochemont (1986) assign the structure in (29) to a sentence like (28).

29



[9]It may be significant that the verbs in these examples pattern to some degree with unaccusatives.

As Ross acknowledges, the CNPC does not prohibit extraction from such extraposed sentential complements and relative clauses. In particular, the illformedness of the questions in (30), corresponding to the declaratives in (28), cannot be attributed to the CNPC, since the extraction site of *who* and *what* no longer occurs within an NP constituent.

30 a. *Who did a rumour spread quickly that Stalin denounced?

b. *What did the firemen perish that rescued?

Thus the standard transformational analysis of extraposition deprives us of a unified account of the illformedness of the examples in (30) and their counterparts in (24b) and (25b). Moreover, while the CNPC accounts for the ungrammaticality of the sentences in (31), it does not extend to cover those in (32).

31 a. *Who did Lois hear a report that Stalin denounced today?

b. *What did Ned find an economist who speaks yesterday?

32 a. *Who did Lois hear a report today that Stalin denounced?

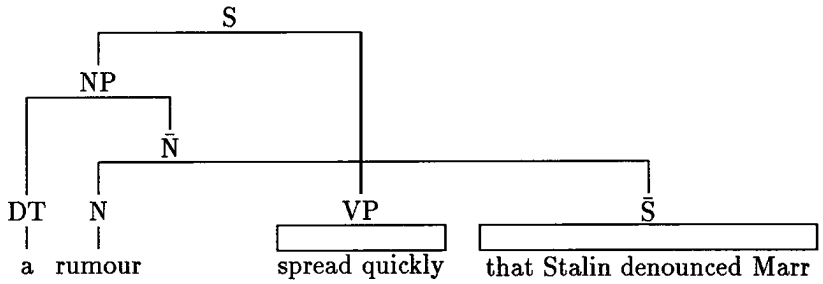
b. *What did Ned find an economist yesterday who speaks?

Although additional mechanisms and constraints can be invoked to rule out the examples in (32), an account that appeals to such supplementary conditions appears to be missing the relatively clear descriptive generalization that extraction from an internally complex noun phrase yields an ungrammatical result.[10]

[10]Baltin (1984) argues that extraction from extraposed NPs is generally illformed, irrespective of whether the NP originates in a complex noun phrase. However, Huck and Na (1990)

In contrast, as McCawley (1982:98) notes, a unified account of the ungrammaticality of questions like those in (22)–(32) follows directly if Extraposition from NP is characterized as a permutation that preserves constituent structure, since then the offending sentences will all be classed as illformed by the CNPC. A candidate structure is provided in (33).[11]

33



If the extraposed sentences above are assigned a discontinuous structure in which the postposed elements remain within a noun phrase constituent, the CNPC will uniformly block extraction.

7.3.1.2 Right Node Raising

Again, there is a variety of options that do not require the relaxation of constraints on the representation of phrase structure. Specifically, the illformedness of extraction from extraposed sentential constituents can be treated as a CNPC violation if leftward *wh*-movement must obligatorily precede extraposition from

observe that the acceptability of extracting from extraposed NPs that do not originate in a complex noun phrase is dependent on focus structure and discourse context, in contrast to CNPC effects, which are largely unaffected by contextual factors.

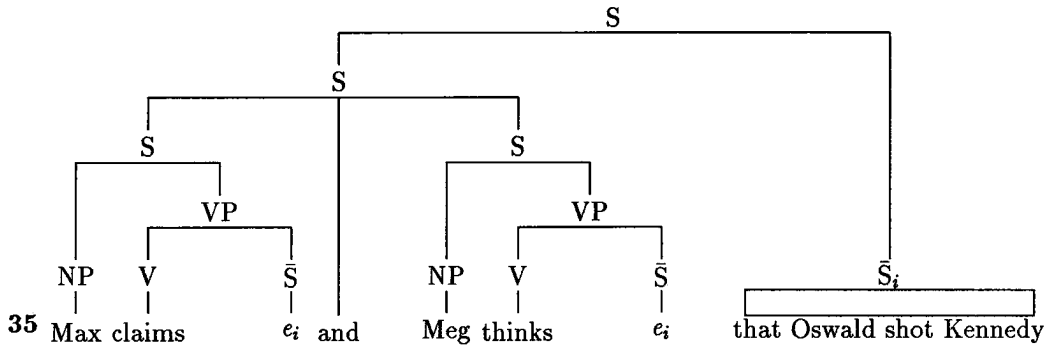
[11] A similarly discontinuous analysis of extraposition structures is informally suggested by Halliday (1961).

NP. Alternatively, the adjoined position of an extraposed clause can be declared an island; in the best case for reasons similar or identical to those that are responsible for the islandhood of complex noun phrases. Another strategy would involve blocking extraction from extraposed clauses as a consequence of an analogue of Ross' Frozen Structure Constraint, or the more general freezing principle of Wexler and Culicover (1980), which prohibits a transformational rule from applying to constituents that have already been dislocated by a movement rule. Notice, however, that these latter analyses differ in at least one essential respect from McCawley's discontinuous account. Whereas McCawley attributes the ungrammaticality of sentences like those in (25) to the fact that a reordering rule preserves islandhood, either of the transformational alternatives would ascribe the illformedness of these examples to the fact that a movement rule gives rise to a syntactic island. Although it is difficult to construct a test case involving extraposition that will clearly distinguish these accounts, the interaction of extraction with rules like Right Node Raising provides a useful means of teasing apart the divergent predictions that they make.

The rule of Right Node Raising (RNR), as formulated by Ross (1967) and Bresnan (1974), deletes identical subconstituents within a coordinate construction, and Chomsky-adjoins a copy of the deleted constituent to the matrix S node. More recent variants, e.g. Saito (1986), likewise classify the output of this rule as an adjunction structure, though, to satisfy the Projection Principle of Chomsky (1981), they typically posit traces in the former deletion sites. A

representative example of RNR is provided in (34); (35) gives the associated structural description.

34 Max claims, and Meg thinks, that Oswald shot Kennedy.



35

There are numerous inessential features of this diagram. In particular, the syncategorematic status of the conjunction, the presence of the traces and their syntactic category are all immaterial.

What is relevant is just that the raised clause occupies an adjoined, or at least nonargument position according to this analysis. Notice that the clausal complement in the adjoined structure in (35) occurs in the same configuration as the extraposed complement in (24). Thus, if rightward movements invariably create islands, extraction from the raised clause in (34) should be blocked. As the wellformed example in (36) shows, however, this is not the case.

36 Who does Max claim and Meg believe that Oswald shot?

The contrast between (36) and the ungrammatical (30a) is unexpected if rightward movements either induce 'freezing' or create island configurations.

On the other hand, this contrast is predicted, if preservation of islandhood or nonislandhood is taken to be characteristic of rightward movement displacements. Just as the illformedness of the extraposed (30a) is correlated with the ungrammaticality of (24b), in which extraposition has not applied, the grammaticality of (36) can be attributed to the fact that each of the conjuncts allow extraction of their direct object. This is shown by the examples in (37) and (38).

37 a. Max claims that Oswald shot Kennedy.

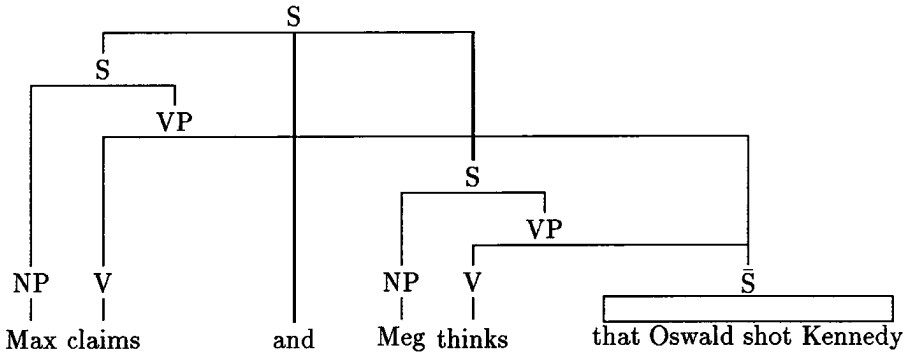
b. Who does Max claim that Oswald shot?

38 a. Meg believes that Oswald shot Kennedy.

b. Who does Meg believe that Oswald shot?

The preservation of extraction domains follows directly on the structural analysis assigned by McCawley to sentences like (36).

39



Since the embedded object is not dominated by any higher NP node, its extraction is not prohibited by the CNPC; nor, in this case, by any other condition.

Hence the result of preposing the object, as in (36), is correctly predicted to be wellformed.

In order to distinguish (30a) from (36), a transformational account could again resort to extrinsic ordering of leftward and rightward movement rules. Alternatively, a difference in derived structure can be associated with the contrasting sentences. However, any strategy that simply differentiates the output of extraposition and RNR in some manner will obscure the generalization that is directly expressed by McCawley's account; namely that the islandhood of a conjoined sentence depends on whether the conjunct clauses contain islands. Further, failure to capture this generalization leads to descriptive inadequacy, as well as inelegance. Specifically, an account that treats the output of extraposition as an island, while classifying the configuration defined by RNR as a nonisland will be unable to account for the complex pattern that results from the interaction of RNR, the CNPC and extraction.

Recall that the CNPC prohibits extraction from sentential complements and relative clauses dominated by NP. In particular, it accounts for the contrast between the declaratives in (40) and the corresponding questions in (41).

40 a. Meg heard a rumour that Len believes Oswald shot Kennedy.

b. Meg knows a man who thinks that Oswald shot Kennedy.

41 a. *Who did Meg hear a rumour that Len believes Oswald shot?

b. *Who does Meg know a man who thinks that Oswald shot?

Moreover, the embedded clauses in (40) can be embedded within a RNR construction.

42 a. Max claims, and Meg heard a rumour that Len believes, that Oswald shot Kennedy.

b. Max claims, and Meg knows a man who believes, that Oswald shot Kennedy.

However, questioning the raised constituents in (42) leads to ungrammaticality, as the sentences in (43) show.

43 a. *Who did Max claim, and Meg hear a rumour that Len believes, that Oswald shot?

b. *Who does Max claim, and Meg know a man who believes, that Oswald shot?

The contrast between the examples in (36) and (43) suggests that the acceptability of extraction from a RNR construction cannot be straightforwardly keyed to the output configuration. If the output of RNR is classified as an island, (36) is incorrectly excluded; however, if the output of RNR is identified as nonisland, the questions in (43) are incorrectly predicted to be grammatical. Either way a misdiagnosis results.

The basic problem here is that a binary island/nonisland distinction applied to output configurations cannot satisfactorily record whether an extracted item was at some point contained within a complex NP. This island preservation is, however, an immediate consequence of the discontinuous representation assigned by McCawley. Since the multidominated subordinate clauses in (42) and (43), for example, remain within a complex noun phrase, extraction of the embedded

object will violate the CNPC. Thus, the CNPC can be formulated as a general constraint on representations defined on possibly discontinuous structures.

7.3.2 Configurational vs Derivational Constraints

Before considering an appropriate condition, let us briefly examine some possible transformational strategies for describing the pattern exhibited above. As suggested at various points in the discussion, the requisite distinction can be represented procedurally, in the form of extrinsic ordering conditions that require the application of rightward movement rules to follow unbounded leftward extraction. A more subtle variant of this sort of derivational account (suggested to me by Edwin Williams) can be formulated by permitting free ordering of movement rules, and declaring the output of rightward movement rules to be island configurations. Like the previous rule ordering account, this analysis permits extraction just in case an element does not originate in an island. Thus, for example, elements that are base generated within complex NPs will be unextractable; movement from their base position will violate the CNPC, while movement from a rightward-dislocated surface position will run afoul of the restriction on extraction from the output of rightward movement rules. In contrast, elements that do not originate in a complex NP will be extractable, since nothing will bar movement when they occupy their base position.

Yet notice that this sort of account does not provide a unified analysis of the illformedness of the sentences in (31) and (32), given that the ungrammat-

icality of the examples in (32) would be due in part to the prohibition against extraction from extraposed constituents. Moreover, the conditions that exclude (32) must be interpreted as applying to derivational stages and hence cannot be formulated as general wellformedness conditions. The grammaticality of (36) depends on the fact that a derivation in which extraction of *who* precedes RNR of *that Oswald shot* does not violate either of the posited island constraints. However, this entails that the configuration that results from rightward movement of a sentential complement containing a 'gap' cannot be disallowed, since well-formed sentences like (36) may instantiate this pattern. Thus, the prohibition against extraction from rightward-dislocated constituents cannot be expressed as a constraint on representations. Further, while the CNPC can be stated as a representational constraint that applies straightforwardly to conventional s-structures associated with examples like (31), such a constraint must apply to an intermediate derivational stage of the examples in (32), since their s-structures will not preserve the offending configuration.

Consequently, excluding a simple example like (32a) requires a certain ineliminable amount of derivational 'bookkeeping' that records constraint violations that are not recoverable from the derived constituent structure of (32a). In sum, though such an account may, like an analysis that appeals to extrinsic ordering, describe the desired pattern, this success incurs the cost of abandoning the program of providing general configurational accounts of extractability. Further, in both cases it is no longer ordered sets of representations that

collectively characterize syntactic discontinuity, but rather sequences of such representations in conjunction with supplementary ordering constraints or disjunctive wellformedness conditions. Moreover, this elaborate mechanism must be further articulated, ordering pronominal construal before any movement rule in order to account for the preservation of anaphoric domains under movement.

7.4 Constraints on Binding and Discontinuity

The phenomena discussed above present a relatively clear demonstration that the effect of syntactic discontinuity cannot always be replicated by invoking an extended, cross-derivational notion of constituency. Recall that in the case of bound anaphora, it was possible to define configurational constraints on an underlying structure, or equivalently, to define expedient chain-binding algorithms that apply to annotated surface structures in such a way as to disregard inconvenient derived configurations.[12] However, in the examples above involving successive rightward and leftward movements, there is no obvious way of executing a similar strategem while retaining a declarative configurational account of extraction domains. Thus the interaction of preposing and postposing rules yields a sort of canonically discontinuous structure that cannot be reconstructed simply in terms of sets or sequences of continuous representations,

[12] See especially Kayne (1983), Weisler (1983) and Barss (1986) for elaborations of the latter strategy. See also below for a discussion of Barss' procedure.

confirming Chomsky's (1955:190) conjecture that some cases of discontinuity may ultimately have to be directly represented at the level of phrase structure.

7.4.1 Conditions on Bound Anaphora

Let us examine how the relaxation of constraints on phrase structure can facilitate the configurational characterization of both anaphoric and extraction domains. Anaphoric domains are delimited by the the principle in (44), proposed in Partee (1978) and Reinhart (1983), in conjunction with the acategorial definition of c-command in (45).[13]

44 The C-command Condition

C-command is a necessary condition for bound variable anaphora.

45 Acategorial C-command (Klima (1964), Reinhart (1983))

α *c-commands* β iff (i) neither α nor β dominates the other, and
(ii) every branching node that properly dominates α dominates β.

Both Partee and Reinhart classify quantificational noun phrases and reflexive pronouns as nonreferential expressions that may participate only in bound anaphoric dependencies. As noted earlier, this taxonomy provides an elegant and unified account of the complementary configurational restrictions on quantificational antecedents and bound reflexives.[14] In particular, it accounts for the

[13]This formulation diverges from the strict version of c-command introduced in Reinhart (1983) in that it incorporates the nondominance requirement that Klima (1964) imposes on nodes standing in the *in construction with* relation. The proper domination qualification is required for the case in which α is itself a branching node.

[14]Constraints on sloppy identity readings provide additional support for this taxonomy.

familiar subject/object anaphoric asymmetries in declarative clauses, illustrated in (10) and (12) above. The dissociation of linear order and hierarchical structure facilitates a straightforward extention of this account to the interrogative examples in (13), (14) and (18). Decoupling structure and order in the manner suggested above allows the c-command condition to apply indifferently to nominals that occur at different positions within a string, which directly yields a unified account of the otherwise unrelated crossover and connectedness effects that arise in connection with preposed interrogative quantifiers in English.

The interaction of rightward displacements with the account of anaphora proposed above further illustrates the advantages of extending this account by relaxing constraints on phrase structure. As Levine (1985) observes, Right Node Raising does not affect the anaphoric options of a pronominal contained within the raised constituent. Thus, the reflexive *himself* contained within the raised object in (46a) can be construed as anaphoric to the subjects of the conjoined sentences.

46 a. Ned collects and Sam discards pictures of himself.

b. Which pictures of himself did Ned collect and Sam discard?

Moreover, as (46b) shows, the anaphoric permeability of a raised constituent is retained even when it is preposed. Conversely, (47) indicates that the anaphoric domain of quantificational objects is unaffected by either rightward RNR or subsequent leftward preposing.

47 a. *His$_i$ constituents distrust and his$_i$ opponents deride every politician$_i$.

b. *Which politician$_i$ do his$_i$ constituents distrust and his$_i$ opponents deride?

Again, these patterns are predicted without additional stipulations if subjects uniformly c-command objects in English clauses, and raised constituents are analyzed as multidominated structures. On these assumptions, the c-command condition on bound anaphora directly accounts for the contrast above. The subjects in (46) c-command *himself*, as it is embedded within a dislocated object. In contrast, the quantificational objects in (47) uniformly fail to c-command the possessive pronoun *his*, which occurs within higher subjects. Further, notice that the characterization of RNR as multidomination in (46) suggests a means of reconciling the parallelism requirement on extraction from conjoined structures with the requirement that transformational rules affect single constituents. This is a point to which we will return below.

First, however, let us consider a number of apparent problems for the treatment of bound anaphora outlined above. There are familiar cases of anaphoric dependencies that appear to violate the condition in (44). One class of these involves pronouns that are construed as anaphoric to quantificational antecedents embedded within NPs or reduced relative clauses. Some representative examples are repeated in (48).

48 a. Every boy's mother kissed him.

b. Felix's mother kissed him and so did Siegfried's mother.

c. Some person in every small town despises it.

The first pair of examples are due to Reinhart, who reports that some speakers accept a bound reading for *him* in (48a) and allow a sloppy identity interpretation in (48b). Likewise, May (1985) asserts that *it* in (48c) may be interpreted as a variable bound to the embedded universally quantified antecedent *every small town*. Thus, in each case, a quantificational noun phrase, which by hypothesis can only license bound variable anaphora, is interpreted as the antecedent of a pronoun that it fails to c-command.

Reinhart (1983) interprets these examples as evidence that the operative structural restriction on bound anaphora must be weakened, essentially to the notion of superiority introduced in Chomsky (1973). However, this revision is somewhat unsatisfactory, since it simply replaces one problem with another. Although the weakening of the c-command condition accounts for the readings attributed to (48a) and (48b), it leaves unexplained the the fact that reflexives cannot be substituted in these sentences. To account for this discrepancy, Reinhart provides supplementary constraints on reflexives that account for the fact that they show a more restricted distribution than bound pronouns. However, this seems to be a misconceived strategy, given that the interpretations available for the examples in (48) are subject to considerable speaker variation, while the ungrammaticality of the corresponding sentences with reflexives is constant. Moreover, substitution of negative quantifiers (which Evans (1977) and Partee (1978) identify as the most incontrovertibly quantificational NPs) for the putative antecedents in (48) also leads to decreased acceptability. These

considerations support the conclusion that the examples in (48) do not show that bound anaphora is subject to a weaker configurational constraint, but rather that the distinction between bound and coreferential anaphora does not provide an exhaustive characterization of anaphoric dependencies in English.

Another putative problem arises in connection with the interaction of (44) with picture NPs and Chomsky's (1973) Specified Subject Condition. As Jackendoff (1972) observes, the admissible antecedents of a reflexive contained within a preposed constituent may sometimes include a noun phrase that is inaccessible in the unpreposed declarative counterpart. The basic contrast is illustrated in (49); whereas *Mildred* may control *herself* in (49b), this construal is barred in (49a).

49 a. *Mildred$_i$ thinks that Len sold pictures of herself$_i$.

b. Which pictures of herself$_i$ does Mildred$_i$ think Len sold?

This pattern is of course consistent with (44), which identifies hierarchical superiority as a necessary but not sufficient condition for reflexive binding. On the other hand, the converse of the pattern exemplified by these sentences would be more genuinely problematic. Any reduction of the bound anaphoric options of pronominals attributable to preposing would be compatible with the view that such displacement alters hierarchical domains, a position that is in no way supported by the contrast above.

Nevertheless, the near-minimal pair in (49) is of interest in its own right, as it illustrates one respect in which the anaphoric options of a reflexive may be

affected by preposing. There are a variety of ways of approaching this problem; here I will simply sketch out a couple of alternatives that appear to have some initial plausibility. Perhaps the most direct means of accounting for the contrast in (49) would be to incorporate a precedence requirement into the definition of a specified subject. If such subjects are taken to restrict the anaphoric options of pronominals that they both precede and c-command, the grammaticality of (49b) and illformedness of (49a) can be attributed to the fact that *Len* intervenes between *Mildred* and *herself* in the former, but follows both in the latter example. Languages, such as Italian and Spanish, which allow relatively free subject postposing, provide the obvious test cases for this reformulation of the SSC, though an investigation of the anaphoric options of pronominals in these languages is orthogonal to the central point of the present chapter.

