ABSTRACT

Title of dissertation: BINDING PHENOMENA WITHIN
                           A REDUCTIONIST THEORY OF
                           GRAMMATICAL DEPENDENCIES

                           Alex Drummond, Doctor of Philosophy, 2011

Dissertation directed by   Norbert Hornstein
                           Department of Linguistics

This thesis investigates the implications of binding phenomena for the development of a reductionist theory of grammatical dependencies. The starting point is the analysis of binding and control in Hornstein (2001, 2009). A number of revisions are made to this framework in order to develop a simpler and empirically more successful account of binding phenomena.

The major development is the rejection of economy-based accounts of Condition B effects. It is argued that Condition B effects derive directly from an anti-locality constraint on $\overline{\text{A}}$-movement. Competition between different dependency types is crucial to the analysis, but is formulated in terms of a heavily revised version of Reinhart's (2006) "No Sneaking" principle, rather than in terms of a simple economy preference for local over non-local dependencies. In contrast to Reinhart's No Sneaking, the condition presented here ("Keeping Up Appearances") has a phonologically rather than semantically specified comparison set.

A key claim of the thesis is that the morphology of pronouns and reflexives

is of little direct grammatical import. It is argued that much of the complexity of the contemporary binding literature derives from the attempt to capture the distribution of pronouns and reflexives in largely, or purely, syntactic and semantic terms. The analysis presented in this dissertation assigns a larger role to language-specific "spellout" rules, and to general pragmatic/interpretative principles governing the choice between competing morphemes. Thus, a core assumption of binding theory from LGB onwards is rejected: there is no syntactic theory which accounts for the distribution of pronouns and reflexives. Rather, there is a core theory of grammatical dependencies which must be conjoined with with phonological, morphological and pragmatic principles to yield the distributional facts in any given language.

In this respect, the approach of the thesis is strictly non-lexicalist: there are no special lexical items which trigger certain kinds of grammatical dependency. All non-strictly-local grammatical dependencies are formed via A- or $\overline{\text{A}}$-chains, and copies in these chains are pronounced according to a mix of universal principles and language-specific rules. The broader goal of the thesis is to further the prospects for a "reductionist" approach to grammatical dependencies along these lines.

The most detailed empirical component of the thesis is an investigation of the problem posed by binding out of prepositional phrases. Even in a framework incorporating sideward movement, the apparent lack of c-command in this configuration poses a problem. Chapter 3 attempts to revive a variant of the traditional "reanalysis" hypothesis. This leads to an investigation of certain properties

of pseudopassivization and preposition stranding.

The analyses in this thesis are stated within an informal syntactic frame-work. However, in order to investigate the precise implications of a particular economy condition, Merge over Move, a partial formalization of this framework is developed in chapter 4. This permits the economy condition to be stated precisely, and in a manner which does not have adverse implications for computational complexity.

BINDING PHENOMENA WITHIN
A REDUCTIONIST THEORY OF
GRAMMATICAL DEPENDENCIES

by

Alex Drummond

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Advisory Committee:
Professor Norbert Hornstein, Chair/Advisor
Professor Howard Lasnik
Professor Alexander Williams
Professor Ellen Lau
Professor Allen Stairs

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Ellen has been supportive and encouraging throughout. She spotted a serious problem in Chapter 3 which I am glad to have had the opportunity to fix.

I wish that Jeff Lidz could have been on the committee, but time constraints

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Chapter 1

Introduction

This dissertation aims to make a contribution to a long-standing research project within generative syntax: that of reducing the apparently numerous and diverse set of grammatical dependencies to a small and uniform core. There are many historical precedents for a project of this sort. For example, Chomsky's (1977) analysis of *tough* constructions and comparative deletion in terms of *wh*-movement, or the Case-theoretic unification of raising and passive. My own starting point is the theory of grammatical dependencies presented in Hornstein (2001). This theory treats all non-local[1] grammatical dependencies as chain dependencies, where chains themselves are minimally distinguished into A-chains and $\overline{\text{A}}$-chains.

My primary empirical focus is binding phenomena. Chapter 2 presents an analysis of local anaphoric binding and variable binding. To account for the possibility of binding out of PP, chapter 3 develops a variant of the traditional reanalysis hypothesis. This chapter also presents an analysis of preposition stranding in terms of reanalysis, and contains some remarks on the typological relation between pseudopassivization and preposition stranding.

Chapter 4 is primarily concerned with placing certain aspects of Hornstein's framework on a more secure formal footing. In particular, the precise nature of the Merge over Move economy condition was never clarified in Hornstein (2001). This condition figured crucially in Hornstein's analysis of obligatory control, and it will be exploited here in the analysis of certain binding phenomena. Chapter

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[1] That is, all dependencies which are not established under sisterhood. (Hornstein does not, for example, attempt to treat subcategorization and selection as chain dependencies.)

4 shows that the Merge over Move condition can be stated within a formal syntactic framework which models the core properties of the informal framework of the first three chapters. The chapter builds on recent work of Thomas Graf's (Graf, 2010, 2011) to show that the condition can be stated in a computationally constrained manner.

Before getting started, it may be helpful to give a brief summary of the classification of grammatical dependencies within the reductionist theory developed in this dissertation. Roughly speaking, non-local syntactic dependencies divide into two classes: A-movement dependencies and $\overline{\text{A}}$-movement dependencies. The following phenomena fall within each class:

(1) **A-movement:**

    (i) Raising, passivization, and other standard cases of A-movement.

    (ii) Obligatory control.

    (iii) Local binding dependencies.

(2) **$\overline{\text{A}}$-movement:**

    (i) *Wh*-movement in questions relative clauses and comparatives; *tough*-movement.

    (ii) (Some) non-local binding dependencies.

The focus of this thesis is (1iii) and (2ii). The other phenomena will not receive much attention. I will assume that they are to be analyzed along the lines suggested in Hornstein (2001, 2009).

1.0.1 Outline of a simple argument for reduction

What sort of arguments might be provided for the classification in (1)-(2)? It seems appropriate to begin with what was historically one of the first arguments

for a reductionist theory: Lidz and Idsardi (1998). The aim of this subsection is to use some of the observations in Lidz and Idsardi's paper to bring out the appeal of the reductionist approach, and to give some indication of the overall character of the account of binding phenomena to be presented in the rest of this chapter.

Lidz and Idsardi argue that obligatory control and anaphoric binding are both A-chain dependencies. They therefore reject the following commonly assumed constraint on A-chains:[2]

(3)   An A-chain cannot span more than one theta position.

Within early GB theory, this condition derived from architecture of the theory: all thematic roles had to be assigned at D-structure, and so any position which was the target of Move α could not be a thematic position (Chomsky, 1981). The foundations of (3) are less secure in later Minimalist work, but the constraint is still widely assumed. Chomsky (1995, 312-316) derives (3) from Last Resort together with a prohibition on assigning θ-roles to non-trivial chains, whereas Chomsky (2004) suggests that (3) is a consequence of the "duality of interpretation."[3]

It is a curious property of GB theory (and one which carries over to many Minimalist theories) that in precisely those contexts in which A-chain dependencies are ruled out by (3), the theory furnishes *another* kind of dependency which is *not* subject to (3). For example, although (3) rules out the A-chains in (4a) and (4b), GB theory provides two additional kinds of dependency – binding and

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[2] The condition stated in (3) should not be conflated with the θ criterion, which is stronger, and which was not uniformly assumed within the GB literature. (For example, it was sometimes relaxed to deal with secondary predication.)

[3] Chomsky (2004, 111): "There are two kinds of Merge (external and internal) and two kinds of semantic conditions at C-I (the duality noted earlier). We therefore expect them to correlate. That appears to be true. Argument structure is associated with external Merge (base structure), everything else with internal Merge (derived structure)."

control – to plug the gap. This is illustrated in (5a) and (5b):

(4) a. * John$_1$ loves t_1.

 b. * John$_1$ wants t_1 to win.

(5) a. John$_1$ loves himself$_1$.

 b. John$_1$ wants PRO$_1$ to win.

That binding and control should step in precisely when A-chain formation is barred by (3) naturally gives rise to the suspicion that (3) does not in fact hold, and that the dependencies in (5a) and (5b) are just A-chain dependencies. This is a particularly attractive hypothesis in the case of control, since PRO, like trace, is phonologically null.[4] In the case of binding, the presence of an overt reflexive in (5a) presents a technical barrier to an A-chain analysis, since GB theory provides no obvious means by which a trace can be phonetically realized.[5] This problem is, however, parochial to a very particular theory of movement and traces, and there is no real difficulty in formulating the hypothesis that "NP-t[race], PRO and anaphor are allomorphs conditioned by properties of the chains they occur in" (Lidz and Idsardi, 1998, 119).

If Lidz and Idsardi's proposal is workable, the resulting simplification of the theory of grammatical dependencies is striking. Two subtheories have been removed (the theory of binding dependencies and the theory of control dependencies) and the constraint on A-chain dependencies in (3) has been dropped. In exchange, all that has been added is a rather simple set of rules governing the pronunciation of A-chains. Lidz and Idsardi do not make any specific proposals regarding what these rules are, but in the worst case, we have a set of language-

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[4] Though in fact it is not clear that the tails of control dependencies are always phonetically null cross-linguistically (Polinsky and Potsdam, 2006).

[5] Indeed, the original conception of traces as truly *empty* categories, Chomsky (1981), Chomsky (1982), strongly suggests that traces should never be phonetically realized.

specific rules along the following lines:

(6)   **English A-chain pronunciation:**

(i) Pronounce only Case positions.

(ii) Pronounce the highest Case position fully.

(iii) Pronounce other Case positions as reflexives.

There is independent evidence that languages have arbitrary and idiosyncratic rules of pronunciation. Well-known examples include the *wanna*-contraction rule of English and the rule conditioning French *du*:

(7)   a.   *want + to → wanna*

      b.   *de + le → du*

As pointed out by Chomsky and Lasnik (1978) with regard to (7a), such rules raise no serious issue of explanatory adequacy so long as all non-trivial conditions on their application follow from principles of UG. Chomsky and Lasnik argue that given the correct theory of UG, the simple statement of the contraction rule in (7a) yields a full account of the distribution of *wanna*. This implies that the child need only be able to entertain hypothetical language-specific rules stated in terms of simple predicates such as "adjacent to." It does not seem unreasonable to assume that "chainmate" is also is a notion which children may make use of in formulating language-specific rules.

There are of course a number of prima facie reasons for not taking binding and control to be A-chain dependencies. The following data will serve as an illustration of the problems faced by the reductionist approach:

(8)   a.   John$_1$ expects that pictures of himself$_1$ will go on display.

      b.   John$_1$ climbed the wall without PRO$_1$ falling.

      c.   PRO$_{arb}$ to leave now would be a bad idea.

d.   Every boy$_1$ knows that someone who likes him$_1$ is nearby.

(8a) and (8b) appear to show that the locality constraints on binding and control are not as strict as those on raising (since there is no raising out of subject DPs or raising out of adjuncts). The availability of "arbitrary" readings for some instances of PRO, exemplified in (8c), appears to show that PRO (in contrast to anaphor and trace) has no grammatical need of an antecedent. Finally, (8d) shows that pronouns may be bound from within strong islands, suggesting that a treatment of pronominal binding in terms of $\overline{\text{A}}$-movement cannot be on the right track. Many of these apparent problems for the reductionist approach have been addressed in the existing literature.[6] Those which have not, such as (8d), will be addressed in detail in chapter 2.

1.0.2   Reduction, simplicity and Minimalism

What exactly is meant by the claim that all of the phenomena in (1) are A-chain dependencies, or that all of the phenomena in (2) are $\overline{\text{A}}$ dependencies? Clearly, the phenomena in each class are not one and the same. Raising and control, for example, certainly have different properties. The claim is rather that phenomena within each class instantiate the same underlying grammatical dependencies. This point can be illustrated using less controversial cases, two of which have already been mentioned. Chomsky (1981) presents a unified theory of raising and passivization, according to which both constructions instantiate dependencies established via Case-driven A-movement. There is, of course, no claim that rais-

[6] This is particularly the case with regard to control. See e.g. Culicover and Jackendoff (2001); Jackendoff and Culicover (2003); Landau (2003); Culicover and Jackendoff (2006); Landau (2007); Bobaljik and Landau (2009) for criticisms of the Movement Theory of Control, and Boeckx, Hornstein, and Nunes (2010) for the most recent statement of the theory and responses to many of these criticisms.

ing and passive have *identical* properties, only that the differences between the two are not within the purview of the core theory of grammatical dependencies. The analysis of comparatives and *tough*-movement in Chomsky (1977) illustrates the same point. The hypothesis that each of these constructions involves abstract *wh*-movement is not equivalent to the hypothesis that they are identical, which is obviously false.

Why is a reductionist theory desirable? This question can be given both a general and a specific answer. The general answer appeals to a broadly applicable methodological principle: that we wish each component of our theory to bear as much empirical weight as possible. If phenomena are "bought" by the outlay of theoretical capital, then the thrifty use of this capital is a scientific virtue. We can get better value for money by by replacing a bundle of separate theories with a single unified theory. The benefits of theoretical thrift have been articulated within many different conceptions of the scientific method. Popper (1959) justified it on the grounds that hypotheses which bear more empirical weight are more falsifiable. Early formulations of inductive logic incorporated a prior ordering of hypotheses in terms of simplicity (see e.g. Carnap 1945, 84; Jeffreys 1961; Howson 1988). A tiny sample of more recent approaches includes those based on Akaike's Theorem (Akaike, 1977; Forster and Sober, 1994), and a variety of Bayesian approaches (e.g. Lowe, Gardner, and Oppy 2007).

As this proliferation of proposals suggests, in spite of the universal appeal of simplicity, it is difficult to come up with a persuasive rationale for assigning a high value to simple theories. A general problem for any attempt to do so founded on realist assumptions is that it is difficult to argue for a deep connection between simplicity, unity and truth. The point is amusingly made by Kelly and Glymour (2004, 103):

Twenty years ago, one of us (Glymour, 1980) proposed that the unified the-

ory is better *confirmed* because it is cross-tested in more different ways than the disunified theory by the same data. This has a tough, Popperian ring: the simpler or more unified theory survives a more rigorous, self-inflicted, cross-testing ordeal. But a theory is not a long-distance runner who needs training and character development in order to win – it just has to be *true*. Since reality might be disunified and complex (indeed, it *is* more complex than we used to suspect), how is the quest for *truth* furthered by presuming the true theory to be simple and severely cross-testable? If there is no clear answer to this question, then science starts to look like an extended exercise in sour grapes (if the world isn't the way I want it to be, I don't *care* what it's like) or in wishful thinking (I like simplicity, so the world must be simple).

It may, however, be possible to defend simplicity as a requirement for successful *explanation*, and explanation may impose requirements that truth does not.[7] In any case, without taking any particular stance on these difficult issues within the philosophy of science, I shall proceed on the assumption that a reductionist theory is to be preferred if it can be shown to be empirically viable.

This leaves open the question of what exactly it is for a theory to be empirically viable. Controversy may arise in cases where a new unified theory does not cover all the empirical ground of its predecessors – our natural reductionist urges may be checked by our guilty empirical consciences. The tradeoff between

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[7] Walsh (1979, 244): "...if we demand that there should be no ingredient in an explanatory theory about the natural world that does not *directly correspond* to some aspect of the world, are we not requiring that an explanatory theory should be nothing other than a straightforward report? But no report, supposing we could get it, and supposing we could certify it as reliable, can *be* an explanation...[H]owever much the preference for the more elegant explanation *because of its greater intrinsic perspicuity* should be a requirement of the human intelligence [as opposed to a requirement following from the nature of reality], it is nonetheless a legitimate requirement. Why should we be unhappy to recognize that explanation is a human intellectual enterprise? How, after all, could this be otherwise?"

empirical coverage and other desirable theoretical properties remains a fertile source of controversy within the philosophy of science.[8] The working linguist must rely on his or her judgment in making such tradeoffs, and – needless to say – judgments often differ as to whether a particular data point is of central or peripheral importance. The approach of this dissertation is empirically quite conservative. The vast majority of the data points for which theories of (1)-(2) are standardly held responsible will be taken at face value. Needless to say, however, binding theory is now a vast area of research, and this dissertation will only get to grips with a tiny subset of the phenomena discussed in the literature.

Before moving on, it is perhaps worth noting that simplification and reduction are in principle distinct goals. The following abstract example illustrates this point. Suppose we are given a pre-theoretic division of certain phenomena into two classes, A and B. John proposes two theories, T_1 and T_2, which account for A and B respectively; Bill proposes a single theory, T_3, which accounts for both A and B. In general, it need not be the case that T_3 is simpler than T_1 and T_2 taken together. This being said, it seems clear that on the whole, replacing two theories with one is not a bad simplification strategy. The theory developed here is, I hope to show, simpler than alternatives which treat each of (1) and (2) as separate phenomena.

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[8] A particularly clear illustration of this issue, though one that does not make any direct connection with syntax, is the problem of fitting a curve to a set of data points. As Forster and Sober (1994, 5) put it, "...scientists seem willing to sacrifice goodness-of-fit if there is a compensating gain in simplicity...Aesthetics to one side, the fundamental issue is to understand what simplicity has to do with truth." Forster and Sober make the important point that in choosing a smooth curve over a "bumpy" one, the scientist is not necessarily *ignoring* data, or trading in accuracy for simplicity: "If we think of the true curve as the 'signal' and the deviation from the true curve as the 'noise,' then fitting the data perfectly involves confusing the noise with the signal. It is overwhelmingly probable that any curve which fits the data perfectly is false."

This is all I will have to say about the general methodological impetus to reduction. A second impetus is provided by the Minimalist Program outlined in in (Chomsky, 1993) and subsequent work. This program of research is many things to many people, and I will not attempt to argue for any particular understanding of it here. However, there is one way of understanding the Minimalist impulse which is relevant to present concerns. This can be summed up in the following hypothesis:

(9)   **Minimalist Hypothesis:** There are reasons *other than general theoretical parsimony* to assign a high value to simple theories of Universal Grammar.

Just as children may need an "evaluation measure" to rank competing grammars (Chomsky, 1965), linguists need an evaluation measure to choose between competing syntactic theories. For the reasons just outlined, we expect that this will include some general preference for simple, unified theories over their complex, multifaceted cousins. What Minimalism is telling us is that an evaluation measure which assigns a high value to simple theories *merely* on general methodological grounds underestimates the value of simplicity in the domain of syntactic theory.[9]

1.1   Previous work

Clearly, this is not the first attempt to develop a unified theory of grammatical dependencies. In its technical details, this dissertation is most obviously indebted to Nunes (1995) and Hornstein (2001). The overall research program is also very

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[9] This relates to the distinction made in Chomsky (2002) between "methodological optimality," which is the ordinary scientific practices of theory evaluation and selection, and "substantive optimality," which is the language-specific thesis that language faculty is "well-designed for interaction with systems that are internal to the mind."

similar to that pursued in Koster (1987) and Neeleman and van de Koot (2002). It may therefore be helpful to say a little more regarding points of agreement and points of difference between the present work and earlier proposals. The following two positions are, I think, held by the authors just cited, and will be assumed and/or defended in this dissertation:

(i) **Shared Constraints:** There are substantial constraints shared by all grammatical dependencies as such. One example is Koster's "Uniqueness of the Antecedent" condition, which requires that no dependent element (e.g. a trace) can be dependent on more than one antecedent.

(ii) **Configurationality:** Both A- and $\overline{\text{A}}$-type dependencies are established via configurational relations in tree or tree-like structures. These relations are constrained by a structural condition along the lines of c-command (Reinhart, 1976).

The first of these positions is necessarily taken in any reductionist theory of grammatical dependencies. The second, in contrast, is not obviously inevitable given reductionism. Clearly, a unified theory of grammatical dependencies must either hold that all grammatical dependencies are configurational or that all are not, but a priori, there is no particular reason to favor one or other of these options. In principle, one could imagine a theory broadly similar to the one stated here, but stated over more abstract representations, such as the f-structures of LFG (Bresnan, 2001). The issue of whether configurational relations such as c-command are of deep grammatical significance is, unfortunately, too big to address here. While this dissertation will argue directly for (i), it will present few explicit arguments in favor of (ii) (though see §2.2.2, §3.4.1.1). The reader must judge for his or her self the extent to which the decision to state the theory in configurational terms is successful.

Within the recent binding literature, there have also been more limited moves towards a reductionist approach. In particular, Safir (2004) has argued (countering the trend started by Reinhart and Reuland (1993) and Dalrymple (1993)) that there is a single universal domain for local anaphoric binding.

1.2 Theoretical background and overview

The role of this section is to introduce the syntactic framework assumed in this dissertation, and to outline some key features of the analyses of the phenomena in (1)-(2). A more formal statement of a portion of this framework will be given in chapter 4.

1.2.1 Features and Chains

There will be many references to features and feature types in what follows. Every feature has a *type* (e.g. Case, θ, Wh). A feature may also have a *value* (e.g. Acc, Agent), The distinction between values and types is primarily of significance for Case and θ features. Many other features, such as Focus, appear to have only a single value, so the type/value distinction is of less importance for features of this sort.

There is one respect in which this dissertation is very much non-reductionist: it does not attempt to reduce Copy+(Re)Merge talk to chain talk, or chain talk to Copy+(Re)Merge talk. Thus, some conditions are stated representationally in terms of chains and others are stated derivationally, according to whichever seems more perspicuous in the case at hand. The question of whether these two ways of talking are "notational variants" is an interesting and much-discussed topic, but one which I leave for future research. My suspicion is that there is not much value in posing these questions in relation to informally stated theories. As

chapter 4 illustrates, derivations are easily reified as trees, such that conditions on derivational steps become constraints on licit derivation trees. Conversely, a set of licit derivation trees can be specified by defining an automaton which effectively "builds" trees from the bottom up. Given that these various ways of doing things are formally equivalent, it is difficult to see how there could be any empirical question of whether derivational theories are superior to representational ones or vice versa. Admittedly, the issue of whether or not two theories can be empirically equivalent is a highly complex and controversial one. One should not infer too hastily from formal equivalence to empirical equivalence. Indeed, according to some philosophers of science, even if two theories *are* empirically equivalent it does not necessarily follow that the available empirical evidence lends equal support to each ("One of a number of empirically equivalent theories may be uniquely preferable on evidentially probative grounds," Laudan and Leplin 1991, 450[10]). I therefore leave it as an open question whether the derivational vs. representational issue might become subject to evidential adjudication at some point in the future. At present, however, I see no reason to favor derivational theories over representational theories or vice versa, nor any reason to disfavor mixed derivational/representational theories.

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[10]A fuller statement of Laudan and Leplin's position (p. 460): "...empirical evidence is chiefly seen as a thesis about the *semantics* of theories; underdetermination, by contrast, is a thesis about the *epistemology* of theories. It has been supposed that, if theories possess the same empirical consequences, then they will inevitably be equally well (or ill) supported by those instances. We shall contest this supposition, and with it, the reduction of evidential relations to semantic relations, on which it rests...[W]e shall find that the relative degree of evidential support for theories is not fixed by their empirical equivalence."

1.2.2 Movement and copying

Following Nunes (1995, 2001), Hornstein (2001), I assume that syntactic structures are constructed via two primitive operations: Merge and Copy. A derivation begins with selection of a numeration, which is a multiset of lexical items. Merge may apply to two items α and β in the numeration to yield either [$_\alpha$ α β] or [$_\beta$ α β], according to whether it is α or β that projects. In addition to applying to items in the numeration, Merge may also apply to its own output. The Copy operation, which simply copies constituents, may apply both to the output of Merge and to its own output. Movement is effected by Copying a constituent and then (Re-)Merging it in a new location. In this way, Move is decomposed into Copy and Merge. It will nonetheless be necessary to take Move to be an operation in its own right, since there are certain conditions on Move (e.g. Minimality) which cannot be decomposed into conditions on Copy and Merge. (Re-)Merge is constrained by the extension condition:

(10)   **Extension Condition:** Merge may only target a lexical item, or the root of a workspace.

I will assume that covert movement is to be analyzed as pronunciation of a lower copy (Bošković, 2001; Nunes, 2004). It is beyond the scope of this dissertation to address the question of why of different movements are overt or covert. I will assume that there is some diacritic on each head which hosts a moved phrase (parallel to a ±EPP specification in Agree-based frameworks) which determines whether or not movement is overt. The technical details are discussed further in §2.12.

Derivations make use of multiple *workspaces*. The use of multiple workspaces is necessary to construct non-uniformly left/right-branching trees using a binary Merge operation. For example, a tree such as (11) has a derivation involving two

workspaces, as shown in (12):

(11)

```
                              VP
                        ╱          ╲
                    DP              V̄
                  ╱    ╲          ╱    ╲
                 D      N        V      DP
                 |      |        |     ╱    ╲
                the    boy      saw   D      N
                                      |      |
                                     the    girl
```
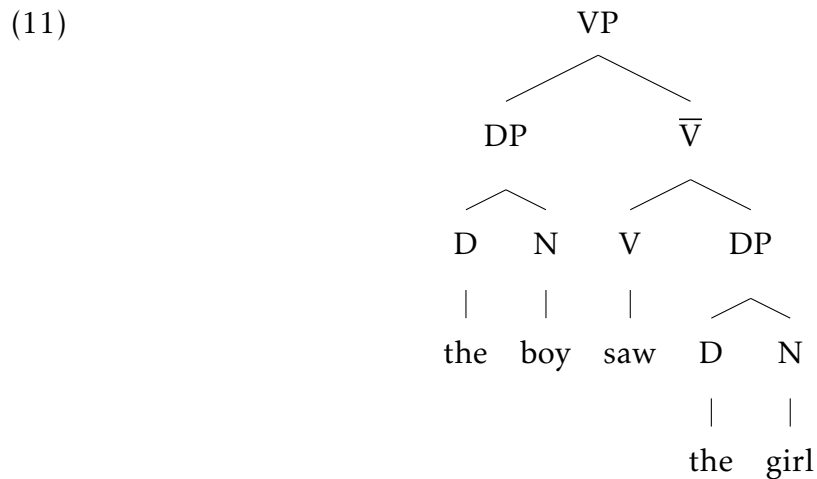
(12)   *Merge of 'the' and 'boy' in Workspace 1:*

        [$_{\text{DP}}$ the boy]

    Merge of 'the' and 'girl' in Workspace 2:

        [$_{\text{DP}}$ the girl]

    Merge of 'saw' in Workspace 2:

        [$_{\overline{\text{V}}}$ saw [$_{\text{DP}}$ the girl]]

    Merge of Workspace 1 with Workspace 2:

        [$_{\text{VP}}$ [$_{\text{DP}}$ the boy] [$_{\overline{\text{V}}}$ saw [$_{\text{DP}}$ the girl]]]

Given multiple workspaces, we can distinguish instances of Merge which add an item from the numeration to a workspace from instances of Merge which merge two workspaces together to form a single workspace. For example, merger of T with vP is an instance of the former, and merger of a DP with $\overline{\text{T}}$ is an instance of the latter.

Departing from much of the Minimalist literature following Chomsky (2000), I will follow earlier Minimalist work in assuming that the Head-Complement and Spec-Head relations are the structural configurations licensing feature valuation (together with whatever structural configuration it is that relates H_1 and H_2 in the complex head [$_{H_1-H_2}$ H_1 H_2]). Thus, there is no analog of Chomsky's Agree

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operation, except insofar as the Head-Comp relation can be seen as a highly local version of Agree.[11]

Movement is constrained by Minimality (Rizzi, 1990b, Chomsky, 1995). Many different formulations of this condition are to be found in the literature, and for much of this dissertation it will not matter very much which formulation of Minimality is chosen. However, one or two of my other assumptions about movement and feature checking will have implications for the formulation of Minimality; these will be discussed in §1.2.6

It is important to clarify the manner in which Minimality constrains sideward movement. Following Hornstein (2009), I will assume that sideward movement *out of* a workspace is constrained by Minimality. That is, the following kind of movement is illicit:

(13)

Workspace 1   *Workspace 2*

---
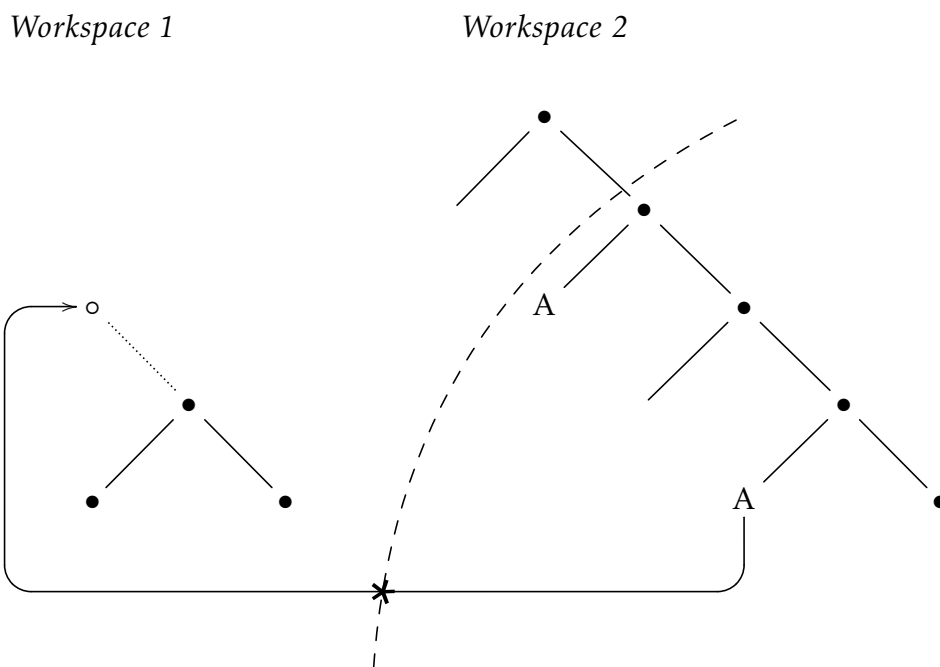
[11] If Merge creates a labeled constituent, the Spec-Head relation can be viewed as a second instance of the Head-Complement relation. This conception of the Spec-Head and Head-Comp relations has recently been defended in Hornstein (2009).

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Movement *into* a workspace, on the other hand, is not constrained by Minimality. Intuitively, the moved element in (13) "moves over" the higher A in Workspace 2, but once it moves into Workspace 1, there is no limit in principle on the extent to which future Merge operations may embed it. However, we will see in the next subsection that the Merge over Move constraint restricts the ability of sideward movement to establish dependencies between deeply nested positions.

1.2.3   Merge over Move and Sideward Movement

Merge over Move can be stated as follows:

(14)   **Merge over Move:** A head or phrase X may not move at a stage S of a derivation D if there is a convergent derivation D' such that

   (i) D and D' begin from the same numeration,

   (ii) D' is identical to D up to S,

   (iii) at S of D', a head or phrase merges in the position that X moves to at S of D, and

   (iv) X later moves in D' to value the same features that it did at S of D.

The requirement that D' be convergent makes Merge over Move a *defeasible* constraint. Unlike Minimality, it is not a hard-and-fast constraint on the application of Move, but rather a preference for convergent derivations which delay movement as long as possible. The particular statement of Merge over Move in (14) is slightly unorthodox in imposing condition (iv) on comparison derivations. It is necessary to impose this condition within the framework of this dissertation due to the assumption that movement through multiple Case positions is possible. This aspect of Merge over Move will be discussed further in §2.8.1, and at the beginning of chapter 3.

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Merge over Move was first mooted as a condition on derivations in Chomsky (2000). It was used, in conjunction with phase theory, to explain certain facts about the distribution of expletive *there*. This is quite distinct from the use that it is put to in Hornstein (2001). Hornstein exploits Merge over Move to rule out illicit cases of object-oriented control such as (15):

(15)   * [TP [TP John$_1$ kissed Mary$_2$] [PP without t_2 blushing]].

To see how Merge over Move blocks (15), consider the point in its derivation where *Mary* moves sideward from the adjunct to the object position:

(16)   *Workspace 1:*

       [PP without t_2 blushing]

    Workspace 2:

       [v′ kissed Mary$_2$]

At this point, the DP *John* (or at least, the material for constructing it) remains in the numeration. Thus, Merge over Move requires that *John* be merged as the object of *kiss* instead of *Mary*. Subsequently, *Mary* moves sideward into [Spec,vP] to pick up the unassigned theta role, and then raises to [Spec,TP] to get Case. The Merge-over-Move-compliant derivation therefore yields subject-oriented control:

(17)   [TP [TP Mary$_1$ kissed John$_2$] [PP without t_1 blushing]].

Consider now the the derivation of (18), shown in (19). In particular, the point at which *John* is moved between the two workspaces:

(18)   * John$_1$ kissed Mary without Bill noticing t_1.

(19)   *Workspace 1:*

       [noticing John]

    Workspace 2:

       [v′ kissed Mary]

Movement of "John" from workspace 1 to workspace 2:

[noticing t_1] *(workspace 1).*

[$_{vP}$ John$_1$ [$_{v'}$ kissed Mary]] *(workspace 2).*

Workspace 1:

[$_{PP}$ without Bill noticing t_1]

Merger of the adjunct:

[$_{TP}$ [$_{TP}$ John$_1$ [$_{vP}$ t'_1 [$_{v'}$ kissed Mary]]] [$_{PP}$ without Bill noticing t_1]]

At the point *John* moves, *Bill* remains in the numeration. Since *Bill* could merge either as the subject of the matrix clause or as the subject of *noticing*, it is a violation of Merge over Move to move *John* before of performing one of these Merge operations. On the other hand, merging *Bill* as the matrix subject would be a derivational dead end. (Since it would stop *John* raising from [Spec,vP] to get Case.) We are left, then, with the possibility of merging *Bill* as the subject of *noticing*. The end result is the grammatical (20):

(20)   [$_{TP}$ [$_{TP}$ Bill$_1$ kissed Mary] [$_{PP}$ without t_1 noticing John]].

This example highlights one of the most important effects of Merge over Move: that it induces Minimality violations which could otherwise be obviated by early sideward movement. In general, before it is possible to move a DP out of a given workspace, Merge over Move forces as much material as possible to merge within that workspace. If there are additional argument DPs to be merged, then these will end up above the DP before it has a chance to move out. Owing to Minimality, these additional DPs then prevent the lower DP from escaping. As a rough generalization, only the highest DP in a given workspace is able to escape via sideward movement.

1.2.4   Selection and the syntax/semantics boundary

Consider (21), where '#' indicates a selectional violation:

(21)   # $[_{TP}$ $[_{TP}$ $[_{DP}$ The swarm of bees$]_1$ dispersed John$_2]$ $[_{PP}$ without t_1 sting-
         ing$]]$.

If the selectional restrictions of *disperse* were to enforced in the syntax (e.g. by
feature checking of some sort), this would raise difficulties for the analysis of
adjunct control outlined in the preceding section. Recall that the derivation of
(21) will begin with construction of the adjunct:

(22) $[_{PP}$ without [the swarm of bees] stinging$]$

At this point in the derivation, Merge over Move prevents *the swarm of bees* mov-
ing to the matrix object position, since *John* remains in the numeration and can
be merged as the object instead. However, if merging *John* as the object of *disperse*
is a syntactic violation, this option is discarded, since Merge over Move compares
only convergent derivations. Hence, nothing would block (23):

(23)   * $[_{TP}$ $[_{TP}$ John$_2$ dispersed $[_{DP}$ the swarm of bees$]_1]$ $[_{PP}$ without t_1 sting-
         ing$]]$.

Since (23) is an illicit instance of object control, this would clearly be the wrong
result.

It seems, then, that an account of adjunct control in terms of sideward
movement crucially depends on the syntax being blind to selectional restrictions:
the derivation in (21) must count as convergent so far as Merge over Move is con-
cerned. The conclusion that selectional restrictions are extrasyntactic is familiar,
and quite well supported on independent grounds (see e.g. Grimshaw 1979).[12]
But to my knowledge, theories combining sideward movement and Merge over

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[12] This being said, Newmeyer (1986, 113-114fn16) notes that Chomsky continued for some
time to maintain the position of Chomsky (1965) on selectional violations of this sort (that they

Move are unique in the extent to which they commit hostages to the theory of selection. They provide grounds that are principled – but non-semantic – for keeping selection out of the syntax.

A similar argument can be made favoring valuation of features over checking (Chomsky 1995, 2000). If, for example, DPs bear a valued-but-unchecked Case feature when they are initially merged, then a DP marked accusative will be unable to move to a nominative Case position and vice versa. But then, if *Mary* were to merge with unchecked accusative Case features in (15), and *John* with unchecked nominative, the defeasible nature of Merge over Move would let in the illicit derivation of object-oriented adjunct control.

1.2.5   Locality constraints on sideward movement and Merge over Move

This dissertation will not make use of phases as defined in Chomsky (2000, 2001, 2008) and developed in much subsequent work.[13] Thus, the Phase Impenetrability Condition will play no role in constraining movement. Movement is primarily constrained by Minimality, Merge over Move, and a condition preventing movement out of adjuncts and subjects. For the purposes of this dissertation, it will not matter very much what this latter condition is. One option would be to adopt the theory of Nunes and Uriagereka (2000), which is based on the multiple Spellout theory of Uriagereka (1999).

Though it has no equivalent of the Phase Impenetrability Condition, the present framework does incorporate a novel locality constraint on sideward move-

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are ruled out in the syntactic component). The basis of Chomsky's argument was the unacceptability of sentences such as "# The boy who was turned by magic into a swarm of bees dispersed."

[13] For a brief critical overview of the development of phase theory, see Boeckx and Grohmann (2007).

ment which has a domain-based flavor:

(24)   **Constraint on Movement:** Movement from a position α to a position β is possible only if α and β are "neighbors."

The notion of a neighbor can be defined as follows:

(25) α and β are **neighbors** iff the shortest path from α to β goes along at most one "bad" branch, where a bad branch is a left branch (i.e. a branch between a specifier and the XP node dominating it) or a branch leading from an adjoined element to its host.

The definition in (24) has a rather representational flavor: one cannot know whether α and β are neighbors until both are present in the same tree. However, the condition can also be formulated in derivational terms via Uriagereka-type cyclic Spellout. Uriagereka proposes that the internal structure of adjuncts and left branches is frozen for further syntactic operations as soon as they merge. This presumably implies that copy deletion must apply to a phrase *before* it merges as a left branch or adjunct, since afterwards it will be too late to "look into" the phrase to see which of the copies internal to it should be pronounced. Now suppose that there is a slight exception to this condition: it is permissible to look inside a left branch or adjunct at the very moment at which it is merged. This will allow copies which move sideward between neighboring workspaces to be matched, such that some of them can be targeted by deletion (or by language-specific spellout rules). In contrast, sideward movement across non-neighboring workspaces will have the effect of introducing pairs of copies which cannot be matched, since there will be no single application of Spellout which can see *both* copies. If failure to match copies leads to a crash at PF, it follows that sideward movement between non-neighboring workspaces is impossible.[14]

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[14]This raises the interesting question of whether even language-specific spellout rules can look

The purpose of the constraint in (24) is twofold. In chapter 4, we will see that it contributes to an effort to make sideward movement formally tractable. Its main empirical function is to rule out illicit control derivations such as the following:

(26)　　* [The man who met ~~[John]~~] wants [[~~John~~] to win].

Without (24), the following derivation would be available for (24):[15]

(27)

[wants John to win]	*Workspace 1*
met	*Workspace 2*

Sideward movement of 'John' from workspace 1 to workspace 2

[wants ~~John~~ to win]	*Workspace 1*
[met John]	*Workspace 2*

Construction of matrix subject DP continues:

[wants ~~John~~ to win]	*Workspace 1*
[the man who met John]	

Matrix subject DP merges:

[[the man who met John] wants ~~John~~ to win]

This derivation is ruled out by (24) because construction of the matrix subject DP requires merging (at least) two separate workspaces together. The relative clause

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into strong islands. See §2.12.

[15] There is some question as to whether (26) is available as a derivation of (24), since Merge over Move might independently block movement deep into the relative clause. This issue is discussed in detail in Drummond (2009). Here, I will tentatively assume that Merge over Move is not sufficient to block all illicit derivations of this sort.

must be constructed in its own workspace and then merged with the workspace containing the NP. At this point, Spellout will be able to "see" inside both the NP and the relative clause, but this will only enable it to see one copy of *John*. Similarly, when *John* merges as a specifier in the embedded clause, Spellout will apply, but it will only be able to see the copy of *John* in the embedded clause. Thus, since there is never an opportunity to match the two copies of *John* and delete one of them, the derivation in (27) inevitably leads to a linearization conflict.

(27) contrasts with a standard adjunct control case such as (19), repeated here as (28):

(28)   *Workspace 1:*

          [noticing John]

          Workspace 2:

          [$_{v'}$ kissed Mary]

          Movement of "John" from workspace 1 to workspace 2:

          [noticing t_1] *(workspace 1)*.

          [$_{vP}$ John$_1$ [$_{v'}$ kissed Mary]] *(workspace 2)*.

          Workspace 1:

          [$_{PP}$ without Bill noticing t_1]

          Merger of the adjunct:

          [$_{TP}$ [$_{TP}$ John$_1$ [$_{vP}$ t'_1 [$_{v'}$ kissed Mary]]] [$_{PP}$ without Bill noticing t_1]]

Here, Spellout will apply at the point where the adjunct merges with the TP. At this point Spellout has already applied to [John] – it had to be spelled out before it could remerge as [Spec,TP] – but it has not applied to any constituent *containing* [John]. Thus, when spellout applies to TP, it will be able to see both instances of [John], match them, and select one for deletion. The logic is similar for parasitic gap constructions, if we adopt the sideward movement analysis of these presented in Nunes (1995), Hornstein (2001). It seems, then, that (24) allows the

key derivations which have proposed in the literature on sideward movement, while at the same time ruling out unwanted derivation such as (27).

The Merge over Move condition assumed in this dissertation is not evaluated locally on a phase-by-phase basis, in contrast to Chomsky (2000). It might seem that if Merge over Move is evaluated over the entire derivation, this should prevent all but the highest DP in any given sentence from being a binder. For example, compare (29a) and (29b):

(29)   a.   John$_1$ persuaded himself$_1$ that Mary would like Bill.

        b.   John persuaded Mary that Bill$_1$ would like himself$_1$.

It might seem that (29b) should be blocked by (29a) under Merge over Move, since at the point in the derivation of (29b) where *Bill* moves from the position of *himself* to the embedded subject position, *John* and *Mary* remain in the numeration and could be merged instead to derive (29a), which is convergent. This is where condition (iv) of the Merge over Move condition in (14) is crucial. When this condition is imposed, (29a) is not in fact a comparison derivation for (29b) because *Bill* does not move in (29a). The only potential comparison derivations are those in which *Bill* moves at a later point in the derivation. However, all of these derivations violate Minimality, as shown in (30). Thus, owing to the convergence requirement, none of them are considered for comparison.

(30)   a.   * John persuaded Bill$_1$ that Mary would like himself$_1$.

        b.   * Bill$_1$ persuaded John that Mary would like himself$_1$.

The same result can be derived from a more orthodox statement of Merge over Move in a theory which makes use of doubling constituents to derive binding relations (Drummond, 2009). In such theories, the DP which is to move is initially merged in a doubling constituent. This DP is forced to move to additional θ and Case positions because it is the doubling constituent, not the DP itself, which

receives the θ and Case features associated with the original position. In these theories, then, it is not necessary to complicate Merge over Move to ensure that both (29a) and (29b) are licit derivations. However, I will argue in the next subsection that there are a number of problems with doubling constituent theories which outweigh this advantage.

1.2.6 No "value judgments" in the syntax

The treatment of control in terms of Movement necessitates taking θ-roles to be features on a par with Case and ϕ features. As a first pass, we may assume that verbs and other predicative heads bear unvalued θ features which may be valued by a valued θ feature on a DP. Since it is the predicate which is "defective," checking of θ features may drive movement through multiple θ positions.