Another alternative would be to retain an exclusively hierarchical definition of the SSC and reexamine the nature of the anaphoric link in (49b). In addition to sanctioning bound variable anaphora, reflexives are known to support a variety of other quasi-anaphoric uses. A striking number of genetically unrelated and geographically distant languages contain reflexives that allow a contrastive or emphatic use. Moreover, various authors have argued that reflexives in many languages exhibit a 'logophoric' use, related in some way to the point of view of a speaker or some other distinguished participant or referent. The notion of 'empathy' proposed in Kuno (1987) is one version of this sort of relation; variations on this theme can be found in Maling (1984), among others. If non-

clausebound reflexives in English do not invariably function as bound variables, as Bouchard (1982) and Lebeaux (1983) have argued on other grounds, the pair in (49) would fall outside the province of the condition in (44). The marginality of the example in (50) can be construed as suggestive though inconclusive support for this view.

50 *?Which pictures of herself$_i$ does no nun$_i$ think Len sold?

This alternative again raises various questions concerning the source of the ungrammaticality of (49a), questions that are only tangentially related to the main thrust of this chapter.[15]

7.4.2 Chain-Binding Algorithms

Before turning to an investigation of extraction domains, let us digress for a moment to consider a family of path-oriented analyses designed to account for examples of the sort illustrated in (49). These analyses differ from reconstruction accounts that restore an underlying constituency in that they make use of selective features of derived constituent structures. Barss (1985) presents a representative variant of such an account, which attempts to characterize the anaphoric permeability of preposed constituents by formulating a path-oriented condition on antecedence that incorporates the REST notion of a syntactic chain.[16] The

[15] Another, more clearly problematic, class of cases involve the connectedness effects that arise in the pseudocleft constructions discussed by Higgins (1979). However, a satisfactory treatment of the relevant examples would require an analysis of the family of cleftlike constructions in English, which would again bring us too far afield.

[16] For a discussion of chains and CHAINs see Chomsky (1981,1986b).

particular relevance of this account resides largely in the fact that it purports to characterize anaphoric domains in a way that makes essential reference to hierarchical properties of derived constituent structures. Specifically, the intermediate traces associated with successive cyclic movement through COMP form critical links in the paths that sanction anaphoric interpretations of reflexives embedded within dislocated constituents.[17] Since such an account, if descriptively adequate, would provide a measure of evidence for derived constituent structure and successive cyclicity, it is worth examining Barss' position in some detail, to determine the actual contribution of derived configurations.

In order to deal with examples like those in (49) Barss suggests that the c-command condition on antecedence be replaced by what he terms a chain accessibility condition. This condition essentially requires that the antecedent of an anaphor α must be a sister of (and hence mutually c-command) the last element (tail) of a sequence of nodes whose intial element (head) is α. Successive elements in such sequences must stand in one of two designated relations. A pair of adjacent elements ϕ_k, ϕ_{k+1} constitute a wellformed subsequence just in case either ϕ_{k+1} immediately dominates ϕ_k, or (ϕ_k, ϕ_{k+1}) occurs as a link in a movement chain. In addition, wellformed sequences must traverse a node which is a projection of the governor of the head of the sequence, though this condition does not figure in Barss' account of the contrast in (49). A sequence $(\phi_1, \ldots, \phi_n)$

[17] A somewhat different execution of this sort of path-oriented account is proposed in Weisler (1983).

that satisfies these conditions is a chain accessibility sequence (CAS) for the head ϕ_1.

The way in which such sequences determine the eligible antecedents of a given pronominal can be illustrated by considering the grammatical example in (49b). The (partially bracketed) yield of the structure that Barss assigns to this sentence is provided in (51a); (51b) extracts the movement chain from (51a), and (51c) gives the licensing CAS.

51 a. [$_{NP}$ which [$_{\bar{N}}$ pictures [$_{PP}$ of herself]]] does Mildred [$_{VP}$ think [$_{\bar{S}}t'$[$_{S}$ Len sold t]]]

b. (which pictures of herself, t', t)

c. (herself, PP, $\bar{N}$, NP, t', $\bar{S}$, VP)

(51b) contains the dislocated NP, along with the trace t, which occurs in object position, and t', which occupies the intermediate nonargument position associated with the embedded clause. The initial subsequence (*herself*, PP, $\bar{N}$, NP) of the CAS in (51c) consists of the head *herself*, and the sequence of nodes (PP, $\bar{N}$, NP), which stand in a relation of immediate domination in the dislocated constituent. The medial subsequence (NP, t') is sanctioned by the fact that the constituent *which pictures of herself* exhaustively dominated by NP occurs as a link in the chain in (51b). The final subsequence (t', $\bar{S}$, VP) is licensed again by immediate domination in (51a); t' is immediately dominated by the subordinate $\bar{S}$ node, and $\bar{S}$ by the matrix VP node. Further, since VP, the tail of the chain,

occurs as a sister to the matrix subject *Mildred* in (51a), this subject can serve as an antecedent for the head of the chain, *herself*.[18]

The ungrammaticality of (49a) is attributed partially to an SSC-like minimality condition on CASs. This condition states that a CAS through which an antecedent α is accessible to a given anaphor β cannot contain a proper sub-CAS through which a distinct antecedent is accessible to β. The relevant nested CASs in (49b) will consist of sequences of nodes related exclusively by immediate dominance. On conventional assumptions about the structure of declarative clauses, any dominance sequence that connects *herself* and the matrix VP sister of *Mildred* will contain a subsequence connecting the reflexive with the embedded VP sister of *Len*. Consequently, the CAS that would allow *Mildred* to bind *herself* in (49b) will contain a subsequence through which *Len* is accessible. This is illustrated in (52).

52 a. [$_S$ Mildred [$_{VP}$ thinks [$_{\bar{S}}$ that [$_S$ Len [$_{VP}$ sold [$_{NP}$ pictures [$_{PP}$ of herself]]]]]]]

b. (herself, PP, NP, VP, S, $\bar{S}$, VP)

c. (herself, PP, NP, VP)

Since (52b), the CAS through which *Mildred* is accessible to *herself*, properly contains (52c), which constitutes a CAS through which *Len* is accessible, *Mildred* is prohibited from serving as an antecedent for an embedded object reflexive in (52a). The illformedness of the sentence follows then from the fact that gender

[18]The node labelling conventions that Barss adopts differ in irrelevant respects from those adopted in (51).

mismatch between *herself* and *Len* also excludes the lower subject as an eligible antecedent.

Barss' account of the contrast in (49) thus makes apparently essential reference to the derived structure associated with (49b), and in particular to the presence of an intermediate conduit trace in the embedded COMP position of this sentence. Notice, however, that this analysis interacts with other assumptions regarding the distribution of intermediate traces in syntactic representations. Specifically, Barss' claim that the presence of the intermediate t' in (49b) is what sanctions the anaphoric interpretation of the reflexive yields relatively clear predictions for constructions in which such an intermediate trace is barred. These fall into two classes: structures that lack a COMP position altogether, and configurations where a COMP node is occupied or otherwise made unavailable. Bare infinitival complements and exceptional case marking constructions are the clearest cases of constituents that are, albeit for largely theory-internal reasons, treated as bare sentential complements in the REST literature.[19] Nevertheless, as the minimal pairs in (53) show, sentences containing both types of degenerate S complements (bracketed for perspicuity) show connectedness effects.

[19]For discussion of ECM constructions, see Chomsky (1981) and Massam (1985). Higginbotham (1983) presents the most clearly articulated REST variant of the 'bare S' analysis of bare infinitives, though see also Neale (1988). The various 'small clause' constructions are also relevant in this connection, though there is much less of a consensus regarding their properties and distribution.

53 a. Which pictures of herself$_i$ does Mildred$_i$ believe [$_S$ Len to have sold]

b. Which pictures of herself$_i$ did Mildred$_i$ see [$_S$ Len sell]

On the assumption, standard within REST analyses, that the bracketed complements are bare sentences, there is simply no suitable intermediate COMP position for a conduit trace to occupy. Hence, in the absence of additional stipulations, the wellformed examples in (53) are predicted to be ungrammatical.

It might be that some such supplementary conventions are independently necessary under orthodox REST assumptions, given that extraction out of a bare S is already unexpected on an account that obligatorily decomposes unbounded dislocations into successive 'COMP-to-COMP' movements. However, the complications that arise for Barss' account are not confined to the problematic, and quite likely misanalyzed, constructions in (53). Clausal complements that contain a COMP position which, on other grounds, must be considered to be occupied or unavailable, present precisely analogous difficulties. Current subjacency accounts of *wh*-island violations attribute the marginality of the sentences in (54) to the fact that the COMP position associated with the embedded question is 'filled' or otherwise made inaccessible by the interrogative elements *whether* and *when*.

54 a. ?Which pictures of Emily does Mildred wonder whether Len sold?

b. ?Which pictures of Emily does Mildred know when Len sold?

As a consequence, the dislocated object *which pictures of Emily* cannot be moved successively, but must advance directly to the matrix COMP position, in the

process crossing two S nodes. The deviance of these examples is attributed then to a general prohibition against crossing more than one bounding node, a class that comprises NP and S in English.

The status of such 'weak' subjacency violations is typically judged to fall somewhere between fully grammatical sentences, and indisputably ungrammatical sentences. In particular, examples like those in (54) are considered to be more acceptable than a sentence which, like (49a) above, violates Condition A of the REST Binding Theory.[20] Yet, notice that the occupied COMPs in (54) that are responsible for the weak deviance of these examples should also yield full ungrammaticality if a reflexive is embedded within the dislocated object. That is, the clogged configurations that block successive COMP-to-COMP movement will also disrupt the construction of a CAS linking an embedded reflexive with a subject it precedes. For concreteness, consider the examples in (55).

55 a. ?Which pictures of herself$_i$ does Mildred$_i$ wonder whether Len sold?

b. ?Which pictures of herself$_i$ does Mildred$_i$ know when Len sold?

Although the complements of *wonder* and *know* are assumed to contain COMP positions, these are filled or blocked by the interrogative elements *whether* and *when* in (55). Thus, if the presence of an intermediate trace in COMP is significantly correlated with connectedness phenomena, these examples should be ungrammatical, on a par with any Condition A violation. The fact that their

[20]The various formulations of this condition essentially require that a reflexive or reciprocal select a hierarchically superior antecedent within a designated local domain. See Chomsky (1981,1986b) for discussion.

status is indistinguishable from that of the sentences in (54) suggests, however, that connectedness effects are indifferent to the condition of intermediate COMPs.

As with the examples in (53), supplementary principles can of course be introduced to deal with these cases. Nevertheless, the requisite principles would simply have the effect of dissociating connectedness from successive COMP-to-COMP cyclicity, hence undermining the central empirical claim embodied within Barss' account. Moreover, even if it were possible to refine this analysis in such a way that would not void it of empirical content, Barss' basic strategy would still face clear problems. Among the most severe of these is the irreducibly disjunctive character of the wellformedness conditions on CASs. Recall that the licensing relation between adjacent elements in a sequence falls into two distinct subcases. Successive elements in a CAS must be related either by immediate tree dominance or by adjacency within a movement chain. Yet these relations have nothing significant in common. It might seem that some notion of hierarchical superiority connects them, since the landing site of movement is customarily assumed to be a hierarchically superior position. That is, if the pair (ϕ_k, ϕ_{k+1}) is a link in a movement chain, ϕ_k will normally c-command ϕ_{k+1}. However, Barss' conditions on adjacent elements ϕ_k, ϕ_{k+1} within a CAS impose asymmetrical requirements; namely that either (i) ϕ_k be immediately dominated by ϕ_{k+1}, or (ii) ϕ_k c-command ϕ_{k+1} (by virtue of occurring in the

chain (ϕ_k, ϕ_{k+1})). In the first case, ϕ_{k+1} is the hierarchically superior member, while in the second ϕ_k occurs higher in the structure.

It is instructive to consider which subsequences within a CAS are typically related by each of these distinct relations, and where they canonically occur. Recall that the simple CAS in (52c), repeated in (56), consists entirely of nodes related by immediate dominance.

56 (herself, PP, $\bar{\text{N}}$, NP, VP)

In this case, the existence of a minimal CAS through which *Len* is accessible to *herself* coincides with whether a c-command relation holds between *Len* and the reflexive. The essential distinction between chain accessibility and c-command arises in connection with sentences whose surface constituent structure is anisomorphic to their base structure. Consider again the example in (49b) and the CAS that ostensibly licenses the reading on which *herself* is interpreted as anaphoric to *Mildred.* Both are repeated in (57) below.

57 a. Which pictures of herself does Mildred think Len sold?

b. (herself, PP, $\bar{\text{N}}$, NP, t', $\bar{\text{S}}$, VP)

The CAS in (57b) contains the immediate dominance subsequences (*herself*, PP, $\bar{\text{N}}$, NP) and (t', $\bar{\text{S}}$, VP), and the linking syntactic chain sequence (NP, t'). The initial and final subsequences trace an ascending path up a sequence of base-generated nodes, just as in (56). However, the medial link (NP, t') provides a means of bypassing the derived constituent structure induced by movement,

and 'connecting' the dislocated constituent with positions from which immediate domination sequences can be constructed.

We have already seen that the purported correlation between the anaphoric permeability of a dislocated constituent and the presence of an intermediate trace is insufficiently motivated in English. In contrast, the hierarchical location of traces that occur in argument positions will interact significantly with anaphoric domains. From the perspective of a movement account, the discussion in sections 7.2.1.1 and 7.2.1.2 can be taken to establish that the initial trace of a dislocated constituent largely determines its anaphoric options. Barss' CASs provide a means of associating a preposed element with its base-generated position. In the absence of evidence of any systematic relation between vacant intermediate COMPs and connectedness phenomena, this 'reconstruction' of d-structure is effectively the only useful function that Barss' mechanism performs. Thus, his reformulation of antecedence conditions for anaphors amounts essentially to a sophisticated procedure for disregarding inconvenient configurational properties of derived constituent structures.

There are further, more fundamental, problems associated with the strategy of replacing the standard hierarchical condition on anaphora with a chain condition that incorporates links licensed by ostensible movement. Recall that Barss' category-neutral definition of chain accessibility attempts to subsume the referential dependency in (49b) under a general account of anaphora. In particular, Barss' analysis is indifferent to the fact that the anaphoric reflexive in

(49b) occurs within a preposed 'picture NP'. Hence, this account sanctions the anaphoric construal of reflexives contained within other dislocated constituents. Yet, as the examples in (58) show, VP-topicalization does not void SSC effects. The illformedness of (58a) and (58b) indicates that reflexives within topicalized VPs do not allow a wider selection of antecedents than their nontopicalized counterparts. Likewise, the wellformed (58c) indicates that the deviance of (58a) is correctly attributable to the presence of the reflexive.

58 a. *Mildred$_i$ never thought that Len would watch herself$_i$.

b. *Watch herself$_i$ Mildred$_i$ never thought that Len would.

c. Watch her$_i$ Mildred$_i$ never thought that Len would.

These examples suggest that the behaviour of picture noun phrases is to some degree exceptional in English, and that the grammaticality of (49b) does not reflect an anaphoric construal that is generally sanctioned by dislocation.[21]

Moreover, as noted above, Barss' algorithm sanctions, in addition to domination paths, various sorts of lateral movement 'through' a tree structure, which are subject only to whatever conditions govern the construction of syntactic chains. However, while tree domination is an intuitively clear and formally well understood relation, the same cannot be said for the heterogeneous class of relations currently subsumed under the cover term 'movement'. Although the problems that arise in connection with the indeterminacy associated with

[21]There are other familiar respect in which picture NPs exhibit exceptional anaphoric permeability in English. Most notably, reflexives embedded within picture NPs may (in some dialects or idiolects at least) select nonclausemate antecedents, in apparent violation of the Tensed S Condition. See Chomsky (1980,1981) for discussion.

movement are certainly not unique to Barss' study, the strategy of importing such an obscure notion into new domains is highly questionable. These problems are compounded by the fact that Barss does not offer an explicit, or for that matter, consistent characterization of the movement relation that obtains between links in a syntactic chain. The clearest statement of his view of this relation is summarized in the remark that "Movement is of course a metaphor; no physical objects are actually changing positions" (p.24fn12).

The conception of a derivation that Barss adopts is similarly inscrutable. For example, he seems to imply that some constraint on the form of REST derivations prohibits a syntactic level such as NP-structure, which van Riemsdijk and Williams (1981) define as the output of NP-movement rules and the input to *wh*-movement.

> NP-structure representations feed the rule of *wh*-movement, which moves a *wh*-phrase into COMP. Such a separation of derivations is impossible in the T-model, of course. (pp.25-26)

Barss does not identify which actual constraint would prevent segregated derivations in the REST T-model. Moreover, the putative impossibility of such derivations is difficult to reconcile with other claims that he defends; notably the intrinsic ordering requirement articulated in the following passage.

> I also argue that the processes of LF-*wh*-movement and QR are strictly ordered, in that all instances of *wh*-movement precede any instance of QR. (p.16b)

It might seem that inconsistency can be avoided here by interpreting Barss as

making the relatively innocuous claim that the output of Quantifier Raising is not granted the status of a sanctioned level of representation in his account.

However, even this interpretation would be somewhat misleading, given that Barss' chain-building algorithm is essentially global in nature. Intuitively, this procedure is intended to allow binding between an antecedent and anaphor if, at any stage in the derivation from d-structure to s-structure, the anaphor occurs in the local domain of the antecedent. The algorithm is in no way sensitive to the distinction between traces corresponding to positions that are lexically filled at sanctioned levels and those that correspond to positions occupied at an intermediate stage. Thus, since it is derivational stages rather than recognized levels that figure in Barss' analysis, the decision to acknowledge or not to acknowledge a particular stage as a level of representation has no discernable empirical consequences for his account of anaphoric binding.

In sum, Barss' analysis illustrates the extensive supplementary procedures that are required within a standard REST account to overcome inconvenient configurational properties of derived constituent structure. Moreover, the descriptive inadequacy of Barss' account, in conjunction with its reliance on notions that are at best vaguely articulated and poorly understood, and at worst incoherent, points to the considerable formal and empirical problems that such procedures introduce. Thus, his account constitutes an clear argument for reconsidering the received generative views of derived constituent structure that necessitate supplementary conventions in the first place.

7.4.3 Conditions on Extraction

The preceding discussion has focused on the interaction of rightward dislocations with the CNPC. Ross' statement of this constraint is repeated in (59).

59 The Complex NP Constraint (Ross (1967))

> No element contained in an S dominated by an NP with a lexical head noun may be moved out of that NP by a transformation.

The CNPC is one of a number of relatively construction-specific constraints that Ross proposes to supplant Chomsky's (1964) more general A-over-A Condition. As McCawley (1988:507) observes, the CNPC and the Coordinate Subject Constraint are the most most plausibly universal of the Ross constraints, as they are operative in constraining extraction options in a relatively wide and diverse range of languages.[22]

Nevertheless, there have been various attempts to subsume the CNPC under more general conditions governing either the application or output of transformational rules. Two of the most direct generalizations of the CNPC are repeated in (60) and (61) below.

[22]The cross-linguistic validity of the CNPC distinguishes this constraint from other putatively structural conditions investigated in the recent REST literature. A clear contrast is provided by the *that*-trace effects which are subsumed under versions of the Empty Category Principle (Chomsky (1981)), as these effects are subject to notorious cross-linguistic variation. It has yet to be demonstrated that such effects arise in coherent class of languages, let alone a class that is revealingly characterized in structural terms. Further, it is not clear that the fundamental subject/object asymmetry incorporated in various formulations of the ECP appears is based on a sufficiently representative sample of languages and constructions. Thus, for example, the survey presented in Keenan and Comrie (1977) identifies a varied collection of languages in which, unlike English, the extraction options of subjects consistently exceed those of direct objects.

60 The Subjacency Condition (Chomsky (1973))

No rule can involve X, Y, X superior to Y, if Y is not subjacent to X.

61 The NP Constraint (Horn (1974))

No constituent that is dominated by NP can be moved
or deleted from that NP by a transformational rule.

The operative notions of superiority and subjacency that figure in Chomsky's definition of the Subjacency Condition are specified in the following passages.

> More precisely, we say that the category A is "superior" to the category B in the phrase marker if every major category dominating A dominates B as well but not conversely. (Chomsky (1973), p.101)

> if X is superior to Y in a phrase marker P, then Y is "subjacent" to X if there is at most one cyclic category $C = Y$ such that C contains Y and C does not contain X. (Chomsky (1973), p.102)

These conditions are both *applicability* constraints, in the sense of Bach and Horn (1976), in that they restrict the application of freely formulated rules. Yet, these alternatives generalize the CNPC in slightly different ways. While (60) takes cyclic nodes (NP and S, in English at least) to constitute barriers to extraction, (61) associates islandhood exclusively with NP nodes. This difference leads to clear empirical differences, some of which are discussed in Bach and Horn (1976).