The account of binding phenomena presented here will require DPs to move through multiple Case positions as well as multiple θ positions. This is potentially problematic on standard assumptions, since it is widely assumed that movement to a Case position "freezes" a DP for further A-movement as a side-effect of Greed or "Enlightened Self-Interest" (ESI, Lasnik 1995). Many movement-based theories of binding (Kayne, 2002; Zwart, 2002) have made use of "doubling" constituents to explain why movement through multiple Case positions is possible. The technical details vary, but the basic idea is that there is some additional element (typically the reflexive itself) which absorbs the Case in the downstairs position, so that the antecedent is only really ever associated with a single Case position. In this dissertation, I will return to something closer to the theory presented in Lidz and Idsardi (1998), in which the chains responsible for establishing binding dependencies really do pass through two Case positions. Some arguments against doubling analyses will be presented in §1.2.7.

If movement through multiple Case positions is possible, this rather sug-

gests that movement is not in fact restricted by Greed/ESI – perhaps this only *appears* to be the case if we assume that binding dependencies are not encoded via movement.[16] I will adopt the following hypothesis:

(31)   **Value-blind syntax:** The computational system is unable to distinguish valued and unvalued features.

On this view, the computational system "blindly" associates heads and phrases which have one or more features of the same type on the optimistic assumption that doing so *might* enable a licit valuation relation. Matching of feature types *licenses* movement but does not necessitate it. Valuation itself is performed at the interface, and at this point, valued and unvalued features must match in the usual manner in order to avoid a crash.

The hypothesis in (31) has the consequence of significantly reducing the number of possible formulations of Minimality. Since the syntax is blind to feature values, Minimality must be stated solely with reference to feature types. There is essentially only one reasonable definition of Minimality having this property which (i) incorporates the A-over-A condition as a special case, and (ii) permits movement through multiple θ and Case positions. This is as follows:

(32)   **Minimality:** γ cannot move over/out of β if the feature types of γ are a (possibly improper) subset of those of β.

The definition in (32) applies as expected in simple cases. For example, it rules out raising of *John* over *Mary* in (33), since (by hypothesis) the feature types of *Mary* are identical to those of *John*:

(33)   * [John] seems Mary to like [John].

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[16]Another possibility, raised in Ura (1998), is that feature checking/valuation is always optional. Thus, a DP which is in a Case position may simply elect not to check case in that position, and then go on to move to a higher Case position. For various technical reasons having to do with the linearization of chains, this proposal cannot be adopted in this dissertation.

There are, however, some slightly unexpected consequences with regard to +*wh*-phrases. If *John* in (33) had an additional +*wh*-feature, for example, then its feature types would not be a subset of those of *Mary*, and Minimality would not block the movement indicated in (33). Care must therefore be taken to ensure that derivations such as (34) are ruled out:

(34)   Who seems Mary to like [who].

This particular derivation is in fact illicit, since movement of *who* "uses up" the only position where *Mary* could have received Case. Since the feature types of *who* are a superset of those of *Mary*, the presence of *who* above *Mary* ensures that *Mary* cannot possibly move to any higher Case position. This illustrates the point that it is only the operations of the narrow syntax which are "value blind": there is a final reckoning at the interface which is sensitive to the valued/non-valued distinction in the usual way.

A more serious problem is posed by the classic instance of superraising in (35):

(35)   * Who seems it was believed [who] to be intelligent.

Here, it seems that Minimality should permit raising of *who* over the *it* expletive. This suggests that Minimality as defined in (32) cannot be maintained together with the standard account of expletive *it* as a contentless item merged in [Spec,TP] as a last resort. Rather, we must adopt the idea – common within pre-GB era work, and revived by Marantz (1991) – that expletive *it* is the associate of a clause. Traditionally, the clause was assumed to have extraposed, but within the present system, it is simpler to treat the "extraposed" clause as a pronounced lower copy. That is, a derivation such as (36) may be spelled out in one of two ways:

(36)   [That John is intelligent] was widely believed [that John is intelligent].

$$\Downarrow$$

It was widely believed [that John is intelligent].

OR

That John is intelligent was widely believed.

They key point is that an *it* expletive is always a pronunciation of the higher copy of a clause which has raised to subject position. Looking again at (35), we see that on this analysis of expletive *it*, the derivation involves a left-branch condition violation:

(37)   * Who seems [who to be intelligent] was believed [who to be intelligent].

Assuming that countercyclic movement is impossible, *who* must have moved out of the higher copy of the clause, which is in [Spec,TP]. Since this is a strong island, (35) is correctly predicted to be impossible.

Another potential difficulty is posed by a different kind of superraising example:

(38)   * [$_{CP}$ Who [$_{TP}$ seems [$_{CP}$ ~~who~~ [$_{TP}$ that John likes ~~who~~]]]]?

Here, the additional features of the *wh*-phrase should permit it to move over *John*. If the tail of the *wh*-dependency is spelled out as a pronoun, (39) is derived:

(39)   * Who seems that John likes him?

One possible means ruling out (38) is to assume that finite clauses in argument positions require Case. If this is so, then movement of *who* to the matrix subject position has the effect of blocking movement of the embedded clause to this position (where it would be pronounced as *it*). In §2.5, we will see that derivations similar to (38) are possible when the embedded clause does not require Case.[17]

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[17] It may be worth noting that the illicit movement in (38) could also be blocked in a less interesting way just by imposing a requirement that chains have at least as many θ positions as

We have seen that in the case of A-movement, (31) does not lead to overgeneration because A-movement through multiple Case positions simply surfaces as reflexive binding. A similar effect can be seen in the case of $\overline{\text{A}}$-movement, with the additional proviso that $\overline{\text{A}}$-movement spanning multiple Case positions is realized as pronominalization (see §2.1.3). Thus, an apparently "crazy" derivation such as (40a) (which is permitted by Minimality as stated in (31)), surfaces as the grammatical (40b):

(40) a. Who do you think [CP [who] [TP [who] said [CP [who] that [TP [who] likes [who]]]]].

  b. Who do you think said that he likes himself?

The aforementioned problem arises in connection with the implication of (31) that there are no freezing effects on $\overline{\text{A}}$-movement. This implication may appear to be falsified by the fact that it is not possible for a single *wh*-phrase to license both an embedded and matrix question:

(41) * Who did you wonder [CP [who] that John married [who]]?

However, (41) is plausibly taken to be ruled out on interpretative rather than strictly syntactic grounds. Lower copies of moved *wh*-phrases are either not interpreted at all, or interpreted as variables if they are in Case/θ positions. The copy of *who* in embedded [Spec,CP] is therefore not interpreted, and cannot license a question interpretation of the embedded clause. In other words, (41) is out for the same reason as (42):

(42) * I wonder that John is married.

Case positions. This requirement might follow from certain conceptions of Case as a "visibility" marker. In (38), the second Case on *who* (i.e. the one assigned by matrix T) would serve as a (false) indication that *who* is associated with a local θ position. Rebecca McKeown has proposed that Case-marking on DPs functions as an indication that all local θ positions below the DP are to be interpreted as variables bound by that DP.

I would now like to explore two possible examples of licit movements which are permitted by the formulation of Minimality in (32), but which would be ruled out by more standard versions of the constraint. The first example involves EPP-driven movement to [Spec,TP] in English. It seems that the derivation in (43) should be both in accord with Minimality as stated in (32) and eventually convergent:

(43)   Who did you persuade [Mary] [TP [who] to [vP [Mary] kiss [who]]]

This derivation proceeds as normal but for the fact that *who* checks the EPP feature of the embedded non-finite T instead of the external argument of the embedded clause (*Mary*). Since it is difficult to find any empirical consequence of this slight deviation from the norm, the availability of derivations of this sort does not seem problematic.

A more interesting putative example of this kind of movement is the French "stylistic inversion" construction (Kayne and Pollock, 1978). One popular analysis of Romance postverbal subjects has the subject remaining in a vP/VP-internal position. For example, Belletti (2001) proposes that the subject's focused status somehow obviates the need for ordinary Case licensing. If a language has available a general means of satisfying the EPP without raising the subject to [Spec,TP], then this analysis, in its simplest form, predicts inverted subjects to be available quite generally. The extent to which this prediction is correct varies between Romance languages and dialects. From the present point of view, French is an interesting case because it does not have null subjects, and has postverbal subjects only in *wh*-questions, clefts and related constructions:[18]

(44)   a.   * Ont   diné   tes   amis.
             Have dined your friends.

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[18] An apparent exception to this generalization is stylistic inversion triggered by the subjunctive.

b. * Voulaient dîner   tes   amis?
   Wanted   to dine your friends?

c. Où   voulaient dîner   tes   amis?
   Where wanted   to dine your friends?

That there should be a connection between operator movement and subject inversion is somewhat mysterious on the face of it. We have just seen, however, that in the present framework, *wh*-phrases may move to check EPP features in configurations where Minimality would prevent an ordinary DP from doing so. A first pass analysis of French stylistic inversion can therefore be outlined as follows. French, like many other Romance languages, has some means of Case-licensing certain argument DPs without moving them out of vP. But, in contrast to Spanish and Italian, French has no general means of satisfying the EPP without movement of an argument to [Spec,TP]. Thus, the availability of vP-internal licensing for external arguments can only be exploited when a *wh*-phrase (or other $\overline{\text{A}}$ operator) is available to check the EPP feature.[19] This analysis makes the interesting prediction that only those operators which are of a category suitable for filling [Spec,TP] should be able to license inversion.

In the present framework, Minimality is not taken to be a hard-and-fast constraint on movement. Rather, following much recent literature[20], it is a PF constraint – a constraint on the spellout of chains. UG provides a "default" mechanism for spelling out chains which results in deletion of all but the highest copy.

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[19] Although the option of vP-internal licensing *may* be exploited when a *wh*-phrase is available, it need to be. Thus, stylistic inversion is correctly predicted to be optional in French. This however raises a difficulty in extending the analysis to other Romance languages such as Spanish, where *wh*-movement obligatorily triggers postposing of the subject even though null subjects are freely available. On present assumptions, it would be difficult to give a unified account of inversion in French and Spanish *wh*-questions.

[20] See e.g. Ross (1967), Ross (1969), Merchant (1999), Merchant (2001), Lasnik (2001c), McCloskey (2002), Fox and Lasnik (2003).

This mechanism is restricted by Minimality: if a chain links two positions which are too far apart, then the default pronunciation mechanism cannot apply. The default pronunciation mechanism will be discussed in more detail in §1.2.8 in this chapter, and in §2.12 of chapter 2. There is a potential loophole here which must be closed. We surely do not want to permit very-long-distance A-movement, even if the resulting chain is not spelled out using the default mechanism. Thus, we must assume that only $\overline{\text{A}}$-chains are permitted to violate Minimality. This follows if there is a general principle requiring that movement make use of intermediate landing sites wherever these are available. I will argue in §2.5 that A-movement may skip an intervening [Spec,CP] landing site. However, if C comes in two flavors, one of which may host a derived specifier and one of which may not, then apparent instances of [Spec,CP] being skipped by A-movement can be understood to derive from the choice of a non-spec-hosting C.

We will see in §2.12 that Minimality may not be the only constraint which turns out to be a constraint on the default spellout mechanism rather than a constraint on movement per se.

1.2.7 The lexicon, chains and their role in grammatical dependencies

If both (45a) and (45b) are instances of A-movement, then A-movement must have diverse morphological realizations:

(45)   a.   John$_1$ wants PRO$_1$ to win.

     b.   John$_1$ saw himself$_1$.

The same must hold for $\overline{\text{A}}$-movement, if both (46a) and (46b) are instances of it (as I will argue that they are in §2.1.3):

(46)   a.   Who$_1$ did John see t_1?.

b.   Everyone$_1$ thinks that he$_1$ is intelligent.

The idea that the same kind of dependency may be pronounced in a number of different ways found a comfortable home within early transformational formalisms. Transformations were free to introduce additional morphology, and there was particular reason to hypothesize a deep distinction between "chopping" rules and "copying" rules (Ross, 1967). This changed upon the introduction of the notion of an "empty category" (Chomsky, 1981, 1982). The original conception of empty categories as truly *empty* did not survive long into the 80s. However, most formulations of GB theory incorporated some version of the idea that dependencies with silent tails formed a natural class. These dependencies were, for example, subject to proprietary licensing conditions such as the Empty Category Principle. Within GB theory, this division of dependencies created a certain amount of internal tension. The clear parallels between local anaphoric binding and A-movement led to the hypothesis that A-trace was specified +anaphor, but this was never an entirely natural theoretical move. If empty categories are not lexical items, it seems strange that they should share feature specifications with lexical items such as *himself*. (Though to be sure, there is no actual inconsistency or incoherence in this hypothesis.) On the other hand, if traces *are* lexical items, there is no longer any principled reason why traces should be phonologically null. That an empty category has no phonological features is a special case of its having no features whatever, but since lexical items in general may be overt, there is no obvious reason why the traces of A- and $\overline{\text{A}}$-movement should not be overt in some languages.

On top of these conceptual problems, the increasing use of covert movement in late GB theory threatened to remove the empirical content of the assumption that traces are phonologically null. For example, Chomsky (1992) proposed that there was a covert head-movement dependency indirectly linking the

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anaphor to its antecedent in (47):

(47)   SS: John$_1$ likes himself$_1$.

       LF: John$_1$ self-likes [him-t]$_1$.

In practical terms, *self*-movement in (47) has the effect of establishing a movement dependency between *John* and *himself*. The technical artifice of covert head movement is necessary only to protect two core hypotheses of GB theory: (i) the hypothesis that the trace of overt movement is phonologically null, and (ii) the hypothesis that movement through multiple theta positions is impossible. The late phase of GB theory is partly characterized by the development of technically ingenious tricks for sneaking around (i)-(ii) and other core assumptions. An uncharitable observer might come to the conclusion that by the early 90s, about 50% of GB theory existed to make it possible to establish dependencies of a kind which the other 50% predicted to be impossible.

With the development of the Minimalist Program, binding and control briefly took a back seat, and the earliest Minimalist work did not really address the way in which these dependencies relate to movement. (Although Chomsky (1993) did argue for a version of the theory of anaphoric binding exemplified in (47).) Insofar as there is a consensus on these issues in current Minimalist work, it appears quite similar to that arrived at in GB theory: binding, control and A-movement are distinct kinds of dependency, but are all established via Agree. Agree here plays a similar unifying role to GB's +anaphor feature. Another point of agreement with GB theory is the assumption that binding, control and A-movement are distinguished primarily by the properties of the downstairs element of the dependency: PRO is distinct from *himself* is distinct from DP-copy. As in many formulations of GB theory, two of these elements are lexical items (PRO, *himself*) and the third is not (DP-copy).

This "mixed" lexical/non-lexical view of grammatical dependencies must be rejected in any reductionist theory of grammatical dependencies. In the theory of Neeleman and van de Koot (2002), for example, the tail of every grammatical dependency is a lexical item. Thus, DP-trace, PRO, *himself*, etc., are all distinct lexical items. In contrast, Lidz and Idsardi (1998) do not take any of these to be lexical items (*himself* being merely a spellout of DP trace). Not all movement-based approaches to control and binding phenomena take this approach. In particular, Zwart (2002) and Kayne (2002) make use of "doubling" constituents, as in the following examples:

(48)   a.   John likes [$_{?P}$ ~~[John]~~ himself].

       b.   John wants [$_{?P}$ ~~[John]~~ PRO] to win.

The use of such doubling constituents obviates the need for special rules for spelling out lower copies, and allows the ban on movement through multiple θ positions to be maintained. However, neither of these motivations for the use of doubling constituents is very persuasive. There is good prima facie evidence that languages have arbitrary spellout rules, so the need to appeal to such rules does not count very strongly against a theory.[21] With regard to the θ-theoretic properties of the derivations in (48), the cost of preserving the ban on movement through multiple θ-positions is the assumption that it is possible for a non-expletive DP to initially merge in a non-θ position. (*John* presumably does not receive a θ-role from himself.) There is also an interpretative issue raised by the use of the doubling constituent. If a copy of *John* is present in the object position of (48a), for example, it is not clear what interpretative contribution *himself* is making; but the Full Interpretation condition of Chomsky (1995, 219) requires

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[21] I suspect that Kayne may have in mind a more general program of eliminating arbitrary spellout rules. See for example Kayne (2010). Interesting as this program of research is, it surely remains rather speculative at present.

all lexical items present in the numeration to make such a contribution. In the case of morphologically complex reflexives such as *himself*, it has sometimes been argued that the *self* morpheme makes an interpretative contribution, but I will argue in §2.2.1 and §2.2.2 that this is misguided.

1.2.8 Linearization of copies

Following Hornstein (2001), I assume that linearization by default deletes only copies which have unvalued features. So for example, if a DP moves through two θ positions and a Case position, it will be the two lower copies, which have unvalued Case features, which will be deleted by default. Thus, although the syntax is value-blind, the syntax/PF interface is, by hypothesis, not. Hornstein proposes that linearization is governed by the following condition:

(49)   **Copy Deletion Determinism (Hornstein, 2001):** Delete only "defective" copies (i.e. copies with unvalued features). Once all defective copies of any given phrase have been deleted, exactly one copy must remain.

To capture the fact that linearization in accord with (49) is only a default, and not an absolute requirement, I propose to replace (49) with the following universal rule:

(50)   **Universal Chain Spellout Rule:** If a chain contains exactly one copy, c, such that all c's features are valued, then spell out the chain by pronouncing c fully and leaving all other copies silent.

This rule provides one default, easily available means of pronouncing a chain. Languages may, however, pronounce chains in other ways via language-specific chain spellout rules; this will be discussed further in §2.12.

A significant problem for the theory of Hornstein (2001) was that its analysis of parasitic gaps did not provide a persuasive account of why *wh*-phrases are able to move through multiple Case positions. In the case of local anaphoric binding, which also appears to involve chains spanning multiple Case positions, Hornstein assumed that the *self* morpheme was crucially involved in absorbing the extra Case, but there seems to be no overt analog of this morpheme in parasitic gap constructions. In the present framework, it is of course no surprise that *wh*-phrases can move through multiple Case positions, since anything can. The only question is why this does not lead to one of the traces of the *wh*-phrase being pronounced as a pronoun. That is, why is (51a) available in addition to (51b)?

(51)   a.   Which book did you buy *t* after reading *e*?

      b.   ? Which book did you buy *t* after reading it?

In fact, this is readily explained by (50). A chain of the form (Case,θ,Case,θ) cannot be pronounced using (50), since it contains three copies (all except the lowest) which bear all and only valued features. In contrast, the highest copy in the chain in (51a) is the only copy which has a valued +*wh* feature. Thus, the Universal Chain Spellout Rule can apply in parasitic gap constructions – leaving a gap – but not in ordinary cases of pronominalization. It is for this reason that chains encoding pronominal binding dependencies are always pronounced via language-specific spellout rules. This gives languages the option of pronouncing lower copies in these chains as overt pronouns.

It should nonetheless be emphasized that language-specific chain pronunciation rules *may be deletion rules*. Thus, the failure of the Universal Chain Spellout Rule to apply does not necessarily imply pronunciation of a lower copy (either fully or as an overt pronoun). A case in point, to be discussed in §2.12, is that of null arguments in Japanese. I will suggest that these are in effect bound pronouns very much like the *him* in English "Everyone$_1$ thinks that he$_1$ is intelligent," but

that the relevant pronunciation rule of Japanese simply deletes the lower copy instead of inserting a pronoun.

1.2.9   Agr heads and Case

Following Koizumi (1993); Lasnik (1999), I will assume that accusative Case is assigned by an Agr head between v and V. For the most part, this is not an assumption crucial to any of the analyses to follow. However, it does play an important role in chapter 3.

1.2.10   Morphology

I will argue that the morphology of reflexives and pronouns is largely superficial, idiosyncratic and language-specific. UG may in some instances urge that a particular copy be pronounced or deleted, and there may be semantic/pragmatic consequences of each option, but in general, UG is silent on the morphology of reflexives and pronouns. The familiar distinction between simplex and complex reflexives provides an illustrative example. Consider for example the case of Dutch *zich* vs. *zichzelf*. There is a sizable literature which argues for a fundamental grammatical distinction between the two forms and their licensing requirements (e.g. Everaert 1986, Reinhart and Reuland 1993). In contrast, following earlier work of Zribi-Hertz (1989), Koster (1994), Geurts (2004), I will argue that the two forms are (with a few caveats to be discussed later[22]) grammatically identical. Their distributional differences follow from general interpretative principles regulating the use of "strong" and "weak" pronominal and reflexive forms. These principles spring not from the narrow syntax, but rather from the constraints imposed on interpretation by phonology and its interface with semantics

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[22] See section §2.10 for further discussion.

and pragmatics.

As we have seen. the approach to binding phenomena developed here does not treat anaphors or bound pronouns as lexical items, in the sense of items which enter into the numeration. One consequence of this is to bar any appeal to idiosyncratic lexical properties of anaphors or pronouns. A case in point is the distinction in the availability of "statue" readings between Dutch *zich* and *zichzelf* (Jackendoff 1992, Lidz 2001). Under the approach developed here, it seems unlikely that it could be any special lexical property of *zichzelf* which licenses these readings, since *zichzelf* is just "morphological junk," not a distinct lexical item with its own interpretative contribution. Two possibilities therefore remain. Either the dependency established between *zich* and its antecedent is distinct in kind from that established between *zichzelf* and its antecedent, or the availability of statue readings is conditioned by extragrammatical principles. In this instance I will go for the latter option (see §2.10.1).

1.2.11 C-command and sideward movement

The availability of sideward movement might seem to imply that it should be commonplace for grammatical dependencies to be established outside of a c-command configuration. In fact, the Merge over Move condition outlined in §1.2.3 makes it very difficult to use sideward movement to obviate c-command. For example, consider the phenomenon of binding out of PP, illustrated in (52):

(52)   John talked to Mary$_1$ about herself$_1$.

One might suppose that it should be possible to give a derivation for (52) along the following lines:

(53)

[about Mary]	*Workspace 1)*
to	*Workspace 2)*

Sideward movement of 'Mary' to become the complement of 'to' :

[about ~~Mary~~]	*(Workspace 1)*
[to Mary]	*(Workspace 2)*

Derivation continues and 'John' merges as subject:

[John ... [talked [to Mary] [about ~~Mary~~]]]

However, this derivation violates Merge over Move. At the point where *Mary* moves to become the complement of *to*, *John* remains in the numeration and could be merged instead. The problem posed by (52) will be discussed extensively in chapter 3.

Another case to consider is (54):

(54)   * John$_1$'s mother loves himself$_1$.

Again, it may seem on the face of it that sideward movement should permit an A-chain dependency in this configuration. The issue becomes rather ticklish owing to the existence of "sub-command" phenomena in Chinese and other languages which superficially appear to furnish grammatical counterparts to (54). This topic will be taken up briefly in §2.11.1. The tentative conclusion is that A-chain dependencies are not in fact possible in this configuration.

One might ask at this point whether there is any reason at all to abandon a c-command condition in chain formation. In Nunes (1995), sideward movement was restricted by a c-command requirement on chain formation: the head of a chain had to c-command all of the other copies in it. The majority of the analyses in this dissertation are in fact compatible with this requirement, and I will not be concerned to reject it as a viable option. If such a requirement can be imposed, the empirical motivation for Merge over Move is substantially reduced.

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There are, however, some stubborn phenomena which cannot be assimilated under Nunes' approach. In particular, the dependency in examples such as (55) has all the properties of obligatory control (Hornstein, 2001), but it is clear that neither copy of *John* c-commands the other:

(55)   [[~~John~~] playing baseball] amuses John.

For this reason, I will tentatively assume that c-command is not an absolute condition on chain formation. Movement within a single workspace is constrained by c-command as a consequence of the extension condition (Hornstein, 2009). Movement between workspaces (i.e. sideward movement) is only able to obviate c-command in a small number of instances, owing to the constraints imposed by Merge over Move.

1.2.12   A brief note on the A/$\overline{\text{A}}$ distinction

The distinction between A- and $\overline{\text{A}}$-movement will be of some significance in what follows, since the two kinds of movement map onto two distinct kinds of binding relation: local anaphoric binding and variable binding. Nonetheless, the particular formulation of the A/$\overline{\text{A}}$ distinction is of somewhat peripheral importance to the central claims of the dissertation, since my assumptions regarding the properties of A/$\overline{\text{A}}$-movement will be quite conventional (modulo the hypothesized availability of movement through multiple Case and θ positions). I will assume that the specifiers and complements of heads which have Case, ϕ or θ features are A-positions, and that all other positions are $\overline{\text{A}}$-positions.[23] I will further assume that the number of A-positions that a given head may host is rationed by the availability of Case, ϕ and θ features. Thus, a head which has no more than

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[23] This particular way of formulating the distinction is incompatible with recent suggestions that C has ϕ features (Chomsky, 2008).

one of any of these features[24] can host at most one A-position, which will be its complement unless its complement is filled by a subcategorized non-DP phrase, and its (first) specifier otherwise. (For example, v's complement is filled by VP, so that it is v's specifier which is an A-position, not its complement.)

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[24] In stating the distribution of A-positions in this manner, I am thinking of multiple nominative constructions, which may involve a single head bearing multiple Case features (and hence having multiple A-specifiers) and of V, which may perhaps assign θ-roles to both its complement and its specifier in some instances.

Chapter 2

Binding phenomena

2.1 Outline

This section will present a brief summary of the key hypotheses to be defended in this chapter. §2.2 provides some background to show how my analysis of binding phenomena is situated with respect to key proposals in the existing literature. The remaining sections go into more detail with regard to competition between dependency types (§2.3), copy reflexives (§2.4), copy raising (§2.5), the Anaphor Agreement Effect (§2.6), reflexives which function as Case absorbers (§2.7), the role of Merge over Move in deriving subject-orientation facts (§2.8), epithets and Condition C (§2.9), differences in binding domain and interpretation (§2.10), and the extent to which sideward movement permits binding dependencies in violation of c-command (§2.11).

2.1.1 Terminological note

It will be useful to have a neutral term to cover bound and coreferential readings. I will say that A is "construed with" if A is coreferential with B, or if A binds B (or if some other similar interpretative relation holds between them). It should be emphasized that this is not a theoretical term – I do not propose that the syntax or the interpretative interfaces have any general notion of construal. The term "construal dependency" will cover binding, coreference, etc.

There will be some discussion of pronouns of the type found in the following sentences:

(56)   Every farmer who owns [a donkey]$_1$ beats it$_1$.

(57)   Either this building doesn't have [a bathroom]$_1$ or it$_1$'s very hard to find.

(58)   Everyone except John received [his paycheck]$_1$ yesterday. John received it$_1$ today.

My main interest in these pronouns stems from the hypothesis that they are uniformly interpreted via processes at the CI interface, and not via A- or $\overline{\text{A}}$-chains. This dissertation will not make any attempt to investigate the interpretation of examples such as (56)-(58), which is a vast topic in its own right. Given the increasing semantic sophistication of this literature, the term "high-tech pronoun" seems appropriate as an (almost[1]) theory-neutral cover term for E-type pronouns, paycheck pronouns and the rest. There is no claim that high-tech pronouns are a natural class.[2]

2.1.2   Local anaphoric binding as A-movement

The instance of local anaphoric binding in (59) has the derivation shown in (60):

(59)   John$_1$ likes himself$_1$.

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[1] The claim that these pronouns are distinct from ordinary bound pronouns is, of course, not theory neutral.

[2] It may be that there are several distinct classes of high-tech pronouns which are interpreted differently. E.g., Patel-Grosz and Grosz (2009) propose to distinguish "weak" and "strong" donkey pronouns.

(60)

TP
- John+θ+C+θ+C
- $\overline{\text{T}}$
  - T
  - vP
    - John+θ+C+θ
    - $\overline{\text{v}}$
      - v-Agr-V
      - AgrP
        - John+θ+C
          - | Spellout
          - himself
        - $\overline{\text{Agr}}$
          - ~~Agr~~
          - VP
            - ~~V~~
            - John+θ
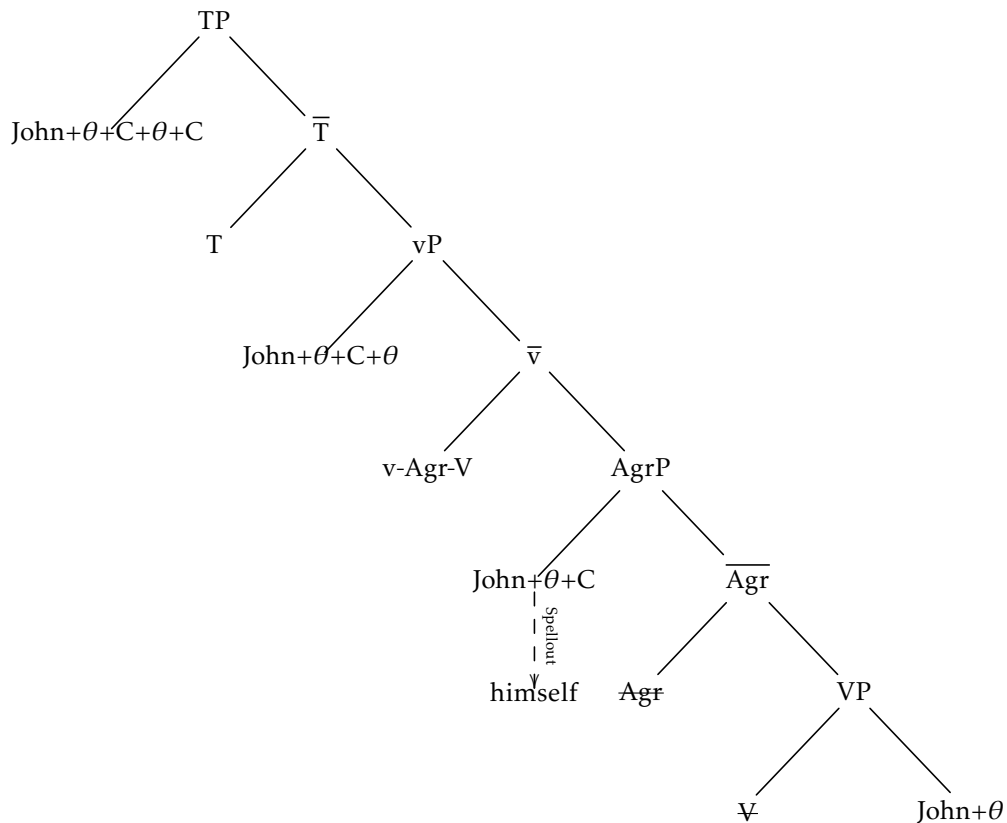
The copy of *John* in [Spec,AgrP] is spelled out as *himself* via an English-specific chain spellout rule (see §2.12).

The following examples illustrate the effect of Minimality on binding:

(61) a. * John$_1$ heard Mary hit himself$_1$.

  b. * John$_1$ expects Mary to beat himself$_1$.

Both (61a) and (61b) are ruled out because *John* has "moved over" *Mary*. The deviance of (62) is somewhat unexpected, since it does not appear to violate Minimality:

(62) * John$_1$ thinks that himself$_1$ is intelligent.

I will argue in §2.6 that (62) is ruled out by the Anaphor Agreement Effect.

Following Pollard and Sag (1992); Reinhart and Reuland (1993), I will assume that *picture* DP reflexives are not bound as local anaphors. As noted by

Zwart (2002), this is plausibly taken to be a result of the A-over-A constraint (which is a special case of Minimality in the present framework). Thus, none of the following sentences illustrate local anaphoric (i.e. A-chain) binding:

(63) a. $John_1$ likes pictures of $himself_1$.

    b. $John_1$ thinks that pictures of $himself_1$ are on display.

    c. $John_1$ was worried. Pictures of $himself_1$ were on display.

I will not have much to say about these "exempt" or "logophoric" reflexives in this dissertation beyond what has already been said in the literature.

   A crucial distinction between the analysis of binding phenomena presented in this dissertation and that of Hornstein (2001) lies in the treatment of Condition B effects. As we will see, the theory presented here is *not* built on the hypothesis that Condition B violations arise from the use of a pronoun when a reflexive could have been used instead. That is, (64a) will not be taken to be ungrammatical owing to the grammaticality of (64b):

(64) a.   * $John_1$ likes him_1.

    b. $John_1$ likes $himself_1$.

Rather, adapting a speculation in Drummond, Kush, and Hornstein (2011), I will argue that Condition B effects result from an anti-locality constraint on $\overline{\text{A}}$-movement. This will be discussed in the following subsection.

2.1.3   Pronominal binding as $\overline{\text{A}}$-movement

Drummond, Kush, and Hornstein (2011) suggest that certain instances of pronominal binding may be derived by $\overline{\text{A}}$-movement followed by "improper" movement to an additional θ and Case position:

(65)   [$_\text{TP}$ John thinks [$_\text{CP}$ [John] that [$_\text{TP}$ [John] is intelligent]]].

        ⇓

"John thinks that he is intelligent."

As in the case of local anaphoric binding, the presence of two Case positions in the chain triggers a special spellout rule.[3] The only difference is that a pronoun is used instead of a reflexive. In some languages, only the head of the chain is pronounced. For example, bound pronouns in English typically correspond to null pronouns in Japanese:

(66)   Hanako$_1$-wa [e_1 furansugo-o sitteiru to]   itta.
        Hanako-ᴛᴏᴘ   French-ᴀᴄᴄ knows that said.
        'Hanako said that *e* knew French.'

(67)   John$_1$ said that he$_1$ knew French.

Overt Japanese pronouns typically resist binding by a c-commanding quantificational antecedent, but they do sometimes permit high-tech interpretations (Kurafuji, 1998; Watanabe, 1993; Nishigauchi, 1990):[4]

(68)   [$_{Rel}$ Ronbun$_1$-o yon-da] dono gakusee-mo sore$_1$ hihanshi-ta.
        paper-ᴀᴄᴄ read-ᴘᴀsᴛ which student-every it-ᴀᴄᴄ criticize-ᴘᴀsᴛ.
        'Every student that read a paper criticized it.'

Similarly, building on observations of Wiltschko (1998), Patel-Grosz and Grosz (2009) note that German demonstrative pronouns disallow binding under c-command but permit high-tech interpretations, and that strong pronouns in Kutchi Gujarati behave similarly:

(69)   a.   [Jeder Mann]$_1$ behauptet, dass er$_1$ / *der$_1$ intelligent ist.
           Every man   claims   that he / that.one intelligent is.
           (German)

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[3] An interesting question is whether the use of a special spellout rule can be triggered *solely* by the fact that a chain violates Minimality. The answer to this question would clearly have implications for the correct analysis of resumptive pronouns, but I will not attempt to figure out the answer in this dissertation.

[4] Example (68) is from Kurafuji (1998, 136).

'Every man claims that he is intelligent.'

    b.   [Batha manas]$_1$ kidhu ke *pro*   / *i   hosiyar   che.
             Every man   says   that 3.sg.nom   3.sg.nom intelligent is.
             (Kutchi)

'Every man said that he was intelligent.'

(70)   a.   Jede   Linguistin, die   einen Esel   hat, liebt den. **(German)**
             Every linguist   who a   donkey has   loves it.
             'Every linguist who owns a donkey loves that donkey.'

    b.   Ji manas jena passe pathni che, gare   aave,   tho   *pro*
             If man   who poss wife   is   home comes then 3.sg.nom
             ene   bak bharave **(Kutchi)**
             3.sg.acc hug makes
             'If any man who has a wife comes home, he hugs her.'

These data illustrate what I take to be a very important point. The apparent similarity between referential pronouns, bound pronouns and high-tech pronouns is in part an accident of English morphology. In languages such as Japanese, there is a reasonably clear split between pronouns of the first type (which to a first approximation are always covert) and pronouns of the other two types (which may or may not be overtly realized depending on a range of complex factors[5]). This split is roughly what I take to be the split between pronouns which spell out the tails of chain dependencies and base-generated pronouns which are connected to their antecedents via interpretative processes at the LF interface.[6] When languages make a morphological distinction between "strong" and "weak" pronouns, it tends to be the weak pronouns which are used to spell out lower copies of chains spanning $\overline{\text{A}}$-positions. This can also be seen in some

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[5]For discussion of the Japanese facts see Kurafuji 1998.

[6] It is also roughly the conclusion of Evans (1980) and Montalbetti (1984, 75), in the sense that what Evans called "free pronouns," "coreferential pronouns" and "E-type" pronouns are lumped together and contrasted with bound pronouns.

languages with resumptive pronouns.[7] For example, in Lebanese Arabic, which has morphologically distinct strong and weak pronouns, it is only the weak pronouns which can be used as resumptives under most circumstances (Aoun and Choueiri, 2000). This dissertation will not investigate resumptive pronouns, but within the present framework these would presumably be analyzed as the spell-outs of lower copies of $\overline{\text{A}}$-position-spanning chains.

The movements involved in deriving pronominal binding clearly violate Minimality in some instances. For example, *John* moves over *Mary* in (71):[8]

(71)   [John] said [$_{\text{CP}}$ [John] that [$_{\text{TP}}$ Mary likes [John]]]

$\Downarrow$

"John said that Mary likes him."

Recall from §1.2.6 that Minimality is not a hard-and-fast constraint on movement, it is only a constraint on the default chain spellout mechanism. Thus, since chains encoding pronominal binding are not spelled out via this mechanism in

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[7] This may follow from a universal constraint on chain spellout along the lines of Montalbetti's (1984, 94) "Overt Pronoun Constraint," which requires, roughly, that covert pronouns be used in preference to overt pronouns to express bound readings (see also §2.3). It may be that the real distinction here is between strong and weak, rather than between overt and covert. The OPC accounts for a number of interesting facts regarding the availability of bound readings for overt subject pronouns in Spanish. Roughly speaking, these pronouns can receive bound readings if they are linked to their antecedents indirectly via a covert pronoun. Many of these results could also be captured by stating the OPC as a condition on chain spellout. However, I have found that judgments on the Montalbetti facts are somewhat variable between Spanish speakers (as Montalbetti also seems to find in some instances, p. 130fn17), so I have held off attempting to formulate a version of the OPC in this dissertation. I would like to thank Juan Uriagereka for bringing the importance of Montalbetti's work to my attention.

[8] In principle, one could hypothesize *John* has an additional feature which permits it to move over *Mary*, but this is not nearly as plausible for pronominalization as it is in the case of, e.g., *wh*-movement, since *John* sounds just like an ordinary DP, and is not moving to a special position.

any case, the Minimality violation in (71) is of no consequence.

It should be emphasized that not all instances of variable binding are derived via $\overline{\text{A}}$-movement. In some cases, a base-generated pronoun may be interpreted as a bound variable via interpretative processes at the Conceptual-Intentional (CI) interface. Moreover, as we will see in §2.3, there is no preference for the use of $\overline{\text{A}}$-movement over these interpretative processes. Thus, the interpretation of *he* in an English sentence such as (72) may be obtained either via movement or via interpretative processes at the CI interface:

(72)   Everyone$_1$ thinks that he$_1$ is intelligent.

In English, there is no overt distinction between pronouns which spell out the tails of chains and base-generated pronouns. However, we have seen that languages such as Japanese there is an overt distinction. While we frequently find pronouns which are *never* chain spellouts, we rarely if ever find pronouns which are *always* chain spellouts. For example, we will see in §2.3 that Spanish overt subject pronouns, in contrast to null subject pronouns, can never spell out the tails of $\overline{\text{A}}$-position-spanning chains. However, Spanish null subjects have a number of uses where they clearly are not chain spellouts, as for example when they are used to express high-tech readings:[9]

(73)   Cada chico que comió [un burrito]$_1$ dijó que *pro*$_1$ estuvo delicioso.
        Every boy that ate   a   burrito said that (it) was   delicious.

The question now arises of how base-generated null subject pronouns are distinguished from base-generated overt subject pronouns. One possibility is that they are syntactically distinguished in their feature specifications. Another possibility is that both are merely bundles of phi-features, with the choice of whether or not to realize these features overtly or not being made at the point of spellout. As we will see in §2.3, the phonological form of a pronoun has consequences for

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[9] Although see Boeckx (2003) for a movement analysis of donkey anaphora.

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the kinds of dependencies it can enter into due to the effects of the "Keeping Up Appearances" principle.

There is one aspect of the spellout mechanism for pronominalization which must be clarified. Consider the following instance of reflexive binding:

(74) $[_\text{CP}$ Who $[_\text{TP}$ [who] loves [who]]]

$\Downarrow$

"Who loves himself?"

Here we have a chain which spans two Case positions and an $\overline{\text{A}}$-position, but pronominalization does not apply. To explain why pronominalization does not apply here, we must ensure that the reflexive spellout rule applies before pronominalization gets a chance. I will assume that with regard to the application of subsequent spellout rules, a spelled-out chain is equivalent to the trivial chain formed of its head. So for example, in the case of (74), spellout proceeds as shown in (75). Here, only copies with valued Case features are shown, for reasons to be discussed in §2.12.

(75)   Who $_{\overline{\text{A}}}$ ... [who]$_\text{A}$ ... [who]$_\text{A}$

Reflexive spellout rule:

[Who]$_{\overline{\text{A}}}$ ... [who]$_\text{A}$ ... *himself*

Universal Chain Spellout Rule (50):

Who$_{\overline{\text{A}}}$ ... *himself*

2.1.4   Why Conditions A and B are mirror images

A classic puzzle in binding theory is posed by the complementary distribution of pronouns and reflexives. The puzzle has both an empirical and a conceptual component. The empirical component is raised by apparent exceptions to com-

plementarity:[10]

(76)   John$_1$ saw a snake near him$_1$/himself$_1$. (Chomsky, 1965)

(77)   John$_1$ likes pictures of him$_1$.

(78)   Jan$_1$ seach [$_S$ him$_1$/himsels$_1$ yn 'e   film de partij winnen]. **(Frisian)**
        Jan   saw   [him/himself   in the film the match win].
        'John saw himself win the match in the film.'

This dissertation takes the position that the complementarity is real, once inter-
fering factors (such as logophoric reflexives) are controlled for. This position,
the cornerstone of the classic GB binding theory,[11] has recently been defended in
Safir (2004). With regard to English, the key to defending the complementarity
hypothesis is the recognition that DP-internal reflexives are not locally A-bound.

The conceptual puzzle is to explain the source of the complementarity ef-
fects. In the GB binding theory, this complementarity derives from the statement
of Conditions A and B in terms of the same notion of Governing Category. How-
ever, this approach leaves open the question of *why* both conditions are sensitive
to the same locality domain. This has naturally led to proposals that one of the
two conditions is primary, with the other somehow a side effect of the application
of the primary condition. As to the question of which condition is primary. there
are arguments on both sides. Lasnik (1989) points to examples such as (79)-(80)
as evidence that Condition B effects obtain in the absence of a competing reflex-
ive:[12]

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[10] (78) is taken from Reuland 1994, 240.

[11] Later extensions to the GB binding theory, such as Chomsky (1986), relaxed complemen-
tarity slightly. The empirical motivation for doing so derived from data involving DP-internal
reflexives and reciprocals. Since I am assuming that these are not in fact locally A-bound, Chom-
sky's arguments for relaxing complementarity do not apply within the present framework.

[12] I should note here that Lasnik is not arguing either that Condition A effects are the mirror
image of Condition B effects, or vice versa.

(79) a. * The boys$_{\{1,2\}}$ like him$_1$.

  b. * The boys$_{\{1,2\}}$ like himself$_1$.

(80) a. * We$_{\{1,2,...\}}$ like me$_1$.

  b. * We$_{\{1,2,...\}}$ like myself$_1$.

On the other hand, there are many languages in which Condition B appears to be obviated with first and second person pronouns. This phenomenon can be illustrated with Spanish:

(81) a. Me lo dio.
      (He) 1PS 3PS gave.
      'He gave it to me.'

  b. Te lo dio.
      (He) 2PS 3PS gave.
      'He gave it to you.'

(82) a. Me lo di.
      (I) 1PS 3PS gave.
      'I gave it to myself.

  b. Te lo diste.
      (You) 2PS 3PS gave.
      'You gave it to yourself.'

As shown in (81), the first- and second-person clitics behave as pronouns which do not require a local grammatical antecedent. However, (80) shows that, unlike English pronouns, these pronouns are *compatible* with a local grammatical antecedent. It seems natural to hypothesize that Spanish *te* and *me* may be locally bound because there is no dedicated first- or second-person reflexive clitic in Spanish. This point has recently been emphasised in Safir (2004), in connection with similar phenomena in some of the Germanic languages.

I believe that data of the kind in (79)-(80) carry more weight than data of the kind in (81)-(82). This is because the latter are easily accounted for as a instance of morphological syncretism. It often turns out to be necessary to posit

such syncretism in any case, since first and second person pronouns quite often take on special grammatical functions which are not plausibly compatible with ordinary pronounhood. For example, Spanish *me* and *te* are able to take on some of the special functions of the third-person reflexive clitic *se*. The verb *ir* ('go') has a special "reflexive" form meaning "to go away" or "to leave." In the first and second persons, this special meaning is expressed using *me* and *te*:

(83)   a.   Me voy.
              (I) 1PS go.
              'I leave.'

       b.   Te   vas.
              (You) 2PS go.
              'You leave.'

       c.   Se   va.
              (He) 3PS-REFL goes.
              'He leaves.'

It does not seem likely that the reflexive form of *ir* expresses a true two-place relation holding between a person who leaves and himself. But if it does not, *me* and *te* in (83a) and (83b) cannot be ordinary bound pronouns. It seems that at least some of the competition between reflexive and pronominal forms must take place in the morphology, not the syntax. This considerably reduces the motivation for assuming that *any* of the competition is syntactic. Further evidence against syntactic competition comes from ellipsis. In ellipsis contexts, locally bound *te* and *me* behave like reflexives insofar as they permit only sloppy readings:

(84)   a.   Yo me toque y   Juan tambien.
              I   1PS touch and John too.
              'I touched myself and John did too.'

       b.   I touched myself and John touched himself too.

       c.   * I touched myself and John touched me too.

For these reasons, I think that the most promising approaches to explaining the complementary distribution of pronouns and reflexives take Condition B as the primitive. This move is advocated, for example, in Kayne (2002), and to a certain extent in Reinhart and Reuland (1993) and Reuland (2001). In the present framework, a form of Condition B follows from the nesting of A and $\overline{\text{A}}$ domains. To link two θ positions via pronominalization, it is necessary for an $\overline{\text{A}}$ position to intervene between them. Since there are (by hypothesis) no $\overline{\text{A}}$ positions within $\overline{\text{v}}$, local pronominalization is impossible. A key advantage of this analysis of Condition B effects is that it allows us, in a certain sense, to have our cake and eat it with respect to the relation between Condition A and Condition B. The theory presented here has analogs of both Condition A and Condition B: the former is subsumed under locality conditions on A-chains; the latter follows from the distribution of $\overline{\text{A}}$-positions. Any account of binding phenomena must provide some analog of Condition A, since there must be something to prohibit reflexives from taking non-local antecedents. Within most frameworks, if a version of Condition B is added to the theory in addition to Condition A, it must simply be stipulated that the domains of Condition A and Condition B are identical. A key advantage of the present proposal is that no such stipulation is necessary, since the assumption that the A and $\overline{\text{A}}$ domains are nested is independently motivated.

There is one configuration in which the domains of Condition A and Condition B are predicted to diverge on the present analysis. The subject of an embedded clause is plausibly taken to be A-local to the subject of its parent clause, but there is also an intervening $\overline{\text{A}}$-position – embedded [Spec,CP].[13] Thus, we might

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[13] Note that it will make little difference whether or not there is an intermediate $\overline{\text{A}}$-position available on the edge of vP (Chomsky, 2000, 2001). The $\overline{\text{A}}$-position must intervene between the two *thematic* positions which are to be related. So for example, the presence of an $\overline{\text{A}}$-position in this location would not permit pronominal binding of a direct object by a subject, since although the $\overline{\text{A}}$-position on the left edge of vP would intervene between the subject in [Spec,TP] and the

expect to find both anaphoric and pronominal binding relations between α and β in the following configuration:

(85) $[_{TP} \; \alpha \; ... \; [_{CP} \; ... \; [_{TP} \; \beta \;]]]$

In English, this prediction is difficult to test owing to the Anaphor Agreement Effect (see §2.6). Since β cannot be a reflexive due to the AAE, only the option of pronominal binding can be exploited. However, in languages permitting subject anaphors such as Chinese, we do find that pronouns and reflexives are not in complementary distribution in subject positions:[14]

(86)   Zhangsan$_1$ shuo ta-ziji$_1$/ta$_1$ hui lai.   **(Chinese)**
        Zhangsan   say   he-self/he will come.

This example is taken from Haddad (2007), who notes that *ta-ziji* is always locally bound. Examples of this sort provide further evidence against the hypothesis that Condition B effects derive from an economy competition between pronouns and reflexives. Another potentially relevant data point is the breakdown in pronoun/ reflexive complementarity that we saw in (76), repeated here in (87):

(87)   John$_1$ saw a snake near him$_1$/himself$_1$.

These are somewhat less persuasive than the Chinese examples, since the reflexive in (87) is quite plausibly treated as a logophor. However, there are some facts weighing against a logophoric analysis, such as the fact that these reflexives do not permit extrasentential antecedents:

(88)   a.   The boys$_1$ were frightened. Near them$_1$/*themselves$_1$ they saw a
              snake.

object position, it would not intervene between the thematic positions of the internal and external arguments.

[14] Though the facts become more complex when quantificational antecedents are considered; see Huang (1983).

b. The boys$_1$ were frightened. Near the recently sculpted statues of them$_1$/?themselves$_1$ they saw a snake.

If the reflexives in these examples are not logophors, it might be hypothesized that the relevant prepositional phrases have specifiers which can be used as intermediate $\overline{\text{A}}$-positions.

The mere impossibility of $\overline{\text{A}}$-chain formation is, of course, not sufficient in and of itself to derive a Condition B effect. There are other means of encoding construal dependencies, such as coreference and LF binding, which do not depend on the possibility of $\overline{\text{A}}$-chain formation. In §2.3, I will argue that a phonological variant of Reinhart's (2006) "No Sneaking" principle suffices to ensure that the antilocality condition on $\overline{\text{A}}$-chain formation cannot be obviated by means of coreference or LF binding.

2.2 Some perennial issues

Any approach to binding phenomena can be broadly characterized by the position it takes on a number of touchstone issues. Of particular importance are the following:

- Are Condition A effects the mirror image of Condition B effects, and if so why?

- What is the status of DP-internal reflexives (as in e.g. *pictures of himself*)? Are all or some of these exempt from the normal binding constraints?

- Is any notion of "coargument" relevant to binding theory?

- Is there a distinction between anaphoric binding and variable binding?

- Is the semantic distinction between binding and coreference significant in the formulation of the binding principles?

- The role of economy: can the availability of one kind of binding relation block the availability of another? (E.g., does the availability of *John*$_1$ *likes himself*$_1$ block *John*$_1$ *likes him*$_1$?)

The first two questions have already been addressed in the preceding section. The following subsections will address the remaining questions. The last two questions are further addressed in §2.3, which argues that the availability of a chain dependency can, under certain phonologically conditioned circumstances, have the effect of blocking other kinds of semantic dependency.

2.2.1 Against inherently "defective" or "referentially dependent" elements

One way to begin a discussion of referential dependency is to pose the following question. Why is it that *the man* can bind *he* in (89a), but *he* cannot be construed with *the man* in (89b)?

(89)   a.   [The man]$_1$ thinks that he$_1$ is intelligent.

     b.   * He$_1$ thinks that [the man]$_1$ is intelligent.

One answer, of course, is that (89b) is a Condition C violation. But leaving aside this possibility, there is an appealing "semantic" answer to this question: *the man* can't be bound by anything because it is a referential DP. This answer figures crucially in Reinhart (1983b). Reinhart rules out the possibility of *he* and *the man* being coreferential in (89b) by means of a preference for binding over coreference. But the impossibility of *binding* in (89b) is assumed to follow from semantic considerations without the need to stipulate any additional syntactic or interpretative condition.

The key idea here is that there are some DPs, such as *he*, which are by nature "referentially dependent" or "defective". These contrast with full DPs which

(whether or not they are strictly speaking referential) do not depend on any other DP to fix their interpretative contribution. A number of authors have proposed multi-level hierarchies of referential dependency (e.g. Lasnik 1989, Safir 2004).A particularly common and intuitive idea in this domain is that referential dependence is tied to ϕ-featural deficiency (see e.g. Reuland 2001, 2005). For the remainder of this subsection, I will lump this cluster of ideas together as the "Theory of Lexically-Specified Referential Dependence" (TLSRD).

As intuitive as TLSRD may appear, it is difficult to state precisely, and there is significant evidence against it. With regard to the coherence of TLSRD, a crucial point is that "referentially dependent" cannot be understood to mean simply "non-referential." There are of course many elements which are non-referential which nonetheless cannot receive bound interpretations (e.g. adjectives). Thus, even under the simplest formulations of TLSRD, we have a three-way distinction: things which refer, things which do not refer, and things which cannot refer in and of themselves but which nonetheless *seek out* referents. This last category is easy enough to conceive if we understand the need in question to be a syntactic or grammatical one. But on this understanding, to say that something is referentially dependent is merely to assign it a diacritic picking it out for the purpose of some Condition-A-like syntactic principle. In other words, to say that something is referentially dependent in this sense is essentially just to say that it is specified "+anaphor," and no insight is gained by the change in terminology. On the other hand, a semantic notion of referential dependency cannot do the necessary work. Seeking a referent is not the same thing as *seeking a referring expression*, and anaphors do the latter.

A significant empirical difficulty for TLSRD is raised by the ability of full DPs to receive bound (or at least covarying) interpretations:

(90)   Every woman who met [a man]$_1$ asked [the man]$_1$ out to dinner.

Even if (90) illustrated a distinct epithetic use of the DP which was syntactically distinguished from truly referential uses, we would still have to explain why this epithetic form is not available in (89b). It seems unlikely that there could be any semantic condition or consideration blocking this option. We are therefore led to the conclusion that there is a *grammatical* condition which blocks the relevant interpretation in (89b). This implies that the deviance of the indicated interpretation does not follow on independent semantic grounds.

A further difficulty for the TLSRD arises in connection with the hypothesis that referential dependency is tied to ϕ-featural deficiency. From a Minimalist point of view, this hypothesis arguably follows immediately from Full Interpretation together with the assumption that pronouns/reflexives are lexical items in their own right. Chomsky (1995, 219) states Full Interpretation as follows:

(91)   **Full Interpretation:** An LF representation must consist entirely of "legitimate objects" that can receive an interpretation (perhaps as gibberish).

If bound elements were fully ϕ-specified, it would be difficult to see how the ϕ-features of both the antecedent and the pronoun could receive an interpretation. (One might suppose that the ϕ-features of the bound element could be interpreted as restrictors on the variable, but we will see shortly that this is empirically untenable.)

Moreover, the hypothesis that bound elements are ϕ-featurally deficient appears on the face of it to be refuted by the existence of bound elements having full ϕ-feature specifications, such as *himself*. For this reason, Reuland (2001) is forced to assume that Dutch *zichzelf* and English *himself* enter into different kinds of dependency. In both cases, *zelf/self* serves to obviate Semantic Condition B, but the requirement that *zichzelf* and *himself* have local antecedents is derived in a different way for each. Since the ϕ-features of the *zich* portion of

zichzelf are defective, these enter into an Agree[15] relation with the antecedent, and this forces an interpretation in which *zich(zelf)* is bound by the antecedent. In contrast, English *him* (within *himself*) is fully ϕ-specified, and so cannot enter into an Agree relation with the antecedent. Thus, Reuland assumes that *him* is bound as a variable (i.e., in the same way as *him* in "Everyone$_1$'s mother thinks that he$_1$ is intelligent.") The requirement that *himself* have a local antecedent is then enforced by covert raising of *self* to the relevant predicative head. All of this technology seems rather unmotivated, given that *zichzelf* behaves very much like *himself* when "interference" from *zich* is ignored.

In later work (Reuland, 2010), Reuland, following Kratzer (2006, 2009), has adopted the idea that some pronouns have ϕ-features which are not lexically specified, but which are acquired in the course of the derivation. These acquired ϕ-features are interpretatively vacuous, and hence do nothing to mitigate the interpretative consequences of ϕ-featural deficiency. There is independent evidence for this interpretative vacuity. For example, Kratzer points to the fact that (92a) has a reading (92b):

(92)   a.   Only I take care of my children.

          b.   I am the only $\{x \mid x$ takes care of x's children$\}$

Here, the first-person ϕ-features of *my* appear to make no interpretative contribution. Kratzer develops the notion of a "minimal pronoun": a pronoun which is introduced with no ϕ-features whatever. She argues that minimal pronouns may acquire ϕ-features in the course of the derivation, and hence be spelled out as superficially ϕ-complete expressions. Certain heads further condition the manner in which the pronoun is spelled out. For example, a minimal pronoun in the neighborhood of v will be spelled out as a reflexive.

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[15] I am being anachronistic in stating the theory of Reuland (2001) in terms of Agree, but see Reuland (2005, 2011).

Kratzer's approach to binding theory is strikingly similar to the chain-based approach. Both approaches maintain (i) that the ϕ-features on pronouns and reflexives are superficial morphology; and (ii) that the distinction between (e.g.) pronouns and reflexives is also a fairly arbitrary morphological one. However, minimal pronouns raise a number of serious conceptual difficulties which do not arise within the chain-based approach. In particular, the following questions arise:

- If a "minimal pronoun" has neither ϕ-features, nor any referential content, it seems to contribute nothing more than an index. But the property of being an index is inherently relational: the only significant properties of an index are (i) its position in a given representation and (ii) whether or not it is identical to other indices *in the same representation*. Thus, it is not obviously coherent to conceive of an index as a lexical item.

- Why does a "minimal pronoun" have to acquire ϕ-features from its antecedent (rather than from some other item)? It is presumably not an interpretative requirement that it must do so, since its (eventual) ϕ-features make no interpretative contribution. But nor can it be a morphological requirement, since any ϕ-feature bearing element is a fine source of ϕ-features from a purely morphological point of view, whether or not it is the pronoun's antecedent.

- Given that minimal pronouns behave very much like lower copies, why does UG provide both minimal pronouns and Copy+Merge for establishing grammatical dependencies?

These problems can be traced back to the question raised at the beginning of this subsection in relation to (89). There are essentially two ways to go about fleshing out the intuition that there is something inherently "dependent" or "defective"

about bound pronouns and reflexives. The first is to encode this defectivity as a formal syntactic requirement, similar to the ±anaphor feature of GB theory. This, however, has a rather stipulative flavor. Thus, especially with Minimalist considerations in mind, it is tempting to try to find some semantic or "interface" notion of referential defectiveness, perhaps tied to the interpretative consequences of ϕ-feature deficiency. The aim is to construct a lexical item from whose nature the requirement for a grammatical antecedent simply *follows*. But in reality it seems unlikely that the requirement to enter into a particular kind of *grammatical* relation could ever follow, directly, from the intrinsic properties of a lexical item. Even supposing we have a clear semantic notion of referential defectivity, there is no particular reason to think that a referentially defective element must obtain a reference via a grammatically-licensed antecedent. The reverse is also true: interpretative dependencies never follow directly from grammatical dependencies. For example, Reuland (2005) argues that *zich* receives a bound interpretation because its ϕ-features are valued by those of its antecedent. But this does not really follow without stipulation, given that ϕ-feature concord is observed in other areas of the grammar (e.g. subject/verb agreement) without the same interpretative effects. That a particular kind of interpretative dependency is linked to a particular kind of grammatical dependency must always, in the final analysis, be stipulated. A virtue of the chain-based approach is that it uses one and the same interpretative stipulation for anaphoric binding, control and other instances of A-movement: viz., the tail of a chain is interpreted as a variable bound by the head.

2.2.2   Against predicate-centric approaches to binding theory

The publication of Reinhart and Reuland (1993) was a landmark in the development of binding theory. The paper presented a persuasive critique of the GB

binding theory, and proposed a return to a more traditional "predicate-centric" approach to binding phenomena.[16] The predicate-centric approach can be roughly characterized by the following pair of hypotheses:

(i) The core principles of binding theory can be stated in terms of the notions "predicate", "argument" and the derivative notion of "co-argument."

(ii) There is a special licensing condition on predicates which have two or more co-indexed arguments ("reflexive predicates").

It is important to distinguish Reinhart and Reuland's predicate-centric binding theory from theories stated in terms of argument structure. Although Reinhart and Reuland clearly make reference to some notion of argument structure in their definition of "reflexive predicate," the binding conditions themselves are stated as conditions on *predicates*. This is in contrast to the theory of, say, Pollard and Sag (1992), in which it is only argument structures (in the form of "SUBCAT lists") which are referenced in the statement of the binding conditions. The distinction is not as academic as it may first appear. When binding conditions are stated over argument structures, one may or may not choose to make use of the notion of "coargument" in stating the locality constraints on local anaphoric binding. For example, Pollard and Sag make use of this notion, whereas Bresnan (2001) (in the course of stating a binding theory over argument-structure-like representations) does not. In contrast, the decision to state the binding conditions as conditions on predicates virtually forces one to adopt the hypothesis that the co-argument domain is the domain of local anaphoric binding.

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[16] This approach is traditional in the sense that it is a development of the traditional observation that reflexive pronouns are used "when the subject of the sentence is identical to the object." Reinhart and Reuland were not the first to propose a formal version of this kind of analysis; see e.g. Bach and Partee (1980).

From the present perspective, the primary interest of Reinhart and Reuland's theory is that its rather spare notion of "predicate" might reasonably be incorporated into a Minimalist theory.[17] Since some notion of co-argument comes more-or-less for free given certain assumptions regarding the architecture of the CI interface, it would be not be surprising if certain grammatical relations were local to the co-argument domain. Thus, if it can be shown that local anaphoric binding is not in fact a co-argument relation this strongly suggests, given Minimalist background assumptions, that it is a chain-like relation of some sort.

Indeed, Reinhart and Reuland themselves advanced the hypothesis that certain aspects of the distribution of pronouns follow from general conditions on A-chains, and it was noted immediately by Fox (1993) that there is a high degree of redundancy between Reinhart and Reuland's Condition A and their Chain Condition. Fox proposed that the former should be disbanded in favor of a revised version of the latter. I will not summarize his arguments here, but instead present some additional arguments against the predicate-centric approach in §2.2.4-§2.2.5.

2.2.3   Summary of Reinhart and Reuland (1993)

For the reader's convenience, this subsection contains the useful summary of Reinhart and Reuland's theory given in Reuland (2001, 451fn13).

(93)   *Definitions*

    a.   The *syntactic predicate* formed of (a head) P is P, all its syntactic arguments, and an external argument of P (subject).

    b.   The *syntactic arguments* of P are the projections assigned θ-role or

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[17] See e.g. Reuland (2001, 2005, 2011) for Minimalist developments of Reinhart and Reuland's initial theory.

Case by P.

c. The *semantic predicate* formed of P is P and all its arguments at the relevant semantic level.

d. A predicate is *reflexive* iff two of its arguments are coindexed.

e. A predicate (of P) is *reflexive marked* iff either (i) P is lexically reflexive or (ii) one of P's arguments is a SELF anaphor.

(94) *Binding conditions*

a. Condition A: A reflexive-marked syntactic predicate is reflexive.

b. Condition B: A reflexive-marked semantic predicate is reflexive-marked.

(95) *Generalized chain definition*

$C = (\alpha_1, ..., \alpha_n)$ is a chain iff C is the maximal sequence such that

a. there is an index i such that for all $j, 1 < j < n$, α_j carries that index, and

b. for all $j, 1 < j < n$, α_j governs α_{j+1}.

(96) *Condition on A-chains* (condition on well-formedness)

A maximal A-chain $(\alpha_1, ..., \alpha_n)$ contains exactly one link – α_1 – that is completely specified for grammatical features.

2.2.4 Binding across clause boundaries

The possibility of binding in the following configurations poses a challenge to the predicate-centric approach:

(97) a. John$_1$ expects [$_{TP}$ himself$_1$ to beat Mary].

b. John$_1$ wants very much [$_{CP}$ for [$_{TP}$ himself$_1$ to win]].

Reinhart and Reuland (1993) discuss examples such as (97a), but the proposed analysis is somewhat unsatisfactory. Reinhart and Reuland's statement of Condition A is couched in terms of the rather stipulative notion of a "syntactic predicate," which is defined such that both *John* and *himself* are arguments of the syntactic predicate headed by *expects*. The reflexive in (97a) therefore functions to reflexive-mark this predicate. However, as Reinhart and Reuland note, on their theory the reflexive should *also* reflexive mark the embedded predicate headed by *win* (arguments: *himself*, *Mary*). Since this predicate is not in fact reflexive, (97a) is incorrectly predicted to be ungrammatical. To rectify this problem, Reinhart and Reuland propose that the embedded predicate raises covertly at LF to form a complex predicate with *expects*:

(98)   LF: John$_1$ [to-beat]$_2$-expects [$_{TP}$ himself$_1$ t_2 Mary].

In this structure, *himself* is an argument of the matrix syntactic predicate, but Reinhart and Reuland claim (for reasons that I find somewhat obscure) that *himself* is not an argument of the embedded predicate or its trace t_2. Thus, *himself* reflexive-marks the matrix syntactic predicate, as required, but it does not reflexive-mark the embedded predicate. Presumably, given the grammaticality of sentences such as (99a), the process of complex predicate formation must be permitted to apply successive-cyclicly to yield arbitrarily complex predicates:

(99)   a.   John$_1$ expects himself$_1$ to expect himself$_1$ to expect himself$_1$ to beat Mary.

       b.   LF: John$_1$ [[[to-beat]$_2$-to-expect]$_3$-to-expect]$_4$-expects [$_{TP}$ himself t_4 [$_{TP}$ himself$_1$ t_3 [$_{TP}$ himself$_1$ t_2 Mary]]]

In defense of their predicate-raising analysis, Reinhart and Reuland point out that predicate raising structures are overtly attested in other languages (e.g. Dutch). Indeed, there does not even appear to be any grammatical upper bound on the

size of the resulting verb cluster (Shieber, 1985). However, even if one is willing to swallow LFs such as (99b), there is still the issue raised by the stipulative notion of syntactic predicate. It is important to note that Reinhart and Reuland's predicate-raising analysis does *not* make it possible to dispense with this notion. This is because mere raising of a predicative head at LF is not sufficient to bring the matrix predicate into a head-complement configuration with the subject of the embedded clause. To render the embedded subject the internal argument of a new complex predicate would require a structural reorganization more drastic than movement is able to effect. (There would also be the question of what to do with the internal argument(s) of the embedded clause – would these have to be dragged up into the complex?) In any case, as Reinhart and Reuland note (p. 679), examples such as (100) show independently that the notion of a syntactic predicate is indispensable within Reinhart and Reuland's theory:

(100)   John$_1$ seems to himself$_1$ t_1 to be intelligent.

Since *John* is not, under standard analyses, a semantic argument of *seem*, it cannot be the case that *John* and *himself* are coarguments in any semantic sense. Thus, it must be that they are arguments of the same syntactic predicate.[18]

Reuland (2011) gives a different analysis of English ECM subject reflexives. In contrast to Reuland (2001), Reuland (2011) once again states Condition A in terms of "syntactic predicate" (though there is some discussion on how this notion might be derived from simpler primitives). However, Reuland drops the LF-raising analysis just discussed. Instead, he proposes that *himself* doesn't reflexive-mark the downstairs predicate because reflexive-marking is effected via covert *self*-movement, and movement must be upward:

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[18] For this to be the case under Reinhart and Reuland's definition of syntactic predicate, it would be necessary to assume some kind of reanalysis of *seem* and *to*, but as chapter 3 will make clear, I have no quarrel with this kind of analysis.

(101)   LF: John self-expects him-*t* to beat Mary.

This is an intriguing instance of binding theory coming full circle. Reuland assumes, following Chomsky and Lasnik (1993), that *self*-movement is governed by general locality conditions on movement. These conditions are, as far as I can make out, imposed *in addition* to the locality conditions imposed by Reuland's Condition A (which is defined in terms of syntactic predicates). Within English, the two sets of locality conditions are almost entirely redundant. Clearly, if the theory is not to undergenerate, the locality constraints on *self*-movement must be lax enough to allow *self* to move from any internal argument of a syntactic predicate to the head of that predicate. If *self*-movement ever succeeds in moving *self* outside of its original syntactic predicate, Condition A will be violated in any case, so nothing of any consequence will result. If we simply remove Condition A, together with the notion of syntactic predicate in terms of which it is stated, we arrive at precisely the theory of Condition A presented in Chomsky and Lasnik (1993)! For English at least, the latest revision of the predicate-centric approach has arrived at precisely it's point of departure – the late GB binding theory.

   To put it another way, Reuland's current theory of English reflexives holds that: (i) there is a c-command constraint on reflexive marking and (ii) that there are (not one but two!) non-semantically-defined locality constraints on the binding of reflexives. When examined closely, this is essentially a rather cryptic reformulation of earlier GB-theoretic analyses. The moral of the story seems to be that English reflexives simply do not care which predicate they may or may not be arguments of. Whatever the utility of predicate-centric theories in accounting for binding phenomena in other languages, the attempt to apply the approach to English has proved to be an almost unmitigated failure.When "predicates" are defined in syntactic terms, and reflexive marking is conditioned on syntactically-formulated structural constraints, then these predicates are nothing more than

syntactic locality domains – Governing Categories.

A broadly similar point can be made regarding Reinhart and Siloni (2004). Reinhart and Siloni come to the conclusion that reflexive interpretations can be derived by an operation of "θ-role bundling" which applies in the syntax. This operation is not restricted to operating within the domain of a single semantic predicate, but is governed by fairly strict locality conditions. Again, it seems that an adequate account of the binding patterns found in English and a number of other languages requires an operation of some kind which is able to link multiple θ positions which are not arguments of the same predicate. In this respect, the current consensus of the literature seems to be that an entirely predicate-based formulation of binding theory is impossible (even if certain binding phenomena do require a treatment in these terms). This seems to be something of a retreat from the position of Reinhart and Reuland (1993), which argued for a wholly predicate-based approach.

To further the case against predicate-centric approaches, let us now return to (97b) above, repeated here as (102):

(102)   John$_1$ wants very much for himself$_1$ to win.

Examples of this sort are not discussed in Reinhart and Reuland (1993) (an omission pointed out in Fox 1993). However, Pollard and Sag (1992, 290) do present an argument that reflexives in this configuration are (like *picture* DP reflexives) exempt from the standard binding conditions:

> The question then arises whether the anaphors in examples like the follow-
> ing are subject to Principle A:
>
> (103)   a.   John$_1$ wanted more than anything else for himself$_1$ to get the
>   job.
>
>   b.   The men$_1$ preferred for each other$_1$ to do the hard work.

On standard accounts, this question is answered affirmatively. But there is good reason to question the correctness of such accounts. Whatever factors (e.g. point of view) are at work to determine the coindexing in such examples, such factors are also at work in examples such as (104):

(104) a.   What John$_1$ would prefer is for himself$_1$ to get the job.

      b.   The thing [Kim and Sandy]$_1$ want most is for each other$_1$ to succeed.

In these examples, there is no possible appeal to Principle A, however formulated, inasmuch as the antecedents are in remote syntactic domains. Yet the indicated co-indexing seems just as obligatory as it is in (103).

It is not clear what we should conclude from this discussion, since (as Pollard and Sag themselves go on to note) reflexives quite generally behave strangely within cleft constructions. Thus the effect in (104) can be reproduced with direct object reflexives:

(105) a.   What John$_1$ would prefer is himself$_1$.

      b.   The thing [Kim and Sandy]$_1$ want most is each other$_1$.

Such examples may well show that reflexives of this sort are not subject to the standard binding conditions (and thus imply that there are no real "connectivity" effects to be seen here; see e.g. Jacobson (1994)). But surely, if the data in (105) fail to show that ordinary direct object reflexives are not subject to the standard binding conditions, then the data in (104) cannot do the same for reflexives in the subject position of *for...to* infinitives. These reflexives show all the usual signs of being non-exempt/logophoric. That is, in contrast with *picture* DP reflexives, they are in complementary distribution with pronouns, do not permit split antecedents and do not permit cross-sentential antecedents:

(106) a.   John likes pictures of him/himself.

b.　　John said that Mary would take pictures of themselves.

　　c.　　John was embarrassed. Nude pictures of himself were on display in the gallery.

(107)　a.　　John wants very badly for *him/himself to win.

　　b.　　* John said that Mary wants very badly for themselves to win.

　　c.　　* John was terrified. For himself to lose now was unthinkable.

Thus, it would seem that reflexives in the subject positions of *for...to* infinitives should be brought under the yoke of the core binding principles. Since it is extremely implausible to analyze these reflexives as arguments of the matrix predicate, this suggests that predicate-centric theories of binding cannot be on the right track. Further support for this conclusion comes from languages which have clearer examples of subject anaphors. For example, Haddad (2007) points to Chinese, which has locally-bound subject anaphors.

2.2.5　Inherent reflexivity

Key to Reinhart and Reuland's analysis of Dutch and English binding phenomena is the notion of an *inherently* reflexive predicate. Inherently reflexive predicates are marked as reflexive in the lexicon, and hence to do need to be reflexive-marked by a reflexive pronoun such as *himself*. The idea is presumably that there is some independent logical, semantic or conceptual notion of "inherent reflexivity" such that the set of predicates which are inherently reflexive in this sense is – more or less – the same as the set of reflexive predicates which do not need to be marked by reflexive pronouns. There are, however, a number of serious difficulties facing any attempt to define such a notion, as I will now argue.

　　Consider first how we might attempt to define inherent reflexivity in logical/semantic terms. Presumably, a predicate which is "reflexive" in any sense

must take more than one argument, so the inherently reflexive predicates can perhaps be understood as a subclass of the $n{>}1$-ary predicates. Speaking relationally, we might define a reflexive predicate as a predicate whose corresponding relation is necessarily identical to one of its (i, j)-diagonals, where the (i, j)-diagonal of a predicate $P(x_1, \ldots, x_n)$ is $\{\langle x_1, \ldots, x_n \rangle \mid x_i = x_j \text{ and } P(x_1, \ldots, x_n)\}$. This is not, however, a very well-motivated definition. Consider the following Dutch examples, which exemplify two kinds of (allegedly) inherently reflexive predicate:

(108)   a.   Jan$_1$ gedraagt zich$_1$/*zichzelf$_1$. **(Dutch)**
             John behaves ZICH/ZICHZELF.

        b.   Max$_1$ wast   zich$_1$/zichzelf$_1$.
             Max   washes ZICH/ZICHZELF.

The first kind, exemplified in (108a), requires *zich* to the exclusion of *zichzelf*. In cases of this sort, there is no independent reason at all (other than the superficially transitive form of the sentence) to think that *behave* denotes a two-place relation. On intuitive semantic grounds, it it would be more natural to treat *behave* as an intransitive verb of some sort. Behaving is not obviously any more a reflexive or self-directed action than, say, laughing or arriving, but *laugh* and *arrive* surface as ordinary intransitives in Dutch, whereas *behave* takes *zich*. Moving onto (108b), we see that verbs such as *wash* [*wassen*] are compatible with both *zich* and *zichzelf*. On the face of it, this immediately refutes the hypothesis that the distribution of *zich* and *zichzelf* is determined by the presence or absence of inherent reflexive marking on the predicate. However, Reinhart and Reuland suggest that verbs of this sort really come in two distinct forms: *zich* is licensed by an inherently reflexive form of *wash*, whereas *zichzelf* is only possible with the ordinary transitive form. The trouble with this proposal is that it seems to predict that an inherently reflexive form might be available for virtually *any* transitive verb. The idea is perhaps that in the case of "grooming" verbs such as *wash* or *shave* [*scheeren*], there is a distinct concept associated with the self-directed forms

of these actions. But this takes us into very squishy territory. Self-hating, for example, seems just as good a candidate for its own concept as self-washing, but *hate* [*haten*] in Dutch is never compatible with *zich*.

Similar problems arise if we take a more conceptual tack. The idea here would be to single certain *concepts* out as inherently reflexive, and hypothesize that predicates denoting relations derived from inherently reflexive concepts should be inherently reflexive. We might try, for example, to single out the relevant class of concepts terms of prototypicality – perhaps it is concepts of prototypically self-directed actions which are typically linked to inherently reflexive predicates. This idea immediately runs into the same kinds of difficulty as the first. Behaving can only be construed as a prototypically (indeed, obligatorily) self-directed action if we take the unmotivated step of characterizing it as a two-place relation in the first place. And it is not at all obvious that, say, washing is prototypically self-directed. It is true, of course, that washing qua grooming is prototypically self-directed, but to say this is virtually to make the tautological point that self-directed instances of washing are typically self-directed.

In short, inherently reflexive predicates occupy a strange no-man's land between the 1-place and the >1-place. On the one hand, we do not really wish to say that behaving is a two-place relation. On the other hand, in order to maintain that inherently-reflexive *wash* and *shave* denote inherently self-directed actions – and what's more, that they do so in a way that *arrive* and *laugh* don't – we have to say that *wash* and *shave* denote two-place relations in their inherently reflexive forms. In the final analysis, it seems that inherent reflexivity functions as a mere diacritic, having no real logical, semantic or conceptual significance. The primary purpose of this diacritic is to predict two sets of distributional facts. The first of these is the distribution of direct-object *zich* with respect to different verbs; this will be discussed further in §2.10.2. The second is the reflexive

interpretation of English intransitive sentences such as *John washed*.[19] Even as a diacritic, inherent reflexivity isn't very successful. Consider for example the following data:

(109) a. John washes.

b. John washes himself.

(110) a. John behaves.

b. John behaves himself.

The predicate-centric approach would have us believe that the interesting cut to be made here is between (109a)/(110a) and (109b)/(110b) – the former are sentences with inherently reflexive predicates, whereas the latter have non-inherently-reflexive predicates which must be reflexive-marked by *himself*. On this view, then, *behaving oneself* is of a piece with *washing oneself* in terms of predicational structure, but the former is quite distinct from merely *behaving*. This might turn out to be the right way of looking at things, but it is a rather counterintuitive way of dividing up the data on the face of it. One would naturally suppose that *washing* and *washing oneself* were pretty much the same thing – and ditto for *behaving* and *behaving oneself*. Similarly, one might suppose that *washing* – a relation between a washer and washee who might happen to be identical – must be quite a different sort of relation from *behaving* – a one-place relation holding of all well-behaved people.

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[19] I do not mean to suggest here that Reinhart and Reuland's notion of inherent reflexivity is relevant only to the English and Dutch data. Clearly, many other languages could be used to illustrate the same points. Reinhart and Reuland also give an interesting analysis of certain subtle Condition B facts within their predicate-based approach. It may be that these facts really do require some Condition-B-like condition stated over the coargument domain. However, such a condition can easily be added to the present framework if it should prove necessary. See Lidz (2001), Reuland (2001), Safir (2004) for pertinent discussion.

Indeed, there is a good evidence that grooming verbs are transitive in many languages. For example, Lødrup (1999) notes an interesting contrast between grooming verbs in Norwegian and other "inherently reflexive" verbs. All take *seg* as an object (which is broadly similar to Dutch *zich*). However, only the grooming verbs permit *seg* to be modified by *hele* [*all*]. Those inherent reflexives which more closely resemble unaccusatives, such as *appear (self)*, do not permit modification by *hele*:

(111) a. Hun vasket hele seg.
       She washed all SEG.
       'She washed all over.'

    b. * Hun innfant hele seg på kontoret.
       She appeared all herself at the office.
       'She appeared all herself at the office.'

Oya (2010) notes that German grooming verbs taking *zich* permit passivization:

(112) a. Es wurde sich gewaschen.
       It was itself washed.
       'They washed.'

    b. Es wurde sich rasiert.
       It was itself shaved.
       'They shaved.

On the assumption that Perlmutter and Postal's (1984) 1-Advancement Exclusive Law[20] is an accurate descriptive generalization, Oya points out that this suggests that the external argument cannot have been suppressed in (112). This in turn argues against an unaccusative analysis of these verbs.

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[20] This law requires that there is only a single advancement to subject position per clause. Both unaccusatives and passives involve the advancement of an internal argument to subject position, so the 1-Advancement Exclusive Law prohibits a single clause being both passive and unaccusative.

The distribution of *zich* and *zichzelf* in Dutch will be discussed further in §2.10.

2.2.6   Competition and Comparison

I will follow Reinhart (1983b) in assuming that the syntax does not have any notion of coreference. There are no syntactic conditions which make reference to coreference relations, and there are no syntactic conditions which require any pair of DPs to have disjoint, overlapping or identical reference. Though I share Reinhart's goal of removing conditions on coreference from the grammar, there are well-known problems with Reinhart's original proposal. Subsections §2.2.6.1-§2.2.6.2 present a summary of existing proposals which build on Reinhart's ideas, outlining some of the problems these proposals face. §2.3 presents my own analysis, introducing the "Keeping Up Appearances" principle as an alternative to Reinhart's (2006) formulation of Rule I.

2.2.6.1   Reinhart (1983b)

Reinhart (1983b) proposes the following binding principles:

(113)   Coindex a pronoun P with a c-commanding NP α (α not immediately dominated by COMP or $\overline{S}$).

Conditions:

(a) If P is a reflexive/reciprocal pronoun α must be in its minimal governing category.

(b) If P is a non-reflexive/reciprocal pronoun, α must be outside its minimal governing category.

(114)   Translation procedure for bound anaphora:

$$[_{\overline{S}} \ \phi] \Rightarrow [_{\overline{S}} \ \beta(\lambda x(\phi^{\beta}/x))]$$

where for any string ϕ and any NP β in non-COMP or $\overline{\text{S}}$ position in ϕ, ϕ^{β}/x is the result of replacing β and all pronouns coindexed with and c-commanded with β by x.

Conditions (113a) and (113b) are simply the analogs of Condition A/B as presented in Chomsky (1981). The requirement that α not be immediately dominated by COMP or $\overline{\text{S}}$ amounts, in modern terms, to a requirement that α be in an A-position. The translation procedure in (114) ensures that coindexation is always interpreted as variable binding (i.e. that a pronoun or reflexive co-indexed with a c-commanding NP is interpreted as a variable bound by that NP). As an example of the operation of the translation procedure, the output of (114) for (115a) is given in (115b):

(115)   a. Mary_1 thinks that she_1 is intelligent.

       b.   Mary ($\lambda x \, . \, x$ thinks that x is intelligent)

Since (114) applies obligatorily, coreference cannot be encoded using coindexation. As a consequence, coreference relations can be established only at the interpretative interfaces. Reinhart, echoing a point made in Lasnik (1976), notes that:

> The problems for [previous] theories of anaphora (including those which distinguish bound anaphora from coreference) result from attempting to define within the grammar the conditions for coreference, rather than for bound anaphora only. Whatever way we may specify conditions on the referential interpretation of unbound pronouns within the sentence, there is always the problem that such pronouns can corefer freely (i.e. subject to pragmatic conditions only) across sentences. So, unless we introduce the problematic non-coreference rules, there is no way to prevent a pronoun from selecting the 'wrong reference' from outside the sentence. We shall see now that once the procedures determining bound-anaphora are specified, there is in fact

no need to establish sentence-level coreference rules.

(p. 69)

This raises the question of how (116b) is to be ruled out under an interpretation where *him* corefers with *John*. For the remainder of this subsection, I will adopt the convention of indicating coreference (and other extrasyntactic construal relations) using italics:[21]

(116) a. * John$_1$ likes him$_1$

   b. * *John* likes *him*.

With the given indexing, (116a) is straightforwardly ruled out by condition (113b), but there is no grammatical condition ruling out (116b). Reinhart's key proposal is, in short, that the coreferential interpretation is not licensed in (116b) because (117) provides the speaker with a means of encoding the same interpretation using binding:

(117) John$_1$ likes himself$_1$.

Reinhart (1983b) argues that when a given interpretation can be expressed using either binding or coreference, the use of binding is preferred. In the 1983 paper, Reinhart gives a Gricean rationale for this preference, but there would be little to be gained from summarizing the details here.[22] A more straightforward version

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[21] If Reinhart's analysis is correct, the asterisks of (116a) and (116b) signal different kinds of deviance. (116a) is an illicit syntactic representation ruled out by (113b). In contrast, (116b) is syntactically licit, but cannot under ordinary circumstances receive an interpretation in which *him* is taken to refer to John.

[22] The basic idea is that using binding is in some sense more "explicit" than using coreference, since the use of the former hard-codes the desired interpretation into the syntactic representation itself. However, as Lasnik (1989) points out, this rather technical notion of explicitness is quite different from whatever notion of explicitness we might expect to play a role in Gricean pragmatic reasoning.

of the same general principle is stated as "Rule I" of Grodzinsky and Reinhart (1993, 79):

(118)   **Rule I: Intrasentential Coreference**

NP A cannot corefer with NP B if replacing A with C, C a variable A-bound by B, yields an indistinguishable interpretation.

In the case of (116b), it is clear that replacing *him* with a variable bound by *John* would yield the same interpretation. Thus, Rule I kicks in, and requires this interpretation to be expressed using binding. Owing to (113b), (116a) cannot be used to express the bound interpretation, but (117) can.[23]

As Reinhart herself noted in later work (Reinhart, 2000, 2006), there are a number of problems with the Rule-I-based account of (116). In particular, it appears to clash with Reinhart's own analysis of strict/sloppy ambiguities in VP ellipsis contexts. Like Keenan (1971), Reinhart assumes that the ambiguity in (119a) derives from a hidden ambiguity in (119b):

(119)   a.   John loves his mother and Bill does too.

Either:

i. John loves John's mother and Bill loves John's mother.

(Strict reading)

ii. John loves John's mother and Bill loves Bill's mother.

(Sloppy reading)

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[23] Norbert Hornstein (p.c.) points out that Rule I does not obviously yield the correct results in the case of ECM verbs such as *expect*, because locally-bound reflexives, unlike pronouns, yield obligatory *de se* readings. So for example, "John expects himself to win" has only a *de se* reading, whereas "John expects that he will win" has both a *de se* and *de re* reading. If it is some property of the reflexive itself which is responsible for the absence of the *de re* reading in the ECM case, then replacing a locally bound ECM pronoun with a reflexive does not obviously yield the "same interpretation."

b. John loves his mother.

There are in principle two possible LFs for (119b): one in which *his* is co-indexed with *John* and interpreted as a bound variable, and another in which there is no syntactic relation between *John* and *his*. The latter leaves open the option of interpreting the two as coreferential:

(120) a. $John_1$ loves his_1 mother.

b. *John* loves *his* mother.

As we have seen, Rule I will rule out (120b) when the sentence "John loves his mother" is uttered on its own. However, Rule I as stated in (118) would appear to license the use of (120b) in (119a), since with the addition of the second conjunct, the use of coreference in the first conjunct makes available a distinct interpretation. Unfortunately, this understanding of Rule I leads to clear instances of overgeneration:

(121) * *John* loves *him* and Bill does ~~love *him*~~ too.

(Where all instances of 'him' are interpreted as referring to John.)

As shown by the unacceptability of (121) under the indicated reading, the availability of the additional interpretation in the second conjunct does not in general license the use of coreference in the first conjunct. (Recall that if *John* and *him* are not co-indexed in the first conjunct, (113b) will not be violated.)

A further difficulty with Reinhart's approach relates to its account of Condition C effects such as (122):

(122) He believes that John is intelligent.

Reinhart assumes that construal of *he* with *John* in (124) can only be effected via coreference, on the grounds that a full DP is incompatible with a bound reading. Thus, the LF (123a) is outcompeted by (123b), and there is no possible LF along the lines of (123c):

(123)   a.   *He* believes that *John* is intelligent.

   b.   John$_1$ believes that he$_1$ is intelligent.

   c.   He$_1$ believes that John$_1$ is intelligent.

        (LF where 'he' binds 'John' as a variable.)

However, epithetical DPs such as *the guy* do in fact allow bound readings when they are not c-commanded by the DP which binds them:[24]

(124)   Every man who knows [a lawyer]$_1$ thinks [the guy]$_1$ is super rich.

Thus, there cannot be any deep semantic reason why binding is not available in an example such as (125):

(125)   * John$_1$ believes that [the guy]$_1$ is intelligent.

Rather, there must be some syntactic condition which makes it impossible to parse (125) as a structure in which *the guy* is bound by *he*.