However, for present purposes it is immaterial which of the above constraints we adopt. The general advantages of stating island constraints in terms of discontinuous representations are, as we will see below, largely independent of the island condition chosen. However, since Horn's constraint applies more

straightforwardly to the examples considered above, let us focus principally on the NP Condition in (60). The arboreal counterpart of this constraint proposed below is, in the spirit of 'representational' characterizations of island effects, formulated as a general mobile wellformedness condition. The intuitive idea here is just that the branches of a submobile cannot cross a branch whose superior member is a node labelled NP.[23]

In order to state this constraint it is necessary to introduce some (mixed) terminology. Recall that a *branch* of a mobile μ is defined as a pair of nodes (x,y) whose first coordinate, the *mother*, immediately dominates its second coordinate, the *daughter* on μ. Recall as well the GPSG notion of a *local tree* (or *limb*) $(u; v_1, \ldots, v_n)$ consisting of a mother node u and all daughters $v_1, \ldots, v_n$ of u. Given these notions, a branch can be said to *intersect* a limb whenever the mother of the branch immediately and properly dominates the mother of the limb, and the daughter of the branch intervenes between any two daughters of the limb. This notion of intersection is defined in (62).

62 A branch (x, y) *intersects* a limb $(u; v_1, \ldots, v_n)$ iff:

i x properly dominates u

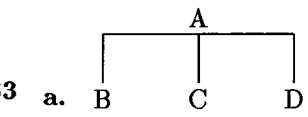
ii there are branches (u, v_i) and (u, v_j) on $(u; v_1, \ldots, v_n)$, $1 \leq i, j \leq n$, such that v_i precedes y and y precedes v_j.

The proper domination qualifications in (62i) have the effect of preventing a branch of a limb from intersecting that limb. On this definition of intersection,

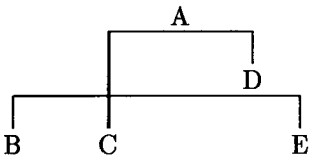
[23] Similarly, the arboreal counterpart of the Subjacency Condition would take the form of a prohibition against branches crossing successive branches headed by designated cyclic nodes.

the medial branch (A, C) does not intersect the ternary branching limb in (63a). In contrast, the branch (A, C) in (63b) intersects the discontinuous limb headed by D.

63 **a.**



b.



Thus the definition in (62) makes what seems to be the correct distinction, in classifying as intersected only limbs that are discontinuous.[24]

We are now in a position to state an arboreal counterpart of Horn's condition.

64 The Arboreal NP Constraint

A limb cannot be intersected by a branch whose mother is an NP node.

As desired, this condition will class as illformed the starred examples above. Consider first cases involving extraposition of a sentential complement. The paradigm in (24), (28a) and (30a), repeated below in (65) and (66), is representative.

65 a. A rumour that Stalin denounced Marr spread quickly.

b. *Who did a rumour that Stalin denounced spread quickly?

66 a. A rumour spread quickly that Stalin denounced Marr.

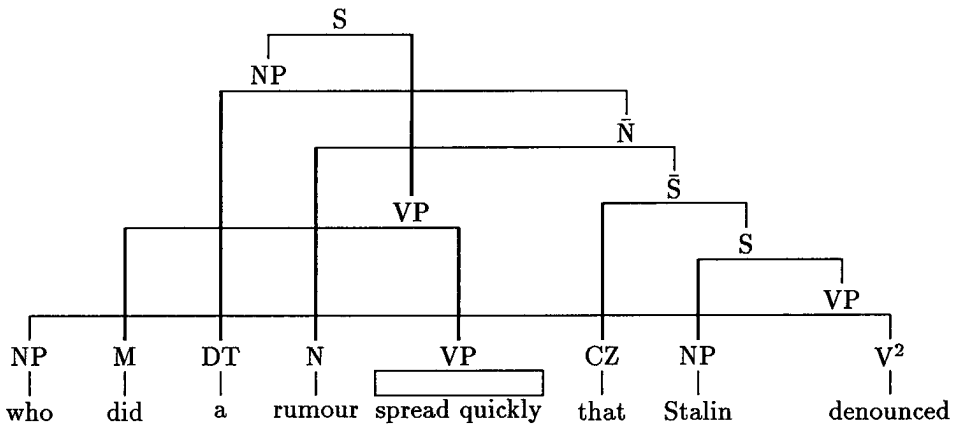
b. *Who did a rumour spread quickly that Stalin denounced?

[24]Though notice that the dominance qualifications are unnecessary for maximally binary-branching structures.

Recall that (66b) is the problematic member here, since standard formulations of extraposition treat it as a rule that removes the sentential complement *that Stalin denounced Marr* from the complex subject NP.

However, if (66b) is assigned the discontinuous structure in (67), the ungrammaticality of this example can, like that of (65a), be attributed to a violation of (64).

67



The offending configuration in the above diagram involves the branch (NP, DT), which intersects the limb $(VP; V, NP)$. Notice that the branch (NP, DT) does not similarly intersect the limb $(VP; M, VP)$, since the head of the limb is not dominated by NP.

Likewise, island preservation in Right Node Raised constituents can also be accounted for in terms of (64). Consider the contrast from (34), (36), (42a) and (43a), repeated in (68) and (69) below.

68 a. Max claims, and Meg thinks, that Oswald shot Kennedy.

b. Who does Max claim and Meg believe that Oswald shot?

69 a. Max claims, and Meg heard a rumour that Len believes, that Oswald shot Kennedy.

b. *Who did Max claim, and Meg hear a rumour that Len believes, that Oswald shot?

Given the analysis of Right Node Raising represented earlier, the mobile corresponding to (69b) will contain a branch (NP, DT) that intersects the limb headed by the embedded VP most immediately dominating *who* and *shot*.

The requirement that the head of an intersecting branch (properly) dominate the head of an intersected limb yields an account of the wellformedness of the extraposed (66a) and Right Node Raised (69a). Inspection of the mobile in (33), for example, shows that, unlike (67), the discontinuous limbs in this example do not cross any branch with a structurally superior NP head. As can be readily verified, other island constraints can be similarly reformulated as arboreal wellformedness conditions, with comparable empirical benefits in the types of cases discussed above.[25]

In the examples discussed above, branch intersection results where movement of an element would cross a dominating NP node. However, there are cases where a prohibition against branch intersection diverges from conventional crossing constraints. In particular, violations of Ross's (1967) Left Branch Condition (LBC) in (70) will not lead to intersecting branches.

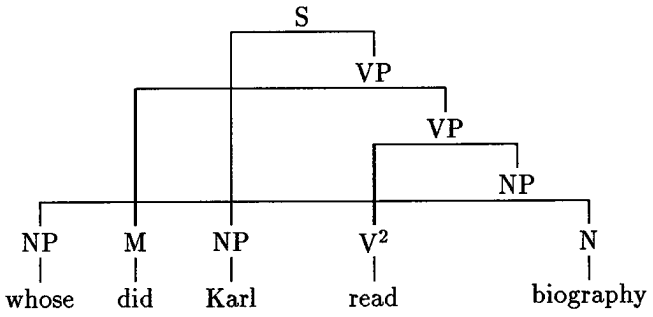
[25]For example, an arboreal variant of the Subjacency Condition in (60) can, in addition to covering the contrasts in (65)–(66) and (68)–(69), be formulated so as to capture Ross' Right Roof Constraint, since nonlocal extraposition or Right Node Raising will cross two successive bounding nodes.

70 The Left Branch Condition (Ross 1967)

No NP which is the leftmost constituent of a larger NP
can be reordered out of this NP by a transformational rule.

Thus, although sentences like **Whose did Karl read biography* is correctly blocked by the LBC and Horn's NP Constraint, the structure in (71) does not violate the branch intersection condition proposed in (64).[26] This is clearly illustrated by the diagram in (71).

71



It is doubtful, however, that the illformedness of typical LBC violations is correctly ascribed to structural factors. Grosu (1974) shows that preposing of possessives leads to ungrammaticality, independently of whether they originate on a left or right branch. A representative paradigm is given below.

72 a. Harriet discovered a photo of Bill/Bill's

b. Who did Harriet discover a photo of

c. *Whose did Harriet discover a photo of

Whereas the unmarked interrogative pronoun *who* may be advanced to sentence-initial position in (72b), (72c) indicates that the same option is not available

[26] The relevance of this class of cases was pointed out to me by Lee Baker and David Pesetsky.

for the genitive *whose*. Other hypothetical cases can be constructed in which branch intersection may differ from movement out of a constituent, though it is not clear that any certifiably structural island effects are sacrificed by arboreal constraints of the sort outlined above.

More generally, notice that the inability to characterize Left Branch Condition violations in terms of branch crossing is due to the fact that this intrinsically directional constraint makes essential reference to the underlying linear position of a dislocated element. It is perhaps significant that the LBC is virtually the only familiar constraint with this property. The account of island effects suggested above provides a principled account for the scarcity or absence of this sort of condition, since it does not recognize any linear ordering other than the surface order. Rather than develop a typology of arboreal island constraints, let us instead consider some additional issues that arise within the general approach outlined above.

7.4.4 The Status of Dislocated Positions

The preceding discussion of anaphoric processes and extraction domains suggests that word order alternations attributed to movement rules do not affect hierarchical domains. This conclusion is clearly inconsistent with the prevalent view that dislocation, and in particular *wh*-movement, involves advancement into an anticipatory sentence-initial 'COMP' slot that is hierarchically supe-

rior to the clause it precedes. Nevertheless, there are independent grounds for questioning received assumptions about dislocation structures.

Recall that within orthodox EST and REST analyses, COMP positions are standardly taken to be associated with subordinating conjunctions, in that the slots themselves either may be occupied by subordinating conjunctions and other 'complementizers', or alternatively may form part of an $\bar{X}$ projection headed by such an element. The main empirical motivation for this association in English is the fact that complementizers and dislocated elements tend to show complementary distribution in clause-initial positions. However, the putative universality of this correlation is undermined by the existence of well described languages in which the ordering properties of extracted constituents and complementizers diverge. Navajo is a clear case in point. Schauber (1979) describes complementizers as occurring clause-finally, while questioned constituents occupy an initial position. A similar discrepancy in Duala is reported by Epée (1976).[27] Furthermore, there are familiar cases of languages, such as Hixkaryana (Derbyshire (1985)), that lack subordinating elements altogther but nevertheless front questioned constituents.

Such examples indicate the independence of the principles that determine the ordering properties of complementizers and dislocated elements, and sug-

[27]Recent REST accounts that posit a full COMP projection may, as Chomsky (1986a) notes, be able to describe such inconsistent languages. However, simply dissociating the order of complementizers and extracted interrogatives admits an additional, seemingly unattested possibility; namely complementizer-initial languages in which questioned constituents are uniformly postposed. As well, any proposal that allows COMP 'escape-hatches' to occur clause-finally will introduce significant complications for successive-cyclic accounts of the boundedness of rightward displacements.

gest an alternative generalization. That is, dislocated questioned elements show a strong preference for a clause-initial position, whereas complement-marking particles tend to serialize with adpositions and other phrasal heads. Thus, the behavior of structure-sensitive phenomena casts doubt on the existence of hierarchically superior dislocated COMP positions, while attested ordering patterns call into question the presumed categorial identity of such positions.[28] Yet notice that the elimination of designated COMP 'landing sites' does not impinge on the ability to distinguish the initial position in a clause, as such a position is straightforwardly identifiable as the position occupied by the leftmost constituent in the clause. All that is sacrificed by this linear characterization is the notion of an unoccupied position, though such unoccupied positions could in principle be defined in linear terms by amalgamating the precedence conditions of a language into phrasal and clausal templates.

[28]Recall also that the phenomenon of Breton preposing was earlier argued to provide counterevidence to current conceptions of the structure of COMP projections. See Chapter 3 for discussion.

Chapter 8

Admitting Discontinuity

Discontinuous structures cannot be directly generated by standard phrase structure rewrite rules either on a string rewrite interpretation, or on the node admissibility interpretation that McCawley suggests, as the righthand side of such rules are ordered sequences of symbols or labelled nodes. A similar restriction constrains transformational rules if, as is standard, their output is required to satisfy the wellformedness conditions for phrase markers. In both cases, continuity is ensured by constraints that bind together constituency and ordering relations. Hence, in order to generate representations of the sort illustrated above, it is necessary to adopt a model of grammar that dissociates these relations, either through the introduction of nonconcatenative operations, or rules that separately specify hierarchical structure and linear order.

8.1 Nonconcatenative Rules

Nonconcatenative variants of both base and transformational rules have been proposed to handle a range of constructions exhibiting apparent surface discontinuity. Modified rewrite rules that intrapose an element between the parts of an adjacent string are suggested in Yngve (1960) as a means of according constituent status to verb-particle sequences like *take...out* in English. Yngve supplements a standard phrase structure grammar with elliptical production rules of the sort illustrated in (1).

1 $\alpha[\beta] \rightarrow \alpha \ldots \beta$

On the intended string rewrite interpretation, these rules rewrite a complex symbol $\alpha[\beta]$ as two noncontiguous strings α and β that flank the single symbol occurring immediately to the right of $\alpha[\beta]$.[1]

Thus, applied to (3a), the rule in (2) rewrites the variable string ... as NP, to which V is left-concatenated, and PRT right-concatenated. The output of these operations is the string in (3b); successively rewriting the leftmost nonterminal in (3b) by an appropriate terminal ultimately yields the verb phrase in (3c).

2 V[PRT] $\rightarrow$ V...PRT

[1] Ojeda (1987b) proposes a variant of Yngve's intraposing rule which rewrites a nonterminal X as symbols Y and Z which must flank the argument sibling of X.

3 a. V[PRT] NP

b. V NP PRT

c. take the garbage out

The strings in (3) assign constituent status to the discontinuous sequence *take ... out*, while also representing the fact that its parts flank the object pronoun *the garbage*.[2]

8.1.1 Wrapping Operations

Although Yngve's intraposing rule is incorporated in the phrase structure grammars proposed by Harman (1963) and Ojeda (1987b), the application of nonconcatenative operations has, been most systematically explored in various of the extensions of Montague Grammar, notably Thomason (1976), Dowty (1982), Bach (1979,1981), Schmerling (1983) Huck (1984), and Pollard (1984). These works all employ a syntactic infixation operation of one form or another. Bach (1979), for example, suggests syntactic infixation is operative in the derivation of the class of transitive verb phrases (V^2Ps) in English. Starting from the assumption that a language will instantiate a phrasal counterpart for each basic (i.e. lexical) category it contains, Bach identifies a heterogeneous group of

[2]Notice that rules like (1), which are interpreted as rewriting both a complex symbol and the symbol occurring immediately to its right, do not rewrite a unique symbol, and hence are not strictly phrase structure rules. Nevertheless, Matthews (1963,64) argues that the requirement that rules must apply to the leftmost nonterminal in a derivation ensures that Yngve's extended grammars generate only context-free languages.

control, resultative and 'small clause' constructions as members of the category V^2P. Some representative examples are listed in (4).

4 a. persuade to stay, tell to leave, ...

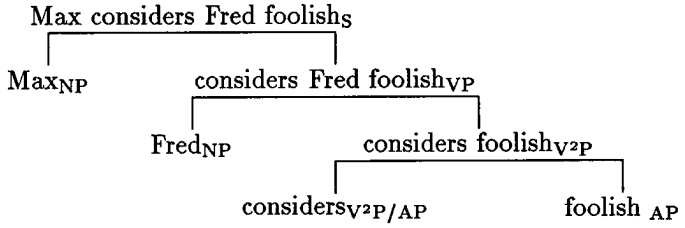
b. paint grey, hammer flat, ...

c. consider foolish, deem inappropriate, ...

Treating these sequences as constituents entails that they must combine with their nominal arguments by some operation other than concatenation, given that such arguments tend to occur medially within the resulting intransitive verb phrase (VP).[3]

This can be illustrated most clearly by considering a sample derivation tree containing the V^2P *consider foolish*.[4]

5



The subscripts here indicate the syntactic category of an expression, with categories of the form α/β interpreted as functions from expressions of category β to expressions of category α. Thus, the 'predicative transitive verb' *consider*

[3]This basic line of analysis is also pursued in early transformational studies of V^2Ps, e.g., Chomsky (1957:79f) and Chomsky (1961:18fn28).

[4]To facilitate comparison with other alternatives I have substituted the hybrid labels introduced earlier for their categorial counterparts in the analysis trees proposed by Bach and Dowty. Thus, S uniformly replaces t, NP replaces T, V^2(P) replaces Vt(P) and V(P) replaces Vi(P).

is a member of the transparently functional category V^2P/AP.[5] In the derivation above, *consider* applies to the AP *foolish* to yield the V^2P *consider foolish*. Although the mode of combination is concatenation in this case, the V^2Ps identified by Bach typically differ from predicative transitive verbs in this respect, and combine with their arguments by means of an intraposing operation he terms 'right wrap'.

Bach's (1979:516) definition of the wrap operation involved in the formation of the VP *consider Fred foolish* is given in (6), while (7) repeats the specification of (right) concatenation (where concatenation is represented by simple juxtaposition).

6 Right-Wrap (RWRAP)

i if α is simple, then RWRAP(α,β) = RCON(α,β).

ii if α has the form $[_{XP}$ X W], then RWRAP(α,β) is XβW.

7 Right Concatenation (RCON)

If α is a function applied to β, then RCON(α,β) is $\alpha\beta$.

The intended range of the variables X and W is somewhat unclear in Bach (1979), though this indeterminacy is harmless in the cases that Bach considers, as the obvious interpretations yield the same result in these examples. If X is taken to range over a single syntactic constituent, then (6ii) will insert the ar-

[5]The labels V^2P and VP are likewise shorthand for transitive and intransitive functional categories.

gument of a V^2P after the predicative transitive verb.[6] Likewise, RWRAP can also be interpreted as an operation that concatenates an argument to the right flank of a distinguished 'head' constituent.[7] Whenever a transitive predicate is lexical, this will reduce to simple right concatenation, as in (6i) above. Moreover, if predicative transitive verbs like *consider* are identified as the heads of transitive verb phrases, then right concatenation to the head of a V^2P will again derive VPs of the form *considers Fred foolish*.[8] Thus, either of these plausible interpretations of RWRAP is compatible with examples of the sort listed in (4).

8.1.2 Prosodic Infixation

Yet another interpretation of the wrap rule in (6), advocated in Dowty (1982) and Schmerling (1983), among others, is that syntactic infixation is sensitive to prosodically defined constituents, such as words. It is instructive to consider the proposals that Dowty outlines, as they clearly illustrate a number of the possibilities and limitations characteristic of a prosodic approach. Dowty observes that the separation in Montague grammar between syntactic rules and the operations they perform allows for the definition of universal schemata like those in (8) (in which VP ranges over intransitive verbs as well as intransitive verb phrases).

[6] This interpretation of the wrap operation is adopted in Huck (1984).

[7] As suggested by the structural description $[_{XP}\ X\ W]$, which implicitly identifies X as the head of the phrase XP.

[8] A generalized operation of head adjunction figures in the model of head grammar presented in Pollard (1984).

8 a. Subject-Predicate Rule : $\langle F_1, \langle VP, NP \rangle, S \rangle$

b. Verb-Direct Object Rule: $\langle F_2, \langle V^2, NP \rangle, VP \rangle$

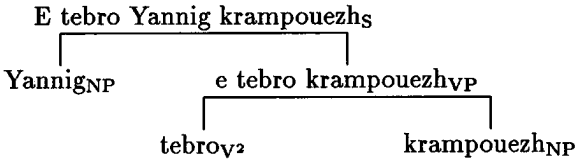
The first element of these triples is a syntactic operation, the second specifies the input of the operation (in the order function, then argument), and the third indicates the category of the output. These latter two components are taken to be constant, with cross-linguistic variation restricted to the operations. Thus, subject nominals will be uniformly introduced by (some instantiation of) (8a), while direct objects will invariably be introduced by (8b).

Supplying different values for the operations provides a means of describing the attested cross-linguistic variation in word order conventions, as well as differences in case-marking and agreement patterns. In English, for example, F_1 left-concatenates a subject NP to an intransitive verb phrase and, in addition, marks the verb to agree with the NP. Similarly, F_2 right-concatenates an object NP to a transitive verb. However, in Breton, and in subject-medial languages generally, F_1 will have to intrapose a subject past the initial verb or object. The specifications of F_1 and F_2 that Dowty proposes for Breton are stated in (9).

9 i $F_1(\alpha,\beta)$ = the result of inserting β after the first word in α.

ii $F_2(\alpha,\beta) = \alpha\beta$.

The application of these operations is illustrated in the analysis tree below for *E tebro Yannig krampouezh* 'Johnny will eat crepes'.



10

F_2 concatenates the direct object *krampouezh* to the right flank of the synthetic verb *tebro*, in the process adding the initial syncategorematic particle *e*. Subsequently, F_2 inserts the subject *Yannig* after the finite verb *tebro*, yielding the surface VSO order.

However, the initial particle surreptitiously added in (10) raises a pair of related difficulties for Dowty's proposal. In the first place, since *e* is not actually mentioned in Dowty's (1982:86) specification of F_2, the operations he presents do not in fact generate the accompanying analysis tree. A more substantive problem concerns the prosodic status of the particle. While Dowty's F_2 can be straightforwardly modified to introduce *e*, the presence of this particle will significantly complicate the application of F_1. If *e* is accorded the status of a word, the operations in (9) will generate the ungrammatical sequence *E Yannig tebro krampouezh*. There are at least two strategies for excluding *e*. On the one hand, the appelation 'word' can be restricted to expressions assigned to some syntactic category. Unless constraints are imposed on the class of syncategorematic elements, a proposal of this sort will permit the wrapping rule to operate over a potentially unbounded domain. Alternatively, 'word' can be defined prosodically, and *e tebro* treated as a single word consisting of a verb and proclitic. This seems to be a more plausible interpretation of (9i), though

its viability depends on a demonstration that the class of particles that would have to be ignored actually behave phonologically as clitics.[9]

The fact that the 'extraprosodic' element specified in (9i) is something like a prosodic unit rather than a syntactic constituent is not an accidental feature of Dowty's formulation of right wrap, but is instead a direct consequence of the formal nature of the operations he introduces and the objects they define. Strictly speaking, analysis trees like (10) do not identify constituency relations, but rather represent the string-to-string mappings that constitute the derivational history of an expression. Thus, analysis trees are more properly conceived of as categorial analogues of the T(ransformational)-markers of a preclassical transformational grammar than as the counterpart of phrase markers, trees, or labelled bracketings. (9i) cannot refer to syntactic constituents, as such units have no sanctioned theoretical status.[10]

The parallel between analysis trees and T-markers is reinforced by the fact that the operations that define such trees are formally closer to transformations than to the phrase structure rules that generate a phrase marker.[11] Although Dowty's operations typically involve local manipulations, there is nothing in

[9]Though both of these alternatives will make the necessary distinction in (10), it is doubtful that either supplies a sufficiently general solution to the problem posed by subject-medial languages. It is unclear, for example, how a prosodic or syncategorematic analysis would account for the order of ditransitive clauses in Hixkaryana (Derbyshire (1985)), which conform to a relative OVSX pattern. Similar difficulties arise in connection with OSV languages.

[10]Though, as Partee (1973) shows, a categorial system can be extended to represent syntactic constituency.

[11]Dowty (1982) recognizes this correspondence when he acknowledges that "syntactic operations may perform many of the manipulations that transformations perform in a TG" (p.85).

the theory he presents that guarantees this. Consider, for example, Dowty's (1982:85) specification of F_1 for English.

11 $F_1(\alpha,\beta) = \beta\alpha'$,
where α' is the result of marking the verb in α to agree with β.

The potential alocality that arises here is due to the fact that a verb may be buried indefinitely deeply within an intransitive verb phrase in English. In the best case, namely when α is an intransitive verb, α will be identical to α', and the domain of the agreement rule will be a function (α) and its argument (β). However, this will not be true for intransitive verb phrases containing transitive or ditransitive verbs, as the binary syntactic analyses that Dowty advocates will ensure that such verbs form part of subfunctors embedded within α'. The interaction of recursive adverbial modifiers will compound the problem, particularly if they apply successively.

Further, Dowty does not suggest any restriction on the form of operations that would prevent F_1 from, say, marking or permuting a direct object, or any other designated element within an intransitive verb phrase. Likewise, if an agreement process can refer to an arbitrary expression, there is no principled reason why such an element cannot also serve as a target for a concatenation operation. It appears, moreover, that constraining the nonlocal manipulations that operations can perform is a nontrivial task. One means of allowing (11) while preventing the manipulation of an embedded direct object would involve limiting the terms that can occur within the statement of an operation to func-

tors, their arguments, and some expression designated as the head of a functor. However, this option is strictly incompatible with Dowty's characterization of syntactic operations as mappings from unannotated strings into unannotated strings.[12] In the absence of some convention for encoding constituent structure, or an appropriately global definition of the notion of 'head', the verbal head of a verb phrase will not, in general, be recoverable from a string of concatenated morphemes. Moreover, as Hawkins (1983) and others have noted, the traditional notion of a syntactic head does not correspond to any natural class definable in terms of either functors or arguments.[13]

The related family of categorial systems termed 'combinatorial grammars' by Steedman (1985) exploit a more limited rule inventory, comprising essentially variants of function application, function composition and type raising. While these operations do not import nearly as much of the apparatus of classical transformational grammar into the resulting categorial systems, the derivational graphs they associate with an expression are often radically anisomorphic to the desired constituent structure. Thus, for example, in Steedman's analyses of English gapping and extraction constructions, a finite transitive verb typically combines first with its subject, resulting in a canonically left-branching graph structure. Yet the various asymmetries discussed above were interpreted

[12]One solution to this problem, proposed by Pollard (1984), involves defining operations that map headed strings into headed strings.

[13]A similar complication arises in Montague's PTQ, where characteristic differences in valence prevent English verbs from forming any natural class, though see Cooper (1975) and Bach (1979) for proposals for defining traditional syntactic categories within a Montagovian system.

as support for the assumption that transitive verbs invariably combine with their direct objects to form a constituent that excludes the subject nominal. This basic incompatibility makes combinatorial grammars unsuitable devices for accounting for the observed asymmetries.

8.1.3 Reordering Rules

The *reordering rules* proposed by McCawley (1982) represent a transformational device for generating discontinuous structural descriptions. Unlike classical transformations, which produce a derived hierarchical structure and linear order, reordering rules rearrange constituent order without altering constituent structure. In the rule taxonomy advocated by McCawley, transformations that change grammatical relations, (among which he includes *wh*-movement) invariably affect constituency, and consequently do not give rise to a discontinuous output. In contrast, ostensibly 'stylistic' rules like Parenthetical Placement, Right Node Raising, and Heavy NP Shift are classed as reordering rules that map the continuous output of a conventional base component into a class of canonically discontinuous structures.

McCawley does not explicitly define any reordering transformation, but rather exhibits the characteristic output of this class of operations. Nonetheless, such rules can be unproblematically identified as functions from stringsets to stringsets or trees to trees which preserve dominance and labelling relations, but which alter precedence relations in some specified respect. For concrete-

ness, consider again verb-particle constructions, specifically the representative examples in (12).

12 a. The police brought in the criminal.

b. The police brought the criminal in.

Recall that Chomsky (1957) analyzes the sentence in (12b) as a transform of (12a), derived through the application of T^{ob}_{sep}. The characteristic effect of this transformation on the terminal string of a sentence is represented in (13).

13 $X - V - Prt - NP \implies X - V - NP - Prt$

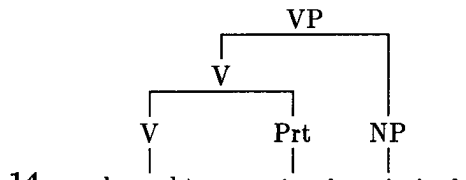
The structural description and structural change represented in (13) does not uniquely determine a classical transformation, since it does not specify the derived constituent structure of the transform.[14]

In contrast, transformations that do not alter hierarchical structure can be straightforwardly specified with reference to an input and output template. On this structure-preserving interpretation, T^{ob}_{sep} can be identified as a mapping that takes mobiles satisfying the input template in (13) to hierarchically isomorphic permutations that differ only in that they conform to the output template in (13). Since only precedence relations will be affected by such permutations, what is essentially required for a well defined transform is that the structural difference between a pair of input and output templates induces a unique derived

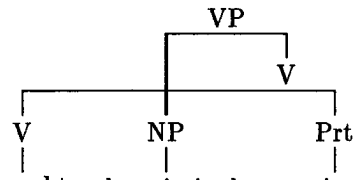
[14] Indeed, the traditional terms 'structural description' and 'structural change' are misnomers, as the information they encode is exclusively linear rather than structural.

precedence order. It is intuitively clear that the pair of templates in (13) have this property, and determine a mapping that takes (14a) into (14b).

14 **a.**



b.



There are various ways of defining reordering rules with the desired structure-preserving character; one candidate definition is outlined below.

To begin with, it is necessary to define a class of templates and mobile factorizations and identify the conditions under which mobiles satisfy templates under a given factorization. Templates can be defined as finite sequences of node labels and variable symbols, designated collectively as *terms*. The factorizations of a mobile consist of linearly ordered sequences of nodes whose collective yield is equal to that of the mobile. Thus, VP, along with Verb,NP and V,Prt,NP comprise the nonterminal factorizations of (14a).[15] Intuitively, a template is satisfied by a mobile whenever the terms of the template can be brought into a one-to-one correspondence with sequences of nodes in some factorization of the mobile.

A general specification of template satisfaction is provided in (15).

[15]There are fewer nonterminal factorizations of (14b), however, since the nodes (labelled by) Verb and NP are not ordered by precedence.

15 A mobile $\mu = (N, L, D, P, Q)$ satisfies a template $\tau = \alpha_1, \ldots, \alpha_n$ iff there is a factorization ϕ of μ and a function f from τ to ϕ such that:

i. f maps each label l_i into a node x_i such that $Q(x_i) = l$,

ii. f maps each each variable term v_j into a (possibly null) sequence σ_j,

iii. α_k, α_{k+1} is a subsequence of τ iff $f(\alpha_k), f(\alpha_{k+1})$ is a subsequence of ϕ, for all $1 \leq k \leq n$

The input to a reordering rule will be a mobile that satisfies, in the above sense, the input template specified by the rule. It remains to be shown how the output template determines a unique permutation of any mobile to which the rule applies. Since the set of nodes N, the dominance relation D and the labelling function Q all remain constant, this reduces to the problem of specifying a unique derived precedence relation P'.

The first step in the construction of P' from the original relation P involves identifying the structural change represented by the two templates. To simplify the construction of P', delete from the input and output templates all variable terms that correspond to a null node sequence. The structural change encoded by a pair of input and output templates can then be represented by the set Σ of pairs α_k, α_{k+1} that occur as subsequences of the output but not of the input template. The derived precedence order that Σ determines for a given mobile is mediated through the mapping f on which the mobile satisfies the input template. For each sequence of labels l_k, l_{k+1} in Σ, add the corresponding pair of nodes $(f(l_k), f(l_{k+1}))$ to P. For sequences v_k, α_{k+1} incorporating a

variable term v_k, add $(x, f(\alpha_{k+1}))$ to P for each x that occurs in $f(v_k)$.[16] After adding each new pair (x, y) to P, remove all of the existing elements that are inconsistent with (x, y); that is, all pairs (z, w) in P such that z stands in some domination relation to y and w stands in a domination relation to x. Once all possible new pairs have been added to P, and all inconsistent elements excised, the derived relation P' is obtained by forming the closure of the resulting set under the Precedence Inheritance Condition. This final step, which ensures that a permutation is a fully specified mobile, involves adding a new pair of nodes (x, y) whenever either (i) each node dominated by x precedes each node dominated by y, or (ii) some node dominating x precedes some node node that dominates y.

This construction can be illustrated with reference to the structures in (14) above. Since no labels are assigned to more than one node, we can safely collapse the distinction between nodes and labels. The precedence relation of the input tree is provided in (16a). This structure transparently satisfies the input template in (13) by virtue of the preterminal factorization V,Prt,NP.[17] The structural difference between the templates in (13) solely concerns the order of the terms Prt and NP. Adding (NP, Prt) and removing the inconsistent pairs (Verb, NP), (Verb, *the criminal*), (Prt, NP), (Prt, *the criminal*), (*in*, NP), (*in, the criminal*), yields the relation in (16b).

[16] Analogously, for sequences v_k, v_{k+1} containing two variable terms, add each of the pairs that occurs in the corresponding cross-product to P.

[17] The principal difference concerns the variable X, which is subsequently deleted in the determination of Σ.

16 a. {(Verb, NP), (Verb, *the criminal*), (V, Prt), (V, NP), (Prt, NP), (*in*, NP) (V, *the criminal*), (Prt, *the criminal*),(*brought*, Prt), , (*brought*, NP), (V, *in*), (*brought*, *in*), (*brought*, *the criminal*), (*in the criminal*) }

b. {(V, Prt), (V, NP), (V, *in*), (V, *the criminal*), (NP, Prt), (*brought*, NP), (*brought*, Prt), (*brought*, *in*), (*brought*, *the criminal*)}

c. {(V, Prt), (V, NP), (V, *in*), (V, *the criminal*), (NP, Prt), (NP, *in*), (*brought*, Prt), (*brought*, NP), (*brought*, *in*), (*brought*, *the criminal*), (*the criminal*, Prt), (*the criminal*, *in*)}

The derived relation P' in (16c) is then formed by adding the pairs (*the criminal*, Prt) and (*the criminal*, *in*). As is readily verified, this is the precedence order of the permuted mobile in (14b).

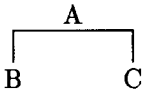
The preceding discussion outlines one strategy for formulating reordering rules in terms of pairs of ordering templates. Further restrictions must be placed on such templates to bar transformations that add or delete lexical material. Specifically, to confine the difference between transforms to their respective precedence orderings, it is necessary to require of templates that they differ only in the linear order of their terms. Additional constraints can then be placed on the application of such rules or on the derived configurations they induce. Notice, moreover, that the structure-preserving property of reordering transformations largely undermines the need for multi-level transformational descriptions. Since such rules do not modify constituency relations, there is no need to associate sentences with multiple representations that effectively encode underlying (and sometimes intermediate) constituent structure. Instead, reordering rules can be treated as closure operations on the set of basic structures admitted by the base component of a grammar.

8.1.4 Node Admissibility

An analysis of unbounded dependencies in terms of structure-preserving closure operations is presented below in §8.3.5. However, in the case of local word order alternations of the sort illustrated in (12), there is a more straightforward means of dispensing with transformational derivations. In particular, a suitable modification of McCawley's strategy for eliminating phrase structure derivations directly facilitates the 'base-generation' of derived structures like (14). McCawley (1968:246) proposes to circumvent the troublesome ambiguity of phrase structure derivations noted earlier by interpreting production rules as *node admissibility conditions* that directly determine the wellformedness of a tree structure. More specifically, McCawley observes that a rule like (17) can be interpreted as a condition that directly sanctions the subtree in (18).[18]

17 $S \rightarrow NP\ VP$

18



That is, (17) can be construed as licensing a node labelled 'S' just in case it immediately and exhaustively dominates nodes labelled 'NP' and 'VP' and the node labelled 'NP' precedes the node labelled 'VP'. This interpretation of phrase structure rules obviates the need for intermediate derivations, since the

[18] Though McCawley (1968:247) credits the original insight to a suggestion by R. Stanley.

only additional information provided by a derivation, i.e. the order in which nonterminals are rewritten, is syntactially inert.

The precedence condition incorporated within the node admissibility conditions that McCawley proposes ensures that they sanction only continuous trees. As a consequence, reordering rules are required to derive discontinuous structures. Yet, given that it is the dissociation of linear order and hierarchical structure that admits discontinuity in McCawley's phrase structure axiomatization, a corresponding decomposition of the devices that generate such representations will provide a correspondingly direct means of generating discontinuous structures. Generalized phrase structure grammars in ID/LP format provide a useful point of departure, as they explicitly factor out the hierarchical and linear information expressed by standard phrase structure production rules on a node admissibility interpretation.

A generalized phrase structure grammar in ID/LP format consists of a set of *immediate dominance* (ID) rules, and a set of *linear precedence* (LP) statements. ID rules define constituency, while LP statements determine order. To take a simple example, the ID rule in (19a) is interpreted as admitting a node S just in case it immediately and exhaustively dominates nodes VP and NP. The LP rule in (19b) requires that an NP node must precede any VP sister.

19 a. $S \rightarrow NP,VP$

b. $NP \prec VP$

Together, these rules represent essentially the same structural information as the phrase structure rule in (17). Since LP statements refer to precisely the set of categories introduced by ID rules, the rules and statements of an ID/LP grammar can always be 'multiplied out' to form a reconstituted context-free phrase structure grammar. This guarantees a general equivalence between conditions like those in (19), and rewrite rules like (17).

However, such locally unordered context-free grammars are not immediately adaptable to our present purposes, as the sisterhood restriction on linear precedence statements and metarules effectively excludes discontinuous structures. In order to admit discontinuity, greater flexibility is required in the locality constraints on LP statements. This can be illustrated with reference to the ID and LP rules in (20).

20 a. $VP \rightarrow V,NP$ c. $V \prec NP$

b. $V \rightarrow V,Prt$ d. $V \prec Prt$

If LP rules are restricted to siblings, the rules above will generate the (nonterminal skeleton of the) tree in (14a). Although NP and Prt are not explicitly ordered, an ordering is implicitly imposed as a consequence of the fact that NP is ordered after a category which dominates Prt. Two basic revisions are required to obtain an interpretation of these rules that allows them to admit both of the trees in (14). First, LP rules must be permitted to range (at least) over VPs. As well, LP rules must be interpreted as applying to the lowest (i.e. most deeply embedded) element in an unbroken chain of identical nonterminals.

In the sentence under consideration, (20c-d) must be satisfied by the V node dominating *brought*, rather than the higher node dominating *brought out*. Under this interpretation of LP rules, the lack of an explicit ordering between NP and Prt permits both of the structures in (14).

This example informally illustrates how expanding the domain of LP rules permits modified ID/LP grammars to admit discontinuous structures. The interaction of LP rules and complex verbs supplies an additional and inessential complication. To clarify how increasing the domain of serialization rules contributes to discontinuity, let us next examine some basic strategies for decoupling the domains of rules that induce hierarchical and linear structure.

8.2 Mobile Grammars

To begin with, consider a somewhat idealized version of an unordered phrase structure grammar in which dominance and precedence are globally dissociated. Let a *free mobile grammar* be a pair (U,V), consisting of a set U of ID rules, interpreted as node admissibility conditions, and a set V of global LP statements. ID rules are of the general form $A \rightarrow \phi_1, \ldots, \phi_n$, with $n \geq 1$. The lefthand side of an ID rule is a single labelled node, while the righthand side is interpreted as a set of labelled nodes. More concretely, an ID rule such as (21a) can, as Jacobson (1987a) observes, be characterized in terms of the components in (21b) and (21c). The first element of the pair in (21b) is the mother node (here

represented as an integer), while the second element is a set of daughters. The function φ in (21c) assigns labels to the nodes introduced in (21b); although φ may assign the same label to different daughters, the nodes themselves remain distinct.

21 a. VP $\rightarrow$ V, NP, NP

b. (0,{1,2,3})

c. $\varphi(0)$ = VP, $\varphi(1)$ = V, $\varphi(2)$ = NP, $\varphi(3)$ = NP

Moreover, given that distinctness is the only requirement we place on the integers that represent nodes in an ID rule, a rule like (21a) can be interpreted as admitting a family of appropriately labelled ternary-branching subgraphs. That is, since nothing depends on the particular choice of integers in (21b), (21a) can be taken to sanction any node labelled 'VP' just in case it immediately and exhaustively dominates distinct nodes labelled 'V', 'NP' and 'NP'.[19] Responsibility for ensuring the nonlocal distinctness of nodes introduced by different rules falls on the general wellformedness conditions on mobiles.

LP rules are of the form $\phi \prec \psi$, consisting of pairs of labelled nodes. The LP rule in (22a) is accordingly decomposable into the components (22b) and (22c) below.

[19]There is, e.g., no reason to require that an admissible subgraph be rooted in 0, or that the daughter nodes be 1, 2 and 3; the weaker requirement of structural isomorphism between rules and structures is sufficient. However, if desired, nodes can encode additional hierarchical or labelling (though not precedence) information.

22 a. $V \prec NP$

b. (0,1)

c. $\varphi(0) = V$, $\varphi(1) = NP$

A mobile is compatible with the LP rule in (22a) on a global interpretation just in case it contains no node labelled 'NP' that precedes a node labelled 'V'. Where no ambiguity arises, ID and LP rules will be represented in the unexpanded form (21a) and (22a).

Global dissociation of order and structure appears to extend both weak and strong generative capacity beyond that of context-free grammars. For example, the degenerate grammar in (23) admits an infinite set of structures whose yield consists of one or more a's followed by an equal number of b's, followed by an equal number of c's.

23 a. $S \rightarrow a, b, c, S$

b. $S \rightarrow a, b, c$

c. $a \prec b \prec c$

More generally, free mobile grammars accept the family of non-context-free languages $a^n b^n c^n, \ldots, m^n$, for any finite $m, n > 0$.

Furthermore, a grammar consisting of just the ID rules in (23a,b) will accept the infinite language 'MIX' consisting of equal numbers of a's, b's and c's in any order. Thus, if as Marsh (1987) conjectures, MIX is not an indexed language, it would follow that the languages generated by free mobile grammars are not a

subset of the indexed languages.[20] The converse inclusion also seems unlikely, since it is doubtful that the separation of order and structure provides the counting ability required to generate exponential indexed languages like a^{2^n}.