2.2.6.2   Fox (2000)

Fox (2000) presents a modified version of Reinhart's analysis which fixes the problems outlined in the preceding subsection. There are two principle changes:

(i) Fox argues that Rule I is computed *locally*. Thus, in a sentence with multiple conjuncts, such as (119a) above, each conjunct must satisfy Rule I separately. This implies, inter alia, that the use of coreference in the first conjunct cannot be licensed by any interpretative effect in the second conjunct.

(ii) Fox relaxes the parallelism condition on VP ellipsis considerably. As we have seen, Reinhart assumed (following earlier work) that strict/sloppy am-

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[24] By referring to these as "bound" readings, I do not mean to prejudice the question of whether or not donkey anaphora involves true binding. The point is just that many full DPs are capable of receiving non-referential interpretations under which they co-vary with a quantifier.

biguities must reflect an ambiguity in the first conjunct. Fox rejects this view, arguing that the pronoun in the first conjunct in an example such as (119a) is always interpreted as a bound variable. Fox's version of the parallelism condition is sufficiently lax that the pronoun in the second conjunct may be interpreted either as a bound variable or referentially. (Though as we will see, this looser parallelism requirement does impose constraints on *which* bound/referential interpretations are available.)

To illustrate, let us consider the possible readings of (126):

(126)   John loves his mother and Bill does too.

Under Reinhart's original analysis, the sloppy reading obtains in the pronoun in the first conjunct is bound by *John*, and the strict reading obtains if it is coreferential with *John*. However, if Rule I is computed locally, coreference in the first conjunct will be ruled out for the same reason as coreference in (127):

(127)   John loves his mother.

That is, it will be ruled out because binding is also possible and yields the same interpretation. Thus, Fox requires a way of deriving both the strict and sloppy readings without positing an ambiguity in the first conjunct of (126). His proposal is to relax the parallelism requirement on VP ellipsis in accord with the following principle (p. 117):

(128)   **NP Parallelism** (Fox, 2000)

      NPs in the antecedent and elided VPs must either:

        i. have the same referential value (Referential Parallelism) or

        ii. be linked by identical dependencies (Structural Parallelism).

It should be borne in mind that Fox does not propose (128) as the *only* constraint on VP-ellipsis. Fox does not attempt to subsume (128) within an overall theory of

Parallelism, but he presumably has in mind that any such theory should both (i) impose weaker requirements than strict syntactic/semantic identity and (ii) imply (128).[25] Note that in the sense Fox uses the phrase "same referential value," it is possible for a pronoun to have the same referential value as another pronoun which is interpreted as a bound variable.[26] This obtains in the case where the second pronoun is bound by a referential DP, and the first pronoun has the same referent as this DP.

With this background, we can now see that the two readings of (126) correspond to the two kinds of parallelism in (128). If the pronoun in the elided VP satisfies (128) via Referential parallelism (i.e. by taking *John* as its referent), we derive the strict reading:

(129)   *John*$_1$ loves his$_1$ mother and Bill does [love *his* mother] too.

        (Strict reading)

And if the pronoun in the elided VP satisfies (128) via Structural parallelism, the sloppy reading is derived:

(130)   John$_1$ loves his$_1$ mother and Bill$_2$ does [love his$_2$ mother] too.

        (Sloppy reading)

Since Rule I always forces the use of binding in the first conjunct, (121), repeated here as (131), is still ruled out:

(131)   * *John* loves *him* and Bill does [love *him*] too.

A key component of Fox's theory is his account of the pattern of interpretations available in instances of VP ellipsis such as the following:

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[25] It seems from footnote 8, p. 117 that Fox does not intend (128) to be an addendum to the theory of parallelism presented in Chapter 3 of the monograph.

[26] It might be helpful to make use of the notion of "covaluation" developed in Reinhart (2006) to make sense of this.

(132)   John said that he loves his mother and Bill did too.

(As usual, we will be considering only readings where *he* and *his* in the first conjunct are construed with *John*.) In principle, there are four possible interpretations of the second conjunct of (132), but as noted by Dahl (1974), only three of these are in fact attested:

(133)   a.   Bill said that John likes John's mother.

          b.   Bill said that Bill likes Bill's mother.

          c.   Bill said that Bill likes John's mother.

          d.   * Bill said that John likes Bill's mother.

To account for unavailability of (133d), Fox proposes the following principle (Fox, 2000, 115):

(134)   **Rule H:** A pronoun, α, can be bound by an antecedent, β, only if there is no closer antecedent, γ, such that it is possible to bind α by γ and *get the same semantic interpretation*. [Italics in original]

Rule H blocks the LF for (132) whose first conjunct corresponds to (133d). This is the LF in which *John* binds both pronouns directly (co-binding): with the first:

(135)   John λx (x said that x loves x's mother).

Clearly, when evaluated locally within the first conjunct, (135) has the same interpretation as (136):

(136)   John λx (x said that x λy (y loves y's mother)).

Thus, Rule H requires (136) as the LF for the first conjunct (given that Rule I rules out the use of coreference). Fox states the parallelism condition on VP ellipsis in such a way that (136) in the first conjunct is parallel to (133a)-(133c) but not to (133d). The statement of the parallelism condition is somewhat stipulative. Fox defines two distinct notions of parallelism, Referential Parallelism and Structural

Parallelism, and imposes the requirement that every pronoun in the ellipsis site must receive an interpretation which is either referentially or structurally parallel to the corresponding pronoun in the antecedent. In the LF corresponding to (133a), both pronouns are referentially parallel to the pronouns in the antecedent. In (133b), both are structurally parallel. In (133c), the first pronoun is structurally parallel (it is bound by an antecedent in a parallel structural configuration) and the second is referentially parallel. In (133d), the first pronoun is referentially parallel. Crucially, however, the second pronoun in (133d) is neither referentially parallel to the corresponding pronoun in the antecedent (it is construed with *Bill*, not *John*), nor structurally parallel, since due to Rule H, the second pronoun in the antecedent must be bound by the first pronoun, not by *John*.

Fox's approach to the Dahl phenomena is empirically extremely successful. It does, however, have some undesirable properties. Heim (2007) points out that Fox's account of strict/sloppy ambiguities under VP ellipsis requires assumptions regarding the form of the parallelism condition on VP ellipsis which have no independent motivation. There is also a sense in which Fox's analysis lacks the intuitive appeal of Sag (1976), Williams (1977) and Reinhart (1983b). A general maxim which could be extracted from this work is "ambiguities in the interpretation of elided material can always be traced to ambiguities in the antecedent." Fox's approach embodies the arguably less interesting hypothesis that strict/sloppy ambiguities simply reflect a rather weak parallelism condition holding between the elided material and its antecedent. Though it is certainly possible that this will turn out to be empirically correct, it would be desirable to derive an account of the preceding phenomena consistent with the maxim just mentioned.

2.2.6.3   Reinhart (2006)

Precisely such an account is proposed in Reinhart (2006). This subsection has two aims. The first is to present a brief summary of Reinhart's theory and some problems with it raised by Heim (2007) and Roelofsen (2010). Roelofsen and Heim take the position that these problems argue in favor of maintaining a Fox-type analysis of the data. the second aim of this subsection is to show that several of the problems with Reinhart's theory can be resolved when the theory is stated within a chain-based analysis of binding. This is a particularly welcome consequence given that Reinhart (2006) is one of few attempts to develop a principled account of strong crossover effects which does not depend on a traditionally formulated (and hence rather stipulative) Condition C. Thus, resolving the problems with Reinhart's theory will make available an account of strong crossover within the present framework.

Reinhart proposes what I will term a "No Sneaking" condition to replace the version of Rule I stated in (118):[27]

(137)   **No Sneaking:** α and β cannot be covalued in a derivation D, if

   (i) α is in a configuration to A-bind β.

  (ii) α cannot A-bind β in D, and

 (iii) The coreferential[28] interpretation is indistinguishable from what would be obtained if α binds β.

("A-bound" here just means "bound from an A-position.") This is somewhat cryptic at first glance, and significantly more difficult to interpret than the original

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[27] Reinhart calls (137) Rule I, but I think it will be less confusing to assign it a different name, since it is an entirely different principle from the one stated in (118).

[28] As we will see momentarily, Reinhart actually states No Sneaking in terms of "covaluation," not coreference.

Rule I. Let us consider how it applies in a simple example:

(138) a. * John$_1$ likes him$_1$.

b. * *John* likes *him*.

Binding in (138a) is ruled out directly by Condition B. As usual, the problem is to rule out the use of coreference in (138b). Reinhart argues that what is wrong with (138b) is that it uses interface processes (accidental coreference) to "sneak in" an interpretation which a grammatical principle (Condition B) rules out. Thus, just as with the original Rule I, it will be possible to use coreference in (138b) if this results in an interpretation different from that which would be obtained by binding. A similar logic applies in the case of Condition C effects. Coreference in (139) is impossible because, although *he* is in a configuration to bind *John*, and binding of *John* by *he* would derive the same interpretation as coreference, *he* cannot in fact bind *John* because *John* is a referential DP, not a pronoun.

(139) * *He* thinks that *John* is intelligent.

A key advantage of No Sneaking over Rule I is that it does not incorrectly predict the absence of a Condition B effect in (140):

(140) * *John* likes *him* and Bill does [like *him*] too.

Recall that (140) posed something of a dilemma for the Rule-I-based account of (138). If Rule I were evaluated with respect to the entire sentence, then (140) would be incorrectly predicted grammatical. On the other hand, if Rule I were evaluated locally in each conjunct, binding would be forced in the first conjunct in (141), and thus the strict reading would be unavailable given a strict parallelism requirement on VP ellipsis:

(141) John loves his mother and Bill does too.

This problem is what led Fox to weaken the parallelism requirement. On the assumption that No Sneaking is evaluated locally, this principle derives the facts

as desired. No Sneaking rules out the use of coreference in the first conjunct of (140) for the same reason that it does in (138b). But, in crucial contrast to Rule I, No Sneaking permits both binding *and* coreference in the first conjunct of (141). The use of coreference instead of binding is entirely permissible so long as the LF encoding the corresponding bound interpretation violates no grammatical principle. Thus, No Sneaking is compatible with an analysis of the strict/sloppy ambiguity in (141) which traces this ambiguity to an ambiguity in the first conjunct.

So far, I have explicated the operation of No Sneaking in terms of the distinction between binding and coreference. However, Reinhart proposes to replace this distinction with a distinction between binding and *covaluation*. Covaluation is defined as follows (Reinhart, 2006, 172):

(142)　　**Covaluation:** α and β are covalued iff neither A-binds the other and they are assigned the same value.

This is a relation which can hold between variables, and thus is not tied to reference. The use of covaluation instead of coreference is crucial to Reinhart's account of strong crossover effects. Consider a standard example such as (143):

(143)　　* Who$_1$ did he$_1$ say we should invite t_1?

If *who* binds the pronoun (Reinhart assumes that this is possible), then covaluation is obtained between the pronoun and the trace of the *wh*-phrase:

(144)　　Who λx (x said that we should invite x).

We must therefore check whether this covaluation is licensed by No Sneaking. To facilitate comparison with the representation in which *he* binds the trace, Reinhart recasts (144) as the equivalent (145a). This can then be compared to the LF expressing binding of the trace by the pronoun, (145b):

(145)　　a.　　Who λx (x λz (z said that we should invite **x**))

b. Who λx (x λz (z said that we should invite **z**))

These differ minimally with respect to the bolded variables. According to Reinhart, covaluation is not licensed in (143)/(144) because the second x is already bound in (145a), and hence cannot be bound again. That is, it would be illicit for the second x in (145a) to be bound in the same manner as z is bound in (145b). Thus, the covaluation relation in (144) has the effect of "sneaking in" an interpretation which is ruled out by a logical/grammatical principle (the principle that a variable cannot have two distinct binders).

This brings us to Reinhart's account of the Dahl facts. Unfortunately, this now presents something of an exigetical nightmare due to a recent critique of Reinhart's account presented in Roelofsen (2010). In his careful analysis, Roelofsen shows that Reinhart appears to assume that No Sneaking applies iteratively (i.e., that it applies to its own output). Unfortunately, this assumption turns out to derive the wrong results in many instances, casting doubt on whether Reinhart's account is empirically viable. I will first attempt a faithful rendering of Reinhart's original exposition, and then discuss the problems raised by Roelofsen.

Consider (132), repeated here as (146):

(146)   John said that he loves his mother and Bill did too.

As we have seen in (133) above, there is an interesting patterning of available interpretations of the elided VP. Under Reinhart's theory, the first conjunct in (146) has, on the face of it, three possible LFs:

(147)   a.   John λx (x said that x loves x's mother).

       b.   John λx (x said that x loves y's mother) & x = John.

       c.   John λx (x said that y loves x'x mother) & y = John.

We could also have written & x = y in (147b) and (147c) – since covaluation is

specified in *semantic* terms in (142), the distinction is not important. Of the LFs in (147), it is (147c) which gives rise to the unattested reading:

(148)　　John said that John loves John's mother and Bill said that John loves Bill's mother.

Thus, we need a way to rule out (147c) as a possible LF for the first conjunct. Given the apparent symmetry between (147b) and (147c), we will have to find some way of introducing a distinction. Reinhart argues as follows.

Reinhart implicitly assumes that statements of covaluation are added after binding relations have been encoded via lambda abstraction, so there is an ordering component to the argument. Consider the LFs of (147b) and (147c) before the covalued pronouns were replaced with variables:

(149)　　a.　　John λx (x said that x loves his mother). *(Compare (147b))*

　　　　b.　　John λx (x said that he loves x's mother). *(Compare (147c))*

Given that we wish to express an interpretation under which *his* and *he* are construed with *John*, we must now evaluate whether it is permissible to translate these pronouns as covalued variables. Under No Sneaking, this means figuring out whether it would be licit to translate the pronouns as bound variables. Reinhart states that the following procedure should be followed to make this check:

(150)　　To check clause (iii) of (137), construct a comparison-representation by replacing β with a variable A-bound by β. (To be computed locally in each conjunct.)

In (149a), we can do this simply by introducing a new lambda abstraction inside the existing lambda abstraction:

(151)　　John λx (x said that x λy (y loves y's mother)).

In (149b), by contrast, more drastic alterations to the LF would be required. The variable x is already bound, so it "cannot be bound again" (Reinhart, 2006, 193).

Thus, there is no licit way of deriving from (149b) an LF which encodes a binding relation between *he* and *x*. At this point, No Sneaking comes into effect. If there is no licit LF for the bound reading, then we cannot use covaluation to encode an equivalent reading. Reinhart is not particularly clear on what exactly is wrong with "binding a variable again." I will follow Roelofsen (2010) in assuming that the key principle is that all existing binding relations must be left in tact in order for binding to be licit for the purposes of No Sneaking. Thus, (149a) is alright because it leaves in tact the existing binding relation between *John* and *x*, whereas there is no way of constructing a comparison-representation for (149b) which does not destroy the existing binding relation between *John* and *x*.

Though the intuition between Reinhart's account is reasonably clear, Roelofsen (2010) shows that there is a rather deep problem with it. To see this, consider a more detailed step-by-step account of why (149b) is illicit. To evaluate (149b) with respect to No Sneaking, we must begin by constructing its binding alternative. This is simply (149b) with *he* replaced by *x*:

(152)   John λx (x said that x loves x's mother).

In (152), the last two instances of x are covalued. For this covaluation to be licit according to No Sneaking, it must be possible for each covaluation relation to be replaced by a licit binding relation. The question is now whether the comparison-representation for (149b) – (153) – is a No Sneaking violation:

(153)   John λx (x said that x λy (y loves y's mother)).

This does in fact constitute a No Sneaking violation since the existing binding relation between *John* and *x* in (149b) has been destroyed. Thus, it is correctly predicted that (149b) is not a possible LF. The problem, as Roelofsen points out, is that (149a) has the same comparison-representation as (149b)! (I.e. (153).) Thus, by exactly the same logic, (149a) should violate No Sneaking too. It seems, then,

that Reinhart cannot really have had in mind that comparison-representations be constructed according to the method stated in (150). Some passages in Reinhart's exposition suggest that No Sneaking is evaluated over representations where one can still tell the difference between those pronouns which have "already" been translated as bound variables, and those pronouns which are candidates for receiving a covalued interpretation. The idea seems to be that pronouns which have already been translated cannot be "bound again," whereas the untranslated pronouns can. I think that it might be possible to work out a coherent statement of Reinhart's account along these lines. However, I will not attempt to do so here, since I would like to suggest a chain-based alternative to No Sneaking, "Keeping Up Appearances," which will be stated in the following section. This condition is inspired by No Sneaking, but relies crucially on a comparison set defined in phonological rather than interpretative terms.

2.3   Keeping Up Appearances

The basic idea is behind Keeping Up Appearances is that even dependencies which aren't syntactically encoded have to *sound* as if they're syntactically encoded, if the elements related by the dependency are in a configuration which could potentially license a syntactic dependency.

(154)   **Keeping Up Appearances:** If α and β are $\overline{\text{A}}$-local[29], then for any interpretative dependency between α and β which is not established via a chain, it must be possible to replace β with the tail of a licit $\overline{\text{A}}$-position-spanning chain terminating in α (or vice versa) to yield the

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[29] $\overline{\text{A}}$-locality in the intended sense is implied by A-locality. I.e., it is not possible for α and β to be too close to be $\overline{\text{A}}$-local. Roughly speaking, there must be a c-command relation between α and β for them to be $\overline{\text{A}}$-local, but in the present framework, the Merge over Move condition takes on the role of a c-command constraint; see §2.8.5.4.

same phonological output.

We will see in §2.12 that the relevant notion of $\overline{\text{A}}$-locality is quite loose, in the sense that it permits violations of Minimality and certain island constraints. Before going through the account of the Dahl paradigm in terms of (154), I would like to point to some advantages of this condition with regard to Condition C effects. First, consider an example such as (139), repeated here as (155):

(155)   * *He* thinks that *John* is intelligent.

Reinhart's account of (155) relied on the assumption that a DP such as *John* is inherently incapable of receiving a bound interpretation. As argued in §2.2.1, this assumption is somewhat dubious. Under the present analysis, (155) is ruled out simply because English lacks a rule of backwards pronominalization.[30] Suppose a construal dependency is established between *he* and *John* at the CI interface. To check whether Keeping Up Appearances is satisfied, we now form a chain between *John* and the pronoun (so that the pronoun is replaced by a copy of *John*):

(156)   [John] thinks [$_{CP}$ [John] that [John] is intelligent].

Although this is a licit chain, it cannot be spelled out as (139). Keeping Up Appearances is therefore violated.

Keeping Up Appearances correctly predicts the existence of Condition C violations involving epithets:

(157)   a.   *The bastard* thinks that *he* is intelligent.

b.   * *He* thinks that *the bastard* is intelligent.

c.   * *John* thinks that *the bastard* is intelligent.

d.   ?? *The bastard* thinks that *the bastard* is intelligent.

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[30] That is, there is no chain spellout rule which pronounces the *head* of any English chain as a pronoun. This is not to deny that sentences such as "His$_1$ mother loves John$_1$" are grammatical in English, just to deny that they are derived via a pronominalization rule.

e. * *The bastard* thinks that *John* is intelligent.

In every case except (157a), it is impossible for the relevant $\overline{\text{A}}$-chains to yield an appropriate pronunciation. In (157b), a higher copy of *the bastard* cannot be pronounced as *he*, since English lacks a rule of backward pronominalization. In (157c), the problem is that a lower copy of *John* cannot be pronounced as *the bastard* and vice versa. The other examples play out in a similar fashion. These data highlight an advantage of stating Keeping Up Appearances with reference to phonological output. The Condition C violations in (157b)-(157e) are problematic for Reinhart's interpretation-based statement of No Sneaking,[31] but they are easily accommodated under the present approach. If the c-command relation between the epithet and its antecedent is broken (so that the two are not "$\overline{\text{A}}$-local"), then binding is correctly predicted to be possible:

(158) a. *His* mother thinks that *the bastard* is intelligent.

  b. *The bastard*'s mother thinks that *the bastard* is intelligent.

  c. *John*'s mother thinks that *the bastard* is intelligent.

  d. *The bastard*'s mother thinks that *John* is intelligent.

  Strong crossover effects are derived as follows. We must determine what happens if the non-syntactically-derived binding relation in (159) is replaced by the chain relation in (160) (intermediate landing sites not shown):

(159) Who$_1$ did he$_1$ say that we should invite ~~who~~?

(160) Who$_1$ did ~~who~~ say that we should invite ~~who~~?

Once again, we see that although the chain in (160) is licit, and is an $\overline{\text{A}}$-chain as required, (160) cannot be pronounced identically to (159). Keeping Up Appearances is therefore violated. Condition B effects follow in a similar manner:

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[31] The problem posed by epithets was first noted in Lasnik (1989), with reference to Reinhart (1983b).

(161)   * *John* loves *him*.

Here, condition (i) of Keeping Up Appearances is satisfied, but it is impossible to satisfy (ii) because no $\overline{\text{A}}$-position-spanning chain can be formed to link *John* to the position of *him*.[32]

The set of facts in (162) has received an elegant explanation in terms of No Sneaking and Rule I:

(162)   a.   *He* is *John*.

         b.   Obviously, given that everyone is self-identical, *John* is *John*.

         c.   No, you're mistaken, *John* is *him* [points].

         d.   No, you're mistaken, *John* is *that man* [points].

These data cannot be accounted for in terms of Keeping Up Appearances. However, this does not pose a serious problem since they are in any case subsumed under Postal's (1970) generalization that it is only relations of *presupposed* coreference which are of any grammatical significance. A potentially more serious problem for Keeping Up Appearances is posed by the following data, which also have an account in terms of No Sneaking and Rule I:

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[32] It seems that the phonological identity requirement imposed by Keeping Up Appearances must be reasonably loose with respect to the distinction between stressed and unstressed pronouns in English. Or alternatively, it may be that the tail of a pronominalization chain can be spelled out as a stressed pronoun in English. Consider the following contrast:

(i)   *John* thinks that *HE* is intelligent.

(ii)   * *John* thinks that *THE BASTARD* is intelligent.

This contrast follows from Keeping Up Appearances only if *HE* (or something sufficiently phonologically similar to it) can be the spellout of the tail of an $\overline{\text{A}}$-position-spanning chain linking the positions of *John* and *HE*. Thus, either the tail of such a chain simply can be spelled out as *HE*, or if it can only be spelled out as an unstressed pronoun, the phonological identity requirement must be correspondingly loose.

(163)   a.   Only *John* loves *John*.

        b.   Everyone loves *John*. Bill loves *John*, Mary loves *John*, even *HE* loves *John*.

        c.   As for *John*, Bill loves *him*, Mary loves *him* – even *JOHN* loves *him*.

Are these facts are also subsumed under Postal's generalization? To answer this question would require a detailed investigation of presupposition and focus, which I will not attempt here. Examples such as (163a)-(163c) have recently been discussed by Heim (2007). Heim concludes that the availability of coreference in such cases derives from a lack of c-command. In (163a), *John* is embedded in a larger phrase containing *only*. In cases where *only* is not present, such as (163b)-(163c), Heim assumes that there is nonetheless a covert focus head which serves to block c-command.[33] A problem for this account is that it does not obviously accommodate the possibility of reflexive binding in the same configuration:

(164)   Only John$_1$ loves himself$_1$.

One would be forced to conclude that two structures are available: one in which *only* (or the covert Focus head) does not block c-command, and one in which it does.

A alternative approach to the data in (163b)-(163c) is presented in Grodzinsky and Sharvit (2007). Grodzinsky and Sharvit argue that the *de se/de re* distinction is critical to an understanding of these cases. The locally construed pronoun receives a non-*de se* interpretation which is distinct from the interpretation obtained if a reflexive is substituted. From the present point of view, the key question is what exactly counts as an "interpretative dependency" in the statement of Keeping Up Appearances in (2.3). Presumably, interpretative dependencies in

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[33] Most of Heim's discussion centers on more complex examples such as "[Every devil]$_1$ knows that only HE$_1$ loves him$_1$," as famously discussed in Heim (1993, 1998), but the arguments carry across to (163a)-(163c).

this sense must include relations of binding and presupposed coreference which are established via interpretative processes at the CI interface. However, it is not clear that the relation between a non-*de se* pronoun and its antecedent falls into either of these two categories. Grodzinsky and Sharvit's account might therefore be adapted to the chain-based framework. More generally, the point is that the construal relations in (163a)-(163c) may not be simple relations of binding or presupposed coreference. If they are not, then it is not surprising that they are ignored for the purposes of Keeping Up Appearances. However, aside from these speculative remarks, I will have to leave the issues raised by (163a)-(163c) unresolved in this dissertation.

Given this preliminary discussion of the consequences of Keeping Up Appearances, we can now return to the Dahl paradigm. Consider the possible LFs for (165) under a chain-based approach to binding:

(165)   John said that he loves his mother.

One option is for *John* to be base-generated in the position of *his*, subsequently moving through the position of *he* and then on to the matrix subject position:

(166)   [$_{TP}$ John said [$_{CP}$ ~~John~~ that ~~John~~ loves ~~John~~'s mother]].

It is also possible for one or both of the pronouns not to enter into a chain dependency with *John*. In this case, the pronouns relate to *John* via interface binding:

(167)   a.   [$_{TP}$ John said [$_{CP}$ ~~John~~ that ~~John~~ loves his mother]]

         b.   [$_{TP}$ John said [$_{CP}$ ~~John~~ that he loves ~~John~~'s mother]]

         c.   [$_{TP}$ John said [$_{CP}$ that he loves his mother]]

What is not possible, crucially, is for "co-binding" to be encoded via chain relations. The derivation in (166) is interpreted as transitive binding: that is, binding of *he* by *John* and binding of *his* by *he*. Thus, the only way to relate both *he* and *him* to *John* independently of each other is to use interface binding (or coreference).

Once again, to capture Dahl's paradigm, the LF to be ruled out is (167b) (in the case where *he* is construed with the higher copy of *John* by interpretative processes at the CI interface). This is quite straightforward given the statement of Keeping Up Appearances in (154). The basic point is that any sequence of copies of the form in (168) is interpreted according to the pattern on the left, not either of the other two patterns:

(168)

John [John] [John]   John [John] [John]   John [John] [John]
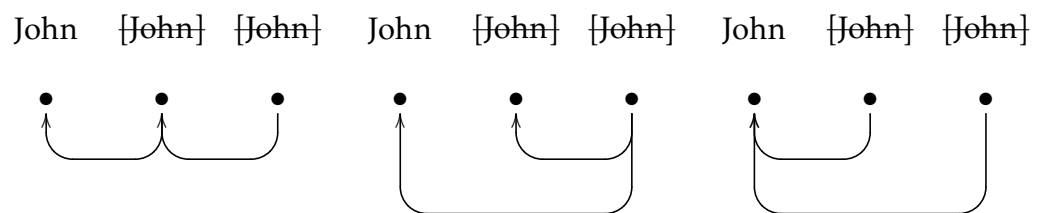
If the pronoun in (167b) were to be replaced by the tail of a chain between it and the higher copy of *John*, the configuration obtained would be the rightmost of those shown in (168). Thus, Keeping Up Appearances is not met. Although the pronoun and the higher copy of *John* are $\overline{\text{A}}$-local, it is not possible to form an $\overline{\text{A}}$-chain linking *John* with the position of the pronoun, since this would lead to an illicit dependency configuration. In general, chains can only be used to encode transitive binding, not co-binding.[34]

Keeping Up Appearances accommodates the data in (79b)/(80b) above, repeated here as (169)-(170):

(169)   * The boys$_{\{1,2,...\}}$ like him$_1$.

(170)   * We$_{\{1,2,...\}}$ like me$_1$.

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[34] This is essentially the conclusion reached by Montalbetti (1984, 110) in his revised formulation of Higgenbotham's (1983) linking theory ("(56) [which corresponds to the leftmost pattern in (168)] is the only configuration that can relate the three positions shown, when c-command relations are enforced.").

In (170), for example, it is not permissible to establish an interpretative relation between *we* and *me* because there is no way of forming an $\overline{\text{A}}$-spanning chain linking *we* to the position of *me* which would yield an identical phonological output. (The condition on the phonological output is irrelevant here, since it is not possible to form such a chain at all.) Keeping Up Appearances also accounts for the lack of a strict reading in (84a), repeated here in (171):

(171)   a.   Yo me toque y   Juan tambien.
             I   1PS touch and John too.

             'I touched myself and John did too.'

        b.   I touched myself and John touched himself too.

        c.   * I touched myself and John touched me too.

This data point highlights the necessity of requiring that there be a licit *$\overline{A}$-position-spanning* chain in the definition of Keeping Up Appearances. If any licit chain were sufficient to satisfy the condition, we would incorrectly predict the availability of a strict reading for (171a), since – owing to the lack of a distinct first-person reflexive clitic in Spanish – an A-chain can be formed between *Juan* and *me* to yield the required phonological output.

On standard assumptions, when two pronouns which do not stand in a c-command relation are bound by the same antecedent, only co-binding is possible. As we have seen, co-binding in the chain-based framework cannot be expressed using only chain-based dependencies, since leaving aside instances of across-the-board movement, two phrases cannot move to the same place. Thus, co-binding must be encoded in one of the ways illustrated in (172). There turn out to be a surprising number of possibilities, if it is admitted that interpretative processes at the LF interface may both (i) relate a pronoun directly to a quantifier or (ii) relate a pronoun to another pronoun interpreted as a bound variable ("covaluation" in Reinhart's sense). In (172), coindexation is used to indicate a chain relation,

and coitalicization to indicate a relation established by interpretative processes at the CI interface.

(172) a.   *Every boy* said that pictures of *him* resemble *him*.

b.   *Every boy*$_1$ said that pictures of him$_1$ resemble *him*.

c.   *Every boy*$_1$ said that pictures of *him* resemble him$_1$.

d.   Every boy$_1$ said that pictures of *him*$_1$ resemble *him*

e.   Every boy$_1$ said that pictures of *him* resemble *him*$_1$

f.   * Every boy$_1$ said that pictures of him$_1$ resemble him$_1$

In (172a), both pronouns are related to *every boy* via interpretative processes at the CI interface.[35] In (172b), the first pronoun is related to *every boy* via a chain and the second at the CI interface. In (172c), the second pronoun is related via a chain and the first at the CI interface. In (172d), the first pronoun is bound via a chain and the second pronoun is covalued with the first at the CI interface. In (172e), the second pronoun is bound via a chain and the first pronoun is covalued with the second at the CI interface. Finally, the impossible configuration is shown in (172f), where both pronouns are linked to *every boy* via a chain.

In English, it is difficult to find any overt correlates of the different dependency patterns in (172). There are however some suggestive Spanish data first noted in Montalbetti (1984). Spanish, to a first approximation, permits only null

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[35] (172a) may actually represent more than one dependency configuration, since at least in principle, there are various different ways in which the quantifier and the pronouns could be related to each other at the CI interface (e.g. transitive binding, co-binding, or binding of one of the pronouns together with covaluation of the one pronoun with the other). The potential availability of these different configurations is however of no significance in the present connection. Note that co-binding at the CI interface, though possible in principle when the quantifier and the two pronouns are linked by c-command, will in fact be ruled out by Keeping Up Appearances, as explained above.

subject pronouns to express bound readings. However, there are some circumstances under which a an overt subject pronoun can be construed with a quantifier when a null subject pronoun bound by this quantifier is also present. In particular, when the quantifier and the covert/overt subject pronouns are linked by c-command, only one of the pronouns must be covert:[36]

(173) a. * Nadie pensó   que las fotos   que él tomó probarían   que él
               No-one thought that the photos that he took would-prove that he
               estuvo ahí.   **(Spanish)**
               was   there.

       b. Nadie pensó que las fotos que *pro* tomó probarían que él estuvo ahí.

       c. Nadie pensó que las fotos que él tomó probarían que *pro* estuvo ahí.

       d. Nadie pensó que las fotos que *pro* tomó probarían que *pro* estuvo
           ahí.

This pattern is the expected one on the chain-based theory, given the assumption that the pronominalization spell out rule of Spanish can only spell out the tail of a chain terminating in a subject position as a null pronoun. (173a) is ruled out by Keeping Up Appearances, since, inter alia, *nadie* and the first *él* are $\overline{\text{A}}$-local and yet the relevant chain could not have its tail spelled out as *él*. In (173b), the relation between *nadie* and *pro* can either be encoded via a chain, or encoded at the CI interface in accord with Keeping Up Appearances. *Él* in (173b) can in principle either be related directly to *nadie* at the CI interface or indirectly via *pro* (covaluation). The former option is ruled out by Keeping Up Appearances, but the latter is not, since in this case the dependency is between *pro* and *él*, and these are not $\overline{\text{A}}$-local. The same logic applies in (173c), since the difference in the order of *pro* and *él* makes no difference. Finally, (173d) can be encoded using any

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[36] These examples are Montalbetti's. I could not find a judgment for (173b) in Montalbetti, but it has been checked. All of the examples in (173b) are being considered under the reading where both pronouns are construed with the quantifier.

one of the patterns of dependencies in (172a)-(172e).

2.4 Copy reflexives and backward pronominalization

As pointed out by Boeckx, Hornstein, and Nunes (2008), the chain-based approach has no difficulty in accommodating copy-reflexive languages such as Hmong (Mortensen, 2003) and San Lucas Quiaviní Zapotec ('SLQZ', Lee 2003):

(174)   a. Pov_1 yeej   qhaus Pov_1. *(Hmong)*
             Pao   always praises Pao.
             'Pao always praises himself.'

        b.   i. Pov_1 yeej   qhaus Pov_1; $Maiv_2$ los kuj ua le hab. *(Hmong)*
                 Pao   always praise Pao; May   TOP also do as too.
           ii.   ✓ Pao always praises Pao and May always praises May.

           iii.   ✗ Pao always praises Pao and May always praises Pao.[37]

(175)   R-yu'lààa'z Gye'eihlly Gye'eihlly. *(SLQZ)*
       HAB-like   Mike   Mike.
       'Mike likes himself.'

These languages simply spell out both the head and the tail of the A-chain in the same manner, rather than using a special reflexive form for the tail. As expected under this account, each instance of the DP must be precisely identical – it is not sufficient to use two different referential expressions which pick out the same person (Lee's "Identical Antecedent Requirement"):

(176)   R-yu'lààa'z Gye'eihlly nnsini'cy   bxuahahz. *(SLQZ)*
       NEUT-know Mike   NEUT-be.smart priest.
       '$Mike_1$ knows the $priest_{*1/2}$ is smart.'

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[37] Mortensen reports that some of his informants do permit this interpretation (the "strict" interpretation). However, Hmong in this respect is perhaps no different from English: some English speakers allow strict readings in examples such as "John defended himself because his lawyer couldn't."

We find similar morphological arbitrariness in the case of bound pronouns. In English, it is the tail of a variable binding dependency which gets spelled out as the pronoun, but in Nuu-chah-nulth either the head or the tail may be spelled out as a (null) pronoun (Davis, Waldie, and Wojdak, 2007; Davis, 2009):

(177)   a.   wawaaʔiš **Christine** ʔin čatšiƛẃiɫashuk sapnii ʔaḿiiƛik.
              say-3.IND Christine COMP push-PERF-ASP-3.SUB bread tomorrow-FUT.
              'Christine$_1$ said that she$_1$'s gonna knead bread tomorrow.'

          b.   wawaaʔiš ʔin čatšiƛẃiɫashuk **Christine** sapnii ʔaḿiiƛik.
              say-3.IND COMP push-PERF-ASP-3.SUB Christine bread tomorrow-FUT.
              'Christine$_1$ said that she$_1$'s gonna knead bread tomorrow.'

              (Lit: 'She$_1$ said that Christine$_1$'s gonna knead bread tomorrow.')

Again, this is not unexpected under the chain-based approach.

2.5   Pronominalization from non-thematic positions

If pronouns and reflexives spell out lower Case positions in chains which span multiple Case positions, the null hypothesis is that the thematic properties of the chain should be irrelevant. Thus, we should find examples of pronouns and/ or reflexives used to spell out positions in chains which do not span multiple thematic positions. In this section, I would like to draw attention to some possible examples of pronouns of this type.

The English "copy raising" construction exemplified in (178) was first investigated in Rogers (1971, 1972, 1974a,b). It is exemplified in (178):

(178)   John$_1$ seems as if he$_1$'s intelligent.

There are a number of reasons to treat this as an example of raising parallel to "John seems to be intelligent." First, it has a near-synonymous counterpart with an expletive subject:

(179)   It seems as if John's intelligent.

Second, many speakers allow non-thematic subjects:[38]

(180)   There seem as if there are too many people here.

Finally, as noted by Kaplan-Myrth (2000), the "if" clause must contain a copy or pronominalization of the subject:

(181)   a.   * John seems as if it's the end of the world.

        b.   * There seem as if too many people have arrived.

This strongly suggests that the subjects of (178) and (180) are derived subjects. I will follow Potsdam and Runner (2001) in assuming that apparent examples of copy raising from non-subject positions, such as (182), really show thematic versions of the same predicates, so that matrix subject is base generated in these examples:

(182)   Mary seems as if her paper received a bad grade.

It is natural within the present framework to analyze copy raising in terms of A-movement.[39] The only question is why in this Case the tail of the A-chain is spelled out as a pronoun rather than as a reflexive. This may perhaps be an indirect consequence of the Anaphor Agreement Effect. Since the AAE typically makes it impossible for an A-chain to cross a finite clause boundary into a finite subject position, English lacks a nominative form of the reflexive. In those rare cases where such chains can be formed, it may be that the pronoun is the closest thing to a nominative reflexive form that is available. The alternative would be to assume that copy raising is derived via $\overline{\text{A}}$-movement, and that the pronoun in copy raising is an ordinary $\overline{\text{A}}$ resumptive. Such an analysis would, however, be problematic in a number of respects. First, there is no independent evidence that expletives can undergo $\overline{\text{A}}$-movement, so (180) would be difficult to account

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[38] A google search for " 'there seem as if there' " will confirm this.

[39] An A-movement analysis was proposed for a similar construction in Igbo by Ura 1998).

for. Second, even allowing for examples such as (182), it seems likely that an $\overline{\text{A}}$-movement analysis would predict non-local copy raising to be much easier than it really is.

The existence of copy raising provides independent evidence in favor of the hypothesis that syntax is value blind. If a DP is already in a Case position this does not necessarily prevent it from raising, so long as there is a local higher Case position for it to move to.

The question remains of why the form of the complementizer of the embedded clause is able to determine the availability of copy raising. I.e., why is (183a) good but (183b) bad?

(183)   a.   John seems as if he's intelligent.

      b.   * John seems that he's intelligent.

With reference to the discussion of expletives in §1.2.6, I suggest that this may relate to the fact that finite clauses with *if* in C are frozen for A-movement:

(184)   a.   Everyone believes that John is intelligent.

      b.   It is believed by everyone that John is intelligent.

      c.   That John is intelligent is believed by everyone.

(185)   a.   Everyone wonders if John is intelligent.

      b.   * It is wondered by everyone if John is intelligent.[40]

      c.   * If John is intelligent is wondered by everyone.

Suppose we have reached the following stage in the derivation of (183b):

(186)   seems that John is intelligent.

If, as suggested in §1.2.6, the embedded clause requires Case, it must raise to

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[40] Recall that on the analysis of §1.2.6, (185c) does involve A-movement of the clause, with the higher copy pronounced as a pronoun and the lower copy pronounced fully.

the matrix subject position at this point in the derivation. This will block raising of *John*. In contrast, the inability to passivize of verbs which take *if* clauses as internal arguments suggests that these clauses do not require Case. Thus, there is nothing to stop *John* raising to subject position in (183a).

2.6 The Anaphor Agreement Effect

The preceding section suggests a partial analysis of the Anaphor Agreement Effect. The Anaphor Agreement Effect is the well-known generalization of Rizzi (1990a) that anaphors cannot appear in positions "construed with agreement."[41] From the present perspective, it seems that an analysis of the Anaphor Agreement Effect should provide an answer to the following question:

(187)   Why can an A-chain not span multiple agreeing positions even though an $\overline{\text{A}}$-chain can?

We have seen in §1.2.6 that one difference between $\overline{\text{A}}$-chains and A-chains is that only the former are permitted to violate Minimality. In the preceding section, it was suggested that ordinary finite clauses in English require Case. It may be that a clause which requires Case and which contains a ϕ-complete T is sufficiently similar in feature specification to a DP to induce an A-over-A violation if a DP inside of it moves out. This is a particularly plausible hypothesis if we assume that T is split between a lexical T head and a higher Agr projection. On Chomsky and Lasnik's (1993, 197) analysis, Agr bears D features of some sort.[42] If so, the Agr head is specified both for ϕ-features and for D. It is possible in any case that category features are invisible for Minimality, so that a merely categorical distinction between two heads/phrases is not enough to distinguish them w.r.t.

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[41] See also Woolford (1999).

[42] Chomsky calls them "NP features."

Minimality.

If the pronoun in examples such as (183a) is the spellout of the tail of an A-chain, we might expect it to exhibit anaphor-like properties in cases where the head of the chain is in a thematic position. There is one respect in which this appears to be the case. Pronouns in the subject position of an *if* clause tend to resist strict interpretations when bound by the matrix subject – (188) – whereas pronouns in the subject position of ordinary finite clauses do not – (189):

(188)   Only John acts as if he's intelligent.

    a. ?? Only John acts as if John is intelligent.

    b. ✓ John is the only *x* such that *x* acts as if *x* is intelligent.

(189)   Only John thinks that he's intelligent.

    a. ✓ Only John thinks that John is intelligent.

    b. ✓ John is the only *x* such that *x* thinks that *x* is intelligent.

This very brief discussion of the AAE does not address AAE effects in languages with object agreement. In principle, the same story may apply. If AgrO is phi-complete, it may be sufficiently similar in feature-specification to a DP to induce an A-over-A effect. But of course, since AgrOP does not, on standard assumptions, undergo Case-driven A-movement, an account along these lines is less plausible for the object case. I leave a fuller treatment of the AAE within the present framework for future research.

2.7   Reflexives and Case absorption

Given the basic mechanics of feature valuation, there is no reason in principle why we should not find chains of the following kinds:

(190)   Case...θ...Case

(191)   Case...Case...θ

(192) θ...Case...Case

Such chains are usually assumed to be impossible. It is difficult to construct putative instances of (192), since clausal structure appears to be such that there is always a theta position between any two Case positions. However, there is no obvious Minimalist rationale for blocking (190) or (191). I will argue that these chains are in fact attested, and that they are responsible for uses of reflexives as "Case absorbers."

To begin with, consider the problem posed by (193). Here, *behave* appears to be a one-place predicate (* *John behaves Mary*), but on traditional accounts this is difficult to reconcile with the presence of the reflexive in object position:

(193)   John behaves himself.

On the assumption that chains of the form in (190) are permitted, (193) has a straightforward derivation that is compatible with the assumption that *behave* is a one-place predicate. Suppose that *behave* assigns only one θ-role, but that it also (in association with AgrO) assigns an accusative Case.If Case features cannot be left unassigned, it follows that some means must be found of checking the Case features of both the verb and finite T. This is precisely what a chain of the form in (190) or (190) achieves. Whether the tail of the chain is a Case or a θ position will be determined by whether the vP/VP is unaccusative or unergative. Or rather, whether it is just like an unaccusative/unergative vP/VP *but* for the addition of an accusative Case assigner. Let us refer to the relevant structures as *pseudo-unaccusatives* and *pseudo-unergatives*. If we follow Hale and Keyser (1993, 315), Chomsky (1995), then in the pseudo-unaccusative case, the Agr head which assigns accusative Case will be above the θ-position. In the pseudo-unergative case, the θ position will be [Spec,vP] above Agr. It seems more reasonable to

treat *behave* as a pseudo-unergative than as an pseudo-unaccusative. There are
few definitive syntactic tests for unergativity in English, but this decision is rea-
sonable on intuitive semantic grounds, and is consistent with the resistance of
behave himself to extraposition from subject:

(194) a. [A boy *t*] arrived [with red hair]. *(Pseudo-unaccusative)*

   b. *[A boy *t*] laughed [with red hair]. *(Pseudo-unergative)*

   c. *[A boy *t*] behaved himself [with red hair].

The pseudo-unergative derivation is roughly as shown in (195). The argument
(*John*) is first merged in the lower Case position, raises to receive a θ-role from v,
and then raises again to receive Case in [Spec,TP]:

(195)
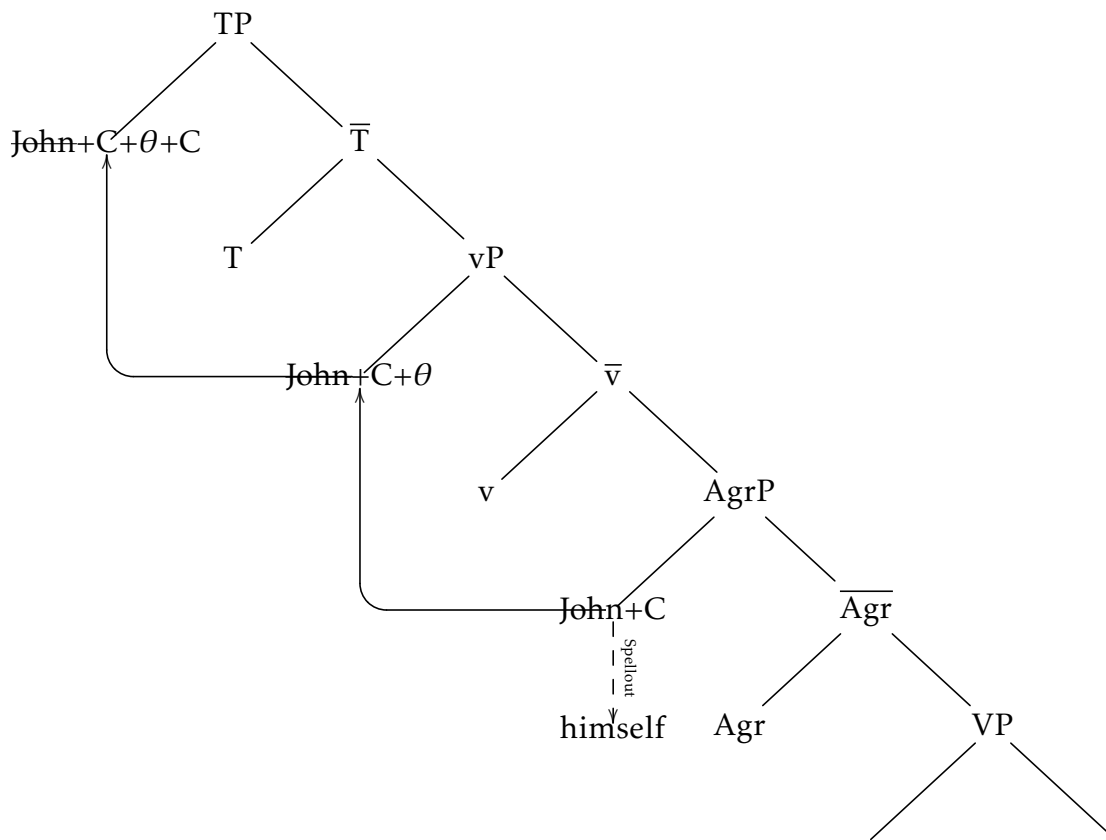
In general, it seems that both pseudo-unaccusative and pseudo-unergative struc-
tures are possible. For example, Oya (2010) argues that German *sich* can appear

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in the object position of verbs which have either external or internal arguments (see also §2.2.5 above):

(196)   **Reflexive verbs with an external argument:**

   a.   Dieter setze sich   hin.
        Dieter sat   himself down.

        'Dieter sat down.'

   b.   Dieter stellte sich   auf eine Leiter.
        Dieter put   himself onto a   ladder.

        'Dieter got on a ladder.'

(197)   **Reflexive verbs with an internal argument:**

   a.   Dieter erkältete sich.
        Dieter cooled   himself.

        'Dieter caught a cold.'

   b.   Da   ereignete sich ein Unfall.
        There happened itself an accident.

        'There happened an accident.'

Derivations of the preceding type provide an alternative to the Case-absorption mechanisms of Hornstein (2001), Reinhart and Siloni (2004) and Reuland (2011). Each of these authors assume that certain kinds of simplex reflexive function as Case absorbers. This explains why these simplex reflexives often turn up in unaccusatives, impersonal passives and other non-reflexive constructions. The analysis also extends to reflexive sentences themselves. For example, in the case of a verb such as Spanish *lavar* [*wash*], Reinhart and Siloni assume that the verb is "reflexivized" by a syntactic operation of θ-role bundling, but that this mechanism fails to remove the accusative Case assigned by the verb. This necessitates the addition of se to absorb the additional Case:

(198)   Juan se ha lavado. **(Spanish)**
          John se has washed.

Under this analysis, *se* functions essentially as a verbal affix. (And indeed, it is not uncommon cross-linguistically to find verbal affixes which function in a similar manner.) A slightly different implementation of this analysis is proposed in Hornstein (2001). Here, the "bundling" of the θ-roles is taken care of by movement through the two θ positions, and *se* attaches to the verb to absorb the spare accusative Case, subsequently cliticizing to T:

(199)
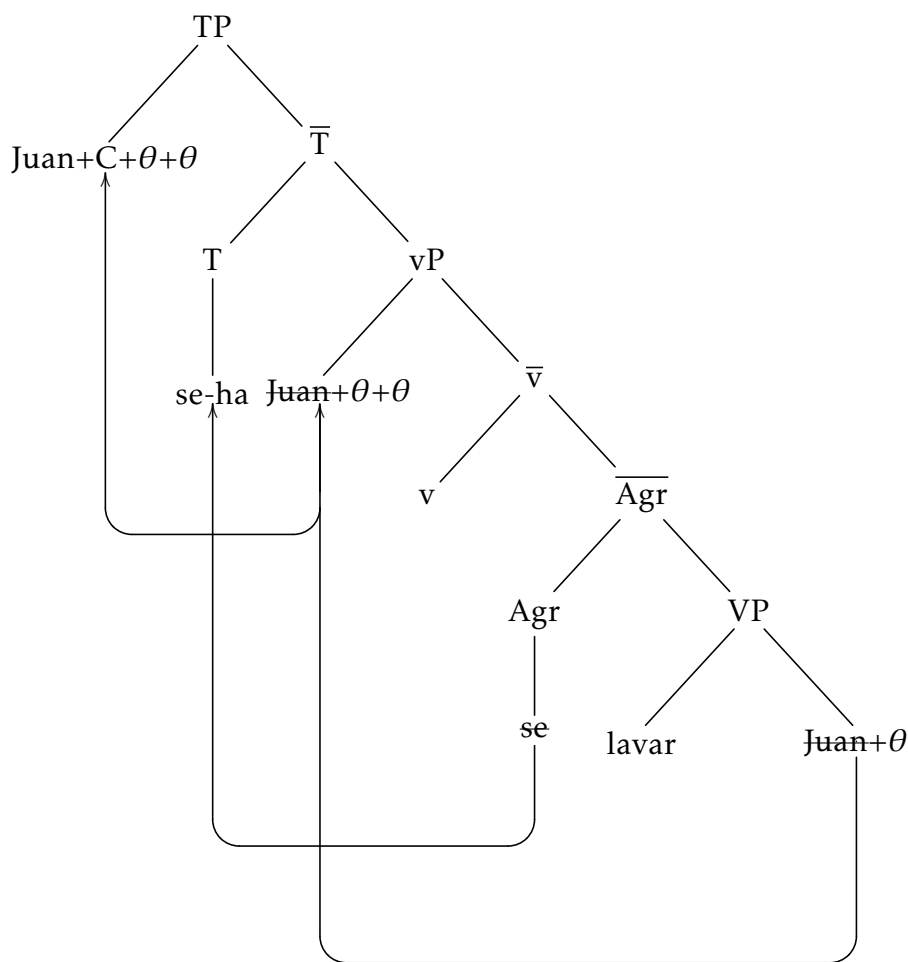
Both analyses face a problem raised in Labelle (2008, 850). Labelle points to certain facts regarding the French causative construction. Reflexive clauses in French (and also Italian) are well-known to pattern with intransitives when embedded under a causative (Labelle, 2008, 867):

(200) a. Je le   farai   laver à Paul. **(French)**
         I 3s-ACC make-FUT-1s wash to Paul.

         'I will make Paul wash it.'

     b. Je ferai   se laver Paul.
        I make-FUT-1s se wash Paul.

        'I will make Paul wash himself.'

     c. Je ferai   manger Paul.
        I make-FUT-1s eat   Paul.

        'I will make Paul eat.'

Labelle notes that in (200a), the subject of transitive *wash* is realized as an oblique, whereas in (200b), the full DP argument of reflexive *wash* is in the accusative.In this respect, (200b) appears to pattern with the intransitive (200c), not the transitive (200a). So far, this is all grist for the Reinhart-Siloni-Hornstein mill, since it appears to suggest that the subject of a reflexive clause is the external argument – *se* functions to absorb Case, but it leaves both the internal and external θ-roles in tact. However, Labelle (2008) points out a rather serious problem with the Case absorption analysis. Sometimes, *se* surfaces too far away from the Case-assigner whose Case it is supposed to be absorbing:

(201)   Il se fera   laver par Paul
        He SE make-FUT-3s wash by Paul.

        'He$_1$ will make Paul wash him$_1$.'

Here, it is clear from the meaning that *se* is absorbing a Case in the embedded clause, but it attaches to the matrix verb/auxiliary. Of course, one might suppose that some sort of clitic climbing takes place here, but given that French does not show clitic climbing in any other construction, this is hardly an attractive line of analysis. This suggests that *se* and other such reflexives are never really Case-absorbing verbal affixes. In cases where these morphemes appear to function as such, it is really the lexical DP which absorbs the additional Case, as in (195).

2.8 Merge over Move and subject-orientation

This section has two main aims. The first is to argue for a treatment of subject-orientation effects in binding based on Merge over Move. The basic logic here will be identical to that of Hornstein (2001)'s explanation of the subject-orientation of adjunct control. The second aim is to motivate my adoption of Reinhart's No Sneaking principle by showing that it allows the account of subject-orientation effects to be extended to cover certain *anti-subject-orientation* effects. Since these effects pose a significant challenge for most approaches to binding theory, I take this to be a significant argument in favor of the theory presented here.

To my knowledge, the first application of Merge over Move to subject-orientation effects in binding phenomena is Motomura's (2001) study of Japanese *zibun*. *Zibun* is subject-oriented when it is a verbal argument:[43]

(202) Takashi$_1$-ga jooshi$_2$-ni zibun$_{1/*2}$-o suisenshita.
       Takashi-NOM boss-DAT self-ACC   recommended.
       'Takashi$_1$ recommended himself$_{1/*2}$ to his boss$_2$.

On the assumption that *zibun* is the residue of A-movement, Motomorua observes that Merge over Move provides a principled account of certain otherwise-curious properties of the distribution of *zibun*. The logic is similar, but not identical, to that of the adjunct control case. The key difference is that in (202), the licit antecedent, *takashi*, must move over the illicit antecedent, *jooshi*. Since *zibun* often functions as a long-distance reflexive, we can assume that it is in some instances a residue of $\overline{\text{A}}$-movement. Thus, Minimality does not block movement of *takashi* over *jooshi*, and Merge over Move can exert its influence, forcing *takashi* to move instead of *jooshi*. (We will see in §2.8.2 that things are a little more complex in comparable English examples, owing to the prima facie expectation

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[43] Motomura notes some examples where *zibun* is, e.g., inside a PP and is not restricted to subject antecedents.

that movement of one internal argument over the other should be blocked by Minimality.) Motomura's second key data point is the possibility of "backward" binding of *zibun* in certain constructions:

(203) [Zibun$_1$-ga gan kamo sirenai koto]-ga Kenji$_1$-o
       [self-NOM cancer may have FACT]-NOM Kenji-ACC
       nayam-ase-ta.
       be.worried.CAUSE-PAST
       'The fact that self$_1$ may have cancer worried Kenji$_1$.'

At first glance, this configuration appears to have nothing in common with (202). However, Motomura notes that a Merge-over-Move-respecting derivation of (203) is straightforwardly available using sideward movement. This derivation essentially parallels that proposed by Hornstein (2001) for English examples such as (204):

(204) a. [PRO$_1$ having cancer] would worry John$_1$.

       b.

               [John having cancer]   *(Workspace 1)*

               worry   *(Workspace 2)*

       Sideward movement of 'John' to become the object of 'worry'

               [~~John~~ having cancer]   *(Workspace 2)*

               [worry John]   *(Workspace 2)*

       Derivation continues and [~~John~~ having cancer] merges as matrix subject:

               [[~~John~~ having cancer] ...would... [worry John]]   *(Workspace 1)*

Thus, Merge over Move permits a unified grammatical characterization of the restrictions imposed on the antecedent of *zibun*.[44] Other accounts have to compli-

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[44] (204) is not the best example to illustrate this phenomenon, since the use of a psych verb raises the question of whether *zibun* is a logophor in this context. However, the use of a psych verb is not necessary to get this effect. For example, Oshima (2004, 186) gives examples such as "*Zibun*'s invention brought George a big fortune."

cate the subjecthood condition somewhat. For example, to account for examples such as (204), Oshima (2004, 187) proposes the following condition:

(205)   (Non-logophoric) *zibun* must be bound to a subject syntactically c-comm-
          anding it *if there is any*; when there is no such potential binder, it can
          be bound to a (subject or non-subject) argument of the same clause or
          a clause containing it.

This illustrates one of the advantages of capturing subject-orientation effects using Merge over Move, rather than imposing a subject-orientation requirement directly. In §2.8 I will argue that there are no anaphors or pronouns which are strictly subject-oriented. Apparent subject-orientation requirements derive from Merge over Move.[45]

Although "subject-orientation" is often inaccurate as a descriptive term, I will continue to use it to use as a theory-neutral label for phenomena of the preceding sort.

2.8.1   "Highest-DP-orientation"

An advantage of Merge over Move as compared to previous approaches to subject-orientation is that it predicts not subject-orientation as such, but rather "highest-DP-orientation." In other words, when the most structurally prominent DP in a clause is a non-subject, it will be preferred to the subject as an antecedent.

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[45] Another source of apparent subject-orientation effects is the set of requirements that certain logophoric pronouns place on their antecedents, which naturally tend to favor subjects. Extra-grammatical requirements of this sort will not really be investigated in this dissertation, however.

2.8.2 Absence of subject-orientation in English

We have seen that local anaphoric binding in English is not constrained by a subject-orientation requirement:

(206)   a.   John$_1$ talked to Bill$_1$ about himself$_{1/2}$.

        b.   John$_1$ showed Bill$_1$ himself$_{1/2}$.

This fact is potentially problematic for a theory in which local anaphoric binding is constrained by Minimality and Merge over Move. As pointed out by Hornstein (2001), (206a) is not particularly problematic, since we can simply assume that the *about* is able to adjoin either above or below the *to* PP. (Or, following the analysis in chapter 3, that "reanalysis" of *to* is optional.) In this way, derivations for both interpretations are made available that are in accord with Minimality and Merge over Move. The more difficult case is (206b). Here, Minimality and Merge over Move pull in opposite directions. Minimality requires *himself* to be bound by the closest possible antecedent – *Bill* – whereas Merge over Move would prefer for the highest possible antecedent – *John* to be the binder. In the present framework, Minimality always trumps Merge over Move. This seems to imply that objects (or more generally, DPs within vP) should be preferred to subjects as antecedents. However, this seems the wrong result in the case at hand. Cross-linguistically, subject-orientation constraints on anaphoric binding are extremely common, whereas object-orientation, if it exists at all, tends to be explicable in terms of competition with an alternative subject-oriented form.[46]

For this reason, I suggest that binding of *himself* by *John* does not violate Minimality. If this is the case, Merge over Move will come into effect, forcing

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[46] E.g., Dalrymple (1993, 29) discusses Norwegian *ham selv*, which appears to be object-oriented (or at least, anti-subject-oriented). It seems, however, reasonable to assume that *ham selv* is in principle compatible with both subject and object antecedents, and that its object-orientation arises from its being dispreferred to the subject-oriented form *seg selv*.

himself to be bound by *John*. Hornstein (2009) gives a path-based definition of Minimality which derives a notion of equidistance: α and β are equidistant if they are within the same minimal maximal projection.

2.8.3 Anti-subject-orientation

The subject-orientation of (much) anaphoric binding is not a particularly interesting fact in itself. It is not at all surprising that certain dependencies should require antecedents that are in some sense structurally prominent. A far more interesting fact is the existence of *anti-subject-orientation* effects This section will consider examples from Romance of anti-subject-orientation in Condition B effects. In many Romance languages the subject of a finite embedded clause cannot be bound by the matrix subject when the embedded clause is in the subjunctive:

(207) $[_{TP}$ ... Subject$_1$ ... $[_{TP}$ pro$_1$ T-IND ...]]

(208) $^*[_{TP}$ ... Subject$_1$ ... $[_{TP}$ pro$_1$ T-SUB ...]]

This "obviation effect" has sometimes been analyzed as a Condition B effect (the idea being that the subjunctive clause is "transparent" for binding in the same way as an infinitive). I think that this analysis is correct, though not uncontroversial; this will be discussed further in §2.8.5. Despite the presence of the (presumed) Condition B effect in (208), the matrix (indirect) object *can* bind the embedded subject:

(209) $[_{TP}$ ... Subject ... Object$_1$ ... $[_{TP}$ pro$_1$ T-SUB]]

We therefore have in (209) what appears to be an anti-subject-oriented Condition B effect. The existence of such effects raises two rather difficult puzzles within most approaches to binding theory.

First, anti-subject-orientation is a *negative* licensing requirement. It is usually quite easy to derive what Dalrymple (1993) describes as *positive* licensing

requirements such as subject-orientation. (So for example, it has frequently been proposed that Dutch *zich* is subject-oriented because it must somehow associate covertly with T; see e.g. Reuland and Koster, 1991; Safir, 2004.) It is more difficult to derive in a principled manner a *negative* licensing requirement such as anti-subject-orientation, since non-subjects have nothing in common as such. Dalrymple simply proposes to allow the bald statement of negative licensing requirements in the binding conditions of any given language, but this approach seems reasonable only as a last resort.

The second puzzle arises even if we are willing to allow anti-subject-orientation as a primitive licensing requirement. In the Romance languages exemplifying the patterns in (207)-(208), the embedded pronoun is an ordinary subject pronoun of a type which typically can be bound either by subject or object antecedents. Thus, it cannot be a peculiarity of the licensing requirements on the embedded pronoun which gives rise to the pattern of binding possibilities in (209) in these instances.

2.8.4 Obviation in Spanish

I will use Spanish to illustrate obviation phenomena.[47] (210a/b) correspond to (208a/b):[48]

(210) a. María$_1$ ha decidido que *pro*$_1$ va a la playa. **(Spanish)**
       Maria has decided that (she) go-IND to the beach.

  b. * María$_1$ ha decidido que *pro*$_1$ vaya a la playa.
       Maria has decided that (she) go-SUB to the beach.

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[47] Spanish has a present subjunctive, glossed here as SUB, and an imperfect subjunctive, glossed as IMPERF-SUB. The imperfect subjunctive has essentially the same behavior with regard to obviation as the present subjunctive, but is used when the matrix clause is in a past tense.

[48] Some Spanish examples are taken from Costantini (2005) and Caballero (2004).

As we saw in (209), the matrix object, in contrast to the matrix subject, is permitted to bind the pronoun:

(211)   María$_1$ convenció a Ines$_2$ de que *pro*$_{*1/2}$ baile   mucho. **(Spanish)**
            Maria persuaded   Ines of that (she) dance-SUB a lot.

Obviation appears to have nothing specifically to do with null subject pronouns. The same effect is found in Spanish with an overt subject pronoun – (212) – and in non-*pro*-drop languages such as French – (213):

(212)   * María$_1$ ha decidido que ella$_1$ vaya   a la playa. **(Spanish)**
            Maria has decided que she go-SUB to the beach.

(213)   * Je$_1$ veux que j$_1$'aille voir   ce   film. **(French)**
            I   want that I   go-SUB see-INF this film.
            (French)

2.8.5   Previous attempts to explain subject-oriented obviation

2.8.5.1   Picallo (1985)

Picallo (1985) argues that the matrix object is able to bind the embedded subject in (211) because subjunctive clauses extrapose to a right-adjoined position above the object. However, in ordinary cases of clausal extraposition over an adverb in Spanish – (214) – there is no amelioration of Condition C.

(214)   * Ella$_1$ convenció a él$_2$ t_{CP} ayer   [$_{CP}$ de que Juan$_2$ baile
            She$_1$ persuaded   him$_2$ yesterday   of that Juan$_2$ dance-SUB
            mucho]. **(Spanish)**
            a lot

Moreover, as noted by Kempchinsky (2009, 1791), a bound variable reading is permitted in cases such as (215), where the matrix object binds the subject of the embedded clause:[49]

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[49] However, the implications of this fact are somewhat unclear, given that it is not obvious that Condition C and variable binding are subject to the same (almost-)c-command requirement; see

(215)   No animé   a nadie a que *pro* estudiara   en el extranjero.
        NEG encourage to no-one to that *pro* study-PST-SUB abroad
        (Spanish)

        'I didn't encourage anyone to study abroad.'

Similarly, there is no amelioration of Condition C in cases such as (216):

(216)   * (A él)   Le$_1$ gusta   siempre que *pro*   visite   a Juan$_1$.
        (To him) 3PS-DAT-PRN is-pleasing always   that (s/he) visit-SUB   John.
        (Spanish)

        '* He$_1$ always likes it that s/he visits John$_1$.'

It is unclear why extraposition should not be able to take the clause out of the c-command domain of the indirect object *a él*.[50] It has occasionally been claimed that *a él* in (216) is a subject with quirky dative case. However, Gutiérrez-Bravo (2006) points out that these PPs have virtually none of the properties typically associated with quirky subjects. If it were the case that *a él* resided in [Spec,TP], Picallo's account would have no difficulty explaining the deviance of (216) when *a él* is present, since by assumption the clause cannot extrapose higher than [Spec,TP]. However, *a él* is optional, and when only the indirect object clitic is present, it is unclear why the clause should not be able to extrapose above it.

§2.11.1 for discussion.

[50] Note that *le*, when it doubles an indirect object, is quite generally inactive w.r.t. Condition C in Spanish:

(i)   El   mes   pasado le$_1$ envió   la madre de   Juan$_1$ varias cartas.
      Last month 3PS.DAT sent   the mother of John   various several letters.
      'Last month, John's mother sent him several letters.'

2.8.5.2 Avrutin and Babyonyshev (1997)

Avrutin and Babyonyshev (1997) propose a different explanation for subject-orientation. (Their examples are from Russian, but the theory could carry over to Romance without significant modification.) Avrutin and Babyonyshev propose that the matrix and embedded clause are closely related, in that a single event operator binds the event in each clause (thus encoding a temporal dependency). Syntactically, this is expressed by raising of the embedded C to the matrix C. Since Avrutin and Babyonyshev assume universal V-to-T-to-C movement, the end result is that the entire spine of the embedded clause ends up as a complex head in matrix C. This is shown in the following tree taken from their paper:

(217)
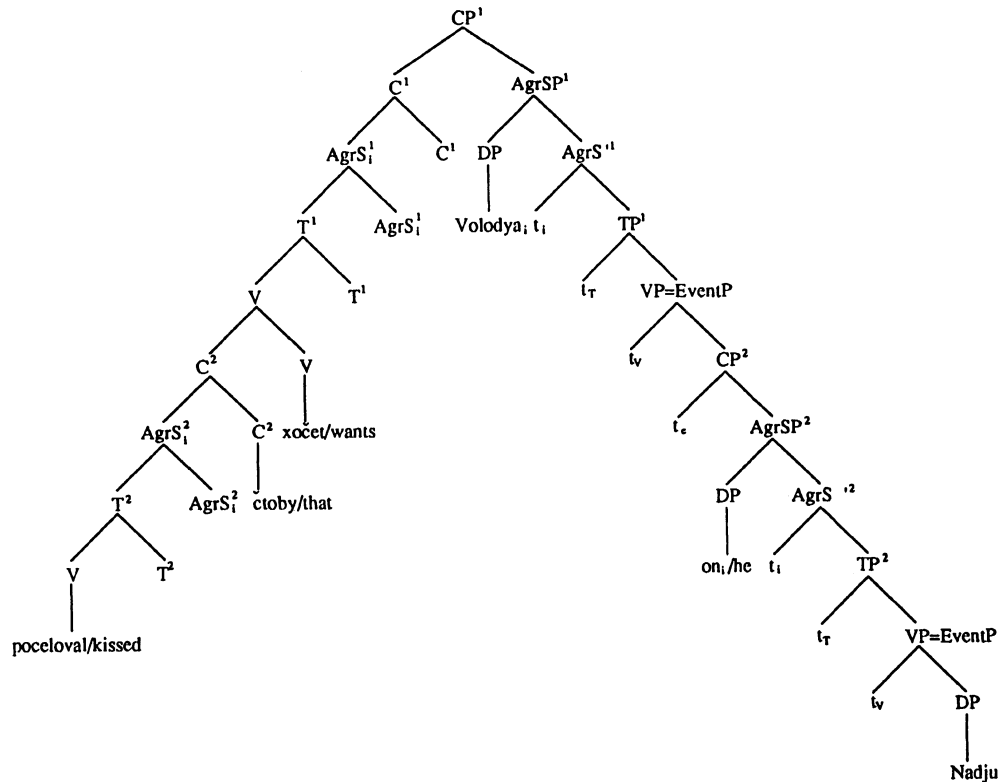
On the assumption that AgrS is pronominal and subject to Condition B, a Condition B violation obtains between the complex in matrix C (bearing the index of embedded AgrS, and hence of the embedded subject) and the matrix subject/

AgrS.

The problem with this proposal, as we will see shortly, is that obviation in Romance is not always with respect to the agreeing matrix subject.

As we saw in §2.8.1, Merge over Move does not predict subject-orientation as such. Rather, it predicts "highest DP orientation." So for example, in (218), object control is blocked not because the controller must be the subject, but because the controller must be the highest DP in the clause containing the adjunct:

(218)   John$_1$ criticized Bill$_2$ [without PRO$_{1/*2}$ being rude].

In principle, therefore, Merge over Move may choose a non-subject DP as the preferred antecedent if this DP is higher in the clause than the subject. In fact, as noted by Costantini (2005), we seem to find examples of this effect with obviation. When the highest DP is a non-subject, obviation occurs with respect to this DP:

(219)   * A mí$_1$ se me antoja [que *pro*$_1$ vaya   a echar un ojito a la   pintura
         To me I'd-like   [that (I)   go-sᴜʙ to take a glance at the painting
         ]. **(Spanish)**
         ].
         'I'd like to take a look at the painting.'

Thus, Merge over Move correctly predicts which DP triggers obviation. Note that even on the assumption that *a mi* is a quirky dative subject in (219), Avrutin and Babyonyshev's account still fails to make the correct prediction, since *a mi* clearly does not agree with the verb This is in contrast to previous analyses, which have tended to stipulate an empirically not-quite-correct subject/object asymmetry. We must, however, determine precisely how Merge over Move exerts an influence on the binding possibilities in (211) and (219). This is where Keeping Up Appearances will be crucial. Before explaining the role of this condition, it may be useful to consider how one might attempt to bring Merge over Move to bear on obviation effects within the theory of Hornstein (2001). In this system, Condition

B effects result from an economy condition which prefers the use of reflexives to pronouns. The difficulties faced by this approach in dealing with the obviation phenomena will highlight the advantages of Keeping Up Appearances.

2.8.5.3 Analysis 1 (doesn't work)

Consider the following set of hypotheses designed to link Merge over Move to the obviation data above:

- Local anaphoric binding is derived via A-movement.

- Condition B effects derive from a preference for local anaphoric binding over pronominal binding. (And then in turn, a preference for all forms of binding over coreference.[51])

- Since local anaphoric binding is derived via A-movement, it is restricted by Merge over Move.

- Hence, Condition B effects will be highest-DP-oriented, since only when the binder is the highest DP in the clause will there be a licit derivation of local anaphoric binding to block the possibility of pronominal binding.

Under this approach, the Condition B effect in in (210b) (repeated in 220) results from the availability of the hypothetically licit derivation in (221):

(220) * María$_1$ ha decidido que *pro*$_1$ vaya   a la playa.   **(Spanish)**
        Maria   has decided that (she) go-SUB to the beach.

(221)   María$_1$ ha decidido que [María]$_1$ vaya a la playa.

However, there is no spellout of (221) which is an acceptable sentence in Spanish: The addition of a reflexive *se* clitic in either the matrix or embedded clause is

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[51] See e.g. Reinhart (1983a), Hornstein (2001), Safir (2004).

scarcely conceivable as a means of expressing the intended meaning. The use of the emphatic anaphor *si mismo/a*, as shown in (222), is roughly as unacceptable as English (223):[52]

(222)   * María$_1$ ha decidido que si misma$_1$ vaya   a la playa.
           Maria   has decided that herself   go-SUB to the beach.

(223)   * John decided that himself will go to the beach.

An additional problem is that Merge over Move and Minimality pull in opposite directions in (221). Movement of the embedded subject to the matrix subject position crosses over the matrix object and thus violates Minimality:

(224)   María$_1$ VERB a Ines$_2$ [$_{CP}$ COMP ~~María~~$_1$ V-SUB].

         ('María' moves over 'Ines' – Minimality violation?)

In contrast to the English cases discussed in §2.8.2, it is clear that *Ines* and *María* cannot be equidistant. Thus, such a derivation could only be permitted if (contrary to the assumptions of this dissertation) Merge over Move took priority over Minimality. However, there is strong evidence that the prioritization is the other way round. For example, cases of control such as (225) provide independent support for the hypothesis that Minimality takes precedence over Merge over Move:

(225)   John$_1$ persuaded Bill$_2$ [$_{TP}$ PRO$_{*1/2}$ to leave].

If Minimality takes precedence, obviation is predicted to occur with respect to the object rather than the subject – precisely the wrong result. Thus, the approach to obviation effects considered in this subsection does not seem very promising.

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[52] In some contexts, *si mismo/a* must be doubled by the reflexive clitic *se* in Spanish. For completeness, I note here that the addition of *se* in either the matrix or embedded clause does nothing to improve the acceptability of (222).

2.8.5.4 Analysis 2 (more promising)

This approach is based on the assumption defended in this dissertation that certain instances of pronominal binding are derived via $\overline{\text{A}}$-movement (§2.1.3):

(226)   John$_1$ thinks that [$_{CP}$ [John]$_1$ [$_{TP}$ [John]$_1$ is intelligent]].

$\Downarrow$

John thinks that he is intelligent.

(227)   Juan$_1$ cree que [Juan]$_1$ es inteligente.

$\Downarrow$

Juan cree que *pro* es inteligente.

As we saw in §2.1.3 and §2.3, Condition B effects derive from (i) the distribution of intervening $\overline{\text{A}}$-positions and (ii) the Keeping Up Appearances principle, defined in (154), which bars the use of a pronoun which could not have been derived via spellout of an $\overline{\text{A}}$-chain.

Given these background assumptions, it is possible to implement a version of the domain-extension analysis by adopting the hypothesis that subjunctives, in contrast to indicatives, do not provide an intermediate $\overline{\text{A}}$ landing site in [Spec,CP]. Kempchinsky (1990, 2009) hypothesizes that Romance subjunctive clauses require T-to-C movement. Let us suppose that movement of T to C renders [Spec,CP] (or [Spec,T-CP]) an A-position. Returning to (210), repeated here as (228), we now see that the contrast between (228a/b) corresponds to that between derivations (229a) and (229b):

(228) a. María$_1$ ha decidido que *pro*$_1$ va   a la playa. **(Spanish)**
            Maria has decided that (she) go-IND to the beach.

      b. * María$_1$ ha decidido que *pro*$_1$ vaya   a la playa.
            Maria has decided that (she) go-SUB to the beach.

(229) a. María$_1$ ha decidido [$_{CP}$ [María]$_1$ que [$_{TP}$ [María]$_1$ va a la playa]].

          (Indicative)

b. María₁ ha decidido [CP ([~~María~~]₁) que [TP *[~~María~~]₁ vaya a la playa]].

(Subjunctive – asterisk indicates impossibility of pronominalizing copy)

Since embedded [Spec,CP] is an A-position in (229b), pronominalization of the lower copy of *Mary* is impossible, whether or not *Mary* is able to move via [Spec,CP]. It must now be established that Keeping Up Appearances makes it impossible to use LF binding or coreference to to encode the dependency in (228a). Clearly it does so, since the matrix and embedded subject positions are $\overline{\text{A}}$-local, but it is not possible to from a chain between these positions which spans an $\overline{\text{A}}$-position.

Let's look at (211) again, repeated in (230):

(230) María₁ convenció a Ines₂ de que *pro*₍*1/2₎ baile   mucho. **(Spanish)**
       Maria   persuaded   Ines of that (she)   dance-sᴜʙ a lot.

In (229b), it was possible to move from the embedded subject position to the matrix subject position, but the resulting A-chain could not feed pronominaliza-tion.[53] For the same reason, *María* can't be construed with the embedded subject position in (230). With regard to the matrix object position, by contrast, it is not possible to even get as far as forming a chain. The crucial point in the derivation of (230) is the following:

(231)

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[53] It presumably cannot feed reflexivization either due to the Anaphor Agreement Effect.

[$_\text{CP}$ de que Ines baile mucho]   *(Workspace 1)*

a$_\text{P}$ *(Workspace 2)*

{..., María, ...}   *(Items remaining in numeration)*

⇒ *Ines* can't move to become the complement of the preposition *a* because *María* remains in the numeration and could be merged as its complement instead.

To get the correct result here, we must understand the notion of "$\overline{\text{A}}$-local" used in the definition of Keeping Up Appearances to be sensitive to the strictures of Merge over Move. This is not as odd as it might at first appear. It would be intuitively reasonable to define a notion of $\overline{\text{A}}$-locality which was sensitive to c-command, such that α and β are not $\overline{\text{A}}$-local in if they do not stand in a c-command relation. Merge over Move is really just the replacement for a c-command constraint on movement within the syntactic framework of this dissertation. It is therefore natural that Merge over Move should enter into the relevant notion of "$\overline{\text{A}}$-local" used in the statement of Keeping Up Appearances. Thus, Keeping Up Appearances does not apply to the relation between the matrix indirect object and the embedded subject in (230), since these are not $\overline{\text{A}}$-local in the relevant sense.

2.9   Condition C, Epithets and Subject-orientation

Attempts to derive Condition C in a non-stipulative manner have, broadly speaking, adopted one of the following two hypotheses:

(i) The structure underlying a Condition C violation is one to which pronomi-

nalization obligatorily applies. A Condition C violation results if pronomi-
nalization fails to apply.

(ii) Condition C violations result from the illicit use of coreference when bind-
ing is available as an alternative.

Hypothesis (i) is to be found in one form or another in most work on pronouns prior to Lasnik (1976). Hypothesis (ii) was first worked out in detail in Reinhart (1983b), and as we have seen, substantially revised in Reinhart (2006). Both (i) and (ii) have difficulty accounting for the fact that epithets behave like r-expressions for the purposes of Condition C:

(232) a. * John$_1$ thinks [the guy]$_1$ is intelligent.

b. * [The guy]$_1$ thinks John$_1$ is intelligent.

With regard to (i), there is on the face of it no reason to think that pronominal-ization should apply in either of the examples in (232). Similarly, it is not clear that (ii) rules out these examples, since replacing the epithet with a bound pro-noun would not yield an equivalent interpretation (on the intuitively reasonable assumption that the epithet makes an interpretative contribution). Even if we simply stipulate a version of Condition C which blocks (232a/b), we face the fur-ther problem that epithets do not in all respects behave like r-expressions. In many contexts they freely allow bound readings:[54]

(233)   [Every student$_1$]'s mother thinks that [the idiot]$_1$ is a genius.

Lasnik (1989) argues that epithets had mixed pronominal and r-expression prop-erties. The theory presented in this dissertation has a slightly different take on epithets. They key observation is the following:

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[54] This is noted for example in Lasnik and Stowell (1991), Safir (1996).

(234)   Epithets are interpreted like pronouns but they don't *sound* like pronouns.

In this section, I will argue very briefly that the mixed pronominal/r-expression behavior of epithets with regard to binding and Condition C follows from this observation together with Keeping Up Appearances. This is a rather pleasing result, since it invokes no distinction between pronouns and epithets other than the undeniable phonological distinction. An epithet is simply a pronoun which sounds like an r-expression. Feeding this back-of-an-envelope description into the theoretical machinery developed in the preceding sections seems to give roughly the right results. In particular, I would like to draw attention to the following pair of data points.

First, epithets freely receive bound readings at LF *except* when the epithet is $\overline{\text{A}}$-local to its antecedent (Hornstein and Weinberg, 1990; Higgenbotham, 1992):

(235)   * [Every politician]$_1$ said that [the politician]$_1$ would have to resign.

(236)   [Every politician]$_1$'s mother said that [the politician]$_1$ would have to resign.

(237)   Every farmer who owns [a politician]$_1$ beats the politician$_1$.

When $\overline{\text{A}}$-locality holds, as in (235), Keeping Up Appearances kicks in, and since the epithet doesn't sound at all like any possible spellout of the tail of an $\overline{\text{A}}$-chain, the result is sharp deviance. Condition C effects with epithets are stronger than the Condition C effects obtained by duplicating a name:

(238)   ?? John$_1$ thinks that John$_1$ is intelligent.

(239)   * John$_1$ thinks that [the man]$_1$ is intelligent.

As suggested in §2.3, full pronunciation of a lower copy may exist as a highly marked alternative to pronominalization in English. However, there is clearly no way of pronouncing the tail of a chain as an epithet, so (239) is sharply deviant.

The second data point is closely related to the the Spanish data discussed in §2.8.4. If two positions α and β are non-$\overline{\text{A}}$-local owing to Merge over Move, then an epithet in β may be bound at LF by α even if α c-commands β:

(240)   [The president]$_1$ told [the Vice President]$_2$ that [the bastard / the brilliant politician]$_{*1/2}$ would be forced to resign.

There are a number of respects in which "strong" pronouns behave like epithets. These pronouns tend to resist bound interpretations when c-commanded by the binder, and yet they freely permit bound or high-tech interpretations in other configurations. A particularly clear case, mentioned in §2.1.3, is Japanese, which has a contrast between null and overt pronouns along these lines. We find a similar contrast in Spanish between null subject pronouns and overt subject pronouns (Montalbetti, 1984, 78):[55]

(241)   a.   [Muchos plomeros]$_1$ creen que *pro*$_1$ compraron un pulpo.
               Many   plummers think that (they) bought   an octopus.

         b.   * Muchos plomeros   creen que ellos compraron un pulpo.
               Many   plummers think they they bought   an octopus.

Within the present framework, we need not postulate any deep similarity between strong pronouns and epithets to capture their similar behavior. What strong pronouns and epithets have in common is, plausibly, that they are phonologically distinct from the pronouns which spell the tails of chains.

2.10   Uniformity of domain and uniformity of interpretation

There are two principle challenges which might be leveled at a uniform theory of obligatory control and local anaphoric binding. The first could be summed up by the following quotation from Dalrymple (1993):

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[55] I use here Montalbetti's examples, which are indeed as bizarre as the glosses indicate.

> If a language has...only one reflexive, it might seem adequate to characterize the "domain of reflexivization" as a property of universal grammar, or of a particular language. However, if a language has two or more reflexives, each with a different domain, the domain of reflexivization must clearly be a property of the particular lexical item for which it is applicable. Similarly, if a language has two or more reflexives, each with different requirements on the syntactic role of its antecedent, one must take these antecedent requirements as lexically specified for each anaphoric element.

Although the inference signaled with "must" is distinctly non-demonstrative, this is a persuasive argument if we accept the hypothesis that all language-specific idiosyncrasies are stored in the lexicon. The following subsections examine the evidence for different locally bound forms having different interpretations and/or binding domains.

2.10.1   Interpretative distinctions

If anaphors are lexical items which make their own contribution to the interpretation of a sentence, we might expect different kinds of anaphor to have different interpretative properties. The following subsections discuss some possible examples, concluding that they can be explained as a consequence of pragmatic and phonological factors.

2.10.1.1   Statue readings

Lidz (2001) claims that there are systematic interpretative differences between morphologically simplex and complex reflexives with respect to their compatibility with "statue" readings (Jackendoff, 1992). An example of a English reflex-

ive supporting a statue reading is given in (242); this example can be contrasted with (243). In general, Lidz claims that only complex reflexives support statue readings. This is particularly clear in languages which have both simplex and complex anaphors, as shown in the table in (244):

(242) Ringo Starr$_1$ shaved himself$_1$ at the wax museum.

(Has a reading: "Ringo Starr shaved the statue of himself at the wax museum.")

(243) Ringo Starr$_1$ wants PRO$_1$ to be shaved at the wax museum.

*(Does **not** have a reading: "Ringo Starr wants the statue of himself to be shaved at the wax museum.")*

(244)

Reflexive	Language	Simplex/complex	Statue readings
John saw **himself**.	English	Complex	Yes
Jan zag **zich**.	Dutch	Simplex	No
Jan zag **zichzelf**.	Dutch	Complex	Yes
Juan **se** vio.	Spanish	Simplex	No
Juan **se** vio a **si mismo**.	Spanish	Complex	Yes
Hari **tann-annu** nooḍ-i-koṇḍ-a	Kannada	Simplex	No
Hari **tann-annu-taane** nooḍ-i-koṇḍ-a	Kannada	Complex	Yes

If it is true that simplex and complex anaphors differ in this way, this is problematic for the hypothesis that all local anaphoric dependencies are established via A-chains. In the best case, we would like A-chains to be interpretatively uniform.

However, it seems likely that pragmatic factors are ultimately responsible for the contrast between simplex and complex reflexives in (244). Geurts (2004) points out that morphologically complex reflexives tend to be "strong," in the sense that they can bear stress. He argues that there is generally a preference for using strong forms over weak forms when the desired interpretation has a high "eyebrow index" (Beaver 1993).

(245) **"Eyebrow Index":** A measure of a proposition's intuitive plausibility or prototypicality – the extent to which an ordinary person would "raise their eyebrows" in response to it.

(246) **Eyebrow Principle:** Use strong reflexives/pronouns to express propositions with a high eyebrow index; use weak reflexives/pronouns to express propositions with a low eyebrow index.

Statue readings are almost invariably more eyebrow-raising than non-statue readings. Thus, the preference for using complex reflexives to encode statue readings may result simply from a preference for using the strongest possible reflexive form. This hypothesis is supported by the fact that the generalization illustrated in (244) does not hold of all languages. German and Japanese, for example, both have morphologically simplex reflexives which permit statue readings:

(247)

Reflexive	Language	Simplex/complex	Statue readings
John-wa **ziko**-hihan-si-ta.	Japanese	Simplex	No.
John criticized himself			
John-wa **zibun**-o hihan-si-ta.	Japanese	Simplex	Yes.
John criticized himself			
Peter sah **sich**.	German	Simplex	Yes.
Peter saw himself			

In both cases, this seems to be because the simplex reflexives are not "outweighed" by a stronger complex form. In Japanese, it is the phonologically weaker of the two reflexive forms which is incapable of expressing statue readings (*ziko* is a verbal affix).

2.10.1.2   Metonymy

Reflexives differ from PRO and ordinary pronouns in failing to license certain kinds of metonymous reading (Lasnik, 1988; Landau, 1999):

(248)   a.   John$_1$ wants very badly PRO$_1$ to be parked near the entrance.

   *(Can be understood as "John wants **his car** to be parked near the entrance.")*

   b.   # John$_1$ thinks that he$_1$ should be parked near the entrance.

   (No such reading is available.)

   c.   # John$_1$ wants very badly for himself$_1$ to be parked near the entrance.

   (No such reading is available.)

This apparent interpretative distinction between PRO and *himself* is unexpected under the chain-based approach, since this approach holds that A-chains are interpretatively uniform. Indeed, Landau uses the facts in (248) to argue against the movement theory of control (Hornstein, 2001; Boeckx, Hornstein, and Nunes, 2010).