There are two natural sorts of restrictions that can be imposed on mobile grammars, as different bounds can be placed on the length of ID rules or on the domain of LP rules.[21] GPSGs in ID/LP format represent one limiting case of a mobile grammar in which tight constraints are imposed on the domain of LP rules, while no specific bound is placed on the length of the expansions of ID rules.[22] The structural descriptions assigned by these grammars are, accordingly, relatively flat context-free phrase structure trees.

Conversely, constraining the length of ID rule expansions increases hierarchical structure. Maximally articulated structural descriptions are assigned by mobile grammars whose ID rules are in Chomsky Normal Form, i.e. grammars whose rules conform to the schemata in (24).

24 a. $A \rightarrow B, C$

b. $A \rightarrow a$

Regimenting the ID rules of a grammar into (maximally) binary-branching CNF while retaining the sisterhood condition on LP rules imposes severe constraints

[20] For discussion of indexed grammars and languages see Hopcroft and Ullman (1979:389f) and Gazdar (1985).

[21] Restrictions on the depth of the rules that introduce hierarchical structure are already implicitly incorporated in the definition of ID rules above. Marsh's (1987) mother-and-daughter grammars and Pereira's (1981) extraposition grammars illustrate some of the consequences of relaxing familiar depth restrictions on production rules.

[22] This property of ID rules is exploited in a recent attempt to demonstrate the intractability of the ID/LP format; see Barton *et al.* (1987) for discussion.

on the strong generative capacity of a grammar. The often superfluous and unintuitive branching structure assigned by such grammars have generally been taken to constitute a *reductio* of a general binary-branching constraint, and justification for considerably flatter constituent anayses.[23]

However, a viable alternative diagnosis in the present context is that the gratuitous structure is due to excessively restrictive locality conditions on LP rules. Extending the domain of LP rules permits the assignment of a relatively constant and highly articulated structural analysis without forcing the recognition of unmotivated constituents. Permitting the LP rules of a mobile grammar in CNF to order nonsiblings immediately allows such grammars to generate intuitively satisfactory, albeit discontinuous representations. Athough this revision sacrifices the parallel locality constraints on ID rules and LP statements characteristic of a standard ID/LP grammar, the motivation for these parallel constraints is to a considerable extent metatheoretical in nature: they are simply what ensure that ID/LP grammars remain context-free.

8.2.1 The Domain of Serialization Rules

Sister nodes are effectively the smallest domain over which ordering rules can define a useful precedence relation; expanding the domain of serialization rules in any of a number of available ways will directly admit discontinuity. Among

[23]This position has been endorsed by proponents of a wide range of syntactic theories; the views expressed in Chomsky (1961:23) and Postal and Pullum (1988:667fn14) are representative.

the domains intermediate in size between siblings and whole mobiles are the cyclic domains NP and S, and the endocentric phrasal categories that figure in the various versions of $\bar{X}$ theory. One point in favour of phrasal categories is that they delineate subdomains within cyclic domains, so that allowing LP rules to range over phrases admits a somewhat more restricted amount of discontinuity. Moreover, endocentric phrases provide a suitable domain and vocabulary for directly expressing cross-categorial ordering tendencies.

Accordingly, let us pursue a strategy of defining ordering restrictions that range over constituents of endocentric phrases. As a preliminary to stating suitably modified serialization rules, let us first informally specify the key notions *head* and *dependent*. For the purposes of the present discussion, the syntactic head of a phrasal category X^nP can be identified as the element X^m with the highest valence which is linked to X^nP by an unbroken (dominance) chain of categories X^iP, $n \leq i \leq m$. The *dependents* of a lexical head X^m will consist then of the elements which are immediately dominated by a constituent headed by X^m, but which do not themselves dominate X^n. Elements that occur as dependents of a common head will be termed *phrasemates*. Although these notions may require further refinement or qualification, their intuitive content is clear enough to allow us to proceed.

Thus let us examine some phrasal serialization rules that make use of these notions. Recent work in diverse theoretical frameworks (e.g. Stowell (1981), GKPS (1985)) has pursued the idea that head placement can be adequately

described by means of unrestricted principles that place elements designated as heads at one periphery of the phrases containing them. Candidate conditions are provided in (25).

25 a. Heads are initial: $H \prec X$

b. Heads are final: $X \prec H$

The head elements that the metavariable 'H' ranges over is, as in $\bar{X}$ theories, contextually defined, except that the context is here a tree structure rather than a phrase structure rule. Declarative conditions of this sort lend themselves to an interpretation as arboreal wellformedness conditions which must be satisfied by each exocentric phrasal subgraph of a syntactic description. These absolute conditions permit an especially economical description of rigidly head-initial VSO languages like Irish and Niuean, and head-final SOV languages such as Turkish or Japanese.

Rules for ordering designated head elements must be supplemented by rules or principles that order nonheads. A model of grammar that recognizes grammatical relations as primitives can establish a relative order of nominals bearing designated relations. Similarly, the HPSG 'obliqueness' ranking provides a means of distinguishing and hence ordering the nominals in a clause. However, the basic ID/LP dissociation of hierarchical arrangement and linear order makes available the more intrinsically structural option of keying order to hierarchical configuration.

Specifically, the structural relations defined by context-free admissibility con-

ditions can be treated as hierarchical contexts that govern the application of precedence rules. Conditions of this sort are, in effect, context-sensitive LP rules. Since LP rules themselves establish order, the environment that determines their application must be stated in hierarchical rather than linear terms. This represents a natural extension of context-sensitivity in an arboreal model. The string rewrite interpretation of phrase structure rules has encouraged the characterization of context-sensitivity exclusively in terms of left and right contexts. This is reflected in the canonical form of context-sensitive rules: $\alpha A\beta \rightarrow \alpha\omega\beta$, in which α and β precede and follow each of the strings A and ω. However, once phrase structure rules are interpreted as node admissibility conditions, rules of this form can be seen to illustrate a special case of context-sensitivity. Since trees, unlike strings, are two dimensional objects, they supply 'top' and 'bottom' contexts, as well as left and right environments. Thus, the node admissibility interpretation of phrase structure rules admits the option of keying the 'application' of a rule to hierarchical structure as well as linear order.

Even more uniform correspondences between structure and order can be expressed as supplementary, language-specific, wellformedness conditions on mobiles. For concreteness, consider the definition of c-command in (26) (in which x, y, z range over arbitrary nodes, and D and I are, respectively, the dominance and immediate dominance relations).

26 x *c-commands* y iff there is a $z, x \neq z \neq y$, such that zIx and zDy.

Given this relation, we can define the rules in (27), which supply a default

branching direction within phrases. Interpreted as wellformedness conditions on exocentric phrasal subgraphs, these rules determine a canonical branching direction by establishing a systematic correspondence between hierarchical structure and linear order. (27a), for example, has the effect of requiring subjects to precede direct objects, while (27b) imposes a mirror-image order.

27 a. Right-branching: xPy only if x c-commands y

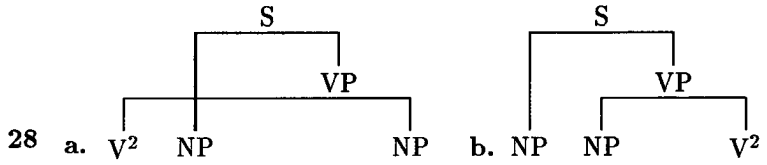
b. Left-branching: xPy only if y c-commands x

Condition (27a) ensures that a pair of phrasemate nodes stand in a precedence relation only if the first c-commands the second. Switching x and y in the consequent, as in (27b), likewise yields the converse condition. Selecting (27a) induces canonically right-branching structures, while (27b) defines left-branching substructures. Moreover, these conditions express the hypothesis that significant subparts of any given syntactic description will exhibit a continuous branching structure. This in turn raises the possibility of confining discontinuity largely to the structures sanctioned by rules that position designated categories, such as syntactic heads and dislocated elements.

8.2.2 Head Position, Branching Direction and Continuity

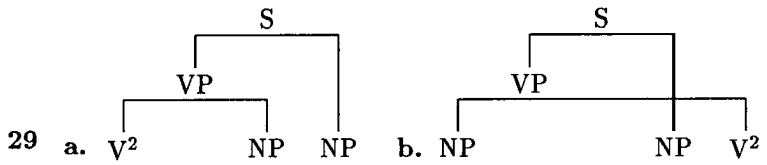
To this point, we have encountered two types of serialization schemata that order the constituents of an endocentric phrase. Head placement schemata of the sort instantiated in (25) position the head of a phrase at either the left or right periphery. Likewise, the rules in (27) establish directionality of dependent

branching. This pair of binary-valued conditions generates four possible combinations of default specifications for the phrases of head-peripheral languages. In particular, it admits the four transitive clause structural analyses exhibited in (28)–(29) below.



The head-initial and right-branching diagram in (28a) exhibits the discontinuous VSO order assigned above to Celtic and Niuean, while the head-final and right-branching (28b) shows the continuous SOV arrangement typically associated with Japanese and Korean.

The mirror-image structures in (29) model somewhat rarer orders in which the direct object precedes the subject of a clause.



The head-initial, left-branching diagram in (29a) provides a continuous analysis of the VOS order attributed to Austronesian languages such as Malagasay and Toba Batak (Keenan 1979). The discontinuous head-final, left-branching structure in (29b) provides an articulated description of the disputed OSV order, which has been principally associated with Amazonian languages, e.g., Apurinã,

Jamamadí, Jarawara (Arawakan), Nadëb, Yahup (Puinave), Xavante (Gê), and Urubú (Tupian).[24]

More generally, these diagrams illuminate configurational consequences of the interaction of head positioning and direction of branching. Comparison of the graphs in (28) and (29) illustrates how 'base-generated' continuity arises through a mismatch of the head-positioning and branching parameters. In the continuous structures (28b) and (29a), the peripheral position of the head matches the direction of branching. The head of the right-branching (28b) is final, i.e., right-peripheral, while the head of the left-branching (29a) is initial, i.e., left-peripheral. In contrast, (28a) and (29b) are inconsistent, in that they position their heads in the opposite direction from which they branch. (28a) combines right-branching with a left-peripheral head, while the left-branching (29b) contains a right-peripheral head. Treating the discontinuity that arises in VSO and OSV languages as a general and predictable consequence of a conflict between head placement and direction of branching ensures that a continuous/discontinuous distinction does not simply replace the flat/articulated bifurcation of earlier phrase structure analyses.

Instantiations of the rules in (25) and (27) straightforwardly admit the head-peripheral transitive clause orders VSO, VOS, SOV and OSV. Notice, moreover, that varying the domain of application of these rules provides a means of admit-

[24]For discussion, see Derbyshire and Pullum (1981,1986). The *SIL Ethnologue* (1988) contains additional listings and references, including possibly OSV Australian and Papuan languages (e.g. Ngarinyin and Yessan-Mayo).

ting the remaining SVO and OVS orders. One option involves restricting the application of the head-placement and branching direction conditions to designated subdomains within phrases. A plausible candidate is what we might call premaximal constitutents. In the notation proposed above, premaximal constitutents will correspond to monadic categories (i.e. those of the form H^1). Likewise, in $\bar{X}$ systems, these will be nonmaximal phrasal constituents immediately dominated by a maximal phrase of the same category.[25] The same result can be obtained by allowing endocentricity to vary across languages, so that clauses are headed by verbs in head-peripheral langauages, but are exocentric adjunction structures in verb-medial languages. For present purposes it is immaterial which of these alternatives is adopted, since either will permit the medial positioning of finite verbs in transitive clauses.[26] Applying the conditions in (25) and (27) within verb phrases will admit a right-branching, head-initial SVO pattern and left-branching, head-final OVS order.[27]

[25] Although premaximal elements are definable within most syntactic frameworks, the node label assigned to them tends to be highly theory-dependent. For example, in uniform variants of $\bar{X}$ theory that recognize n bar levels, premaximal constituents will have $n - 1$ bars.

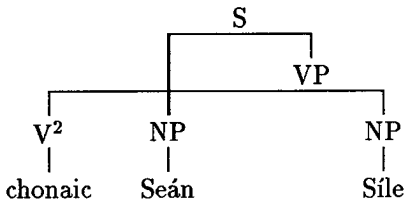
[26] Recognizing premaximal domains may, however, affect the interpretation of the default branching conditions in (27). In a language with a head placement rule that ranges over a premaximal constituent, default conditions can be interpreted as ranging either over all of the dependents of a head, or over just those dependents that occur within the premaximal subdomain. While this choice does not substantially the analyses below, some consequences of adopting the latter alternative are outlined in §8.3.5.

[27] As well, right-branching, head-final SOV and left-branching, head-initial VOS orders will be admitted.

8.3 Locally Discontinuous Structures

Let us next consider some grammar fragments that admit structures of the sort presented in earlier chapters, beginning with the rules required to generate the articulated structural descriptions assigned to transitive Celtic clauses. A typical Irish example is provided in (30).

30



Universal ID rules that determine the hierarchical structure of the nonterminal skeleton of (30) are given in (31), while (32) supplies the operative language-specific ordering principles.

31 a. $S \rightarrow NP, VP$

b. $VP \rightarrow V^2, NP$

32 a. $H \prec X$ in H^0P (heads are initial in maximal phrases)

b. xPy only if x c-commands y (phrases are right-branching)

The rules in (31) induce a maximally binary-branching constituent structure which is exploited by (32b), which orders nonheads according to their relative height. Since V^2 is the head of the clause in (30), it is subject to (32a), which assigns heads a clause-initial position.

8.3.1 Discontinuous V NP NP Sequences

Structure-sensitive conditions on anaphoric construal are adduced above as evidence for the articulated descriptions generated by these rules and against the ternary-branching V NP NP structure that GKPS (1985:61ff) derive by means of a flattening metarule. The same considerations also miliate against both of the available continuous binary segmentations of transitive VSO clauses, since neither a V–SO nor a VS–O analysis assigns asymmetrical hierarchical superiority to the subject. In addition, the rules in (31) provide a solution to a more fundamental problem that arises for standard ID/LP descriptions of VSO languages. Given a flat V NP NP structure for VSO transitive clauses, there is no straightforward means of ordering the subject before the object by means of an LP statement.

Although this shortcoming does not compromise the ability to distinguish the wellformedness of transitive clauses containing nonpronominal arguments, it leads to observational inadequacy in sentences containing pronouns. The examples in (33) illustrate that permutation of nominal arguments alters interpretation, but preserves grammaticality in Irish.

33 a. *Chonaic Síle an sagart.*
saw Shiela the priest
'Sheila saw the priest.'

b. *Chonaic an sagart Síle.*
saw the priest Shiela
'The priest saw Shiela.'

Although Irish transitive clauses conform to an obligatory VSO order, this re-

quirement is not encoded in stringsets containing only nonpronominal arguments.

However, clauses containing pronouns are subject to more stringent ordering conditions. The wellformedness of (34a) and (34b) shows that there is no fixed ordering of pronominal and nonpronominal NPs, since pronominal subjects may precede nonpronominal objects, and nonpronominal subjects may precede pronominal objects.

34 a. *Chonaic Síle é.*
saw Shiela him
'Shiela saw him.'

b. *Chonaic sí an sagart.*
saw she the priest
'She saw the priest.'

c. *Chonaic sí é.*
saw she him
'She saw him.'

Nevertheless, order within the examples in (34) is not free, as the ungrammaticality of the permuted counterparts in (35) indicate.

35 a. **Chonaic é Síle.*
saw him Shiela
(Shiela saw him.)

b. **Chonaic an sagart sí.*
saw the priest she
(She saw the priest.)

c. **Chonaic é sí.*
saw him she
(She saw him.)

The strings in (35) are illformed under any interpretation, and hence, fall outside of the stringset of Irish.

The contrast between (34) and (35) supports the descriptive generalization that subjects must precede objects in transitive clauses in Irish. However, this cannot be directly expressed by means of an LP rule, since grammatical relations are not included among the features assigned to NPs, and also not configurationally definable in terms of a flat V NP NP structure.[28] Instead, an ID/LP grammar requires syntactic features that significantly correlate with subjecthood and objecthood in order to distinguish the transitive clauses of a VSO language like Irish from their counterparts in V-initial languages such as Fijian (Dixon (1988)).

An obvious proposal would be to state the operative ordering constraint in terms of a morphological LP rule like (36), which orders nominative NPs before accusative siblings.

36 NP[NOM] $\prec$ NP[ACC]

This option is most plausible in the case of (34c) and (35c), since there is an overt morphological distinction between nominative and accusative personal pronouns in Irish. However, in order to account for the deviance of (35a) and (35b), such features must be assigned as well to the nonpronominal noun phrases *Síle* and *an sagart*, which do not overtly decline for case. Apart from the undesirability

[28] GPSG analyses do invoke a feature [±SUBJ], though it is a HEAD feature (GKPS 1985:23) that is carried by the verbal head of a clause, and not the nominal arguments of a head.

of introducing inscrutable case features, this analysis raises questions concerning the assignment of such covert features. Although the appropriate values could be introduced by brute force in the rules that introduce subjects and objects, such a solution is problematic in a number of respects.

The most transparent shortcoming is that a case-sensitive LP rule provides a highly construction-specific solution for a general phenomenon. For example, it is well known, though unexpected on many accounts, that the arguments of 'double object' verbs in English exhibit asymmetric anaphoric and grammatico-thematic options. Thus, as Jacobson (1987b:61) notes, the invariant direct object/indirect object order in a verb phrase like *give Fred a cigar* cannot be expressed by means of a standard LP rule, given the ternary-branching analysis proposed by GKPS. In particular, the degenerate English case system does not preserve a morphological distinction between direct and indirect object nominals that can be exploited by an analogue of (36). Recognizing this deficiency, GKPS establish the requisite order by invoking conditions that determine the semantic interpretation of ditransitive clauses. Yet this proposal essentially overcomes the descriptive weakness of LP rules by shifting some of the burden of ordering onto an ostensibly interpretive component; a move that Sag (1987:307) concedes is "both unnatural and without independent motivation".

The problems that arise in connection with VSO clauses in Irish and double object constructions in English thus bring out a basic conflict implicit in the standard ID/LP format. On the one hand, the descriptive economy achieved

by LP statements is maximized by flat structures with multiple sibling nodes. However, one consequence of assigning flat, minimally articulated structural analyses is that multiple occurrences of the same category will typically occur as siblings. No difficulties arise as long as the ordering of expressions of the same category is free. However, enforcing fixed ordering options is potentially problematic, as an invariant order cannot be imposed by means of LP rules that refer to major syntactic category features. Thus, the apparent simplification achieved by assigning minimally articulated constituent analyses is counterbalanced by a corresponding enrichment of feature structures or the intrusion of ostensibly semantic rules.

In contrast, the ID rules in (31) establish a configurational distinction between subject nominals, which are invariably dominated by S, and direct objects, which occur as a daughter of VP. This hierarchical difference is exploited by the condition in (32b), which assigns a left-to-right order to nonheads based on their hierarchical position. Likewise, the rules in (37) and (38) assign an isomorphic structural analysis to double object constructions.

37 a. $\mathrm{VP} \rightarrow \mathrm{V}^2\mathrm{P}$, NP

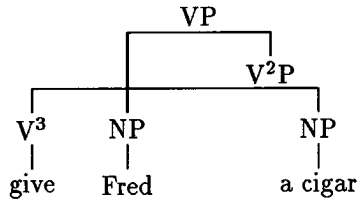
b. $\mathrm{V}^2\mathrm{P} \rightarrow \mathrm{V}^3$, NP

38 a. $\mathrm{H} \prec \mathrm{X}$ in $\mathrm{H}^1\mathrm{P}$ (heads are initial in premaximal phrases)

b. xPy only if x c-commands y (phrases are right-branching)

The structure that these rules assign to the representative verb phrase *give Fred a cigar* is exhibited in (39).

39



The structure in (39), like (30), illustrates the typically discontinuous pattern that results from the conflict between head placement and direction of branching. Although this configuration does not arise in transitive SVO clauses, an examination of anaphoric domains supports the view that it recurs in ditransitive verb phrases. As Kuno (1987) among others has noted, the initial NP in a ditransitive VP can bind a following reflexive, though not conversely. This familiar contrast is illustrated by the minimal pair in (40).

40 a. Otis showed Yolanda$_i$ herself$_i$ (in the mirror).

b. *Otis showed herself$_i$ Yolanda$_i$ (in the mirror).

A similar asymmetry is characteristic of quantificational antecedents and bound pronouns. The sentences in (41) are representative.

41 a. The director sent every chemist$_i$ his$_i$ lab assistant.

b. *The director sent his$_i$ lab assistant every chemist$_i$.

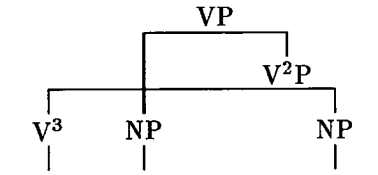
The first, but not the second of these sentences allows an interpretation on which the pronoun *his* is construed as anaphoric to the universally quantified noun phrase *every chemist*. Further confirmation of the asymmetrical anaphoric options within ditransitives is provided by the reciprocal minimal pair in (42), due to Barss and Lasnik (1986).