On closer inspection, however, we once again find that pragmatic/phonological factors are at work here. Just as statue readings require the use of the strongest possible form, it seems that metonymous readings require the use of the *weakest* possible form. Thus in (248a/c), where the reflexive competes with PRO, PRO wins the competition as the weaker of the two forms. In contrast, no weaker form than the pronoun is available in (248b), so its use is licit.

This analysis predicts that the use of a reflexive to express a metonymous reading should be possible if there is no competing structure with PRO. This prediction turns out to be correct:

(249)   a.   * John$_1$ believes PRO$_1$ to be parked near the entrance.

      b.   John$_1$ believes himself$_1$ to be parked near the entrance.

It seems reasonable to maintain, then, that A-chains are interpretatively uniform. There is little evidence that the phonological differences between PRO and the various forms of reflexive have any deep semantic or syntactic correlates.

2.10.2   Variation in binding domains

If anaphors are lexical items, it would not be surprising if they impose different requirements on the choice of antecedent.

A particularly influential argument for lexically determined binding domains is that Reinhart and Reuland (1993) regarding the distribution of *zich* and *zichzelf* in Dutch. Both are locally bound anaphors, but they distribute differently. For example, *zich* is typically impossible as a direct object, except with so-called "inherently reflexive verbs":

(250)   a.   John saw *zich/zichzelf.

          (Ordinary transitive verb.)

      b.   John washed zich/zichzelf.

          (Inherently reflexive verb.)

      c.   John shames zich/*zichzelf.

          (Inherently reflexive verb.)

And whereas *zichzelf* can take antecedents of any grammatical function, *zich* is restricted to subjects:

(251)   Zij$_1$ wilde   hem$_2$ niet voor zich$_{1/*2}$ laten werken.
        She wanted him   not for ᴢɪᴄʜ   let   work.
        'She didn't want to let him work for her/himself.'

Reinhart and Reuland argue that these differences (amongst others) stem from a fundamental grammatical distinction between *zich* and *zichzelf*. The former is a kind of defective pronoun which must receive ϕ-features from a local T (and hence from the subject). The latter is a "reflexive marker" – a formative which is inserted to indicate that a predicate has two co-indexed arguments. In the case of "inherently reflexive" verbs, no such marking is required, hence the grammaticality of (250b/c) with *zich*.

There is one respect in which *zich* surely is grammatically distinct from *zichzelf*. It seems that Dutch always uses *zich* in preference to *zichzelf* when the predicate is a pseudo-unergative or pseudo-unaccusative bearing a "spare" Case which needs to be absorbed (see §2.7). We have already seen, however, that in other contexts there are phonological and pragmatic factors which influence the choice between *zich* and *zichzelf*. Indeed, Geurts (2004) and Koster (1994) argue that it is factors of this sort which largely determine the facts in (250).[56] It seems, then, that several additional properties of the distribution of *zich* and *zichzelf* that are treated grammatically by Reinhart and Reuland (1993) can be accommodated in a Geurts/Koster style phonological/pragmatic analysis. For example, one of the key pieces of evidence R&R present in favor of their theory is the Dutch paradigm in (252) (p. 714):

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[56] The one exception is (250b). That *zich* must be used with verbs such as *shame* is almost certainly a grammatical fact, but not one which obviously has many implications for binding theory. (It may simply result from an arbitrary selectional restriction imposed by these verbs; see §2.2.5.)

(252)

> *(Grammatical sentences translate as "John heard himself criticize himself.")*

> Jan hoorde

> a.   * zich zich critiseren.

> b.   zich zichzelf critiseren.

> c.   zichzelf zich critiseren.

> d.   ?? zichzelf zichzelf critiseren.

According to Reinhart and Reuland's theory, the embedded predicate (*critiseren*) must be marked as reflexive. This can be achieved by inserting *zichzelf* (which is a "reflexive marker") in either the subject or object position. Thus, both (252b) and (252c) are grammatical. (252a) is ungrammatical because the embedded predicate is not reflexive marked, and (252d) is marginal because the embedded predicate is redundantly reflexive marked by both instances of *zichzelf*.

For the most part, this paradigm also has a straightforward phonological/pragmatic explanation. Since self-criticism has a high "eyebrow index" (especially given Reinhart and Reuland's choice of matrix predicate; see §2.10.1.1), this must be marked by the use of a strong reflexive form. Thus, (252a) is out, while either of (252b)/(252c) is ok. The only remaining question is the status of (252d). As Reinhart and Reuland's double question mark indicates, the judgment is not entirely clear. They suggest that (252d) is somewhat degraded because it is redundant to mark the embedded predicate reflexive twice. Something very similar could be said under the phonological/pragmatic account: if the use of the strong form "marks" a high eyebrow index, then it is redundant to mark this twice. However, some caution is probably advisable in constructing intricate explanations for the Dutch paradigm in (252), since the paradigm is not particularly robust cross-linguistically. For example, a Norwegian speaker asked to

judge the equivalent paradigm in Norwegian gave the following judgments:

(253)   a.   * John hørte seg kritisere seg.
             John heard SEG criticize SEG.

        b.   * John hørte seg kritisere seg selv.
             John heard SEG criticize SEG SELV.

        c.   John hørte seg selv kritisere seg.
             John heard SEG SELV criticize SEG.

        d.   John hørte seg selv kritisere seg selv.
             John heard SEG SELV criticize SEG SELV.

Though there are subtle differences in the behavior of *seg* and *seg selv* as compared to *zich* and *zichzelf*, it seems unlikely that these could reflect any deep distinction in terms of reflexivity or reflexive marking. Moreover, the more recent theory of Reuland (2011), in which pronoun-*self* reflexives effect reflexive marking via head movement (see §2.2.4), it is predicted to be impossible for the embedded subject to reflexive-mark the downstairs predicate. Thus Dutch (252c) and Norwegian (253c) seem to be incorrectly predicted to be ungrammatical on this new theory.

2.11   Sideward movement into DP

Is sideward movement permitted in the abstract configuration shown in (254)?

(254) $[_{\text{DP}} [_{\text{DP}} \alpha] \ldots] \ldots [_{\text{DP}} \alpha] \ldots$

There is evidence both for and against the availability of this kind of movement. At present, I do not think that the evidence is decisive in either direction, but on balance it seems better to prohibit it.

2.11.1 Local anaphoric binding and control

In English, the binding and control data argue strongly against the availability of (254):

(255) a. * John$_1$'s mother loves himself$_1$.

b. * John$_1$'s mother wants PRO$_1$ to win.

However, there is some evidence from Chinese that dependencies in this configuration are not universally prohibited. As is well known, the Chinese reflexives *ziji* and *ta ziji* may be bound under "sub-command" as well as under c-command. However, there are rather complex restrictions on licensing via sub-command. For example, sub-command licenses binding only when the containing DP is inanimate (Tang, 1989):

(256) a. [Zhangsan$_1$ de jiaoao]$_2$ hai le   ziji$_{1/*2}$. **(Chinese)**
[Zhangsan DE pride]   hurt PER ZIJI.
'Zhangsan's pride hurt him.'

b. * [Zhangsan$_1$ de baba]$_2$ dui ZIJI$_{*1/2}$ mei xinxin.
[Zhangsan DE father] to ZIJI   no   confidence.
'[Zhangsan$_1$'s father]$_2$ has no confidence in himself$_{*1/2}$.'

For this reason, though an analysis of the sub-command cases in terms of sideward movement is tempting, the Chinese data can hardly be said to unambiguously support the existence of derivations of the form shown in (254).

2.11.2 "Almost c-command"

Pronominal binding in English is (when "high-tech" interpretations are excluded) restricted by an "almost c-command" requirement (Hornstein, 1995):

(257) a. Everyone$_1$ loves his$_1$ mother.

b. Everyone$_1$'s mother loves him$_1$.

c. * A man who met everyone$_1$ loves him$_1$.

As with the Chinese examples in the preceding subsection, it would be tempting to analyze these cases in terms of sideward movement. However, the Condition C facts are not very cooperative. As is well known, (257a) and (257b) *are* crucially distinct configurations with regard to Condition C:

(258) * He$_1$ thinks that John$_1$ is intelligent.

(259) His$_1$ mother thinks that John is intelligent.

Within the present framework, Condition C effects derive in from the spellout rules of English together with Keeping Up Appearances. If *his* and *John* are $\overline{\text{A}}$-local (as indeed they are), then any dependency between *his* and *John* must "sound as if" it was formed by spelling out a chain dependency between the two positions. Thus, if we allow an $\overline{\text{A}}$-chain to be formed in (257b) to effect binding of *him* by *everyone*, we incorrectly predict that there should be no Condition C violation in (259).

2.12   Chain spellout rules

2.12.1   Covert movement

As mentioned briefly in chapter 1, it is assumed in this dissertation that covert movement is pronunciation of a lower copy. Clearly, pronunciation of a lower copy may result from the application of a language-specific spellout rule. However, it seems unlikely that all instances of covert movement derive from the application of such rules, and chapter 3 will propose that there is a certain kind of systematic relationship between the covert/overt status of head movements and related phrasal movements. For these reasons, I conclude that pronunciation of a lower copy sometimes occurs in accord with the Universal Chain Spellout Rule.

This dissertation has nothing of interest to say regarding the factors which determine whether a movement is overt or covert. It seems that copies in positions associated with "weak" heads are simply not considered for pronunciation. That is, these copies are in effect removed from chains prior to spellout, so that neither the Universal Chain Spellout Rule, nor language-specific chain spellout rules, have any inkling of their presence. In common with much Minimalist work, the covert/overt distinction is therefore tied to a stipulative distinction between "strong" and "weak" heads (or heads which do or do not have an EPP feature).

2.12.2 Universal and language-specific spellout rules

Chapter 1 introduced the universal rule (50), repeated here in (260):

(260)   **Universal Chain Spellout Rule:** If a chain contains exactly one copy, *c*, such that all *c*'s features are valued, then spell out the chain by pronouncing *c* fully and leaving all other copies silent.

This is the basic strategy available to all languages for spelling out chains, but languages may, as we have seen, have additional chain spellout rules. It is natural to begin with the hypothesis that these rules kick in if (260) cannot apply (Bošković, 2002; Bošković and Nunes, 2007). With regard to binding phenomena, the usual reason for the failure of (260) to apply is the presence of multiple Case positions in a chain. In a chain spanning multiple Case positions, there will be no unique copy with a valued Case feature. Thus, in the absence of some other distinguishing feature, there will be no unique copy which can be distinguished by (260). This reasoning may also apply to certain instances of pronunciation of lower copies in control structures, given variation in the tense properties of embedded infinitives. For example, Boeckx, Hornstein, and Nunes (2008) suggest that pronunciation of the lower copy in San Lucas Quiaviní Zapotec may be determined by the obligatory presence of Case marking on that copy. This sug-

gests that (260) as currently formulated is missing a generalization. It is not the case that the spellout of chains with multiple featurally indistinguishable copies is entirely idiosyncratic. Rather, Case seems to play a special role in determining which, and how many, copies are pronounced. This suggests the following principle, harking back to the Case filter of early GB theory:

(261)   Only copies with valued Case features are candidates for pronunciation.

Given (260) and (261), the overall situation is as follows. A chain is delivered to the PF component. Only the +Case copies of this chain are visible for pronunciation. If one of these copies has more valued features than all of the others, then (260) applies automatically. Otherwise, the chain is handed over to language-specific chain spellout rules.

The rule in (260) is, by hypothesis, sensitive to Minimality and to some subset of the island constraints. In contrast, language-specific chain spellout rules are not sensitive to these constraints. This idea closely resembles the proposal of Ross (1967) that island constraints apply only to "chopping" (i.e. deletion) rules. However, the claim is slightly weaker than Ross's, since as mentioned above, a language specific rule *may* be a deletion rule. Thus, the implication goes only in one direction. When one of the lower copies in a chain is pronounced, this indicates that a language-specific rule has applied, and we do not expect the process to be sensitive to Minimality or the relevant island constraints. On the other hand, when all of the lower copies are deleted, we cannot tell without further investigation whether this deletion was effected by (260) or by a language-specific rule. For example, deletion of the lower copy of *wh*-phrases in English is effected via (261), and is therefore sensitive to Minimality and island constraints. In contrast, it was hypothesized in §2.1.3 that Japanese has a language-specific pronominalization rule which deletes lower copies and which is not sensitive to

Minimality or island constraints.

A crucial point here is that because (260) is sensitive to Minimality and certain island constraints, the notion of $\overline{\text{A}}$-locality used in the statement of Keeping Up Appearances need not be sensitive to these same constraints. It is an interesting question precisely which of the island constraints restrict $\overline{\text{A}}$-locality. If Ross's hypothesis that there are special restrictions on "chopping" rules is correct, we might expect that the constraints which do not reign in the relevant notion of $\overline{\text{A}}$-locality should be the same as those which can be obviated via ellipsis. Judgments are rather variable in both domains, but it does seem to be the case that positions in which an indefinite is inaccessible to sluicing are also positions in which epithets with c-commanding antecedents are relatively acceptable:

(262)   a.   * John$_1$ said that [the bastard]$_1$ arrived late.

      b.   * John$_1$ wonders whether [the bastard]$_1$ will arrive late.

      c.   ?? John$_1$ said that pictures of [the bastard]$_1$ arrived late.

      d.   ? John$_1$ said that anyone who wanted pictures of [the bastard]$_1$ should arrive early.

(263)   a.   John said that someone arrived, but I don't know who.

      b.   John wonders whether someone will arrive late, but I don't know who.

      c.   ? John said that a picture of someone arrived, but I don't know who.

      d.   * John said that anyone who wants to see pictures of someone should arrive early, but I don't know who.

Aoun and Choueiri (2000) presents some intriguing facts regarding resumptive epithets which also seem to point in a similar direction. He proposes the following generalization restricting the use of epithets and strong pronouns in Lebanese

Arabic (p. 21):[57]

(264)   Strong pronouns and epithets cannot be linked to the most local op-
         erator (where A is the most local element with respect to B iff (i) A
         c-commands B and (ii) for every C, such that C c-commands B, then C
         also c-commands A).

Aoun illustrates (264) for strong pronouns and epithets in (265) and (266) re-
spectively:

(265)   a.   * miin$_1$ fakkarto   huwwe$_1$ b-l-beet   **(Lebanese Arabic)**
              who   thought.2P he   in-the-house
              'Who did you think he was at home?'

        b.   miin$_1$ tseeʔalto   ʔəza   / ʔemtiin huwwe$_1$ rəbifi   ʒeeyze
             who   wondered.2P whether / when   he   won.3SM prize
             'Who did you wonder whether/when he won a prize?'

(266)   a.   * miin$_1$ fakkarto   ha-l-malʔuun$_1$ b-l-beet
              who   thought.2P 3-the-dammed in-the-house
              'Who did you think this devil is/was at home?'

        b.   miin$_1$ tseeʔalto   ʔəza   / ʔemtiin ha-l-malʔuun$_1$ rəbifi
             who   wondered.2P whether / when   3-the-damned won.3SM
             ʒeeyzw
             prize
             'Who did you wonder whether/when this devil won a prize?'

Aoun, Choueiri, and Hornstein (2001) note that resumptive pronouns in Lebanese
Arabic do not always appear inside islands. However, within islands, only weak
pronouns can be used as resumptives. This suggests that in Lebanese Arabic, the
tail of a *wh*-chain may sometimes be spelled out as a weak pronoun. Following
Aoun and Choueiri's earlier observation, Aoun, Choueiri, and Hornstein argue

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[57] This is not the principle as originally stated in Aoun's (35), since it is extended to resumptive
epithets further down in the text of the paper. I should also note that on Aoun's analysis epithets
in Lebanese Arabic are complexes formed of a DP and a strong pronominal element.

that the availability of strong pronouns and epithets as resumptives indicates the inaccessibility of a position to $\overline{\text{A}}$-movement. It seems that in Lebanese Arabic, even a weak island violation is sufficient to destroy $\overline{\text{A}}$-locality for the purposes of Keeping Up Appearances. This is not the case in English, where as we see in (262b), a weak island is not sufficient to permit the use of a bound epithet. This may follow from more general differences in the distribution of A and $\overline{\text{A}}$ positions in the two languages.

2.12.3   Information available to chain spellout rules

What information is available to the spellout rules? Clearly, the rules have access to the formal features of the copies in the chain, since bound pronouns and re-flexives agree with their antecedents. It seems that spellout rules should not be permitted to reference any other features, since there presumably could not be an idiosyncratic rule such as "*John* reflexivization," which outputs a special form of the reflexive only in case the chain is headed by *John*. Spellout rules must, how-ever, have access to the phonological properties of the copies in the chain, given the existence of copy reflexive languages. The rules must also be sensitive to the A/$\overline{\text{A}}$ status of a chain, since in e.g. English, A and $\overline{\text{A}}$-chains spanning multiple θ-positions receive distinct spellouts.

The issue of the A/$\overline{\text{A}}$-status of a chain is a slightly subtle one. In informal syntactic discourse, we talk about the A/$\overline{\text{A}}$-status of both chains and positions. It is not immediately obvious which of these should taken to be primitive – are A-positions defined in terms of A-chains or vice versa? The very brief note on the A/$\overline{\text{A}}$ distinction in §1.2.12 defines a notion of A/$\overline{\text{A}}$-position, and I will assume that this is the primitive. An A-chain is a chain headed by phrase in an A-position, and an $\overline{\text{A}}$-chain is a chain headed by a phrase in an $\overline{\text{A}}$-position.

We saw in §2.1.3 that there must be an ordering of spellout rules, in the

sense that reflexivization must apply before pronominalization gets a chance to apply.[58] The simplest assumption is that a chain is spelled out as soon as possible, i.e., as soon as one of the available rules can apply. Thus, the rules are not ordered directly, but by their domains of application.

How exactly should the phonological form of the DP in the chain be made available to the spellout rules? Clearly, there is a certain sense in which the rules are not able to manipulate these phonological forms. For example, there is no copy reflexive language in which the lower copy is pronounced modulo some phonological transformation (e.g. deletion of final stops). Although any typological conclusions at this point must be tentative, it seems that the only option other than deletion or pronominalization/reflexivization is full pronunciation of one or more of the lower copies. For this reason, it would be slightly odd to conceive the input to a spellout rule as a sequence of copies with phonological specifications included. The output of a spellout rule can, it seems, be a function of the formal features of the copies – as we have seen in cases of pronominalization and reflexivization – but it can only be a trivial function of the phonological forms. It is therefore more natural to suppose that full pronunciation is a default, and that the rules have only the formal features of the copies as input. If no rule applies, copies are pronounced fully, and if a rule applies, the output is a function of the formal features of the relevant copies.

Given the above, I propose that the input to a spellout rule is an ordered sequence of +Case copies, where each copy is a bundle of (i) formal features and (ii) a label indicating whether it is in an A or $\overline{\text{A}}$-position. The output is a sequence of "pronunciation instructions." At least for the phenomena considered in this

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[58] This is not absolutely necessary. It might be that the pronominalization rule and the reflexivization rule are formulated so as to have non-overlapping domains of application. However, this does not seem a very attractive hypothesis.

dissertation, we do not need to consider the possibility of pronunciation of intermediate positions in the subpart of the chain to which a spellout rules applies. Thus, the output is a pair of pronunciation instructions, specifying how the top and bottom copies in the relevant subpart of the chain should be pronounced. A pronunciation instruction is either (i) Delete (D), (ii) Pronounce Fully (F), or or (iii) Reduce (R). The first two are self-explanatory; the third applies to derive pronouns and reflexives. A reduce instruction must of course include a mapping from formal features to output forms (e.g. [+masc,+sing,+acc] → *him*). Since there does not appear to be anything interesting to say about these mappings, I will not specify them explicitly here.[59]

Rules for English reflexivization and pronominalization are given below. The input to each of the rules is the full sequence of copies in a given chain. The rules use ellipsis to represent a (possibly empty) sequence of copies. The reflexivization rule applies to any chain containing a pair of adjacent copies in A-positions. Since only +Case copies are considered by the spellout rules, it is necessary only to specify that each of the copies has a +D feature (i.e. that it is a DP copy).[60] The pronominalization rule applies to any chain containing a sequence of +Case copies such that the first and last are in an A-position and the intermediate copies are in $\overline{\text{A}}$-positions. A '+' postfix is used to indicate "one or more."

(267)   Reflexivization (English):

       ... $[+D]_A$ $[+D]_A$ ... $\rightarrow$ ... K R ...

(268)   Pronominalization (English):

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[59] Of course, there may be something interesting to say about them in languages with rich morphology. I assume that most of this complexity should be factored out into a separate morphological component,

[60] In fact, specifying this on all of the copies is redundant.

$$\dots [+D]_A\ [+D]_{A'} + [+D]_A\ \dots \rightarrow K\ R\ \dots$$

These rules apply "as soon as possible" in the following sense. In order to pro-
nounce a chain, one cycles in order of size through the chains formed of each
rightmost contiguous subsequence of the copies in the original chain. So for ex-
ample, if a chain goes through three positions $\alpha \dots \beta \dots \gamma$, one begins by attempt-
ing to spellout the trivial chain (γ), then (β, γ), and finally (α, β, γ). When a spell-
out rules applies, the relevant subpart of the chain is ignored for the application
of subsequent rules. So for example, if a spellout rule applies to (β, γ), then the
next step is to check if a spellout rule can apply to the trivial chain (α), As a more
complex example, (269b)-(269e) shows the sequence of operations involved in
spelling out (269a). Each step is annotated with the relevant chain spellout rule,
where (U) refers to the Universal Chain Spellout Rule of chapter 1. Striking out
of a copy indicates that is is not being considered for the application of further
spellout rules. When a rule assigns a pronunciation to a copy, this is placed in
parentheses following the copy.

(269)   a.   Who$_1$ said [$_{CP}$ t_1 that Mary thinks [$_{CP}$ t_1 that he$_1$ likes himself$_1$]]?

      b. $[\dots]_{A'}$ $[\dots]_{A'}$ $[\dots]_{A'}$ $[\dots]_A$ $[\dots]_A$

      c. $[\dots]_{A'}$ $[\dots]_{A'}$ $[\dots]_{A'}$ $[\dots]_A$ $[\dots]_A$(himself)   [by (267)]

      d. $[\dots]_{A'}$ $[\dots]_{A'}$ $[\dots]_{A'}$(he) $[\dots]_A$ $[\dots]_A$(himself)   [by (268)]

      e. $[\dots]_{A'}$(who) $[\dots]_{A'}$ $[\dots]_{A'}$(he) $[\dots]_A$ $[\dots]_A$(himself)   [by (U)]

2.12.4   Locality and chain splitting

If spellout rules apply "as soon as possible" in the sense of the preceding sub-
section, this naturally suggests that spellout rules may apply in the course of the
derivation, rather than to a completed syntactic structure. We will see shortly
some evidence in support of this hypothesis. First, it should be noted that if

spellout rules do apply in the course of the derivation, they cannot apply within any particular local domain. For example, the boxed CPs in (270a) and (270b) are identical, but the copies of *who* in the subject position are pronounced differently (the copy in (270a) is unpronounced and the copy in (270b) is pronounced as a pronoun).

(270)   a.   Who did you say [$_{\boxed{\text{CP}}}$ [who] [$_{\text{TP}}$ [who] had to leave]]

⇓

"Who did you say had to leave?"

   b.   Who did you say [$_{\text{CP}}$ [who] [$_{\text{TP}}$ [who] told Mary [$_{\boxed{\text{CP}}}$ [who] [$_{\text{TP}}$ [who] had to leave]]]]

⇓

"Who did you say told Mary he had to leave?"

This shows that spellout rules must, in some instances, be able to look at large chunks of structure in order to apply correctly. For this reason, it would not be possible to integrate the theory of language-specific spellout rules presented here with phase theory.

Examples such as (271a) suggest that spellout rules can feed subsequent movement operations:

(271)   a.   Himself$_1$, I think John$_1$ likes t_1.

   b.   John$_1$, I think t_1 likes himself$_1$.

If it were the case that spellout rules applied only at the end of a derivation, we would be forced to treat both (271a) and (271b) as spellouts of the structure in (272):

(272)   John, I think [John] likes [John]

It seems much more natural to assume that the reflexivization spellout rule is able to feed movement in (271a).

Examples such as (271) may provide a clue to the relationship between language-specific spellout rules and linearization. According to Nunes (1995, 2001), the function of copy deletion is to prevent linearization conflicts at PF. On Nunes' theory, if multiple copies of the same phrase remain at PF, the result is a set of conflicting ordering statements. Within the present framework, the Universal Chain Spellout Rule ensures that such conflicts do not arise in most instances.[61] Data such as (271) suggest that language-specific spellout rules may avoid linearization conflicts by *splitting* chains rather than by deleting copies within chains. In (271a), for example, the copy spelled out as *himself* is initially part of the same chain as the copy spelled out as *John*, but the subsequent movement of *himself* suggests that the application of the reflexive spellout rule splits the chain in two, so that *John* and *himself* head separate chains prior to movement of *himself*. If language-specific spellout rules split chains in this manner, this would go some way to explaining two key facts. First, that pronouns and reflexives behave in many respects as if they head their own chains. Second, that the application of a language-specific spellout rule serves to obviate certain locality conditions on chains, such as Minimality.

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[61] This raises the question of whether the Universal Chain Spellout Rule is really a rule at all. As Nunes points out, at least some properties of copy deletion seem to follow from general considerations of economy.

Chapter 3

Reanalysis, binding, pseudopassivization and preposition stranding

3.1 Introduction

The availability of binding in (273) is a well-known problem for c-command-based theories of anaphoric binding:

(273)   John talked to Mary$_1$ about herself$_1$.

On the face of it, it seems that in a framework incorporating sideward movement, it should be possible to give a derivation for (273) along the following lines:

(274)

<div style="margin-left: 2em;">

[about Mary]   *(Workspace 1)*

to   *(Workspace 2)*

Sideward movement of 'Mary' to become the complement of 'to':

[about ~~Mary~~]   *(Workspace 1)*

[to Mary]   *(Workspace 2)*

Derivation continues and 'John' merges as subject:

[John ... [talked [to Mary] [about ~~Mary~~]]]

</div>

However, this derivation violates Merge over Move. At the point where *Mary* moves to become the complement of *to*, *John* remains in the numeration and could be merged instead. *Mary* could then go on to move to the subject position, deriving (275):

(275)   [Mary ... [talked [to John] [about ~~Mary~~]]]

For this reason, it will take a bit more work to accommodate (273) within the present framework.

Within GB theory, a popular response to the problem posed by (273) was the proposal that *to* "reanalyzes" with the verb, in such a way that the PP no longer breaks the c-command relation between the reflexive and its antecedent. Consider now the status of (274) if the complement of *to* does somehow c-command into the *about* PP. Then the movement of *Mary* in (275) is illicit, since it violates Minimality. Since Merge over Move is a defeasible condition, this implies that the Merge over Move violation in (274) is permitted, since there is no convergent alternative derivation in which movement of *Mary* is delayed until after merger of *John*. Thus the reanalysis theory offers an account of (273) within the present framework. Note that condition (iv) of Merge over Move is crucial here:

(276)   **Merge over Move:** A head or phrase X may not move at a stage S of a
          derivation D if there is a convergent derivation D' such that

   (i) D and D' begin from the same numeration,

   (ii) D' is identical to D up to S,

   (iii) at S of D', a head or phrase merges in the position that X moves to
         at S of D, and

   (iv) X later moves in D' to value the same features that it did at S of D.

If derivations in which *Mary* did not move were considered as competitors, then there would be a competing derivation in which it is *John* which moves to subject position:

(277)   [John ... [talked [to ~~John~~]] [about Mary]]]

Thus, (274), even though not blocked by (275), would nonetheless be blocked by (277) (since in (277), merger of *John* as the complement of *to* replaces movement of *Mary* to this position).

Reanalysis was also implicated in the derivation of pseudopassives such as (278). In order to maintain the Case-theoretic account of passivization, it was necessary to assume that the Case-assigning powers of the preposition were somehow transferred to the verb for subsequent removal by the passive morpheme:

(278) $John_1$ was talked to t_1.

This chapter has two primary aims. The first is to develop an account of reanalysis adequate to the phenomena in (273)-(278). Previous attempts to do so have run into serious empirical and conceptual problems, as pointed out by Baltin and Postal (1996). My account is designed to address these problems, and can be summarized as follows. Reanalysis occurs when a preposition raises covertly to a v/V-medial Agr projection to form a complex [P-Agr] head. This head plays essentially the same role as the [V-Agr] head in Lasnik's (1999) theory of objective Case assignment. After the preposition has raised, its erstwhile complement raises covertly to check Case in the specifier of [P-Agr]. The derivation for (273) is given in (279):[1]

(279)   [John] ... [$_{V-vP}$ ~~John~~] [$_{v-V}$ talked] [$_{P-AgrP}$ ~~Mary~~] [$_{P-Agr}$ ~~to~~] [$_{VP}$ ~~talked~~]

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[1] Pseudopassivization is possible with complex PPs:

(i) $John_1$ was stood on top of t_1.

It is difficult to say whether or not these PPs block binding, since the only examples that can be constructed are such as (ii):

(ii)   John stood on top of the $boys_1$ on each $other_1$'s birthdays.

Though binding in these cases is clearly acceptable, there is strong evidence that possessive reciprocals are logophors which do not require a strictly c-commanding antecedent (see §3.4.2). I will therefore limit my discussion in this footnote to pseudopassivization.

I suggest that complex PPs have the following abstract structure:

(iii)   [$_{AgrP}$ ... [$_{P_1P}$ ... [$_{P_2P}$ ... [$_{P_3P}$ ...]]]]

$[_{PP}$ to [Mary]]]]]

Raising of the the complement of the preposition is "raising to object" of the kind undergone by ECM subjects under Lasnik's analysis.[2]

The second aim of this chapter is to explain why pseudopassivization is typologically linked to preposition stranding under *wh*-movement:

(280)   Who$_1$ did you talk to t_1?

As is well known, most languages do not allow preposition stranding, and pseudopassivization is rarer still (both constructions being limited for the most part to the Germanic languages).Thus German and Spanish – (281)-(282) – permit neither preposition stranding nor pseudopassivization; Icelandic – (283) – permits preposition stranding but not pseudopassivization; and Norwegian – (284) – is one of few languages apart from English with both pseudopassivization and preposition stranding:

(281)   **German** (Abels, 2003, 193)

     a.   * Wem hast du   mit geredet?
             Who have you with spoken?

     b.   * Frank wurde vom   Präsidenten mit geredet.
             Frank was   by-the President   with talked.

(282)   **Spanish**

That is, a sequence of lexical P projections topped by a single Agr projection. The highest lexical P head raises to the Agr head, and the resulting P-Agr complex assigns Case in the usual way. As usual, reanalysis occurs if the Agr head merges within vP, rather than immediately above the highest P head.

[2] The association of P with Agr is also reminiscent of Kayne's (1994, 195) proposal that the Case of an English verb is sometimes able to "percolate" to a lower P head. At a more abstract level, my analysis is further inspired by analyses of pseudopassivization within Relational Grammar (e.g. Perlmutter and Postal 1983).

a. * Quien hablaste   con?
   Who   speak.2s-PAST with?

b. * Frank fue hablado con   por el   presidente.
   Frank was spoken with by   the President.

(283)   **Icelandic** (Maling and Zaenen, 1990, 156)

a.   Hvern hefur Pétur talað   við?
      Who   has   peter talked with?

b. * Ég tel   Vigdísi vera   oftast   talað   vel um.
   I   believe Vigdis be.INF most-often spoken well of.

(284)   **Norwegian** (Merchant, 2001, 93)

a.   Hvem har Per   snakket med?
      Who   has Peter talked   with?

b.   Han ble ledd   av.
      He   was laughed at.

Building on a proposal of Abels (2003), I propose that there is one prereq-
uisite that reanalysis and preposition stranding have in common: the presence
of independent Agr projections. In most languages, ϕ-features (if present) are
bundled onto lexical heads such as V, T and P. Other languages (such as English)
project separate Agr heads above PP; these associate with the P head via head
movement. I argue that the presence of this separate Agr projection within PP
suffices to permit *wh*-extraction. Reanalysis occurs when P's Agr projection is
merged above VP, giving the structure in (279).

This chapter is structured as follows. §3.2 explains the derivation in (279)
in greater detail and provides evidence to support it. §3.3 outlines the impli-
cations for existential constructions, pseudopassives and Case. §3.4 deals with
the binding facts (as exemplified in (273)). §3.5 responds to Baltin and Postal's
(1996) criticisms of reanalysis hypotheses. §3.6 defends my assumption that
covert movement can license new binding relations (and hence license binding in

(273)). Finally, §3.7 contains some further remarks on the typology of preposition stranding and pseudopassivization.

3.2 The analysis

3.2.1 Starting assumptions: Agr and the structure of vP

In common with most accounts of reanalysis, I propose that the complements of reanalyzed prepositions receive Case in the same manner as ordinary direct objects. Adopting the proposals of Koizumi (1993) and Lasnik (1999), I take this to be raising to the specifier of an Agr projection located between v and V. Thus, an ordinary direct object receives Case from a V-Agr complex derived by movement of V to Agr:

(285)   [$_{V-Agr-vP}$ Subj V-Agr-v [$_{V-AgrP}$ Obj V̶-̶A̶g̶r̶ [$_{VP}$ V̶ O̶b̶j̶]]]

(Configuration for assignment of objective Case to a direct object. Overt movement shown; covert movement also possible in English.)

I assume that Case is typically assigned by the combination of a lexical head (e.g. V, T) and an Agr head. Though I remain neutral on the question of whether this configuration is responsible for *all* Case assignment (in particular, all *inherent* Case assignment), I necessarily assume that it extends at least to those prepositions which may be reanalyzed. For example, the complement of *to* in (286b) – a structure in which reanalysis has *not* occurred – will be assigned Case in the configuration shown in (286b):

(286)   a.   John talked to Bill.

b.   [$_{V-vP}$ John [$_{V-v}$ talked] [$_{VP}$ V̶ [$_{P-AgrP}$ [̶B̶i̶l̶l̶]̶ [̶$_{P-Agr}$ t̶o̶]̶ [$_{PP}$ to Bill]]]].

It seems that the "strong" or "weak" nature of the complex Case-assigning head is determined by its lexical component. Thus in English, V-Agr is optionally strong

or weak, with the consequence that overt movement of the object to [Spec,V-AgrP] is optional (Lasnik, 1999). In contrast, English P-Agr must be obligatorily weak, or the preposition and its complement would be pronounced in the wrong order:

(287)   * [$_{V-vP}$ John [$_{V-v}$ talked] [$_{VP}$ ~~V~~ [$_{P-AgrP}$ Bill [$_{P-Agr}$ to] [$_{PP}$ ~~to~~ ~~[Bill]~~]]]].

I will assume that the strength of the requirement for a lexical head to adjoin to an Agr head is always correlated with the strength of the requirement for the specifier of the resulting complex to be filled. Thus in English, movement of T to Agr is always overt, movement of P to Agr is always covert, and movement of V to Agr is optionally either overt or covert. These assumptions regarding the strength of Case-assigning heads are summarized in the following table:

(288)

Complex head	Strength
T-Agr	Always strong.
V-Agr	Optionally strong/weak.
P-Agr	Always weak.

It will be necessary to specify the precise featural motivation for raising of a lexical head to an Agr projection. Following Chomsky (1995, 197), I take the relevant feature to be a category feature on the Agr head itself ("...Agr must in fact have two kinds of features: V-features that check V adjoined to Agr, and NP features that check NP in [Spec,AgrP]."). Movement of the lexical head to Agr therefore falls under Enlightened Self-interest (Lasnik, 1999, 78).

As indicated in (288), movement of V to Agr should in principle be covert when raising of the object to [Spec,V-AgrP] is covert. In practice, however, the need for v and V to associate forces overt movement of V through Agr and then to v; this movement will occur whether or not Agr is strong. The assumption

here is that "opportunistic" movement to check a weak feature is permitted if it is a step in a successive-cyclic movement which will eventually lead to the checking of a strong feature. This assumption is independently required in order to account for, e.g., the instance of *wh*-movement in (289):

(289)   Who did you see *t*?

If, owing to a strong interpretation of Procrastinate, the *wh*-phrase in (289) were required to skip the weak Agr position, then it would never be able to check Case (assuming subsequent lowering to be impossible), and there would be no convergent derivation of (289) available.

3.2.2   Reanalysis

Given the preceding assumptions regarding the structure of "normal" PPs, we can now consider the "reanalysis" structure in more detail. Reanalysis occurs when a P head raises covertly to a v/V-medial Agr head (the latter bearing unchecked 'P' features):

(290)   a.   John talked to Bill.

         b. $[_{V-vP}$ John $[_{V-v}$ talked] $[_{P-AgrP}$ [Bill] $[_{P-Agr}$ to] $[_{VP}$ V $[_{PP}$ to Bill]]]]

Since P-Agr complexes are obligatorily weak, raising of both *to* and *Bill* is necessarily covert. There are two "exceptional" features of the structure shown in (290b). First, the presence in an intransitive vP of a v/V-medial Agr head bearing 'P' features. Second, the absence of an Agr projection attached to the PP itself (compare (286b)). I take these exceptional features to be the preconditions for reanalysis (see §3.7 for further discussion). I will continue to refer to prepositions such as *to* in (290b) as "reanalyzed" prepositions, but it should now be clear that I postulate no reanalysis operation as such. (That is, the analysis does not make use of any operations other than ordinary head/phrase movement.)

The structure in (290b) makes apparent the motivation for taking a feature of Agr to drive movement of V/P to Agr. If movement were driven by a requirement of P/V, then Minimality would presumably preclude movement of P over V in (290b). On the other hand, if the Agr merged in (290b) has a 'P' category feature (i.e. an instruction to "attract" the closest P) then Minimality is satisfied.

The term DCRP ("DP Complement of a Reanalyzed Preposition") will be a useful shorthand. For example, *Bill* in (290b) is a DCRP. If the derivation shown in (290b) is correct, direct objects and DCRPs are similar in that they both receive Case in essentially the same position. However, there are nonetheless some important differences between DCRPs and direct objects:

(i) DCRPs cannot raise to their Case position overtly, whereas direct objects may optionally raise overtly.

(ii) A DCRP is initially merged as the complement of a preposition, whereas a direct object is initially merged as a complement of V.

(iii) The vP containing a DCRP is still in some sense marked as intransitive (the V head does not have a DP complement).

The ability to distinguish between direct objects and DCRPs in these respects will make it possible to account for those cases where the two do not behave alike.

3.3 Passives, unnacusatives, existentials and partitive Case

My account of pseudopassivization can be summed up as follows. The complement of a reanalyzed preposition raises to the same position as an ordinary direct object: the specifier of a v/V-medial Agr projection. The addition of the passive morpheme renders this a Case' position (for whatever reason it does so in ordinary passives). Subsequently, the complement of the reanalyzed preposition moves to [Spec,TP] to receive Case.

The remainder of this section is organized as follows. We first show how my analysis accounts for the adjacency requirement on pseudopassivization (§3.3.1); this first subsection is largely independent of any specific technical implementation of passivization. To place the subsequent discussion in a more concrete theoretical context, I go on to outline a specific analysis of passivization in §3.3.2. This subsection is not intended as an original contribution to the study of passivization, but rather as an indication of the type of analysis which jibes best with my account of pseudopassives. I conclude by addressing the implications of idiomatic passives such as *take advantage of* (§3.3.3), arguing that certain restrictions on these follow from the theory of "partitive" Case.

3.3.1 Existentials, locality and adjacency

Movement of P to Agr is, as would be expected, subject to locality conditions. Thus, the presence of a closer PP in (291c) blocks pseudopassivization:

(291) a. $John_1$ was spoken to t_1 about Mary.

   b. $John_1$ was spoken about t_1.

   c. * $John_1$ was spoken to Mary about t_1.

Under analyses such as that of Bresnan (1982), (291c) is ruled out by a linear adjacency constraint. (That is, a requirement that V and P must be adjacent in order for V+P to reanalyze as a complex verb.) However, if it is reanalysis that permits binding in (292), there can be no adjacency constraint on reanalysis as such:

(292)   John spoke (frequently) to $Bill_1$ (frequently) about $himself_1$.

Something must therefore be said to explain the deviance of (293):

(293)   * John was spoken frequently to.

In contrast to (291c), which is plausibly ruled out as a violation of Minimality or some similar condition on movement, (293) appears to exemplify a genuine linear adjacency constraint on pseudopassivization. If this constraint does not follow from a condition on reanalysis itself, it must derive from some property of English passives. I suggest that the relevant property is the position of V. Caponigro and Schütze (2003) propose that V does not raise overtly to v in English passives. They point out that this accounts for the DP-V order in sentences such as (294):

(294)   There were (three fish) caught (* three fish).

   (Idealized judgments; see subsequent discussion.)

Interpreting C&S's analysis within the present framework, we have two possible structures for active sentences – (295a/b) – and one for passives – (296):

(295)   a.   [$_{\text{V–Agr–vP}}$ Subj V-Agr-v [$_{\text{V–AgrP}}$ **Obj** ~~V-Agr~~ [$_{\text{VP}}$ ~~V Obj~~]]]

         (Active with overt raising to [Spec,Agr])

        b.   [$_{\text{V–Agr–vP}}$ Subj V-Agr-v [$_{\text{V–AgrP}}$ ~~Obj V-Agr~~ [$_{\text{VP}}$ V **Obj**]]]

         (Active with covert raising to [Spec,Agr])

(296)   [$_{\text{v°P}}$ v° [$_{\text{Agr°P}}$ ~~Obj V-Agr°~~ [$_{\text{VP}}$ V **Obj**]]]

         (Passive; raising to Agr and [Spec,Agr] is always covert.)

C&S are not explicit regarding the nature of the Case assigned to the DP in [Spec,V-AgrP] in passive clauses, but it would seem natural to follow Belletti (1988) and Lasnik (1992, 1995) in assuming that it is partitive Case. (In the next subsection, I will argue that this is the only Case which can be assigned by the defective form of Agr present in passive vPs.) Given the structure in (296), the adjacency requirement on pseudopassivization in (293) now follows. If the VP has the structure in (297), then there is no "room" for an adverbial expression to be infixed between V and its PP sister:

(297)   [$_{VP}$ talked [$_{PP}$ to Bill]]

In contrast, V raises to v in (292) (repeated here as (298a)). Thus, an adverb left-adjoined to P-AgrP in (292b) can appear between V and P, as shown in (298b):

(298)   a.   John spoke (frequently) to Bill $_1$ (frequently) about himself$_1$.

b.   [$_{V-vP}$ spoke$_{v-V}$ [$_{P-AgrP}$ **Adverb** [$_{P-AgrP}$ [Bill] [$_{P-Agr}$ to] [$_{VP}$ V [$_{PP}$ to [Bill]]]]]]]

This explains why pseudopassivization in (293) is subject to adjacency, and why binding in (292) is not. Truswell (2009) notes that there are some exceptions to the adjacency requirement. I find his examples marginal, but there is no doubt that e.g. (iv) is much better than (v):

 (iv)   ? John was spoken sternly to.

 (v)   * John was spoken yesterday to.

This suggests that there may be "room" for a certain restricted class of adverbials to adjoin between V and its PP complement. If adjuncts must adjoin to maximal projections, this would imply that the structure of the lower VP is somewhat more articulated than I have been assuming.

Returning briefly to (294), it should be noted that the judgments indicated in this example are an idealization. Many English speakers find a postverbal DP in such cases at least marginally acceptable:

(299)   % There were caught three fish.

However English speakers uniformly reject (300a), showing a clear preference for (300b):

(300)   a.   * There were spoken to three men.

b.   There were three men spoken to.

In §3.5.6, I will argue that this is because Heavy DP Shift may apply to the associate in (300a) but not in (300b).

3.3.2   A very sketchy analysis of the English passive

Following Jaeggli (1986), Baker, Johnson, and Roberts (1989), I will assume that the passive morpheme is responsible for absorbing the external theta-role of v and blocking assignment of accusative Case. BJ&R propose that the passive morpheme is itself a theta and Case assignee. I prefer to assume that the passive vP is headed by a special "defective" v head, written v°, which does not assign a theta-role to its specifier (Chomsky, 2000, 2001). This v° head is spelled out as the passive morpheme, and selects an AgrP as its sister just like an ordinary v.However, the Agr head selected is correspondingly defective (I'll call it Agr°). Like any other Agr head, Agr° may attract a lexical head such as P, T or V, but the resulting P/T/V-Agr complex is not capable of assigning structural accusative Case. Rather, it assigns partitive Case – the Case which licenses the associate of *there* in existentials (Belletti, 1988; Lasnik, 1992, 1995). As mentioned in the introduction to §3.3, I will assume that the surface subject of a (pseudo-)passive sentence transits through [Spec,X-Agr°P] (for $X \in \{V,P\}$) on its way to [Spec,TP].