42 a. I showed the professors$_i$ each other$_i$'s students.

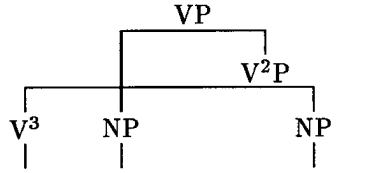
b. *I showed each other$_i$'s students the professors$_i$.

On the assumption that bound anaphoric asymmetries provide a reliable diagnostic for constituent structure, the contrasts in (40)–(42) support the discontinuous structure assigned in (43a) and (43b).[29]

43 a.



b.



Thus, the configurational domains defined by the rules in (31) and (37) both facilitate the assignment of an invariant order to the nominals in VSO clauses and double object constructions, and also provide an account of their asymmetrical anaphoric options.

8.3.2 Control Configurations in English

The preceeding discussion suggests empirical advantages of combining the canonically binary branching structures characteristic of structuralist analyses and categorial grammars with serialization rules that range over endocentric phrases. Similar benefits are obtainable for a wider selection of construction types. The ordering constraints on subconstituents of control structures provide

[29]These diagrams provide what amounts to a phrase structure representation of the standard analysis of ditransitives and control structures proposed within extensions of Montague Grammar.

an illustrative example. As Pollard (1984) observes, a standard ID/LP grammar is unable to distinguish the minimal pairs in (44) and (45) below.

44 a. Kim appeared to Sandy to be aggressive.

b. Kim appeared to be aggressive to Sandy.

45 a. Kim appealed to Sandy to be aggressive.

b. *Kim appealed to be aggressive to Sandy.

Given that the standard GPSG account of raising structures analyzes sentences like those in (44) by means of the Control Agreement Principle (GKPS:89ff), there is no structural distinction between (44) and (45) that can be invoked to account for the difference in permutability between the prepositional phrases and verb phrases in (44) and (45). Thus, since both sentences would be introduced by an ID rule such as (46a), no LP rule can express the distinct ordering possibilities exhibited in (44) and (45).

46 a. VP $\rightarrow$ V, PP[to], VP

b. PP[to] $\prec$ VP

Positing (46b) to account for (45b) incorrectly predicts that (44b) will be ungrammatical. However, imposing no ordering restrictions admits (44b), but at the cost of allowing the ungrammatical (45b).

On the basis of these examples, Sag (1987) concludes that

> in the absence of evidence supporting a structural difference between verb phrases headed by *appear* and those headed by *appeal*, the data in question stand as a counterexample to Gazdar and Pullums's

ID/LP theory: these VPs contradict the ECPO property entailed by the theory. (p.307)

The Exhaustive Constant Partial Ordering (ECPO) property of a GPSG in ID/LP format is simply the property of imposing uniform and consistent sibling ordering restrictions. Thus, for example, grammars of this class establish an invariant order for the expansions of a mother node that is insensitive to the categorial label or bar level of the mother. Yet, notice that the difference between *appear* and *appeal* amounts essentially to the distinction between a subject and object control verb. On a standard Montagovian treatment of control, this difference will, in fact, have a structural reflex. Let us briefly digress at this point to review this family of analyses.

8.3.2.1 Control in Montague Grammar

As Bach (1979) notes, the recognition of a class of transitive verb phrases leads to the expectation that their intraposed arguments will behave in other respects like direct objects. The degenerate case system of English provides a measure of morphological support for this conclusion, given that pronominal arguments of V^2P are obligatorily accusative. In addition, as the minimal pair in (47) shows, the arguments of V^2P freely passivize, unlike the arguments of superficially similar subject-control verbs like *promise.*

47 a. Olga was persuaded to leave.

b. *Olga was promised to leave.

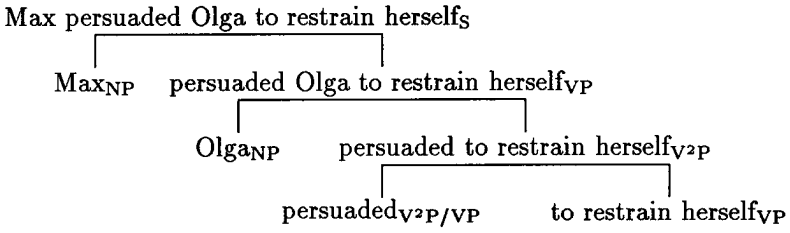
This contrast clearly distinguishes the nonsubject arguments of verbs of the *promise* class from the internal arguments of transitive verbs like *hit* and transitive verb phrases like *persuade to leave.*

Moreover, following essentially Thomason (1976) and Partee (1973), Bach observes that the distinction between sentences containing complex transitive verbs and those containing other complex verbal categories can be exploited in an account of control phenomena which is keyed to argument structure. Specifically, Bach proposes that the distinction between subject and object control and agreement can be attributed to a general 'first argument in' principle that requires a predicative phrase to agree with its first nominal argument. Since the first argument of a V^2P will be its 'shared' direct object, this argument will act as a syntactic controller in sentences containing V^2Ps. The contrast with superficially similar sentences in which the subject acts as a controller can then be attributed to the absence of a V^2P subconstituent. Thus, the familiar difference illustrated by the examples in (48) can be ascribed to the characteristically different order in which *persuade* and *promise* combine with infinitives and nominals. While *persuade*, like *consider*, combines with a predicative expression to form a V^2P, *promise* combines with an NP argument, to form an expression that then takes an infinitival.

48 a. Max persuaded Olga to restrain herself/*himself.

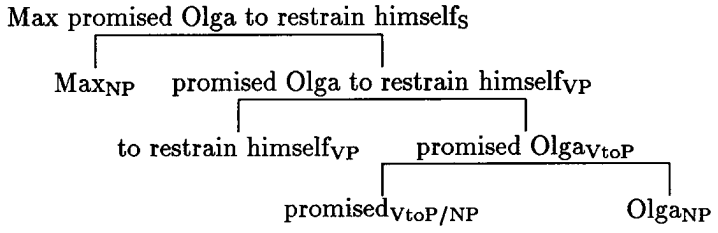
b. Max promised Olga to restrain himself/*herself.

The structural analyses associated with these sentences perspicuously represent the structural differences, which, in conjunction with the 'first argument in' principle, yield the observed differences in reflexive agreement. Consider first the analysis tree for *persuade to restrain herself* in (49), (in which the internal structure of the infinitival is suppressed).



49

As in (5) above, the predicative transitive verb *persuade* combines with a predicative expression to form a syntactically complex transitive predicate. In contrast, the subject control verb *promise* in (50) combines first with a nominal argument, forming an expression that then combines with an infinitival.[30]



50

As comparison of (49) and (50) shows, *Olga* is the first, i.e., controlling, nominal argument of a predicate containing *persuade* and *herself*, while *Max* is the first argument of a predicate including *promise* and *himself*.

[30]The label 'Vto', from PTQ, is used here just as a diacritic means of assigning a category to *promised Olga*.

There are alternative means of implementing the 'first argument in' requirement, and also various additional consequences of the distinctions represented in (49) and (50). For example, this principle provides a means of accounting for the obligatory number agreement between the direct object and predicate nominal arguments of a V^2P illustrated below.

51 a. Max considers Fred *honest men/an honest man.

b. Max considers the sheriffs honest men/*an honest man.

A more thorough discussion of some of these issues is presented in Bach (1979,1980), Dowty (1982), Partee (1973) and Thomason (1976). However, rather than explore further ramifications of the account of control outlined above, let us consider how it applies to the examples that Pollard presents.

8.3.2.2 Object Control

To begin with, observe that the contrasts in (52)–(53), pattern after the examples involving *promise* and *persuade* in (47) and (48) above.[31]

52 a. Sandy was appealed to to leave.

b. *Sandy was appeared to to leave.

53 a. Max appealed to Sandy to cut *himself/herself.

b. Max appeared to Sandy to cut himself/*herself.

[31] Though there are familiar differences (principally concerning expletives) between *promise*, which is traditionally classed as a pure control verb and *appear*, which is most commonly treated as a raising verb.

The parallel between *persuade* and *appeal* on the one hand, and *promise* and *appear* on the other, is further reinforced by the paradigm in (54)–(55).

54 a. Who did Max appeal to to leave?

b. *?Who did Max appear to to leave?

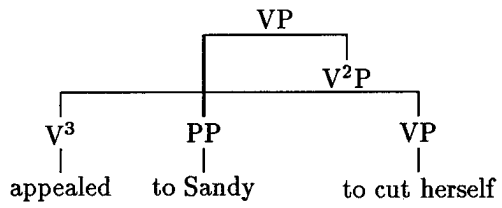
55 a. Who did Max persuade to leave?

b. *?Who did Max promise to leave?

Extraction of (or from) the controlling object in (54a) yields a wellformed question, as does extraction of the controlling object in (55a). In contrast, the corresponding questions involving *promise* and *appear* are deviant.

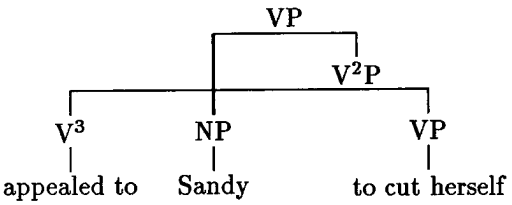
The account of object control outlined above centers on the recognition of a transitive verb phrase constituent such as *persuade to leave*. Extending a phrase structure variant of the same analysis to *appeal* leads to the assignment of (56) to the VP of the grammatical sentence in (53a).

56



Here the sequence *appealed to cut herself* is treated as a V^2P that intraposes its PP object *to Sandy* between the head verb and infinitival. Alternatively, the sequence *appealed to* can, as Bach (1979) suggests, be treated as the verb, and *Sandy* as the argument of the V^2P. This structurally similar analysis is represented in (57).

57



Either way, *Sandy* or the prepositional phrase containing *Sandy* constitutes the first argument in, and hence the controller of *herself*.

Supplementing the rules in (37)–(38), with the rules in (58) admits the non-terminal skeleton of (56). Likewise, adding just (58b) sanctions the skeleton in (57).

58 a. $VP \rightarrow V^2P$, PP

b. $V^2P \rightarrow V^3$, VP

The obligatory PP-VP (or NP-VP) order is enforced by the branching condition in (38b), since permutation of the PP (or NP) and infinitival would result in a configuration in which the infinitival VP precedes a hierarchically superior codependent.

8.3.2.3 Subject Control

In contrast, a strict phrase structure implementation of the Montagovian analysis of subject control will combine the verb *appear* first with the prepositional phrase *to Sandy*, and only subsequently with the controlled infinitival. The structural descriptions associated with the VPs in (44) are illustrated below.

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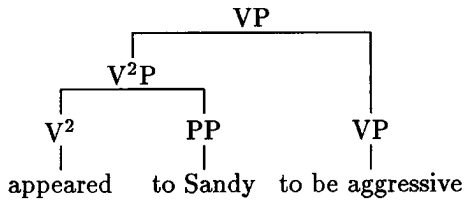

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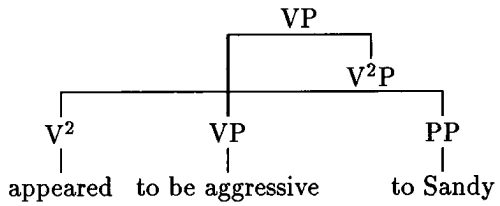


Given these structural analyses, the subject will be the first argument of a predicate containing the infinitival and consequently able to control the reflexive. Further, the order in (60) conforms to the LP rules in (38). What remains to be accounted for is the wellformedness of both sentences in (44).

The positional freedom of *to Sandy* in these sentences can be attributed in part to the generally free serialization options that prepositional phrases along with adverbials, modifiers and optional arguments enjoy in English. Thus, the alternation in (44) fits into a larger pattern which includes sentences like (61), containing the temporal adverbial *yesterday*.

61 a. Kim appeared yesterday to be unusually aggressive.

b. Kim appeared to be unusually aggressive yesterday.

Moreover, as is characteristic of this class of expressions, the prepositional phrase in (44) can be freely omitted, as (62a) illustrates.

62 a. Kim appeared to be aggressive.

b. *Kim appealed to be aggressive.

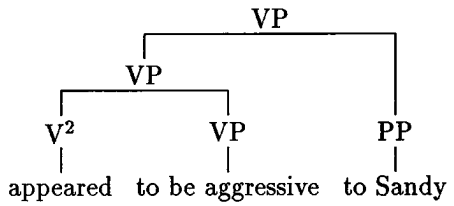
This option again distinguishes the sentences in (44) and (45) since, as (62b) shows, omitting the PP in (45b) results in ungrammaticality.

The examples above support the familiar descriptive generalization that optional prepositional phrases and adverbials are freely permutable in English. The ungrammaticality (on the intended interpretation) of **Max promised to leave Helga* shows that optionality is not a sufficient condition. Similarly, on the analysis represented in (56), the illformedness of (45b) indicates that not all prepositional phrases are permutable, since the subcategorized prepositional phrase *to Sandy* is subject to fixed ordering constraints. Sanctioning the free permutation options exhibited in (44) requires exempting optional prepositional phrases and adverbials from the invariant ordering pattern imposed by the branching condition in (38b). The most straightforward means of achieving this involves definining the class of dependents that this condition ranges over as excluding optional prepositional phrases and adverbials. This revision permits the limited freedom illustrated in (44), since such elements will still be subject to the head placement condition in (38a).

Notice, incidentally, that the argument/nonargument distinction invoked to permit free ordering can also be exploited to provide an alternative account of the distinction between *appeal* and *appear*. Specifically, if controllers are restricted to subcategorized arguments, *to Sandy* will constitute an admissible

controller in (45) but not (44), since it is a subcategorized argument of *appeal* but not *appear*. This account is compatible with the structural descriptions in (63) and (64) below as well as the analyses in (59) and (60).[32]

63



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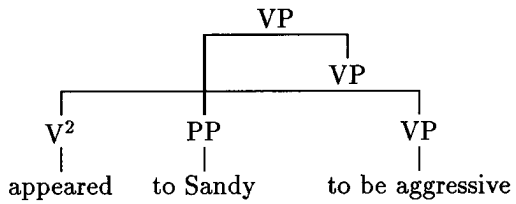


8.3.3 Recursive Object Control

Let us next explore some extensions of object control constructions. The three core ID rules introduced above are repeated in (65). These rules all sanction configurations that can plausibly be viewed as universal: (65a) admits sentences consisting of an NP subject and verb phrase, (65b) licenses verb phrases composed of a direct object and transitive verb phrase, while (65c) admits transitive verb phrases comprised of a ditransitive verb and VP complement.

[32]Though verbs like *want* pose a challenge to an account that depends on argument status, since the optional object of *want* is, when present, an obligatory controller.

65 a. $S \rightarrow VP, NP$

b. $VP \rightarrow V^2P, NP$

c. $V^2P \rightarrow V^3, VP$

Since it is the valence rather than lexicality of verbal elements that determines their combinatorial options, phrasal suffixes on verbal categories in ID rule expansions can be treated as optional. Thus the rules in (65) can be generalized to the schemata in in (65).[33]

66 a. $S \rightarrow V(P), NP$

b. $VP \rightarrow V^2(P), NP$

c. $V^2P \rightarrow V^3(P), V(P)$

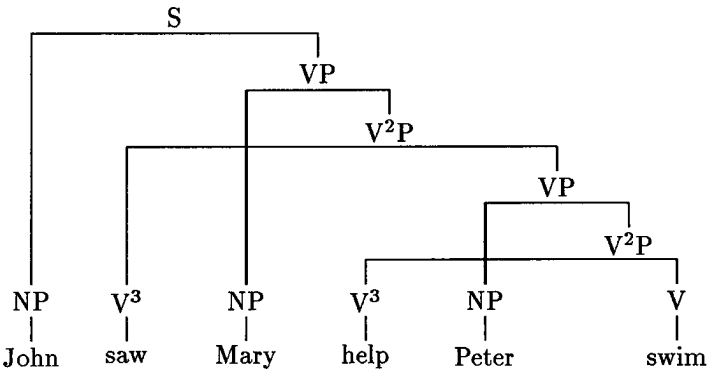
The English-specific ordering principles proposed above are summarized in (67).

67 a. $H \prec X$ in H^1P

b. xPy only if x c-commands y

In addition to the examples presented above, these ID and LP rules admit the doubly-embedded control structure in (68), repeated from Chapter 5.

68

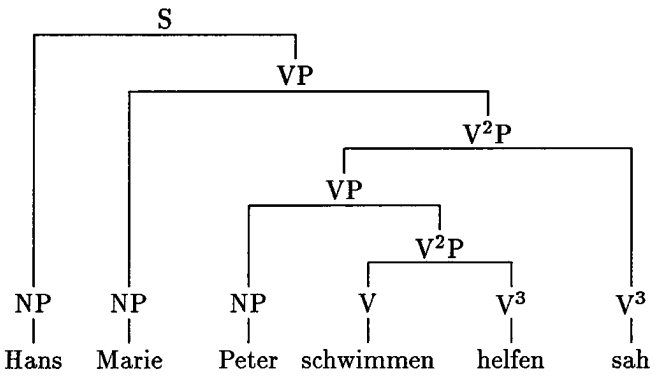


[33]Recall also the abbreviatory convention of omitting superscripts for monadic predicates, e.g., V for V^1 and VP for V^1P.

Similarly, the ID rules in (66), in conjunction with the LP rules (66b) and (69), describe the head-final subordinate German pattern illustrated in (70).

69 $X \prec H$ in H^0P (heads are final in maximal phrases)

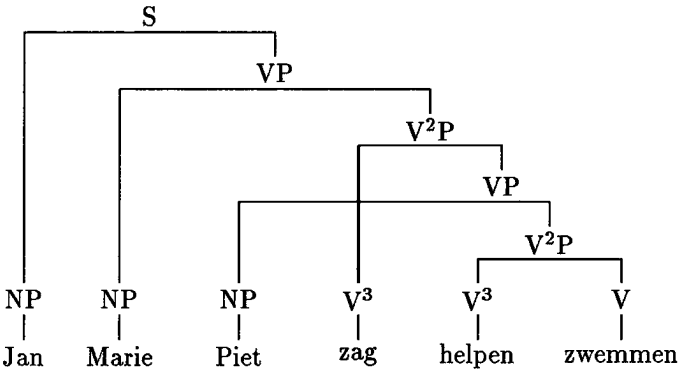
70



Although the ID rules in (66) assign an isomorphic hierarchical structure to the English and German sentences, the distinct LP rules establish characteristically different serialization patterns. The center-embedded German pattern results from the interaction of the rules in (66) with consistently right-branching, head-final, order imposed by (66b) and (69). Thus, the relative order of *helfen* and *sah* is determined by the fact that *helfen* heads a nonfinite VP complement of *sah*. In contrast, discontinuity arises in English due to the mismatch between left-peripheral head placement and right-branching requirements imposed by the LP rules in (67).

The hierarchical structure of the corresponding Dutch structure in (71) is likewise admitted by the ID rules in (66).

71



However, while this structure exhibits the right-branching structure determined by (67b), the strategy of positioning all constituents on one flank of the verb is here undermined by the consistently phrase-medial order of verbs in these constructions. For example, *zag* in (71) intervenes between the parts *Piet* and *helpen zwemmen* of its discontinuous complement. As a result, the segregated ordering patterns in these structures are better enforced by a syntactic category-sensitive condition like (72).[34]

72 $NP \prec V^n$ in V^0P

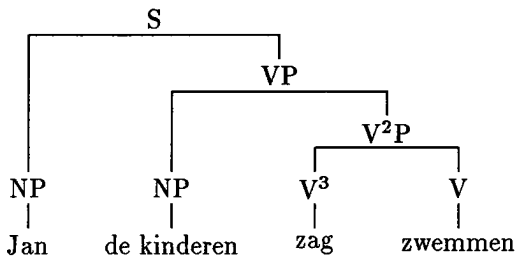
Condition (72) has the effect of ordering an NP before any verb that is most immediately dominated by the same S node.[35] In the absence of a head placement rule to take precedence over (67b), this default rule imposes a generally right-branching structure within the segregated nominal and verbal sequences induced by (72). Further, since these conditions do not order siblings of the

[34] Condition (72) can, if desired, be recast in terms of appropriate syntactic features.

[35] In a more articulated grammatical description, (72) would, like (69), be restricted to subordinate clauses.

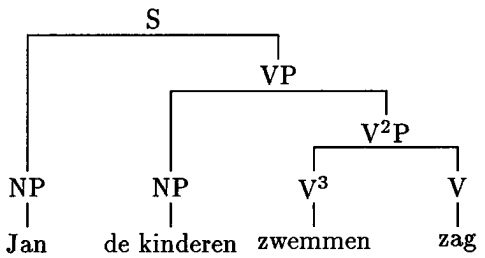
same category, they correctly admit the structure in (73), in which *zag* precedes its sibling *zwemmen.*

73



The structure corresponding to the permuted variant in (74), in which *zwemmen* precedes *zag,* is likewise admitted.