Compared to BJ&R's analysis, mine differs principally in the extent to which it admits the syntactic presence of a nominal expression bearing the external argument theta role. For BJ&R, the passive morpheme is precisely such an expression, and this is taken to explain instances where the suppressed external argument appears to enter into syntactic relations such as control:

(301)   The ship was sunk (by John$_1$) [PRO$_1$ to collect the insurance].

   (PRO can be controlled by the agent of the matrix event whether or not the 'by' phrase is present.)

On my account, the suppressed external argument has a more spectral presence.

It may in some sense be expressed by v°, but since v° is not a nominal (and has no nominal specifier), it cannot enter into ordinary DP-DP relations. This may well be an advantage over BJ&R's analysis, since there is little hard evidence that the suppressed external argument may do so. For example, we have seen in (302) that it cannot bind:

(302)   John was arrested *(by the police officers$_1$) using each other$_1$'s hand-cuffs.

And there is evidence that the apparent cases of control – such as (301) above – are really a separate phenomenon (see e.g. Lasnik 1988; Landau 1999).

To exemplify my analysis of the passive, (303) gives the structures for two active sentences, and (304) the structures for their corresponding passives.[3] The active sentence (303b) is shown with reanalysis having applied, but reanalysis is not obligatory here.

(303)   a.   John saw Bill.

$[_{V-Agr-vP}$ John $[_{V-Agr-v}$ saw$]$ $[_{V-AgrP}$ $[$Bill$]$ ~~V-Agr~~ $[_{VP}$ saw ~~[Bill]~~$]]]]$

   b.   John talked to Bill.

$[_{V-vP}$ John $[_{V-v}$ talked$]$ $[_{P-AgrP}$ ~~[Bill]~~ ~~[$_{P-Agr}$ to]~~ $[_{VP}$ talked $[_{PP}$ to $[$Bill$]]]]]]$

(304)   a.   Bill was seen.

$[_{TP}$ $[$Bill$]$ ... $[_{V-Agr°-v°P}$ ~~[$_{V-Agr°-v°}$ seen]~~ $[_{V-Agr°P}$ ~~[Bill]~~ V-Agr° $[_{VP}$ seen ~~[Bill]~~$]]]]$

   b.   Bill was talked to.

$[_{TP}$ $[$Bill$]$ ... $[_{V-v°P}$ ~~[$_{V-v°}$ talked]~~ $[_{P-Agr°P}$ $[$Bill$]$ ~~[$_{P-Agr°}$ to]~~ $[_{VP}$ talked $[_{PP}$ to ~~[Bill]~~$]]]]]]$

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[3] (303a) is shown with overt raising to [Spec,V-AgrP], though as we have seen, covert raising is also an option in English.

3.3.3 Paying attention to taking advantage

A classic puzzle in the study of passivization is illustrated in (305)-(307):

(305)   a.   John took advantage of Bill.

        b.   John made fun of Bill.

(306)   a.   John was taken advantage of.

        b.   Advantage was taken of John.

(307)   a.   John was made fun of.

        b.   (Much) fun was made of John.

If we take passivization to be driven by the Case requirements of the surface subject, the possibility of the (a) structures in (306) and (307) is surprising. The addition of the passive morpheme ought to absorb the Case of whichever DP it is that receives Case from the verb in (305) (presumably *advantage*); it ought therefore to be *advantage* that raises to subject position, not the complement of *of*. An informal notion of reanalysis offers the sketch of a solution to this problem. I.e., the (a) passives result if reanalysis applies, and the (b) passives result if it does not (Bach and Partee, 1980, 323-324). The problem of refining this analysis further has essentially been a technical one: just how is it that *of* can reanalyze with the verb (or any neighboring projection) when a DP intervenes? And how is the postverbal DP Case-licensed? An advantage of the analysis presented here is that the first question receives a straightforward answer in terms of head movement, since movement of the preposition is not subject to an adjacency requirement.[4]

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[4] It has been proposed that reanalysis is possible in (306a) because *take advantage (of)* forms an idiomatic complex predicate of some sort (Hornstein and Weinberg 1981; Chomsky 1973; Riemsdijk and Williams 1986, 148). Although intuitively appealing, this sort of analysis faces a few problems. The formation of such complex predicates must presumably be optional, given the possibility of (306b) and (307b). Thus, the claim would be that there are *two* optional operations

The second question has previously been addressed by the hypothesis that *take advantage of* forms a single complex predicate, thus exempting *advantage* from the Case filter (Chomsky, 1973; Hornstein and Weinberg, 1981). Rather than taking this approach, I follow Mills (2008) in assuming that *advantage* is licensed by partitive Case.[5] Partitive Case is compatible only with certain classes of DP. These can be roughly characterized as the weakly quantificational DPs, though it is unclear whether bare DPs such as *fun* or *attention* qualify as such. (A reviewer points out that bare and weakly quantificational DPs may have in common the property of being "small" DPs in a theory such as that of Zamparelli (2000).) As expected, the restrictions imposed by partitive Case apply to the postverbal DPs in the pseudopassive constructions under consideration:

(308) a.   John was paid attention to.

b.   John was paid a great deal of attention to.

c.   * John was paid every possible attention to.

Though judgments are difficult in this area owing to the idiosyncrasies of the various idioms involved, the restriction to weak quantifiers tends to be relaxed in passives where the idiomatic DP is the subject. So for example, (309) is detectably better than (308c):[6]

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at work here: optional complex predicate formation, and optional reanalysis of the preposition, the latter conditioned (in the cases at hand) on complex predicate formation. On the face of it, having these two optional operations is overkill, since in principle a single binary optionality should be sufficient to explain the existence of the two different passive versions of (305).

[5] See also Lødrup (1991): "...The generalization [is that] the indefiniteness requirement holds of an unaccusative object whose verb has a non-thematic subject."

[6] Judgments are quite variable for (308), (309) and other such cases. I do not think this variation should be taken too seriously as a grammatical phenomenon. For example, while some English speakers find (309) distinctly odd, the construction appears to have been unexceptionable in 19th century English, as shown by a Google search for "every attention was paid to"

(309)   ? Every possible attention was paid to John.

This contrast crucially shows that the restriction to bare nouns is not imposed by the requirements of the *pay attention* idiom. The idiomatic DP can often appear preverbally in a passive existential:

(310)   a.   There was much fun made of John at the conference.

b.   There was much attention paid to John at the conference.

c.   (The court ruled that) there was no unfair advantage taken of John.

In (310a), *made fun of* is not even a string (and likewise for *paid attention to* and *taken [no unfair] advantage of* in (310b/c)). Thus, passivization in cases such as (308a/b) cannot be conditioned on formation of a complex predicate in the syntax. It follows that the postverbal DP in (308a/b) cannot be exempted from Case licensing by means of incorporation within such a complex. This provides further support for the hypothesis that the postverbal DP is licensed by partitive Case. On this hypothesis, the derivation for (308a) is along the lines shown in (311):

(311)   [TP [John] ... [V–v°P ~~[John]~~ ~~[V–v° made]~~ [P–Agr°P ~~[DP fun]~~ ~~[P–Agr° of]~~ P-Agr°
    [VP [V made] ... [DP fun] ... [PP of ~~[John]~~]]]]]]

Here Agr° has 'P' features. Thus, P raises covertly to Agr° to create a complex P-Agr° head. This head assigns partitive Case to *fun* following covert raising to [Spec,P-Agr°P].[7]

(quotes included), which returns many matches from books published in this period (together with a few contemporary examples). In contrast, a search for "was paid every attention to" returns only two relevant matches as of 03/01/2011. It seems unlikely that any deep grammatical distinction could be responsible for the differing judgments of modern English speakers. The important point here is that virtually everyone finds (309) noticeably better than (308c).

[7] Raising of the DCRP to the surface subject position "crosses over" [Spec,P-Agr°P]. Not all formulations of Minimality/Shortest Move would permit this, but in general this kind of "nested"

In sum, the postverbal DP in a passive such as (308a/b) is subject to two sets of constraints: (i) those imposed by partitive Case; and (ii) those imposed by the idiom itself (e.g., that the DP must contain an NP headed by *fun*).[8] This amounts to the following claim:

(312)   If a DP α ...

      (i) Meets the requirements imposed by partitive Case; and

      (ii) can be the subject of a passivized ...V α PP... type idiom (as in (309))

      ...then α will also be permissible in a passive such as "...V α P t..."

To illustrate the need for stating the claim in this somewhat complex form, note that the contrast in (313) does *not* constitute a counterexample to it:

(313)   a.   There was a significant advantage (in arriving early).

      b.   * John was taken a significant advantage of.

The argument here would be that since *a significant advantage* is compatible with the requirements imposed by partitive Case – as shown by (313a) – we ought therefore to expect the postverbal DP in (313b) to be licensed. However, this argument fails to impugn the claim in (312) because *a significant advantage* is never able to participate in the *take advantage* idiom:

(314)   * A significant advantage was taken of John.

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dependency is what is predicted by the conjunction of Shortest Move and Cyclicity (Richards, 1999; Kitahara, 1995, 1997). With regard to Cyclicity, a complication here is that the "nested" movement is covert, implying that it occurs *after* the overt outer movement. Since virtually all covert movement is *prima facie* countercyclic, it is unclear what the conjunction of Shortest Move and Cyclicity predicts in the case at hand. This issue will not, however, arise within "single-cycle" theories, which take covert movement to be pronunciation of a lower copy, movement of formal features, or Agree without subsequent remerge. This would provide some motivation for interpreting my analysis within a single-cycle framework.

[8] A similar observation is made in Taraldsen (1979).

Thus, (312ii) is not met.

3.3.3.1 Two non-existent pseudopassives

The hypothesis that *advantage* receives partitive Case in (315) may offer an explanation for the impossibility of the pseudopassives in (316):

(315)   John$_1$ was taken advantage of t_1.

(316)   a.   * Mary$_1$ was said to t_1 that Bill is intelligent.

     b.   * Mary$_1$ was said that Bill is intelligent to t_1.

Given the semantic reflexes of partitive Case, it is reasonable to assume that it is incompatible with clauses. If so, the derivation given above for (315) will not be available in (316).[9]

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[9] I have not yet addressed the question of why non-idiomatic pseudopassives such as (vii) are barred:

(vi)   John was taken advantage of.

(vii)   * John was given a book to.

On the face of it, it should be possible for *a book* to be licensed by partitive Case in the same way that *advantage* is licensed in (vii). The only principled explanation for the impossibility of (vi) that I am are aware of is the aforementioned hypothesis that passives of this sort are conditioned on complex predicate formation (which in turn is conditioned on the idiomaticity of the complex predicate). However, we have seen that examples such as (310) constitute decisive evidence against complex predicate formation as a process applying in the narrow syntax. All I can offer here is the weaker hypothesis that there is nonetheless some semantic process of complex predicate formation that is subject to Hornstein and Weinberg's (1981) "natural predicate" condition. This condition seems to extend to subject-predicate constructions more broadly. For example, the contrast between (vi) and (vii) is mirrored in the (albeit weaker) contrast in the acceptability of *tough*-movement between (viii) and (ix):

(viii)   It is tough to take advantage of John $\Rightarrow$ John is tough to take advantage of.

(ix)   It is tough to throw books at John $\nRightarrow$? John is tough to throw books at.

Unaccusative pseudopassives such as (317) are also correctly predicted to be impossible, since no Agr projection can be present within an unaccusative vP:

(317)   * [This bed]$_1$ was died in t_1.

3.4   Reanalysis and binding

Baltin and Postal (1996) object to reanalysis accounts of these binding phenomena on the grounds that the set of PPs which permit pseudopassivization is not identical to the set of PPs which are transparent for binding. Rather, the latter are a proper superset of the former. For example, whereas *talk to* permits both pseudopassivization and binding – (318) – pseudopassivization is degraded for *talk with* despite binding being perfect – (319):[10]

Since *tough*-movement and passivization appear to have little in common syntactically, this supports the hypothesis that the natural predicate condition is syntax-external. In §3.5.5, I will develop further the idea that subject-predicate constructions are a natural class with respect to a certain family of extrasyntactic conditions. Within generative syntax, the idea that the subject-predicate relation has a special interpretative significance is often associated with Chomsky's (1975) discussion of the difference in meaning between *Beavers build dams* and *Dams are built by beavers*. Only the latter can be paraphrased as "It is a general property of dams that they are built by beavers." (See Standop 1981 for a contrasting view.)

   It should also be noted that, according to Taraldsen (1979) and Lødrup (1991), Norwegian is slightly more permissive than English with respect to postverbal DPs in pseudopassives, sometimes allowing them without any supporting idiomatic interpretation:

   (x)   Brevet   ble klistret frimerker på.
           The letter was pasted stamps   on.
           (Lødrup, 1991)

I have no idea why Norwegian should differ from English in this respect, but the Norwegian facts do hint that (vii) may not be ruled out in the narrow syntax.

   [10] Baltin & Postal's other examples are somewhat difficult to assess. In their (5c-f), they present a number of examples based on (xi):

(318)   a.   John was talked to.

         b.   John talked to Mary$_1$ about herself$_1$.

(319)   a.   ? John was talked with.

         b.   John talked with Mary$_1$ about herself$_1$.

I agree with B&P that (319a) is degraded as compared to (318a). However, I suggest that the relevant comparison cases for judging the acceptability of pseudopassives are examples such as (320b), where the complement of a preposition which is not the closest to the verb is passivized:

(320)   a.   John was talked about.

         b.   * John was talked to Bill about.

For all the speakers I have consulted, (320b) is considerably worse than (319a). This is perhaps the level of unacceptability to be expected if reanalysis is truly impossible. With regard to (319a), I note that while reanalysis is a precondition for pseudopassivization, it is surely not the *only* precondition. It may well be that reanalysis does successfully apply in (319a), and that passivization is degraded for some other reason.

One possible source of the degradation of (319a) is a constraint blocking the passivization of symmetric predicates (Bach and Partee 1980, 332-333; Dowty 1991; Hallman 2000, 58). As an illustration of this constraint, note that the verb *marry* has two possible meanings in the active sentence (321a), but in the passive sentence (321b) has only the reading where the surface subject stands in an

_____

(xi)   ? The detective worked from Mary$_1$ back to herself$_1$.

       (B&P's judgment.)

However, all English speakers I have consulted find binding to be highly degraded in this example. The failure of pseudopassives such as B&P's (5e) (* *Mary was worked back from to Sally*) has, on my account, the same explanation as in (333a).

asymmetric relation to the logical subject:

(321)   a.   John married Mary.

        (Ambiguous: either "John and Mary (got) married," or "John presided over Mary's marriage ceremony.")

        b.   Mary was married by John.

        (Has only the reading "John presided over Mary's marriage ceremony.")

Regarding the contrast between (318a) and (319a), note that *talk with* is arguably "more symmetric" than *talk to*, since the former strongly suggests (without perhaps implying) a two-way conversation. For example, (322a) can be roughly glossed as (322b):

(322)   a.   I talked ᴛᴏ John but not ᴡɪᴛʜ him.

        b.   I said things to John, but John didn't reciprocate.

The mild degradation of (318a) may therefore follow from the fact that *talk with* is a "mildly" symmetric predicate. More generally, it appears that *with* pseudopassives are fully acceptable only with robustly asymmetric predicates. Thus, predicates such as *bargain with* and *dance with* (which describe events in which the participants play more-or-less identical roles) pseudopassivize poorly, whereas clearly asymmetric predicates such as *dispense with* and *do away with* pseudopassivize perfectly:

(323)   **Symmetric (or near-symmetric)**

        a.   ? John was bargained with.

        b.   ? John was argued with.

(324)   **Asymmetric**

        a.   John was dispensed with.

        b.   John was done away with.

3.4.1 Non-c-command-based theories of binding

As B&P note, an appealing feature of the reanalysis account of binding from within PPs is the explanation it offers for the contrast in (325) (Riemsdijk and Williams, 1986, 203):

(325)   a.   Who$_1$ did Mary talk to t_1 about himself$_1$?

          b.   * [To whom$_1$]$_2$ did Mary talk t_2 about himself$_1$?

          c.   * [To Mary$_1$]$_2$, John talked t_2 about herself$_1$.

The traditional explanation is that reanalysis destroys the constituency of the PP, barring it from undergoing subsequent *wh*-movement in (325b/c). On my account, P-AgrP is a constituent following reanalysis, but the intervention of VP between P-Agr and the *wh*-phrase nonetheless blocks pied-piping of P-AgrP:[11]

(326)   a.   [$_\text{P–AgrP:+wh}$ P-Agr [$_\text{PP:+wh}$ P Wh]]

               (Percolation of +wh up to P-AgrP is possible; pied-piping of P-AgrP is possible.)

          b.   [$_\text{P–AgrP:}\sout{\text{+wh}}$ P-Agr [$_\text{VP:}\sout{\text{+wh}}$ V [$_\text{PP:+wh}$ P Wh]]]

               (Percolation of +wh is blocked by VP; pied-piping of P-AgrP is impossible.)

To my knowledge, no means of accounting for the data in (325) has yet been proposed which does not appeal to reanalysis in one form or another. Thus, (325a/b)

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[11] No special assumptions regarding pied-piping are required here, since typically pied-piping can never extend up to a maximal projection which is not a PP or DP. This generalization can also be stated in approaches to pied-piping which do not assume feature percolation (e.g. in terms of the subcategorization/selection properties of Cable's (2007) Q head). Though +*wh* features may percolate as far as PP, pied-piping of PP would cause the derivation to crash, since it would block subsequent covert movement of P's complement to [Spec,P-AgrP], and of P to Agr. Apart from this, there may be a more general ban on ϕ-incomplete phrases undergoing $\overline{\text{A}}$-movement.

poses a significant empirical challenge to theories of binding which attempt to accommodate (325a)/(273) by abandoning the c-command condition on binding altogether.

A representative example of such a theory is that presented by Pollard and Sag (1992). P&S argue that Conditions A and B are stated over ARG-ST lists, which are essentially ordered lists containing the arguments of a given predicate. Argumenthood here is to be understood in a syntactic rather than semantic sense, such that *John* in (327) is taken to be an argument of *believe*:[12]

(327)   John believes Bill to like Mary.

The ARG-ST list for *believe* in (327) is approximately as follows:

(328)   < *John*, *Bill*, [VP to like Mary] >

Since ARG-ST lists are ordered, it is straightforward to define an asymmetric precedence relation over them; in P&S's terminology, *John* in (327) "o-commands" *Bill*. Condition A is stated as the requirement that an anaphor have an o-commanding antecedent in the same ARG-ST list (and conversely for Condition B). P&S's crucial further assumption is that the complement of a preposition can appear on the ARG-ST list of the verb which takes the relevant PP as a complement. So for example, the ARG-ST list for *talk* in (329a) is approximately as shown in (329b):

(329)   a. $John_1$ talked to $Bill_1$ about $himself_{1/2}$.

        b.   < *John*, *Bill*, *himself* >

The anaphor *herself* therefore has two potential o-commanding antecedents on the same ARG-ST list, and the attested binding possibilities are correctly predicted.

[12] One might dispute the standard assumption that *John* in (327) is not the semantic object of *believe* (see e.g. Klein and Sag 1985), in which case one might consequentially maintain that ARG-ST lists have more semantic significance than would be thought given standard assumptions.

We have already seen that the data in (325) are problematic for argument structure theories of binding.[13] A further difficulty for P&S's analysis is posed by the contrast in (330):

(330) a. John talked to Mary$_1$ about herself$_1$.

b. * John talked t_2 about herself$_1$ [to Mary$_1$]$_2$.

For P&S, the ARG-ST list is identical for (330a) and (330b) (< *John*, *Mary*, *herself* >), so their Condition A is not able to make any cut between the two. P&S recognize this difficulty, and postulate a linear precedence requirement on anaphoric binding to rule out (330b) (p. 266). However, English does not impose any such requirement on anaphoric binding in the general case, as shown by the acceptability of (331b) and (331d):[14]

(331) a. John$_1$ talks to himself$_1$ frequently.

b. To himself$_1$, John$_1$ talks frequently.

c. John$_1$ would like himself$_1$.

d. Himself$_1$, John$_1$ would like.

The reanalysis account of the contrast in (330) is relatively unproblematic. Following P&S, I assume that *to...about* is the base order, and that the order in (330b) is derived via extraposition of the *to* PP. Movement of P to Agr is obligatorily covert, and thus must follow overt extraposition of the PP. On the assumption that extraposition targets an adjoined position in (330b),[15] head movement of P to Agr (and phrasal movement of P's complement to [Spec,P-Agr]) would therefore violate the adjunct island condition.

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[13] See also Baltin (2006) for further arguments against o-command theories.

[14] For important early discussions of binding facts of this type, see Lakoff (1968) and Reinhart (1976, 1983a).

[15] On "freezing" effects of this type, see Rochemont and Culicover (1990).

With regard to examples such as (332), which are correctly ruled out by P&S's o-command condition, I note that binding is also predicted to be impossible under my account. This is because *about* is not structurally the closest preposition to the verb and hence cannot reanalyze with it:

(332)   * Mary talked [~~to himself₁~~] about John₁ to himself₁.

As expected, pseudopassivization from within an *about* PP is also degraded whenever a *to* PP is present, whatever the surface word order:

(333)   a. ?? Mary was talked about *t* to John.

       b.   * Mary was talked to John about *t*.

3.4.1.1   More arguments against argument structure theories of binding

In addition to the empirical problems just mentioned, there are some conceptual problems with the use of argument structure to obviate the problem posed by binding from within PPs. Often when argument structure theories of binding are presented, the details of the mapping from constituent structure to argument structure are left tacit. This is of course understandable, given the range of highly complex and controversial issues that arise in this connection. Nonetheless, once one begins to spell out in detail a mapping procedure (or set of mapping constraints), it becomes necessary to make an exception for PPs very much like the exceptions typically made in c-command-based theories of binding. Clearly, it is not the case that for any verb V, any DP that is contained within a sister of V can be one of its arguments. For example, the subject of an embedded finite clause which is the sister of V cannot under any circumstances be one of its arguments. In English at least, it seems that the only thing that can be an argument of V (apart from one of its sisters) is the complement of a prepositional phrase that *is*

one of its sisters. Unless this fact can be given some principled explanation, one must resort to making an exception for PPs in the theory of the syntax/argument-structure mapping. Precisely such an exception is made, for example, in the theory of subcategorization and binding presented in Sag, Wasow, and Bender (2003, 211-12) (which is a revised version of that presented by P&S).[16] Thus, the apparent absence of stipulation in P&S's account may be illusory: the stipulation has merely been shifted to another component of the grammar.

3.4.1.2 *About* PP reflexives as logophors

Reinhart and Reuland (1993) and Büring (2005) offer a different explanation for the possibility of binding in examples such as (334):

(334)   John talked to Mary$_1$ about herself$_1$.

They suggest that reflexives in *about* PP's are "exempt" or "logophoric" reflexives which are not subject to Condition A. Since logophors do not require c-commanding antecedents (see the next subsection), it is no surprise that *about* PP reflexives may be bound by antecedents embedded within another PP. The hypotheses that *about* PP reflexives are logophors correctly predicts predicts the absence of a strong Condition B effect when the reflexive in (334) is replaced by a pronoun:

(335)   ? John talked to Mary$_1$ about her$_1$.

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[16] Sag, Wasow, and Bender (2003, 211-12): "For prepositions that function as argument markers, we need to find some way by which they can transmit information about their object DP up to the PP that they project...If the object's MODE and INDEX values can be transmitted up to the PP, then the higher verb that takes the PP as its complement will have the MODE and INDEX information from the object DP in its ARG-ST, within the PP's SEM value." (In SW&B's theory it is the MODE and INDEX values of DPs which are crucially involved in binding dependencies.)

However, it seems unlikely that the logophoric status of the reflexive can be the true explanation for the relative acceptability of (335). This hypothesis overgenerates, incorrectly predicting the absence of a Condition B effect with subject antecedents:

(336)   * John$_1$ talked (to Mary) about him$_1$.

A more plausible explanation for the ungrammaticality of (335) is simply that reanalysis of *to* is optional. If reanalysis does not occur, then the complement of *to* (*John*) will not c-command *him*.

3.4.2   A reciprocal red herring

Examples with possessive reciprocals such as (337) have often been cited in support of the claim that English PPs do not block binding (see e.g. Pesetsky 1995):

(337)   John talked to the boys$_1$ on each other$_1$'s birthdays.

In a certain sense (337) clearly does support this claim: the antecedent is contained in a PP and the indicated interpretation is not blocked. However, there is reason to think that the reciprocal in (337) is a logophor rather than an anaphor bound under Condition A. Pollard and Sag (1992) present a number of persuasive arguments to this effect; there follow three additional arguments.

(i) Though *each other* generally permits both animate and inanimate antecedents, possessive *each other* is compatible only with animate antecedents:

(338)   a.   I placed the boys$_1$ next to each other$_1$.

         b.   I placed the pens$_1$ next to each other$_1$.

(339)   a.   I placed the boys$_1$ next to each other$_1$'s mothers.

         b.   # I placed the pens$_1$ next to each other$_1$'s cases.

This is expected if possessive *each other* is a logophor, since logophors typically seek prominent animate antecedents.

(ii) Fronting of the PP in sentences such as (337) does not block binding, in contrast with (325c) above:[17]

(340)   To the boys$_1$, John talked on each other$_1$'s birthdays.

This suggests that reanalysis is not required to license binding in this configuration. Again, this is expected if the possessive reciprocal is a logophor, since as shown in (341), logophors do not require strict c-command for binding:[18]

(341)   John$_1$'s nervous disposition suggests that pictures of himself$_1$ are on
         display again.

(iii) There are additional examples suggesting that possessive *each other* does not require a strictly c-commanding antecedent:

(342)   Pictures of the boys$_1$ were taken at each other$_1$'s birthday parties.

If possessive reciprocals are indeed logophors, this has the important consequence that examples such as (343) are not as problematic as they may first appear:

(343)   John talked to Bill about the boys$_1$ on each other$_1$'s birthdays.

In this configuration, *about* cannot reanalyze (since *to* intervenes), and thus *the boys* cannot A-move to a position c-commanding *each other*. However, since pos-

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[17] Here we do not give an example with *wh*-movement since *wh*-movement of a PP seems to degrade even variable binding:

(xii)   Who$_1$ did you talk to on his$_1$ birthday.

(xiii)   ?? To whom$_1$ did you talk on his$_1$ birthday.

[18] It is necessary for the antecedent to be contained in an inanimate DP such as *John's disposition*, since an animate DP would be a more prominent logophoric antecedent than its possessor. There appears to be some connection here to the notion of "sub-command" that has arisen in the analysis of long-distance reflexives in Chinese (Tang, 1989).

sessive *each other* does not require a strictly c-commanding antecedent, there is no reason to suppose that this movement is necessary to license the relevant interpretation.

3.5 The Baltin & Postal phenomena

I have already discussed some of objections to reanalysis presented in Baltin and Postal (1996).[19] However, B&P present an entire battery of arguments against reanalysis, and it is the aim of this section to address them comprehensively. The arguments in question are primarily based on a single kind of observation: that in various respects, the DP complements of reanalyzed prepositions (DCRPs) do not behave like ordinary direct objects. B&P are entirely correct in observing that previous reanalysis theories cannot explain these differences in behavior, since these theories essentially claim that DCRPs just *are* ordinary direct objects. On my account, however, DCRPs are syntactically distinct from ordinary direct objects insofar as they have a different base position. (They initially merge as the complement of P rather than V.) In §3.5.1-§3.5.7 I argue that this distinction is sufficient to explain the differences in behavior noted by B&P.

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[19] I unfortunately have not had time to give a proper reaction to Postal (2011). Postal (2011, 200) presents a new analysis of pseudopassivization which does not involve promotion to direct object (or "2-object" in Postal's terms). My "raising to object" analysis has more in common with earlier relational grammar accounts of passivization (e.g. Perlmutter and Postal 1983), which likewise assumed that only direct objects can passivize. I agree with Postal (p. 202) that the absence of "pseudo-middles" is a crucial fact which any adequate theory of pseudopassivization must account for; this is discussed further in §3.7.1.1. I also agree that *make fun of* passives argue decisively against traditional reanalysis theories. (In fact, Postal's analysis of the licensing of the postverbal DP is abstractly reminiscent of the analysis in Mills (2008), which I have adopted.)

3.5.1 Syntactic independence of stranded prepositions

B&P note that given examples such as (344), it is implausible to maintain that reanalyzed prepositions are in any way attached to the associated verb:

(344)   The bridge was flown both under and over.

Under my analysis, cases such as (344) can be derived simply by coordination of the two P heads:

(345)   ... [$_{v°P}$ [$_{V-v°}$ flown] [$_{P-Agr°P}$ [$_{DP}$ ~~the bridge~~] [[$_P$ ~~under and over~~]~~-Agr°~~] [$_{VP}$ [$_V$ flown] [$_{PP}$ [$_P$ under and over] [$_{DP}$ the bridge]]]]]]

3.5.2 Floating quantifiers

B&P note that whereas direct objects sometimes allow floating quantifiers, DCRPs do not:

(346)   The airforce struck **(* at)** those targets both in the morning.

This is expected under an extension of the analysis of floating quantifiers first proposed in Sportiche (1988). According to Sportiche, subject-oriented floating quantifiers originate together with the subject in a quantificational phrase (QP). This QP receives a thematic role in [Spec,VP] (which I will anachronistically take to be [Spec,vP]). The subject then raises out of the QP to the matrix subject position:

(347)   [The boys]$_1$ [$_{vP}$ [$_{QP}$ all t_1] saw the girls].

For floating quantifiers associated with objects, it is easy enough to extend Sportiche's analysis to make use of the v/V-medial Agr projection. The QP begins as the complement of V, and the DP then extracts from the QP to raise to [Spec,V-AgrP]. In the case of V-AgrP, this raising may be overt, whereas in the case of P-AgrP (the

reanalysis case), raising is obligatorily covert. Thus, reanalysis will be incompatible with quantifier float:[20]

(348)   [The airforce]$_1$ ... [$_{V-Agr-vP}$ t_1 [$_{V-Agr-v}$ struck] [$_{V-AgrP}$ [$_{DP}$ those targets]

[$_{V-AgrP'}$ t_{V-AgrP} [$_{VP}$ t_V [$_{QP}$ both [$_{DP}$ ~~those targets~~]]]]]]].

(Raising to [Spec,V-AgrP] is (optionally) overt; quantifier is stranded.)

(349)   [The airforce]$_1$ ... [$_{V-vP}$ t_1 [$_{V-v}$ struck] [$_{P-AgrP}$ [$_{DP}$ ~~those targets~~] [$_{P-Agr}$

~~at~~] [$_{VP}$ t_V [$_{PP}$ [$_P$ at] [$_{QP}$ both [$_{DP}$ those targets]]]]]]].

(Raising to [Spec,P-AgrP] must be covert; quantifier cannot be stranded.)

3.5.3   Heavy DP Shift

B&P note that DCRPs cannot undergo Heavy DP Shift (HDPS), giving examples such as the following:

(350)   a.   I described t_1 to himself$_1$ [the victim whose sight had been impaired by the explosion]$_1$.

b.   *I talked to t_1 about himself$_1$ [the victim whose sight had been impaired by the explosion]$_1$.

Since the source of the ban on extraposing DPs from within PPs is still poorly understood, I will have little to say on this point. I suggest two possible explanations:

 (i) Extraposition is a PF process. At PF, the complement of a reanalyzed preposition is in exactly the same configuration as the complement of an ordinary

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[20] To highlight the relevant contrasts between the two derivations, (348)-(349) use a mix of trace/copy notation. This is not intended to imply any difference in the type of movement. Traces (t) in these examples are always traces of overt movement. A striken-through copy is, if it is the higher copy, the landing site of a covert movement, and if it is the lower copy, the initial position of an overtly moved phrase.

preposition. Thus, there is no reason to expect a difference in behavior w.r.t. extraposition.

(ii) Drummond, Hornstein, and Lasnik (2010) attempt to explain the ban on Heavy DP Shift out of PP in a manner which should extend to the reanalysis structure, if P-AgrP is taken to be a phase. An explanation along these lines is not particularly attractive within the present framework, however, since phases are not appealed to in the analysis of any other phenomena.

3.5.4   Ellipsis phenomena

B&P note a number of respects in which DCRPs do not behave like direct objects with respect to ellipsis/deletion. Most significantly, DCRPs do not permit gapping – (351) – or pseudogapping – (352):[21]

(351)   a.   Frank called Sandra and Arthur __ Louise.

b.   * Frank talked to Sandra and Arthur (to) __ Sally.

(352)   a.   Frank called Sandra and Arthur did Louise.

b.   * Frank talked to Sandra and Arthur did Louise.

As I will now explain, these differences between DCRPs and direct objects are not unexpected under my analysis. First, a point of notation. To avoid a clash between two distinct uses of the strikeout notation, I will for the remainder of this section use a strikeout to indicate ellipsis, and traces to indicate movement.

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[21] The judgment on (352b) is somewhat controversial. E.g., Lasnik (2003) has suggested that such examples are relatively acceptable. Most speakers I have asked find (352b) distinctly worse than (352a). B&P also discuss comparative subdeletion. I will have little to say about this phenomenon, since the analysis of comparative subdeletion remains controversial, and it is difficult to make any general comments.

3.5.4.1 Gapping and pseudogapping

I assume pseudogapping of direct objects is predicated on extraction of the object to [Spec,AgrP] prior to elision of VP (Lasnik, 2003). Thus, pseudogapping is correctly predicted to be degraded in (352b). The structures for (352a/b) are shown respectively in (353a/b):[22]

(353) a. Frank called Sandra and Arthur did Louise.

... [$_{v'}$ v [$_{AgrP}$ Louise$_1$ [$_{VP}$ [$_V$ called] t_1]]]

('Louise' raises overtly and escapes the ellipsis site.)

   b. Frank talked to Sandra and Arthur did Louise.

... [$_{v'}$ v [$_{AgrP}$ [$_{VP}$ [$_V$ talked] [$_{PP}$ to Louise]]]]

('Louise' remains as the complement of V at PF and can't escape the ellipsis site.)

If gapping has a broadly similar derivation to pseudogapping (i.e. one involving extraction of the object from VP; see e.g. Sag 1976, Coppock 2001), then the same logic applies. If, on the other hand, gapping has the derivation proposed in Johnson (2009), a different explanation for the ill-formedness of (351b) will be required. According to Johnson, simple cases of gapping are derived by across-the-board raising of the verb to a higher Pred head, as in (354) (tree from p. 307). More complex cases are derived by across-the-board raising of a VP to [Spec,PredP], as in (355) (tree from p. 318):

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[22] Note that – atypically – V does not raise overtly to v in (353a), even though *Sandra* does raise overtly to [Spec,AgrP]. Lasnik's analysis of pseudogapping relies on the hypothesis that V's strong features are permitted to remain unchecked at spellout so long as V is eventually elided.

(354) (355)
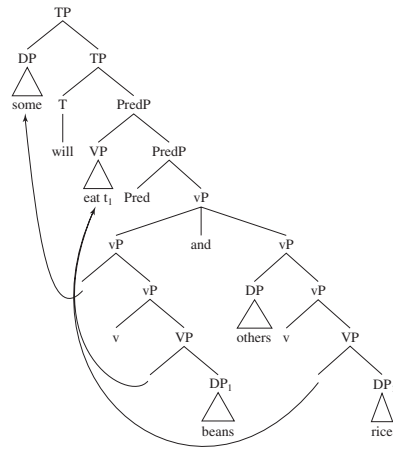
[Tree diagrams for (354) and (355)]
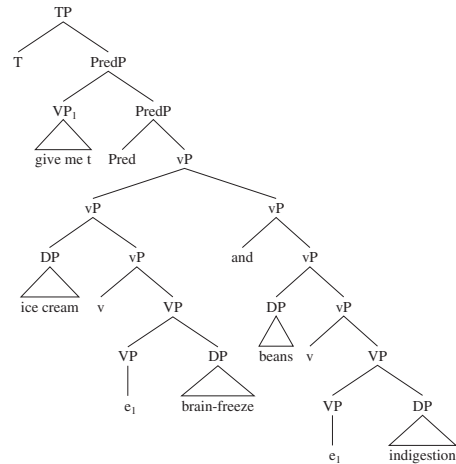
Let us consider these two possibilities in relation to (351b): If the verb moves across-the-board to Pred, we straightforwardly derive the grammatical case of gapping in (356):

(356)   Frank talked to Sandra and Arthur to Louise.

In contrast, to derive (351b), it would be necessary to create a VP constituent with the string yield *talked to* (i.e. a VP excluding the complement of the preposition). We have seen in §3.5.3 that the complement of a reanalyzed preposition cannot extrapose, so no such VP constituent can be created.

3.5.4.2   A problem raised by the interaction of pseudogapping and binding

It is possible to bind out of PPs which are remnants of pseudogapping:

(357)   John talked to Mary$_1$ about herself$_1$ and Jane did to Bill$_2$ about himself$_2$.

On the assumption that pseudogapping is a form of VP ellipsis, the *to* and *about* PPs in the second conjunct must somehow have extracted from VP (I will assume via movement of some kind; Jayaseelan 1990). The problem to be discussed

in this subsection is raised by the contrast between (357) and examples such as (325b)/(330b), repeated here in (358):

(358) a. * [To whom$_1$]$_2$ did you talk t_2 about himself$_1$.

  b. * I talked t_2 about himself$_1$ [to Bill$_1$]$_2$.

I have argued on the basis of such examples that movement of a PP blocks reanalysis, and hence binding. On the face of it, the PPs in (358) would appear to have extraposed out of the ellipsis site, so it is surprising that binding is not blocked.

A clue to the correct analysis of (357) is that the relative order of the *to* and *about* PPs affects binding precisely as it does in the absence of ellipsis. For example, the contrast in (330) is mirrored in (359):

(359) a. John talked to Mary$_1$ about herself$_1$ and Jane did to Bill$_2$ about himself$_2$.

  b. * John talked to Mary$_1$ about herself$_1$ and Jane did about himself$_1$ to Bill$_2$.

This suggests that the *to* and *about* PPs in (359) have not extraposed independently. I suggest that AgrP is in fact the extraposed constituent in these cases, and V-vP the elided constituent:

(360) PF: [[...did [$_{V-vP}$ talk$_{v-V}$ t_{AgrP}]] [$_{AgrP}$ Agr [$_{VP}$ [$_{VP}$ t_V [$_{PP}$ to$_P$ Bill] [$_{PP}$ about himself]]]]]

  LF: [[...did [$_{V-vP}$ talk$_{v-V}$ t_{AgrP}]] [$_{P-AgrP}$ Bill to$_{P-Agr}$ [$_{VP}$ [$_{VP}$ t_V [$_{PP}$ t_P t_{Bill}] [$_{PP}$ about himself]]]]]

In (360), AgrP extraposes overtly to a position above vP, and reanalysis applies subsequently. If such a derivation is available, we also gain some insight into the contrast between (361a) and (361b):

(361) a. John spoke yesterday to Mary$_1$ about herself$_1$.

  b. * John was spoken yesterday to.

So far, I have assumed that *yesterday* can be base-generated between *talked* and *to Mary* in (361a), and that this is not possible in (361b) because the verb is in a lower position (§3.3.1). (See e.g. Johnson 1991, Pesetsky 1989 for analyses in which the order in (361a) is derived without movement of the *to* PP.) If AgrP is able to extrapose, a different account of this contrast becomes available: the order in (361a) is derived via extraposition of AgrP.[23]

3.5.5 Passivization and object raising

B&P point out a striking parallel between passivization and *tough*-movement.[24] The extent to which pseudopassivization is acceptable correlates with the acceptability of the corresponding *tough*-movement construction:

(362)   a.   * The chair was stood next to.

       b.   * The chair is difficult to stand next to.

(363)   a.   ?? John was stood up to (by Bill).

       b.   ?? Bill is tough to stand up to.

(364)   a.   John was spoken to (by Bill).

       b.   John is tough to speak to.

B&P use these data as the basis for an argument against reanalysis. Though the data are very interesting, I find B&P's argument, summarized in the following

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[23] Absent a theory of extraposition, it is somewhat unclear whether it is more stipulative to assume that AgrP *can* extrapose or to assume the converse. In the reanalysis structure, Agr eventually becomes P-Agr, so in a sense, extraposition of AgrP is just extraposition of PP (given that ordinary English PPs are really P-AgrPs on my account).

[24] I have found that many of B&P's starred examples are in fact acceptable for most English speakers, so I give different examples here. As far as I can tell, B&P are nonetheless correct regarding the correlation between the acceptability of pseudopassivization and the acceptability of *tough* movement.

quotation, to be somewhat unclear:

> In all these cases [examples similar to my (362)-(364) above] the PP object
> is [able to undergo *wh*-movement]; thus, there is no general ban on extrac-
> tion or P-stranding that can be used to block the [(b)] form. The constraints
> on the [(b)] cases seem linked to the pseudopassive restrictions in the [(a)]
> cases. **If pseudopassives involved "reanalysis," the unacceptable [(b)]**
> **cases would presumably have to be attributed to failures of "reanalysis".**
> But if it exists, "reanalysis" must be optional…Therefore, whatever "reanaly-
> sis" restrictions exist would leave a full PP analysis available, and full PPs are
> in general not incompatible with object raising. Thus, a "reanalysis" view of
> pseudopassives provides no way to link the pseudopassive and object-raising
> restrictions in a range of cases like [(362)-(364)].
>
> (p. 132, my emphasis)

The bolded claim is questionable. Successful reanalysis is but one requirement
for an acceptable pseudopassive. It therefore seems reasonable to assume that
something other than failure of reanalysis is responsible for the deviance of (362a)
and (363a). This is particularly so given the well-known fact that pseudopassives
of this sort can be rescued by a pragmatic context in which the subject is "af-
fected." For example:

(365)   The chairs in this room are very fragile, and can be damaged if someone
          so much as stands next to one. Thus, you will easily be able to identify
          the chairs that have been **stood next to** (or otherwise disturbed) by the
          small fatigue cracks in the legs.
          (Compare (362a))

Unless the reanalysis operation itself is subject to pragmatic constraints (which
seems unlikely), something else must be at work. In fact, what the illicit pseu-
dopassive and *tough*-movement cases appear to have in common is that they

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are both violations of the "affectedness" constraint on certain kinds of subject-predicate construction.[25] This constraint applies to pseudopassives and passive nominalizations, but not to ordinary passives (or at least, not as strongly[26]):

(366)   **Pseudopassives**

   a.   John shot at Mary $\Rightarrow$ Mary was shot at (by John).

   b.   John stood next to Mary $\nRightarrow$ * Mary was stood next to (by John).

(367)   **Passive nominalizations**

   a.   Bill's arrest of John $\Rightarrow$ John's arrest (by Bill).

   b.   Bill's avoidance of John $\nRightarrow$ * John's avoidance (by Bill).

(368)   **Ordinary passives**

   a.   John arrested Bill $\Rightarrow$ Bill was arrested (by John).

   b.   John avoided Bill $\Rightarrow$ Bill was avoided (by John).

Intriguingly, those forms of the passive constrained by affectedness are precisely those restricted to agentive *by* phrases:

(369)   **Pseudopassives**

   a.   John stood on the desk $\Rightarrow$ The desk was stood on by John.

---

[25] The affectedness constraint was first formulated by Anderson (1979, 43) in relation to passive nominalizations (though Anderson does not propose that passivization as such is restricted by this constraint). See also Ramchand and Svenonius (2004) for recent discussion.

[26] There are examples demonstrating an apparent affectedness constraint on verbal passivization, such as the well-known contrast between the following active/passive pair:

(xiv)   John left Sweden.

(xv)   * Sweden was left by John.