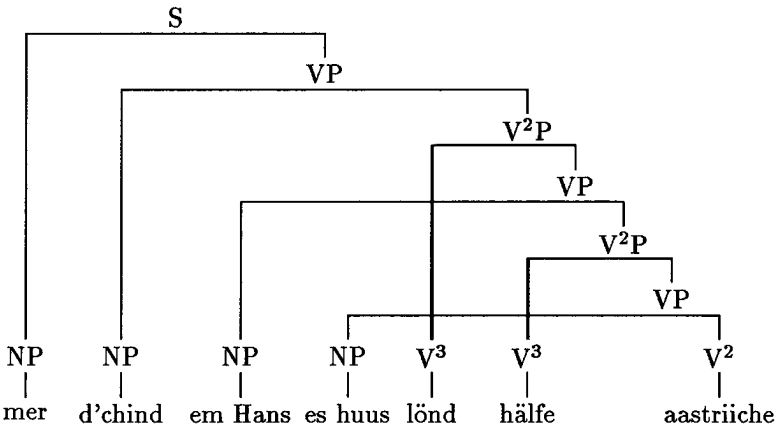
74



However, this optionality must be distinguished from the fixed order of ***helpen*** and its complement *zwemmen* in (71). (75) provides a candidate condition which distinguishes the two cases on the basis of the fact that the verbal siblings, and in particular the head sibling, in a doubly-embedded OIC construction will be nonfinite.

75 H[-FIN] $\prec$ V^1

The rules proposed for Dutch cross-serial constructions rules also admit the subclass of consistently intercalated counterparts in Swiss German. A representative example is diagrammed below.



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Nevertheless, the rigid segregation induced by (72) does not allow the range of word order freedom attested in Swiss German. As various authors have noted, a restricted amount of permutation is tolerated within subordinate clauses. Haegeman and van Riemsdijk, drawing on Lötscher (1978), illustrate this variation with respect to the paradigm in (77).[36]

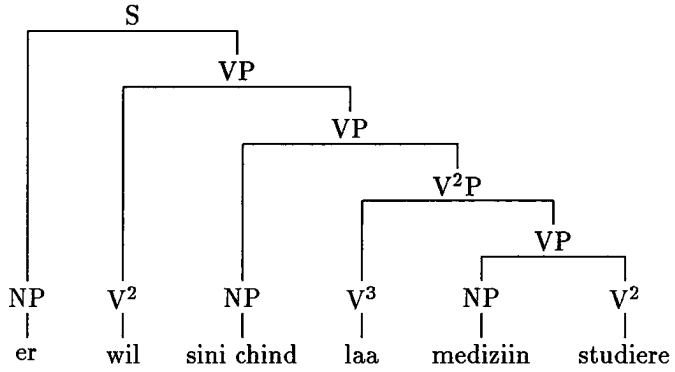
77	a.	*das*	*er*	*sini*	*chind*	*mediziin*	*wil*	*laa*	*studiere*
		that	he	his	child	medicine	wants	let	study
		'that he wants to let his son study medicine'							
	b.	*das*	*er*	*sini*	*chind*	*wil*	*mediziin*	*laa*	*studiere*
	c.	*das*	*er*	*sini*	*chind*	*wil*	*laa*	*mediziin*	*studiere*
	d.	*das*	*er*	*wil*	*sini*	*chind*	*mediziin*	*laa*	*studiere*
	e.	*das*	*er*	*wil*	*sini*	*chind*	*laa*	*mediziin*	*studiere*
	f.	**das*	*er*	*wil*	*laa*	*sini*	*chind*	*mediziin*	*studiere*

The permutations in (77b-f) are subject to a pair of restrictions. In the first place, a fixed relative order is preserved within both the nominal and verbal

[36]Other examples that Haegeman and van Riemsdijk discuss (esp. 29 on p. 428) suggest that sentences in which *mediziin* occurs finally are also ungrammatical.

sequences. For instance, *wil* consistently precedes *laa*, which invariably precedes *studiere*. A rigid order is similarly observed by the nominals *er*, *sini chind* and *mediziin*. Moreover, nominals may optionally follow superordinate verbs, though they must precede the verbal head of the phrase containing them. The sentence in (77e), represented in (78) below, illustrates the limit of leftward verbal drift, as both *wil* and *laa* precede nominal elements.

78



The nominals in this continuous structure occur as far to the right as possible, given the requirement that *sini chind* must precede *laa* and *mediziin* must precede *studiere*.

The ordering pattern exhibited in (77) is described by the LP rule in (79), in conjunction with the default condition in (67b).

79 NP $\prec$ H in H^0P

(79) orders each NP before the head of the phrase containing it. The default branching rule in (67b) likewise imposes a right-branching order within the nominal sequence. Further, since the degenerate head placement rule in (79) does

not restrict what can follow a verbal head, (67b) applies to restore a generally right-branching structure among verbs and in nonnominal complements of verbal heads.

The grammar fragments outlined above assign a fixed constituent structure to a range of Germanic subordinate clauses, and hence confine cross-linguistic variation largely to the principles that determine constituent order. Specifically, the ID rules in (66) largely determine the hierarchical structure of the mobiles presented above. Likewise, the default ordering condition that determines generally right-branching structures recurs in each of the ordering components. The proposed descriptions thus illustrate the potential succinctness advantage of an ID/LP grammar whose LP rules range over nonsiblings.

8.3.4 Generating Free Orders

The succinctness advantage of a modified ID/LP grammar is, moreover, maximized in languages that impose degenerate word order conventions. Consider, for example, simple transitive clauses in Yimas, which exhibit the variation illustrated by the examples below.

80 a. *payum* *narmaŋ* *na-mpu-tay*
man-Pl woman-Sg 3SgObj-3PlSbj-see
'The men saw the women.' [F167]

b. *narmaŋ* *payum* *na-mpu-tay*

c. *payum* *na-mpu-tay* *narmaŋ*

d. *narmaŋ* *na-mpu-tay* *payum*

e. *na-mpu-tay* *payum* *narmaŋ*

f. *na-mpu-tay* *narmaŋ* *payum*

While it is possible to derive these ordering patterns by means of distinct ordered phrase structure rules, or through the application of transformations, wrapping operations or other devices, these alternatives all lack the economy and succinctness of a grammar containing order-free phrase structure rules.

A simple grammar comprising just the unordered ID rules in (81) will admit the full paradigm in (80).

81 a. S → NP,VP

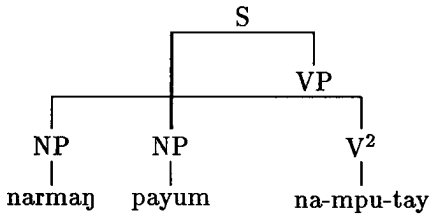
b. VP → V^2,NP

c. V^2 → *na-mpu-tay*

d. NP → *payum*|*narmaŋ*

The rules of this grammar induce an articulated branching structure, which includes a conventional subject/predicate clausal analysis. This structure is illustrated by the mobile in (82).

82

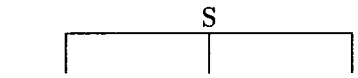


The hierarchical structure of the five other permutations in (80) is isomorphic to that represented in (82). Structural differences between these variants are entirely confined to observable differences in linear order.

This is in contrast to most familiar treatments of free word order languages, which assume a correlation between permutability and variable or degenerate hierarchical structure. I will not attempt here to give an exhaustive summary of the range of analyses that have been suggested, but will instead briefly outline representative illustrations of different dominant strategies. The W* grammars suggested by Hale (1981), and developed in greater detail by Nash (1986), provide one means of directly generating a language that imposes few ordering constraints. These degenerate grammars consist essentially of a single rule like (83), which rewrites a nonterminal E as a concatenation of words assigned category labels.

83 $E \rightarrow W^*$

The structural descriptions assigned by such a grammar are minimally articulated, consisting a nonterminal root E which immediately dominates a sequence of labelled terminals. A W* description associated with (80b) is provided below.



Hale (1981) recognizes that the use of W* grammars to describe free word order languages induces a typological bifurcation of natural languages into 'non-configurational' W* languages and more familiar families of 'configurational' $\bar{X}$ languages, which exhibit a more articulated constituent structure. Pullum (1982) objects to this taxonomy on the grounds that the hypothesis it expresses about possible structural variation in natural language is far too weak to accept in the absence of compelling evidence. In particular, by postulating a radical dichotomy between languages that have and languages that lack hierarchical structure, Hale's classification essentially permits constituent structure to vary without limit. The parallel distinction between the formally distinct classes of W* and $\bar{X}$ grammars expresses a similarly pessimistic view regarding variation in generative devices.[37]

The alternative that Pullum (1982) advocates involves the use of 'liberation metarules', which, intuitively, have the effect of pruning all of the nonterminal nodes of a tree aside from the root and preterminal nodes. The particular metarule that Pullum proposes to allow scrambling of NP subconstituents out of a VP is repeated in (85).

85 $\{\text{VP} \rightarrow \text{NP}[F], X\} \Rightarrow \{\text{VP} \rightarrow \text{Det}[F], \text{N}[F], X\}$

[37]Notice, for example, that the rule in (83) is not a phrase structure rule, as the right hand expansion W* is a regular expression, whereas the right hand side of a standard phrase structure rule must be a finite string.

The input to this rule consists of ID rules that permit a VP to dominate an NP bearing the feature set F, along with some additional labelled nodes (or multiset) X. Given such an ID rule, (85) sanctions a further rule in which a VP dominates a determiner and noun, each with the feature set F, and the same additional material X. By flattening out the structural description assigned by the input rule, a metarule like (85) makes sisters of nodes (in this case Det[F] and X, and N[F] and X) that were formerly separated by an intervening nonterminal (NP[F]). Consequently, these nodes can now be ordered, or left to permute freely, by standard LP statements that range over siblings.

Nevertheless, it is not clear that Pullum's proposal expresses a substantially stronger universalist position than Hale's alternative. That is, if languages can differ with respect to whether their grammars make use of liberation metarules, the bifurcation present in Hale's classification has not been eliminated so much as relocated. Although the grammars of individual languages cannot differ radically in the way that Hale suggests, the constituent analyses available for the sentences of different languages can. In short, Pullum has dispensed with the distinction between $\bar{\text{X}}$ and W* grammars, but has retained a parallel typological distinction between languages that assign $\bar{\text{X}}$ and those that assign W* structural descriptions.

Moreover, as Uszkoreit (1987) observes, the lack of general constraints on the form of liberation metarules is problematic in many regards. In the first place, such rules lead to widespread and spurious structural ambiguity when-

ever the 'liberated' constituents are adjacent and conform to the LP rules of a grammar, since this configuration can be generated either by the input or output rule. Moreover, unlike the rules of function composition familiar from recent work in categorial grammar, liberation rules, as formulated by Pullum, do not systematically collapse a pair of ID rules to obtain a third derived rule. Rather, such rules are specified on an *ad hoc*, case-by-case basis that fails to capture the similarity between the output of a liberation rule and the constituents introduced by the 'pruned' nonterminal node. This shortcoming is remedied by Uszkoreit, who suggests the ID rule counterpart of functional composition in (86), in which α, β range over single symbols and ϕ, ψ range over strings (or multisets) of symbols.

86 $\alpha \rightarrow \phi, \beta$
$\beta \rightarrow \psi$
$\Rightarrow \quad \alpha \rightarrow \phi, \psi$

Although this rule format expresses the systematic relation between input and output rules, it nevertheless generates the same spurious ambiguity and permits the same degree of structural variation as Pullum's original rules.

Spurious variation and ambiguity are also characteristic of transformational strategies for generating free permutation. These typically involve the iterative application of movement rules to the output of a set of base rules that assign an articulated representation and determinate word order. A paradigm example is the scrambling transformation proposed by Ross (1967), repeated below.

87	X	α	β	Y	OPTIONAL
	1	2	3	4	$\Rightarrow$
	1	3	2	4	

The variables α, β in (87) range over elements of {N, NP, V, VP, Adj, Adv}. The clause-bounded character of the permutations sanctioned by this rule is ensured by the condition that any sentence S_i dominates 2 iff S_i dominates 3.

As the supplementary condition above suggests, classical scrambling rules, as well as their contemporary descendents, are difficult to constrain and corresponding difficult to accomodate within even the heterogeneous transformational paradigm. Thus, canonical movement rules typically apply only to (phrasal) constituents and operate over an unbounded domain. In contrast, the scrambling rules Ross proposes for Latin may apply to arbitrary parts of a phrase, while the domain of their application is bounded by clause boundaries. Further, rules of this sort give rise again to widespread structural and derivational ambiguity, as any sentence conforming to the order determined by the base rules can either be generated by those rules alone, or can be derived from the output of the base rules by iterations of (87) that deform and then restore the base order.[38]

Moreover, although the rule in (87) does not specify the derived constituent structure of its output, scrambling rules have almost uniformly been interpreted as operations that alter hierarchical structure. This interpretation is in fact

[38]Indeed, as Lapointe (1981) notes, scrambling rules lead to potentially unbounded derivational ambiguity, as sentences will have potentially infinitely many derivations in which scrambling rules simply permute elements back and forth.

difficult to avoid on standard assumptions about phrase structure. Yet notice that the structural variation introduced by scrambling rules is purely an artefact of unmotivated constraints on representation and hence cannot be construed as expressing a substantive, let alone restrictive hypothesis about constituent structure. Rather, variation in hierarchical structure is dictated by word order variation.

However, along with a succinctness advantage, mobile grammars provide a high degree of cross-linguistic hierarchical consistency. The dual benefits obtained by decoupling order and structure can be more clearly illustrated with reference to Dyirbal, as described by Dixon (1972). If Dixon's claim that clause-bound permutation preserves grammaticality is essentially correct, a five word transitive clause like (88a) will have 119 wellformed paraphrases. (88b) provides a thoroughly intercalated representative.

88	a.	*balan*	*ɖugumbil*	*banŋgul*	*yaraŋgu*	*balgan*
		there-Ab	woman-Ab	there-Er	man-Er	hit-Nf
	b.	*balan*	*yaraŋgu*	*balgan*	*ɖugumbil*	*banŋgul*
		there-Ab	man-Er	hit-Nf	woman-Ab	there-Er

'man hits woman' [D68:79]

In rule systems that impose an obligatory ordering on the elements they introduce, the number of permutated alternatives is directly correlated with the number of rules or the number of application of rules. In an unordered rule system, however, the number of admissible permutations is more nearly inversely proportional to the number of LP rules.

Thus, each of the grammatical variants of (88a) is admitted by the grammar consisting of the ID rules in (89).[39]

89 a. S → NP,VP

b. VP → V^2,NP

c. NP → Det,NP

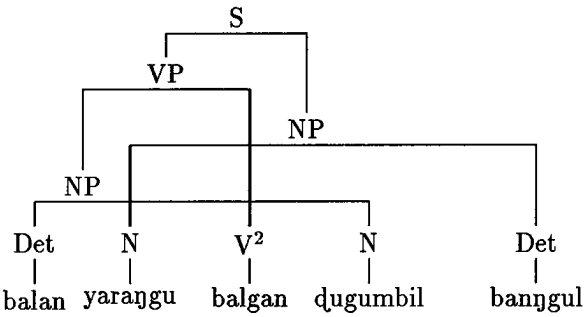
d. V^2 → *balgan*

e. N → *ɖugumbil|yaraŋgu*

f. Det → *balan|baŋŋgul*

The structure that these rules assign to (88b) is exhibited below.[40]

90



Although mobile grammars containing few or no LP rules provide an economical description of languages with degenerate ordering constraints, the constituent intercalation that they permit must nevertheless be bounded. The examination of free word order phenomena in Chapter 6 suggests that indicative

[39]In the absence of conditions guaranteeing classifier/noun congruence, ungrammatical sentences containing NPs with mismatched classifiers and nouns will also be admitted.

[40]Recall that the distinction between lexical and phrasal categories does not directly affect combinatorial options in Dyirbal, since all members of lexical categories qualify, by virtue of their morphology, as autonomous phrases. The syntactically nondistinctive character of lexical/phrasal differences can be reflected in a variety of ways, e.g. by introducing only phrasal elements in the expansions of the rules in (89).

clauses provide scrambling islands, in that elements from different indicative sentences may not be freely mixed together. Identifying indicative sentences as the maximal domain within which elements introduced by ID rules may be freely ordered permits the patterns above without allowing unattested scrambling across indicative clause boundaries. As a restriction of this nature clearly interacts with the analysis of derived sentence types, let us turn next to a consideration of strategies for generating these constructions.

8.3.5 Bounded and Unbounded Dependencies

First, it will be useful to briefly summarize the rule inventory introduced in the analyses presented above. Endocentric ID rules are consistently of the form $H^nP \rightarrow H^m(P)$,Z, where $n \leq m$. Serialization rules, in contrast, form a more heterogeneous class, as both the terms they incorporate and the domains they range over are subject to variation. Absolute head placement rules, like the English rule in (67a), repeated in (91a) below, position a head within a designated phrasal projection. Relativized head placement rules like (79) position a head relative to some designated category, NP in this case. The category-sensitive rule in (72), introduced to describe cross-serial ordering patterns in Dutch, illustrates another variation on LP rules, as (72) orders elements on the basis of syntactic category within an absolute domain.

91 a. $H \prec X$ in H^1P

b. xPy only if x c-commands y

Serialization rules of the type exemplified in (91b) determine a default branching direction by establishing a systematic correspondence between hierarchical height and linear order of nonheads. The domain of these conditions may also be variable, if as suggested above, free permutation of nonargument PPs and adverbials is permitted by exempting such elements from branching rules.

These rules provides a means of associating matrix polar questions like (92a) with discontinuous analyses that are similar to earlier descriptions of ditransitive and control constructions.

92 a. Gladys can drive.

b. Can Gladys drive?

Applied to clauses, the rule in (91a) positions both auxiliary and nonauxiliary verbs initially within the VPs they head, while the rule in (91b) determines the branching direction for VP-internal nonheads. If, as suggested above, the application of default branching rules is restricted by the domain of head placement rules of a language, the rule in (91b) will not establish an order for VP-external elements. In order to sanction the alternation in (92), the supplementary rule that positions the subject of an English sentence must fail to assign a relative order to subjects and auxiliary verbs in matrix clauses.

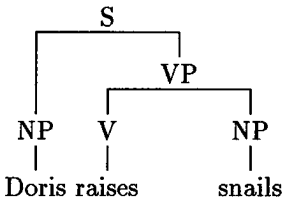
A candidate condition is provided in (93).

93 NP $\prec$ V[-AUX]

In conjunction with the rules in (91), (93) has the effect of requiring any NP occurring outside the VP to precede any nonauxiliary phrasemate verb. This

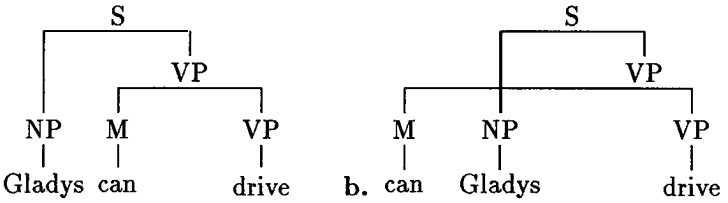
ensures that declarative sentences headed by nonauxiliary verbs, such as *Doris raises snails*, diagrammed below, will conform to an SVO order.[41]

94



In contrast, both of the structures in (95) are compatible with the ordering conditions proposed above.

95



The head placement rule orders the modal initially within the matrix VP. Likewise (93) orders the subject NP before the nonfinite head of the embedded VP complement. However, the [-AUX] restriction on (93) ensures that this LP rule does not establish an invariant order for the subject and auxiliary verb, and hence allows both of the orderings in (95).[42]

Serialization rules that do not establish an ordering for subjects and auxiliary verbs thus provide a means of directly admitting both declarative and interrogative clauses headed by a modal or auxiliary verb. The fact that basic

[41] Recall that the label 'M' was specified above as V[+AUX] and V, implicitly, as V[-AUX].

[42] Additional restrictions must be placed on the distribution of unstressed *did*, as well as obligatorily initial elements like (first person) *aren't* and uninvertible quasi-auxiliaries like *better*. These lexical idiosyncracies can, if desired, be captured by means of LP rules that make reference to individual lexical items.

serialization rules can order only phrasemates (or clausemates) ensures that the auxiliary 'inversion' that results from the absence of rules ordering a subject and finite auxiliary is invariably clausebounded, as desired. Alternatively, the subject-initial declarative order can be designated as basic, and auxiliary-initial sentences derived by means of supplementary rules. However, since the motivation for pursuing this latter strategy is clearer in connection with unbounded dependencies, let us turn directly to a consideration of such constructions.

The locality constraints on LP rules and the relatively fixed clause-initial positioning of dislocated elements undermines the strategy of describing potentially unbounded extraction constructions by exempting dislocated elements from LP constraints. It is, however, not immediately clear what is the most productive strategy for extending serialization rules to apply over potentially unbounded domains. Hence, in what follows I will briefly outline one possible approach, without attempting to evaluate it against the various available alternatives.

Since derived constituent structure typically plays a nominal role in classical transformational descriptions of *wh*-fronting, the rules that figure in such analyses can, if desired, be reformulated as reordering rules of the sort proposed by McCawley. Likewise, the more general injunction in (96), from Chomsky (1977:85)

96 move *wh*-phrase into COMP

can be rendered by the corresponding permutation rule in (97).

97 advance *wh*-phrase to the front of S

Such a rule can be implemented, in the manner outlined in §8.1.3, as a mapping between mobiles which alters precedence relations while preserving hierarchical structure.[43]

However, a more direct means of sanctioning dislocation structures involves introducing a class of rules that may license specific configurations that violate LP constraints. For example, an override rule like (98) can achieve the effect of a reordering rule that fronts designated interrogative elements.

98 XP[+WH] $\succ$ S

Rules of this form are interpreted as existential conditions that, sanction rather than filter structures. (98), in particular, can be taken to license any mobile in which the only nodes that precede other nodes in violation of an LP condition are dominated by a sentence-initial *wh*-phrase.[44] The existential interpretation of (98) will allow interrogatives to remain *in situ*, though additional conditions must be imposed to restrict this option to *wh*-phrases which receive contrastive stress or which are preceded by a hierarchically superior interrogative clause-mate.

[43] Actual implementations of (97) would need to resolve various questions which are not specified by injunctive principles like (96) and (97); in particular, questions concerning the order in which elements are permuted in complex clauses or sentences containing multiple interrogative phrases.

[44] A constituent X can be said to occur initially within a sentence S whenever X precedes each element dominated by S which does not dominate X.

Requiring that XP[+WH] occur initially within the sentence most immediately dominating it will ensure that interrogative fronting remains clausebound, while omitting the [+WH] qualification permits topicalizations and other non-interrogative dislocation structures. Moreover, a condition like (98) yields a straightforward prohibition against clause-initial sequences of dislocated elements in English, given that all but the first member of such a sequence will fail to occupy an initial position and hence will not be allowed by (98). Nevertheless, the application of (98) would otherwise be unrestricted, with island effects captured by means of representational constraints of the sort discussed earlier.

The strategy roughly sketched out here raises numerous other issues and a range of potential problems. As noted above, conditions like (98) must take precedence over the rules that determine head placement in languages like English. Additional constraints must also be imposed to govern the complex interaction of preposing and inversion.[45] Likewise, familiar ordering differences between matrix and subordinate clauses and intonational differences between topicalizations and *wh*-questions must ultimately be taken into account.

8.3.6 Summary

The preceding sections adumbrate various strategies for generating discontinuous representations. The basic intuition underlying these proposals is that dis-

[45]It may be that the constituents that 'trigger' inversion in matrix clauses, namely interrogatives and negatives, are suitably characterized as semantic operators, though it is unclear what form the syntactic correlates of this classification should take.

continuity arises principally as a result of inconsistent structural requirements. Locally discontinuity is ascribed to a mismatch between branching direction and the placement of phrasal heads. Similarly, the discontinuous structure associated with unbounded dependency constructions is induced by the clause-initial positioning of distinguished interrogative and focused constituents. Scrambled sentences of free constituent order languages exhibit the most extreme structural conflict, as they may not show any stable correlation between hierarchical structure and order. The specific proposals outlined involve relaxing the locality constraints of the standard ID/LP format to bring it somewhat closer to the 'set system' of Curry (1961), though more even radical modifications may be required to describe adequately the phenomena considered above.

Chapter 9

Some Remaining Questions and Issues

The present study reviews a model of phrase structure that sanctions discontinuous and multidominated structures, and examines a range of construction types that are argued to instantiate such configurations. The principal focus of this work is on representational properties, and, in particular, on the manner in which the assignment of discontinuous structural descriptions facilitates a revealing and straightforward characterization of structure-sensitive syntactic phenomena. Proposals for generating nonstandard representations are outlined at various points in this discussion, though it is assumed throughout that representational issues can be productively investigated independently of generation strategies. This assumption clearly conflicts with the standard generative practice of evaluating syntactic analyses in close conjunction with proposals for generating them. Nevertheless, if the central claims of this work are in the main correct, this would suggest that the generative emphasis on systems of rules and

principles has substantially hindered rather than advanced the understanding of representational issues.

A number of questions that remain either unresolved or altogether unaddressed in earlier discussions deserve further comment at this point. Let us begin with some general considerations and proceed to more specific issues.

9.1 Phrase Structure

The strategy for defining discontinuous and multidominated structures essentially involves removing the constraints that ensure continuity and 'single motherhood' in a standard arboreal model of phrase structure. The resulting model of phrase structure may however be too permissive in that it allows unnatural configurations of a sort that are not instantiated by any natural language. This possibility is perhaps clearest in connection with multidominated structures. Although cycles (loops in which a node dominates itself) are barred by the requirement that the dominance relation be a partial order, no restrictions are imposed on the number of branches that can converge on a common node or on the structural relations which may hold among various converging branches.

Likewise, discontinuous constituents are characterized somewhat negatively as elements which fail to stand in a precedence relation to some other constituent or constituents (to which they are not related by dominance) within a representation. A more perspicuous and revealing representation of discontinuous

constructions might be obtained by factoring out discrete, fully ordered planes of the sort recognized in nonlinear models of phonology.[1] For example, it might be possible to eliminate crossing patterns by characterizing syntactic structures more consistently as multidimensional objects. However, it is not immediately clear what criteria to apply in segregating syntactic planes.[2] In particular, no natural class of syntactic elements has been shown to exhibit the types of locality effects that motivate plane separation in phonological representations.[3] In sum, although additional constraints on discontinuity and multidomination are clearly desirable, the syntactic constructions that have thus far been analyzed as discontinuous or multidominated do not suggest any general restrictions.

The techniques outlined earlier for generating multidominated structures rest on the decomposition of phrase structure rules into rules that introduce hierarchical structure and those that determine linear order. This decoupling of structure and order is parallel to the dissociation of dominance and precedence relations induced at the level of phrase structure. A principal benefit of such a division of labour is that it allows the assignment of uniform hierarchical structure to sentences with different constituent order. This in turn facilitates canonically binary constituent analyses, configurational definitions of

[1] See, e.g., McCarthy (1979).

[2] Determining a principled grounds for planar separation is also a nontrivial problem in contemporary models of nonlinear phonology. See the discussion in McCarthy (1989).

[3] Though van Riemsdijk (1982) argues that the construal of split phrases in Warlpiri is restricted by a syntactic analogue of the standard phonological prohibition against crossed association lines.

grammatical relations, and the reduction of ostensibly structural distinctions to observable differences in word order.

As the primary locus of ordering information, linear precedence rules are accordingly responsible for capturing a large measure of cross-linguistic variation. Although the specific rules proposed in the grammatical fragments above may be deficient in various respects, such linearization rules provide a useful and economical means of imposing order on the structures sanctioned independently by order-free hierarchical conditions. In particular, extending the domain of LP rules and introducing the head and nonhead metavariables 'H' and 'X' facilitates the peripheral placement of distinguished head constituents within endocentric constructions. An obvious limitation of head placement rules of the sort outlined above is that they do not allow a head or other distinguished element to be ordered after (or before) exactly one other element. One way of extending the present notation to overcome this shortcoming involves interpreting 'X' as ranging over single constituents, and adding a variable, such as 'X*', ranging over arbitrary sequences of nonheads. This modification provides a means of characterizing some syntactic 'edge effects', though it still does not supply a fully general notion of an initial position. Defining occupant-independent positions in purely linear terms would seem to require collapsing precedence conditions into syntactic templates of some sort. Although adopting this alternative would entail altering the form in which ordering requirements are imposed, explicit

precedence conditions would nevertheless remain a basic component of the resulting grammatical formalism.

Parochial ordering rules are sometimes assailed by proponents of REST accounts that pursue a different strategy for decomposing phrase structure rules, on the grounds that linear rules are deficient as explanatory principles. This criticism is succinctly expressed in the following passage from Stowell (1982).

> Although formulae of the type illustrated in (2) [i.e. H $\prec$ NP $\prec$ PP $\prec$ $\bar{S}$] may be valid as a means of stating descriptively true generalizations of constituent order at some level of representation, it is far from obvious that rules of this type are actually responsible for the observed orderings. Notice that these rules essentially stipulate the orders in which the terms must occur, ***and therefore do not explain them.*** Nothing in the theory of phrase structure provides a principled reason for expecting the order in (2) as opposed to any other arbitrary order; nor is there any formal explanation for why why the grammars of Walpiri, Latin, Sanskrit and Japanese eschew them entirely. Because these rules directly stipulate the observed constituent orders, it is impossible to find an independent explanation of them without rendering the LP rules superfluous. (p. 239, emphasis added)

We must, I believe, reject Stowell's presupposition that the word order conventions of individual languages must, or even can be explained in terms of syntactic principles that are more basic or less stipulative than linear precedence statements.[4] While pragmatic principles may plausibly account for the

[4]Certainly, the principles that Stowell invokes are neither less stipulative nor more explanatory than LP rules. In the alternative decomposition of phrase structure rules that Stowell proposes, the burden of determining ordering regularities is shifted onto versions of Case Theory and Θ-Theory. Constraints on constituent order are attributed to an adjacency requirement on Case assignment, in conjunction with Stowell's Case Resistance Principle, which stipulates that Case cannot be assigned to categories that themselves assign Case. Yet, the pivotal Case assignment relation lacks any clear intuitive or morphological content, and is defined wholly in extension. Stowell simply lists a set of categories that assign Case, along

recurrence of syntactic patterns, rules that directly establish order have as clear a claim to primitive status or epistemological priority as any current syntactic principles.

Unlike linear order relations, which must be represented in any adequate syntactic description, the assignment of an articulated hierarchical structure expresses a hypothesis about the central role of part/whole relations in syntactic representations. The viability of this hypothesis has been assumed rather than defended in this work, and much of the discussion has concentrated on motivating specific structural analyses. Hierarchical structure is defined by order-free phrase structure rules in the grammatical fragments presented above. However, no substantive commitment to such rules is intended, and they can, if desired, be viewed as representing epiphenomenal patterns which are extracted from the subcategorization frames or type assignments of individual lexical items.

There are a number of obstacles to any reasonable implementation of a lexical entry-driven description. Foremost among these is the lack of sufficiently articulated theories of subcategorization and syntactic features. Thus, for example, it seems clear that the crude verbal valence classes delimited above must be further subdivided to reflect differences in the syntactic category and order

with a set of categories that require Case and a set of environments that allow Case assignment. Because his account stipulates these sets and conditions, it cannot explain why the sets of categories that assign Case and those that require Case must be disjoint rather than coextensive, why Case assignment requires government and adjacency as opposed to one or the other or neither, or even why Case assignment should play any role at all in determining the grammaticality of sentences of natural language. In short, Stowell's account attempts to explain regularities in constituent order in terms of principles that are no less stipulative and no less in need of explanation than the ordering patterns that they ostensibly explain.

of combination of subcategorized elements. These distinctions are transparently represented in the type assignments of pure categorial systems of the sort proposed by Ajdukiewicz (1935), Bar-Hillel (1953) and Lambek (1961), which essentially identify the syntactic category of a formative with its subcategorization frame. However, these systems are not immediately adaptable to present purposes, as their extreme parsimony leads to familiar problems in connection with the characterization of such traditional notions as 'part of speech'. The existence of subcategorization differences within each of the major categories, as well as similarities that cut across them, makes notions like part of speech difficult to reconstruct in terms of valence classes, however finely individuated.

The standard GPSG characterization of nonterminal symbols avoids this problem by incorporating both a subcategorization feature and a specification for the major category features ±N, ±V; a similar solution is formulated within a categorial system by Bach (1979). Nevertheless, the greater flexibility achieved in GPSG accounts through the dissociation of subcategorization, syntactic category and agreement features introduces a measure of redundancy. In particular, the values for the SUBCAT feature of a given verbal preterminal will be an integer that is associated with a certain valence class of verbs. For example, GKPS (1985:34f) associate 1 with the class of intransitive verbs like *weep*, 2 with transitives like *devour* and 3 with ditransitives like *hand*. Thus, it is the feature [SUBCAT n], passed up from a preterminal symbol, that ensures matching between the valence of a verb and the number and category of arguments in

a given sentence. However, independently, the agreement feature AGR checks the grammatical features of the subject argument. The redundancy that this separation introduces is less obvious in connection with English than with languages that have both subject and object agreement. The description of such languages would require two AGR specifications to check in tandem the grammatical features of arguments whose number and syntactic category is governed by the value of the SUBCAT feature.[5]

One plausible solution would be to incorporate reference to grammatical features in the SUBCAT feature.[6] However, this revision would require an explicit characterization of the complex objects that constitute appropriate SUBCAT values. This in turn demands an articulated theory of syntactic features which specifies, among other things, the range of possible features, which features are logically dependent and independent, etc.[7] Graph-theoretic feature structures of the sort outlined in Gazdar and Pullum (1982) and developed in greater detail in recent phonological work would seem to provide appropriate terms in structure-inducing subcategorization frames.

[5]Proposals that handle subject and object agreement by means of sequences of sets of agreement features are presented in Stucky (1981,83) and Harrocks (1983).

[6]Perhaps along the lines suggested by Pollard and Sag (1987).

[7]The issue of what constitutes a possible feature arises especially in connection with the inconsistent effect that the addition of arguments has on syntactic category in GPSG analyses. A nonterminal (VP) symbol that dominates a verb and its direct object is essentially distinguished from the preterminal that dominates the transitive verb by a difference in bar level: the preterminal is assigned the feature [BAR 1], while the VP is assigned [BAR 2]. In contrast, the difference between a verb phrase node and sentence node is reflected in distinct specifications for the diactritic feature [± SUBJ]: VPs are [-SUBJ], while Ss are [+SUBJ].

9.2 Recalcitrant Constructions

The treatment of unbounded dependencies as discontinuous constructions provides an immediate and hierarchically local account of the matching required between dislocated elements and (the predicate governing) a dislocation site. On this account, the contrast between the wellformed (1a) and the ungrammatical examples (1b) and (1c) is attributable to valence/subcategorization mismatches.

1 a. Who did Fred accuse?

b. *Who did Fred accuse Bill?

c. *Who did Fred arrive?

Thus, the pattern in (1) is ascribed to the same considerations or principles that determine the status of the corresponding matrix declaratives in (2).

2 a. Fred accused Gus.

b. *Fred accused Gus Bill.

c. *Fred arrived Gus.

There are two cases that pose an obvious challenge to an account of this sort; namely constructions which contain more apparent 'gaps' than 'fillers', and converse constructions with more putative fillers than gaps. Resumptive pronoun constructions provide the clearest example of structures containing more arguments than argument positions. Moreover, in some cases at least, initial elements resumed by a pronominal elements show evidence of occupying a clause-internal argument position. Thus, for example, Engdahl (1986) notes that in Swedish reflexives within a preposed interrogative can be bound

by a quantificational element when the quantifier is hierarchically superior to a resumptive pronoun which is linked to the initial interrogative element.[8] A plausible strategy for accomodating these constructions in the spirit of the approach outlined above involves treating them as apposition structures in which the dislocated element and resumptive elements occupy the same hierarchical position. There are various ways of executing such a strategy, though further elaboration of this basic analysis must await another occasion.

The phenomenon of 'parasitic gaps' provides a paradigm example of a mismatch involving more gaps than fillers. A representative example is given in (3).

3 What should Max discard without using?

One promising approach involves treating parasitic gap constructions as containing preposed multidominated constituents, so that *what* occurs as a sibling of both *discard* and *using* in (3). The Right Node Raised structure in (4) provides a declarative multidominated counterpart of (3).

4 Max should discard without using his grandfather's astrolabe.

A parallel analysis can likewise be extended to the general class of across-the-board extractions from coordinate constructions.[9]

[8]Resumptive pronominal epithets participate in the same pattern, which effectively undermines proposals on which resumptive elements are taken to 'spell out' traces of *wh*-movement.

[9]The contrast between wellformed questions like *Who does Max support and Ralph hope will resign?* and a corresponding RNR structure like **Max supports and Ralph hopes will resign the local school superintendent* presents an apparent counterexample to this account. However the actual force of this contrast depends on assumptions about how these examples

The generation of different constructions discussed above also raises a variety of questions and issues. Generating extraposition structures and other 'stylistic' variants requires a notion of 'heaviness' which does not appear to be straightforwardly specifiable in either syntactic or prosodic terms. The generation of Right Node Raising structures likewise requires a general arboreal analysis of coordination. Although graph theory provides a suitable metalanguage for a multidimensional theory of coordinate structures, there are at present no off-the-shelf implementations of this approach.[10] Further, generation of shared and apparent nonconstituent elements within coordinate structures demands general techniques for deriving multidominated structures that go beyond the programmatic remarks proposed for raising constructions in Niuean.[11]

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are derived. Since no strategy for generating RNR constructions is articulated above, let us consider the issue from a roughly transformational standpoint. An essential distinction between Right Node Raising and *wh*-fronting, viewed for the moment as structural operations, is that Right Node Raising invariably preserves the precedence order within conjunct clauses, while the characteristic effect of *wh*-fronting is to alter precedence relations. If the precedence-preserving character of Right Node Raising is enforced as an output rather than an applicability constraint, **should Max discard without using what* could occur as a legal stage in the derivation of (3) without constituting a wellformed surface form, just as movement analyses of passive assume that the illformed **was discarded his grandfather's astrolabe* may occur as a stage in the derivation of *his grandfather's astrolabe was discarded.* Precedence order will likewise be preserved if Right Node Raising applies to interrogative conjuncts with preposed arguments. A separate issue that arises in this connection concerns the fact that ATB extraction groups together objects and embedded subjects, though this is part of a broader phenomenon which also affects, for example, resumptive pronoun strategies.

[10]Goodall (1984) and Chametzky (1987), which present the most articulated multidimensional accounts of coordination, both adopt a string-based model of phrase structure.

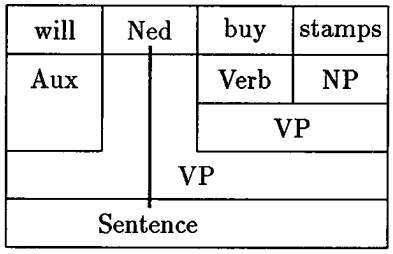
[11]Another related issue concerns the distribution of different species of multidominated constructions. Niuean provides the clearest case of constituent sharing across subordinate clauses, though a similar analysis may be extended to *tough*-constructions in various languages, including English and possibly Nahuatl (Higgins (1989)).

9.3 Conclusion

Formal grammars, and most subsequent augmented grammatical formalisms, are constrained in numerous arbitrary respects which, I have argued, restrict their usefulness for describing natural languages. However, the first step in establishing this conclusion involves identifying shortcomings which are common to the structural descriptions assigned by this general class of devices. The bulk of this study is accordingly devoted to demonstrating that a varied range of constructions instantiate a problematic discontinuous or multidominated constituent structure. There are clear structuralist antecedents for most of the analyses presented above; a more thorough review of the structuralist literature would doubtless have uncovered more. Moreover, although these descriptions typically differ markedly from transformational analyses of the same phenomena, some of the diagramming strategies explored by proponents of immediate constituent analysis illustrate interesting points of apparent contact.

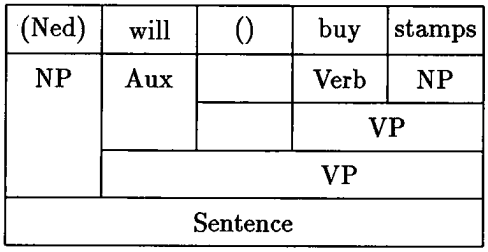
Recall that example (5) illustrates one sort of discontinuous IC diagram assigned by Hockett (1954) to polar questions.

5



The structure in (6) illustrates a superficially different diagramming strategy which Hockett (1954) also applied to polar questions.

6



This diagram factors out the hierarchical and linear position of the subject. The initial bracketed expression *(Ned)* marks the hierarchical location of the subject, while the empty medial brackets mark its linear position.

If earlier conclusions about the hierarchical structure-preserving property of preposing are substantially correct, we should resist the temptation to interpret diagrams like (6) as syntactic analogues of quantified formulas of the predicate calculus. Rather, (6) is, like (5), most productively viewed as a somewhat unperspicuous representation of a discontinuous syntactic construction. An analogous interpretation can likewise be extended to current REST structural analyses, which are often characterized in a metalanguage consciously modelled on standard systems of logic.[12] The characterization of dislocation in particular in terms of syntactic quantifiers binding null gaps is a red herring which diverts attention from the remaining problem of probing the correspondence between constituent structure and order.

[12] Just as the string-theoretic metalanguage of early transformational accounts was based on the concatenation algebras developed in Rosenbloom's (1947) logic.

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