However, the contrast between (367b) and (368b) appears to show that the affectedness constraint is (for reasons I do not understand) weaker for the verbal passive. Alternatively, one might conclude that there are two entirely distinct constraints at work here.

b.   A lamp stood on the desk $\nRightarrow$ # The desk was stood on by a lamp.

(370)   **Passive nominalizations**

a.   The surrounding of the city by the barbarians.

b.   # The surrounding of the city by trees.

(371)   **Ordinary passives:**

a.   John persuaded Bill $\Rightarrow$ Bill was persuaded by John.

b.   John's argument persuaded Bill $\Rightarrow$ Bill was persuaded by John's argument.

Similarly, it has been noted that the subject of the non-finite clause in *tough* constructions must be agentive, whether it is null or overt (Jackendoff, 1975):

(372)   a.   This ledge is easy to fall off.

*(Has only the reading "...is easy for **people** [not plants etc.] to fall off.")*

b.   This ledge is easy for careless people to fall off.

c.   # This ledge is easy for large potted plants to fall off.

This effect is seen only when the application of *tough*-movement derives a subject-predicate structure. The effect disappears when the subject is an expletive, as shown in (373); and the affectedness constraint likewise fails to hold, as shown in (374):

(373)   a.   It is easy for a careless person to fall off this ledge.

b.   It is easy for large potted plants to fall off this ledge.

(374)   It is difficult to stand next to this chair.

These facts may be a clue to the source of the correlation between pseudopassivization and *tough*-movement in (362)-(364). It seems that there is some link between the affectedness constraint and the agentivity requirement (though

I have no insight to offer regarding what this link might be). Descriptively, this link can be stated as follows:

(375)   In the configuration $[_\gamma \ \alpha_\iota \ [_\phi \ ... \ t_\iota \ ... \ ]]$, where

> (i) α a is a subject
>
> (ii) ϕ is a predicate containing a trace co-indexed with α, and
>
> (iii) ϕ has an external argument η which may or may not be syntactically expressed and which if expressed is distinct from α and its trace,

α must be affected and η must be agentive.

(Following Chomsky (1986), I assume that the subject of a *tough* predicate is co-indexed with the trace of the null operator.[27]) As we have seen, the one exception to this generalization is the ordinary verbal passive. I do not know why (375) holds insofar as it does. However, I see no reason to suspect that the ultimate explanation for (375) will be incompatible with an account of pseudopassivization in terms of reanalysis.

3.5.6   Pseudopassives, *there* existentials and locative inversion

Citing examples such as (376b), B&P note that pseudopassives are incompatible with locative inversion. Postal (2004, 47) cites examples such as (376c) to show that pseudopassives are incompatible with *there* existentials:[28]

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[27] I.e.:

(xvi)   John$_1$ is tough $[_{CP}$ Op$_1$ to talk to $t_1]$.

[28] Postal's actual claim is slightly more subtle than this. He argues that pseudopassives are incompatible with locative inversion just when they are incompatible with the corresponding *there* existential. However, it is clear from his example (127b), p. 47, that he takes sentences

(376)   a.   Many famous revolutionaries were shot **(at)** in this very building.

        b.   In this very building were shot **(*at)** many famous revolutionaries.

        c.   In this very building there were shot **(*at)** many famous revolutionaries.

The unacceptability of pseudopassives in (376b/c) is arguably unexpected under reanalysis accounts, which seem at first blush to imply that pseudopassives ought to have all the properties of ordinary passives. In this subsection, I will argue that on closer inspection, the data in (376) do not in fact pose a serious challenge to reanalysis theories.

Consider first (376c). We have already seen (in connection with (300) above) that pseudopassive existentials require the associate of *there* to appear preverbally. We therefore expect (376c) to become acceptable if the DP is placed in a preverbal position. This is indeed the case, so long as a "light" DP is used:[29]

(377)   In this building there were many revolutionaries shot at.

The only remaining problem pertaining to (376c) is that of explaining why (377) is unacceptable with a heavy DP. This is so whether the associate is pre- or postverbal:

(378)   a.   ?? In this building there were a number of revolutionaries who'd fought for years shot at.

        b.   * In this building there were shot at a number of revolutionaries who'd fought for years.

such as (376c) to be unacceptable (as do all native English speakers I have consulted). These observations go back to Bresnan (1994). See also Postal (2004, 46) for further discussion.

[29] See Bruening (2011), Chomsky (2001) for arguments that *shot at* in (377) cannot be a reduced relative attached to *revolutionaries*.

The degradation in (378a) is likely due to prosodic awkwardness; and as for (378b), we have already seen that the lack of V-to-v raising in English passives implies that the order in (378b) cannot be straightforwardly generated (§3.3.1). The question, then, is why the word order in (378b) cannot be derived via Heavy DP Shift:

(379) * In this building there were t_1' shot at t_1 [a number of revolutionaries who'd fought for years]$_1$.

There is no general ban on HDPS of the associate of *there* – as demonstrated by examples such as (380) – so some explanation is required for why HDPS is blocked in (379).

(380) There were (t_1) arrested (t_1) on Tuesday [a number of low-level drug dealers]$_1$.
       (Bracketed traces indicate two possible base positions.)

I suspect that this restriction may fall under the descriptive generalization in (381):

(381) Heavy DP Shift cannot apply to a DP which was ever – at any stage in the derivation – the complement of a preposition.

In (378b), the DP is initially the complement of a (reanalyzed) preposition, and is thus barred by (381) from undergoing HDPS. Independent evidence for (381) comes from certain properties of ECM subjects of pseudopassive clauses. As shown in (382a), subjects of ECM clauses are marginally able to extrapose. However, when an ECM subject originates as the complement of a (reanalyzed) preposition, as in (382b), extraposition is more severely degraded:

(382) a. ? I believe t_1' to have been shot t_1 [every soldier in the unit]$_1$.

       b. * I believe t_1' to have been shot **at** t_1 [every soldier in the unit]$_1$.

The same contrast can also be seen in certain kinds of small clause construction. For example in (384b), *every prisoner* cannot extrapose from the subject position of the small clause because it originates as the complement of *at*:

(383)   a.   I'll have [every prisoner who tries to escape]$_1$ shot t_1 on sight.

      b.   I'll have [every prisoner who tries to escape]$_1$ shot **at** t_1 on sight.

(384)   a.   ? I'll have t_1' shot t_1 on sight [every prisoner who tries to escape]$_1$.

      b.   * I'll have t_1' shot **at** t_1 on sight [every prisoner who tries to escape]$_1$.

Thus, given that there is no means of shifting the associate of *there* to the right in pseudopassive existentials, the only word order possible is one in which the associate is pre-verbal.[30]

Turning now to (376b), I will follow Bruening (2011) in assuming that locative inversion is banned in pseudopassives because the derivation of locative inversion involves rightward extraposition of the postverbal subject DP. Without going into the details of Bruening's analysis, the claim is essentially that the postverbal subject in an instance of LI such as (385) obligatorily undergoes Heavy

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[30] Intriguingly, (381) cannot be strengthened to the following generalization:

(xvii)   If a DP cannot undergo Heavy DP Shift from its initial Case/θ position, then it cannot undergo Heavy DP Shift from any subsequent position.

For example, it is well known that the first object in the double object construction cannot undergo Heavy DP Shift:

(xviii)   * I'll give t_1 a free book [every student in my class]$_1$.

But when the first object is promoted to an ECM subject position via passivization, Heavy DP Shift is then possible:

(xix)   I expect t_1' to be given t_1 a free book [every student in my class]$_1$.

This contrasts with (382b), where raising to ECM subject position fails to improve extraposition of the erstwhile complement of a preposition.

DP Shift:

(385) Into the room t_1 walked [a man]$_1$.

We have just seen that the complements of prepositions (whether reanalyzed or not) cannot undergo Heavy DP Shift, so Bruening's analysis correctly predicts that locative inversion is incompatible with pseudopassivization. As would be expected, other DPs which resist Heavy DP Shift, such as the first object in the double object construction, likewise fail to appear postverbally in locative inversion. For example, locative inversion is barred in (386a) because Heavy DP Shift is barred in (386b).[31]

(386) a. * In this room were given books the best students in the class.

b. * I gave t_1 books [the best students in the class]$_1$.

3.5.7 Pronoun binding restrictions

B&P argue (i) that reanalysis must, if it exists, be optional, but that (ii) this optionality leads to overgeneration. I agree with (i), but am not persuaded by (ii). In support of their argument, B&P present the following paradox:

(387) a. To whom did you talk about that issue?

b. * I talked to Thelma$_1$ about her$_1$.

(B&P's judgment.)

The possibility of pied-piping in (387a) appears to show that reanalysis is not obligatory, but if reanalysis is optional, the Condition B violation in (387b) is unexpected (since if reanalysis does not apply, *Thelma* will not c-command *her*). Thus, neither optional nor obligatory reanalysis seem to be consistent with the facts.

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[31] The deviance of examples such as (386a) is noted by Postal (2004, 47), Bresnan (1994, 79fn79).

The logic of B&P's argument is undoubtedly correct. However, as we have seen in connection with (336) above, it is likely that the judgment shown in (387b) is not correct. A number of authors (e.g. Reinhart and Reuland 1993, Büring 2005) have reported these sentences to be acceptable, or at least marginally so. Furthermore, there is a detectable contrast in the strength of the Condition B effect between (388a) and (388b):

(388) a. ? John talked to Thelma$_1$ about her$_1$.

     (My judgment; compare (387b).)

     b. * Thelma$_1$ talked to John about her$_1$.

Thus, given that the acceptability judgments are rather fuzzy in these cases, I see no clear indication that reanalysis theories make the wrong predictions regarding grammaticality. Indeed, they appear to account for the otherwise puzzling contrast in (388).

A more serious problem is raised by the following example given by B&P, which they take to be a Condition B violation:

(389)   * The person to whom$_1$ I talked about him$_1$.

There may also be a weak crossover effect in (389).[32] However, it seems at least plausible on the face of it that Condition B is also at work, given that (389) is clearly far less acceptable than (390):

(390)   ? The person to whom$_1$ I talked about his$_1$ mother.

The same pattern is found in simple questions:

(391) a. * To whom$_1$ did you talk about him$_1$.

     b. ? To whom$_1$ did you talk about his$_1$ mother?

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[32] Whether or not (389) instantiates a WCO configuration will depend on the extent to which WCO is linearly or structurally conditioned.

These facts are puzzling and I have no explanation for them. However, I believe that B&P's argument against reanalysis based on these data ultimately fails because the phenomenon in question turns out to be much broader. For example, an apparent Condition B effect obtains in (392b), despite the complete absence of any Condition B effect in the underlying configuration (392a):

(392) a. I talked about John$_1$ near him$_1$.

　　　 b. * About whom$_1$ did you talk near him$_1$?

Thus, it seems that obviation in cases such as (389), (391a) and (392b) is simply not predicated on the existence of a Condition B configuration in the underlying structure. For this reason, it is difficult to draw any firm conclusions from (389a) and (391). To add to the puzzle, I conclude this section by noting that the absence of pied-piping seems to improve these examples somewhat:[33]

(393) a. ?? Who$_1$ did you talk about near him$_1$?

　　　 b. ?? Who$_1$ did you talk to about him$_1$?

3.6 Binding and covert movement

I have argued that raising to [Spec,P-AgrP] places a DCRP in a position to c-command into PPs to its right. This explains why binding is possible in (273), repeated here as (394):[34]

(394) 　 John talked to Mary$_1$ about herself$_1$.

---

[33] Note that on my account, full reanalysis is not required to obtain preposition stranding, so I do not predict that reanalysis must necessarily occur in (393) (though of course it *may* optionally occur, yielding a structure where the trace of *who* c-commands the pronoun). Thus, while the contrast between e.g. (392b) and (393a) is puzzling, the mere absence of Condition B effects in (393a/b) does not pose a problem for my account, since a derivation is available without reanalysis (and hence without c-command of the pronoun by the *wh*-phrase).

[34] There appear to be cases parallel to (394) in the nominal domain:

Lasnik (1999) presents evidence that *covert* raising of an anaphor to [Spec,V-AgrP] (i.e. v/V-medial Agr) is not sufficient to establish new binding relations. This implies that binding should not in fact be possible in (394). Lasnik is of course working within a framework in which anaphors are separate lexical items and are not linked via a chain to their antecedents. Within the present framework, it is very difficult to see why a DP which undergoes covert movement to a Case position should not then go on to merge in another pair of Case and θ positions to derive a binding relation. (Recall that this dissertation treats covert movement as pronunciation of lower copies – there is no separate covert cycle.) Lasnik's argument is based on evidence from English verb-particle constructions and English existential constructions. These arguments were strong given the prevailing theoretical assumptions at the time of publication, but as I will now attempt to show, recent shifts have rendered them somewhat less compelling.

3.6.1   English verb-particle constructions

The most straightforward evidence for Lasnik's position is the contrast in (395):

(395)　a.　The boys made themselves/each other out to be idiots.

　　　　b.　* The boys made out themselves/each other to be idiots.

(xx)　　A letter to Mary$_1$ about herself$_1$.

Since reanalysis is clearly not involved in (xx), examples of this sort appear to argue that reanalysis is not a precondition on binding out of PP. (I would like to thank Richard Larson for drawing my attention to this issue.) The argument is, however, weakened by the observation that reflexives in this configuration behave as logophors (Pollard and Sag, 1992; Reinhart and Reuland, 1993):

(xxi)　　Letters about herself$_1$ frighten Mary$_1$.

(xxii)　　Mary$_1$ was worried. A private letter about herself$_1$ was circulating.

Since logophors need not be structurally bound at all, the lack of c-command in (394) will not prevent the reflexive receiving the indicated interpretation. (See also §3.4.1.)

Lasnik takes (395) to show that an ECM subject cannot be bound by an antecedent in the matrix clause unless it raises overtly to matrix [Spec,V-AgrP]. This suggests that only overt A-movement is sufficient to license new binding configurations. This conclusion has been challenged by Craenenbroeck and Dikken (2006), who point to Lasnik's (2001b) observation that covert raising in (395b) can be analyzed not as the presence of a weak Agr, but rather as the complete absence of a separate Agr projection. Thus, the data in (395) do not rule out the possibility that covert A-movement can license new binding configurations, since the anaphor may not undergo A-movement at all in (395b).

3.6.2 *There* existentials

Lasnik (1999, 2001a) also considers the question of whether the associates of *there* expletives can bind from [Spec,TP], as might be expected if associates move covertly to replace or adjoin to the expletive (Chomsky, 1986, 1995). On the basis of contrasts such as (396), he concludes that covert movement does not feed binding:

(396)   a.   The DA proved [two men$_1$ to have been at the scene] during each other$_1$'s trials.

  b.   * The DA proved [there to have been two men$_1$ at the scene] during each other$_1$'s trials.

This argument depends on an analysis of existential constructions in which the associate of *there* raises to subject position at LF. Though there have long been alternatives to this kind of analysis (see e.g. Williams 1994), these alternatives were not straightforwardly compatible with early Minimalist assumptions. In particular, given the assumption that agreement is established in a Spec-Head configuration, it was difficult to see how the subject/verb agreement pattern illustrated in

(397) could be explained unless the postverbal DP ended up in subject position:

(397)   There *is/are three men in the room.

More recent work has shown that covert raising of the associate is not the only possible analysis. An alternative hypothesis is that *there* itself bears ϕ-features valued by those of the subject. This is proposed in the doubling analysis of *there* existentials presented in Hornstein and Wiktos (2003), Hornstein (2009, 139). According to this analysis, an existential sentence such as (398a) has the derivation in (398b):

(398) a.   There is a man in the room.

       b. $[_{TP}$ There$_1$ is $[_{vP}$ $[_{?P}$ t_1 [a man]] in the room]]

The doubling relation allows ϕ-features on *there* to be valued by those of [a man]. When *there* subsequently raises to T, the ϕ-features of *there* value those on T. Since no direct relation is established between T and [a man], I do not expect [a man] to behave as if it c-commands the region of the tree c-commanded by T. Binding is therefore predicted to be impossible in (396b), as desired.

3.7   Typological remarks

3.7.1   Preposition stranding

Reanalysis has been claimed by some authors (e.g. Hornstein and Weinberg 1981) to account for preposition stranding under *wh*-movement:

(399)   Who did John talk to *t*?

I do not think that reanalysis is involved in the derivation of P-stranding. However, it seems likely that both phenomena are linked to a language's ability to use

P-Agr complexes to assign Case to prepositional complements.[35]

Abels (2003) presents an account of P-stranding based on the hypothesis that P is a phase head only in non-P-stranding languages. If P is a phase, it follows that any *wh*-phrase extracted from a PP must move through [Spec,PP]. But Abels argues that movement of P's complement to its specifier violates an anti-locality condition on movement. It follows that preposition stranding is possible only when P is not a phase (so that the *wh*-phrase is not obliged to stop off in [Spec,PP]). Abels also mentions a variant of this analysis according to which P is a phase head in all languages (p. 227). In this version of the analysis, the locus of variation is the presence or absence of an additional projection within PP. If this projection is present, then movement of the complement of P to [Spec,PP] does not violate anti-locality, and preposition stranding is permitted:

(400) a. * [$_{PP}$ wh [$_{P'}$ P t]]

   (Non-preposition-stranding language; movement from the complement of P to [Spec,PP] violates Anti-locality.)

   b. [$_{PP}$ wh [$_{P'}$ P [$_{XP}$ ... t]]]

   (Preposition stranding language; presence of XP circumvents Anti-locality.)

Let us attempt to situate Abels' second proposal within the analysis of prepositional phrases presented in this chapter. I have argued that there is an Agr projection above PP in English. Adapting Abels' analysis in (400), we might suppose that only P-stranding languages have this Agr projection above P. That is, languages without preposition stranding have the structure shown in (401a), whereas languages with preposition stranding have the structure shown in (401b):

(401) a. * wh ... [$_{\textbf{PP}}$ t [$_{P'}$ P t]]

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[35] See Truswell (2009) for another attempt to link preposition stranding to pseudopassivization without implicating reanalysis in both (or indeed either, in his case).

> > *(Movement of the wh-phrase violates anti-locality – non-preposition-stranding language.)*
>
> b.   wh ... [$_{\textbf{AgrP}}$ t [$_{\text{Agr}'}$ Agr [$_{\text{PP}}$ ... t]]]
>
> > *(Movement of the wh-phrase respects anti-locality – preposition-stranding language.)*

In (401a), P assigns Case directly to its complement (the *wh*-phrase); in (401b), it assigns Case in association with Agr. Just as in Abels' original analysis, we can appeal to anti-locality to rule out the movement in (401a). However, since the framework of this dissertation does not include phases, we cannot use phase theory to *force* the *wh*-phrase to move via [Spec,PP]. Some other condition must therefore be found to play the role of the Phase Impenetrability Condition. One possibility is a condition on $\overline{\text{A}}$-movement requiring the use of all available intervening $\overline{\text{A}}$-positions. Since the complement of P is an A-position (it is a θ position), it follows from the generalizations stated in §1.2.12 that [Spec,PP] is an $\overline{\text{A}}$-position. *Wh*-movement from P's complement is therefore required to go via [Spec,PP] in (401a), but this violates anti-locality.[36] In (401b), by contrast, where there is an Agr projection above the PP, the complement of P first undergoes A-movement to [Spec,AgrP] before undergoing any subsequent $\overline{\text{A}}$-movement. Since

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[36] It might be objected that there is something rather unnatural about stating the requirement that intervening $\overline{\text{A}}$-positions not be skipped in such a manner that a position which is inaccessible due to anti-locality is still taken into consideration. I think this is a reasonable objection. I will only note here that a similar objection applies to Abels' original analysis. Anti-locality is quite natural when understood as a side-effect of Greed or Enlightened Self-Interest – if a phrase is the complement of a head, it presumably cannot check any additional features by moving to the specifier of the same head. However, if we assume that intermediate steps in successive-cyclic movement are not (necessarily) driven by feature checking, then it is unclear why movement of P's complement to its specifier should, when it is an intermediate step in a successive-cyclic movement, violate anti-locality.

A-movement is not required to stop off in intervening $\overline{\text{A}}$-positions, there is no requirement that this movement pass via [Spec,PP], and anti-locality can be obviated.

We now see that both preposition stranding and reanalysis require Agr to project a head separate from P. As mentioned in the introduction, pseudopassivization is attested in a proper subset of those languages which permit preposition stranding. This is to be expected given that pseudopassivization requires a v/V-medial Agr head bearing P-features. The availability of independent Agr projections bearing P-features is necessary, but not sufficient, to ensure that v°s able to select an Agr° head.

3.7.1.1   Abels (2003) on pseudopassives

Abels (2004) does not give a detailed analysis of pseudopassivization, but he hypothesizes that languages with pseudopassives have P heads which assign Case only optionally. Abels notes that this analysis – unlike reanalysis accounts – does not have "the virtue [of capturing] the fact that there needs to be a close relation between the verb and the preposition to allow pseudopassives..." (p. 246). Abels' theory also fails to explain why there are no "pseudo-unaccusatives" or "pseudo-middles":[37]

(402)   * [This bed]$_1$ was died in t_1.

        (Unaccusatives cannot pseudopassivize.)

(403)   a.   Paper cuts easily.

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[37] I thank members of the audience at a 2011 LSA talk for pointing out the significance of unaccusatives in this connection. The absence of pseudo-middles is noted by Fagan (1988) and Postal (2011), amongst others. See Abels (2003, 234fn141) for a very brief discussion of overgeneration with pseudopassives. This discussion does not, so far as I can see, consider the cases in (402)-(403).

(Ordinary middle.)

    b.   * Paper cuts through easily.

        (Impossible "pseudo-middle.")

On my analysis, (402) and (403b) are impossible because the passive morpheme is crucially implicated in removing the Case-assigning powers of a reanalyzed preposition. Given Abels' assumptions, the only function of the passive morpheme in pseudopassives is to suppress the external argument. The Case-assigning powers of the preposition are removed by an independent (and optional) process. This predicts, all else being equal, that impersonal pseudopassives such as (404) should be possible in English:

(404)   * It was spoken to John.

Abels does not attempt to explain why (404) is out in English. However, he argues that it is not clear how serious a problem this sort of overgeneration is for his theory, given that impersonal passives are attested in many other languages (p. 234fn141). While this is of course true, it should be noted that many attempts to explain cross-linguistic variation in the availability of impersonal passives have focused precisely on cross-linguistic differences in the Case-absorbing role of the passive morpheme (see e.g. Baker, Johnson, and Roberts 1989, 234, Svenonius 2001, 9). Abels' account of pseudopassives appears to shut off this promising line of analysis.[38]

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[38] In a modification of Abels' analysis, Truswell (2009) proposes that V may assign Case to the complement of P when P does not assign Case. Thus in pseudopassives (where P does not assign Case), the addition of the passive morpheme to V is required to prevent P's complement receiving Case from V. It is not entirely clear that (404) is blocked on this account, since some further condition preventing the passive morpheme from vacuously absorbing Case would be required. (Otherwise, we are free to choose a Case-assigning P in (404), and the passive morpheme will harmlessly absorb V's accusative Case, which would not have been assigned to anything any-

3.7.2 Binding out of PP

Binding out of PP appears to be possible in some languages which have neither preposition stranding nor pseudopassivization. For example, the Spanish reflexive *si mismo/a* can be bound by an antecedent contained in a PP (Demonte, 1987, 151):

(405)   Juan$_1$ le$_2$ habló a Jorge$_2$ de   si mismo$_{1/2}$.
         John him spoke to George about himself.
         'John spoke to George about himself.'

Moreover, as in English, $\overline{\text{A}}$-movement of the relevant prepositional phrase blocks binding by the object (compare (325) above):

(406)   a.   [A quién$_2$] le   habló Juan$_1$ t$_{PP}$ de   si mismo$_{1/*2}$.
             To whom   him spoke John   about himself.
             'To whom did John speak about himself.'

        b.   [A Jorge$_2$] Juan$_1$ le$_2$ habló t$_{PP}$ de   si mismo$_{1/*2}$.
             To George John him spoke   about himself.
             'To George John spoke about himself.'

As in the case of the corresponding English examples, the data in (406) suggest that reanalysis is implicated in (405). Since Spanish has neither pseudopassivization nor preposition stranding,[39] it seems that the mere availability of reanalysis cannot be sufficient to guarantee the possibility of preposition stranding and pseudopassivization. Conversely, I know of no languages which have preposition stranding or pseudopassivization but which do not permit binding out of PP (except where this is independently explained by the subject-orientation of the relevant anaphor). Thus, these phenomena appear to stand in the following

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way.) A condition of this sort would not obviously follow on general "economy" grounds, since the passive morpheme in (404) would still serve the useful purpose of suppressing the external argument.

[39] Though on preposition stranding in Spanish, see Campos (1991).

implicational hierarchy:

(407)   Pseudopassivization $\Rightarrow$ preposition stranding $\Rightarrow$ binding out of PP.

The second implication is expected for the reasons outlined in the preceding sub-section; the first is more problematic. If Spanish has binding out of PP then it must permit reanalysis. But the availability of reanalysis ought to license pseudopassivization – and if (407) is correct, pseudopassivization implies preposition stranding. What all this suggests is that the complements of Spanish prepositions may undergo covert A-movement to a v/V-medial position, but that this movement is not predicated on formation of a complex P-Agr head.

I suggest that in languages such as Spanish, P's complement raises solely in order to check an EPP feature. More precisely: the v/V-medial Agr head has no 'P' feature that needs to be checked, assigns no Case, and has only the requirement that its specifier be filled by a phrase bearing ϕ-features. The idea here is that a "bare" Agr head has the following properties as compared to a complex formed of Agr and a lexical head:

(408)   For λ a lexical head:

Agr	Requires a phrase bearing ϕ-features in its specifier.
Agr + λ	Requires a phrase bearing ϕ-features in its specifier **and** assigns a structural Case determined by λ to this phrase.

Given these assumptions, the DP complement of a Spanish preposition may receive Case from the preposition and then undergo covert A-movement to check the EPP feature of a v/V-medial bare Agr head. As in English, this places the DP in a position where it can c-command into VP-adjoined phrases on its right. Similarly, fronting of the preposition blocks covert movement of the DP to [Spec,AgrP], so the contrast in (406) is accounted for. The bare Agr head is not involved in Case assignment, so passivization of the verb cannot have the effect of leaving P's

complement without Case. Pseudopassivization is therefore impossible. Similarly, since the case position for the DP remains the complement of P, preposition stranding is also ruled out in Spanish.

Chapter 4

Merge over Move

4.1 Terminological note

The term "successive-cyclic movement" will be used to refer to any movement which passes through more than one position. So for example, raising of a *wh*-phrase to [Spec,Agr], followed by movement to matrix [Spec,CP], counts as an instance of successive-cyclic movement according to this way of talking. The formalism defined below makes no distinction between this case and, e.g., movement through multiple +Q specifiers of C.

Given a tree T, a "treelet" of T is a set of nodes t such that there is no node which does not belong to t yet both dominates a node of t and is dominated by a node of t. Thus, all subtrees of T are treelets of T, but not vice versa.

4.2 Introduction

We have seen that Merge over Move is a global economy condition. The use of such economy conditions in early Minimalist work gave rise to a number of of criticisms. These can be divided roughly into two classes: claims that global economy conditions were not stated with sufficient precision, and claims that economy conditions led to an unacceptable explosion in computational complexity. Both classes of criticism are exemplified in Johnson and Lappin (1997).

The aim of this chapter section is to show that Merge over Move, as applied within the syntactic framework of the preceding chapters, can be stated precisely and without adverse computational effects. Recent work in mathematical linguistics allows this goal to be achieved largely with the use of "off the

shelf" technology. Thus, there will be no original mathematical results presented in this chapter. Rather, I will show that it is possible to construct a formal specification of the relevant parts of the syntactic framework, and that it is possible to construct this specification in such a way that the resulting class of grammars is known to generate string languages within the class of Mildly Context-Sensitive (MCS) string languages. Although some caution should be exercised in making inferences from the recognition properties of the string language,this does suggest that there is nothing fundamentally intractable about Merge over Move.

The key insights that I will make use of are those of Rogers (1998), Morawietz (2003), and Graf (2010, 2011). Rogers' monograph was an important development in what it is now frequently referred to as *model-theoretic* syntax. This is, broadly speaking, the approach to syntactic theorizing in which grammars (or classes or grammars) are specified in terms of a set of *constraints* over structures. Structures which meet all of a grammar's constraints are *models* of that grammar. Rogers' key insight is that many of the constraints to be found in grammatical theories can be concisely stated over trees using *weak monadic second-order predicate logic* (henceforth "MSO"). This is first-order logic supplemented with quantification over finite subsets of the domain. Rogers defines a form of MSO extended with binary predicates ("dominates", "precedes", etc.) for stating constraints over trees. He shows, via a result of Rabin (1969), that the class of trees definable in this logic is the *regular tree languages*.

There is a very close – but not quite exact – correspondence between the regular tree languages and the derivation tree languages of context free grammars. Roughly speaking, for any regular tree language *L*, it is possible to define a context-free grammar whose derivation tree language is *L* (and hence whose string language is the string yield of *L*). There is, however, an important caveat. For obvious reasons, the derivation trees of context-free grammars are strictly

local, in the sense that they can be verified as licit by comparing the labels of each non-leaf node and its children with the production rules of the CFG. In contrast, regular tree languages may have non-local conditions on node labeling. For example, Rogers (1998) gives the example of the regular tree language L_{AB} consisting of all finite binary $\{A, B\}$-labeled trees such that exactly one node is labeled B. Since L_{AB} clearly includes trees in which B is dominated by A, any CFG which generated L_{AB} as its derivation tree language would have to include the rule $A \rightarrow AB$ (amongst others). But then, since this rule permits any A-node to have a B-node as a child, there would be nothing to prevent the generation of trees containing multiple B nodes. It is nonetheless easy to show that L_{AB} is a regular tree language. The extension of the Myhill-Nerode theorem to regular tree languages (Gécseg and Steinby, 1984) gives us (409):

(409)   A set of trees T is a regular tree language iff there is a congruence R of the corresponding term algebra such that R defines a finite set of equivalence classes and T is equal to the union of zero or more of these equivalence classes.[1]

The term algebra corresponding to a regular tree language L is the term algebra with function symbols f of rank n for every f-labeled n-branching node of a tree in L, together with constant symbols c for every c-labeled leaf node.[2] The terms of an algebra can be represented as trees – see (410) for an example – and from now on we will implicitly move back and forth between terms and trees.

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[1] A congruence of an algebra $\mathcal{A}$ is an equivalence relation which is invariant with respect to the operations of $\mathcal{A}$. An equivalence relation is a reflexive, transitive and symmetric relation. An equivalence relation R over the domain of $\mathcal{A}$ is invariant with respect to the operations of $\mathcal{A}$ iff for every n-ary operation of $\mathcal{A}$, $R(f(a_1, \ldots, a_n), f(b_1, \ldots, b_n))$ for all $a_1, \ldots, a_n, b_1, \ldots, b_n$ such that $R(a_i, b_i)$ for all $0 < i \leq n$.

[2] Gécseg and Steinby do not set things up in precisely this manner. In their presentation, the labels of unary nodes correspond to variables rather than constants.

(410)

$$f(g(x,y),h(y,z))$$

$$
\begin{array}{c}
f \\
\diagup \quad \diagdown \\
g \qquad h \\
\diagup \diagdown \quad \diagup \diagdown \\
x \quad y \quad y \quad z
\end{array}
$$

Returning now to the case of L_{AB}, note that all subtrees of trees in L_{AB} fall into one of two classes: (i) those which contain exactly one node labeled B, and (ii) those which contain no node labeled B. To define a congruence over the term algebra, we will need to consider a third class of trees not in L_{AB}: (iii) trees which contain more than one node labeled B. It is easy to verify that the equivalence relation for which (i)-(iii) are the corresponding equivalence classes is a congruence of the term algebra. As an example, consider the case $A_2(x,y)$, for each possible pairing of equivalence classes c, c' such that $x \in c, y \in c'$. If both c and c' are (i), then $A_2(x,y)$ will have two nodes labeled B, so $A_2(x,y)$ will always be in the same equivalence class – (iii). If both c and c' are (ii), then $A_2(x,y)$ will always be in (ii). If both c and c' are in (iii), then $A_2(x,y)$ will always be in (iii). We can proceed in this manner to check exhaustively that for any pairing of c and c', there are equivalence classes d, d' such that for any $x \in c, y \in c'$, $A_2(x,y) \in d$ and $B_2(x,y) \in d'.$[3] This shows that the equivalence relation is a congruence. By (409), it then follows that L_{AB} is a regular tree language.

By contrast, consider the language $L_{A^n B^n}$ consisting of all finite binary $\{A, B\}$-labeled trees such that each tree has the same number of *leaf* nodes labeled A and B. We can show that this is not a regular tree language by showing that there is no suitable congruence of the term algebra. Suppose that $L_{A^n B^n}$ is regular. Then, $L_{A^n B^n}$ is the union of a subset of a finite set of equivalence classes defined by a

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[3] Strictly speaking, we also have to check the constant terms, but this is trivial.

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congruence. Let the expression (a,b) denotes the subset $T \in L_{A^n B^n}$ s.t. T has a A-labeled nodes and b B-labeled nodes. Since the number of equivalence classes is finite, there must be an equivalence class containing both $T \in (a-k, b+k)$ and $T' \in (a+k, b-k)$ for some k. Then both $A_2(T,T)$ and $A_2(T,T')$ must be in the same equivalence class. But then this class contains one tree which is in $L_{A^n B^n}$ (i.e. $A_2(T,T')$) and one tree which is not (i.e. $A_2(T,T)$). Thus, contrary to the initial assumption, there is no subset S of the equivalence classes such that S contains all and only the trees in $L_{A^n B^n}$, and it follows that $L_{A^n B^n}$ is not a regular tree language. This result is worth noting primarily because it is potentially counterintuitive, given that there *is* a CFG for the string language consisting of all permutations of $a^n b^n, n \geq 1$:

(411) $S \rightarrow ab$

          $S \rightarrow ba$

          $S \rightarrow aSb$

          $S \rightarrow bSa$

The derivation tree language of this CFG is a regular tree language, but this only shows that it is possible to define *a* regular tree language with this string yield. The language containing *all* trees with a string yield of this form is non-regular, for the reason just given.

There are a number of advantages to working with trees rather than strings. For one thing, regular tree languages have many of the useful closure properties that context-free string languages lack. These will frequently be exploited in what follows. In addition, tree-languages are a better formal approximation of what we are actually interested in as (generative) linguists: the hierarchical structures made available by the language faculty. In part, the idea that weak generative capacity is of marginal linguistic interest stems from Chomsky's decision to formalize context-free and transformational grammars as string-rewriting sys-

tems. This has the slightly odd consequence that the object of interest (roughly, the tree language[4]) plays second fiddle to the string language, which is only of peripheral linguistic significance. Rather than recovering trees from sequences of strings, it is arguably more natural to define the relevant class of trees directly.

There are a number of different ways of formalizing tree structures. Rogers (1998) uses Gorn tree domains (Gorn, 1967) as his intended models. These are sets of strings in $\mathbb{N}^*$ which can be understood intuitively as paths to nodes from the root. For example, ε is the root, and 210 is the first child of the second child of the third child of the root. Trees can also be viewed as a directed acyclic graphs with labeled edges, with the labels of the edges giving the order of the children. This graph-theoretic conception of trees will be important in §4.6.5.

4.3   Strategy

The overall strategy for showing that (my particular formulation of) Merge over Move is computationally tractable has three steps. The first step is to define a derivation tree language for a toy Minimalist grammar incorporating sideward movement. This derivation tree language is specified by defining a finite-state tree automaton which recognizes it. The second step is to set up a mapping from derivation trees to strings. This mapping is specified using a logical language in such a manner that the resulting string language is known to be within the class of MCS string languages. The third step is to define a a regular tree transduction from a candidate derivation tree to its comparison set for Merge over Move. Why precisely it is helpful to do this cannot be explained until some more background information has been provided in §4.7. However, the key idea, taken from Graf

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[4] Of course, the representations of (say) GB theory appear at first glance to be somewhat richer than trees labeled with a finite alphabet. This may motivate a move to more general graph structures, or to higher dimensional trees (see Rogers 2003 on the latter).

(2010), is that Merge over Move becomes much more tractable when the comparison set is specified in this manner, rather than as the set of all convergent derivations from the same numeration.

It may be worth noting that there is no particular reason for the use of automata in the first and third steps and a logical construction in the second step. The formal properties of trees, strings and the mappings between them have been quite thoroughly investigated, and for any given type of recognizer or transducer, there is typically an equivalent formulation in both logical and automata-theoretic terms. The choice here was made solely on grounds of convenience.

4.4   A Minimalist Grammar incorporating sideward movement

This subsection defines a class of Minimalist grammars, which I will refer to as MGWSM ("Minimalist Grammars with Sideward Movement"). This definition uses a number of ideas from Stabler (1998, 1999, 2001); Stabler and Keenan (2003), and Graf (2010, 2011). Since MGWSMs are designed principally to capture the key properties of derivations involving multiple workspaces and sideward movement, a few shortcuts will be taken in other areas. Thus, the resulting formalism is not quite ready to be taken as a formalized theory to replace the informal grammatical framework assumed in the rest of this dissertation. It is, however, able to deal with a number of core grammatical phenomena. The following are some properties of the formalism which it may be useful to state up front in informal terms:

- Universal Spec-Head-Comp order is assumed. Adjuncts are always on the right.

- There are two basic classes of operation in a derivation:

(i) Unary Merge and Move operations. Merge merges a head at the top of a workspace; Move fills the complement or specifier of a head with a phrase somewhere else in the tree.

(ii) Binary workspace-combining operations. Combination of two workspaces is either interpreted as adjunction, or as merger of one workspace as the specifier of the highest head in the other.

Thus, MGWSM derivation trees are mixed unary/binary-branching trees. A sharp distinction is made between base-generated and derived specifiers.

- No phrase may have more than one specifier. (Having one derived specifier and one base-generated specifier is not permitted.)

- Movement is constrained by a very simple and strong formulation of Minimality: γ cannot move over or out of β if the feature types of γ are an (improper) subset of those of β.

- "Short" movement of the complement of a head to its specifier is prohibited.

- All syntactically active features may be valued under either the Head-Complement configuration or the Spec-Head configuration. (The latter is actually two distinct configurations, given the distinction made between derived and base-generated specifiers.)

- Nesting and crossing dependencies are permitted, movement out of a moved constituent is permitted (but see footnote 19), and remnant movement is permitted. Additional restrictions could be imposed to block some of these, if desired.

- Sideward movement is possible only between positions in the tree which are "neighbors" by the end of the derivation. The following is the relevant definition repeated from chapter 1:

α and β are **neighbors** iff the shortest path from α to β goes along at most one "bad" branch, where a bad branch is a left branch (i.e. a branch between a specifier and the XP node dominating it) or a branch leading from an adjoined element to its host.

- Although the formalism includes adjuncts and movement of adjuncts is permitted, movement *to* an adjoined position cannot be encoded. Thus, as it stands, MGWSMs cannot model, e.g., successive-cyclic movement of *wh*-adjuncts, or extraposition to an adjoined position.

- Head movement is implemented in a rather simple form. Sideward head movement is not possible. Successive-cyclic head movement is permitted, but it is restricted by the requirement that head movement may not cycle through a position of the same category twice. This restriction is imposed to ensure that complex heads can be spelled out using a finite mapping from sequences of lexical items to phonological forms. If the formalism incorporated a more sophisticated morphological component, this restriction could probably be relaxed. Nunes (1995) and Bobaljik and Brown (1997) observe that sideward movement offers an elegant means of making head movement compatible with the extension condition. However, there is no extension condition as such in the present formalism,[5] and at least for the analysis of the core grammatical phenomena of English, there is no clear empirical motivation for sideward head movement.

- Covert movement is not implemented.

- The formalism does not recognize any distinction between A and $\overline{\text{A}}$-movement. Thus, it does not permit the kind of Minimality-violating $\overline{\text{A}}$-movements

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[5] That moved elements generally move to the "edge" of a workspace is ensured by the form of the mapping of derivation trees to strings.

which are assumed in the informal framework of the preceding chapters. This is a fundamental limitation of the formalism, since in cases where movement is permitted to violate Minimality, it is not possible to deterministically identify the moved phrase from its feature specification. It is possible to "fake" the availability of Minimality-violating $\overline{\text{A}}$-movements by introducing additional linguistically-unmotivated features.

- The formalism does not have any notion of a chain, and I have not attempted to formalize the language-specific chain spellout rules postulated in chapter 2. However, the method used for mapping derivation trees to strings in §4.6.5 could easily be extended to allow for full or partial pronunciation of lower copies.

4.5   Informal introduction to MGWSM derivation trees

This subsection provides an informal introduction to MGWSM derivation trees. This is intended to be more accessible than the formal definition of the set of licit MGWSM derivation trees. It should also bring out some of the motivations behind particular features of the formalism.

Let us first consider the special case of derivations which involve only one workspace. On the assumption that complements follow the heads which subcategorize/select for them, these are also the derivations which generate uniformly right-branching structures. We can think of such derivations as sequences of heads, with each head in the sequence taking as its complement a phrase headed by the head to its right. So for example, a more compact representation of the derivation in (412) is (413) (for simplicity the subject is taken to be base-generated in [Spec,TP]):

(412)   Merge(seen$_V$, him$_D$)

$$\to [_{\text{VP}} \text{ seen him}]$$

$$\text{Merge}(\text{has}_{\text{T}}, [_{\text{VP}} \text{ seen him}])$$

$$\to [_{\text{TP}} \text{ has } [_{\text{VP}} \text{ seen him}]]$$

$$\text{Merge}(\text{he}_{\text{D}}, [_{\text{TP}} \text{ has } [_{\text{VP}} \text{ seen him}]])$$

$$\to [_{\text{TP}} \text{ he } [_{\text{T}'} \text{ has } [_{\text{VP}} \text{ seen him}]]]$$

(413) $\text{he}_{\text{D}}, \text{has}_{\text{T}}, \text{seen}_{\text{V}}, \text{him}_{\text{D}}$

Given a fairly restrictive $\overline{\text{X}}$ theory, no information is lost when (412) is represented as (413). For the moment, we will take heads to be pairs consisting of a phonological form and a label. For example, 'him$_{\text{D}}$' in (412)/(413) has the phonological form *him* and the label D.

The derivation tree for the derivation in (412)/(413) is straightforward and corresponds directly to (413).

(414)

$$+\text{he}_{\text{D}}$$
$$|$$
$$+\text{has}_{\text{T}}$$
$$|$$
$$+\text{seen}_{\text{V}}$$
$$|$$
$$+\text{him}_{\text{D}}$$

The '+' signs indicate that the corresponding steps in the derivation are Merge steps.

An MGWSM must be able to impose subcategorization/selection restrictions, so that (e.g.) D cannot take V as its complement. A simple way of doing this is simply to add to each MGWSM a regular expression specifying the permissible sequences of heads in unary-branching treelets of the derivation tree. For example, to specify the range of possible clausal spines with heads C...T...v...V,

the following regular expression could be used:[6]

(415)   ((vV)|(TvV)|(CTvV))+

The expression in (415) allows the simple clausal spines shown in (416), and also permits recursive embeddeding of clauses within clauses, as exemplified in (417):

(416)   a.   C...T...v...V

        b.   T...v...V

        c.   v...V

(417)   C...T...v...V...C...T...v...V...T...v...V...v...V

It is clear that the regular tree languages are closed under intersection with constraints of the following form, for a given regular expression R:

(418)   For any tree T, for any maximal sequence of nodes in T $\eta_1,\ldots,\eta_n, n \geq 1$, such that η_{i+1} is the rightmost[7] child of η_i for $0 < i < n$, R matches the string formed by concatenating the labels of each unary-branching η_i in order.

Thus, we may assume that one component of an MGWSM is a regular expression specifying permissible sequences of heads.

In order to create structures with mixed left/right branching, it will be necessary to permit multiple workspaces to combine. Workspaces always combine in pairs. We can therefore represent the operation of combining two workspaces using a binary branching node in the derivation tree. For example, the vP for a sentence with structurally complex subject such as "the girl saw the boy" will have a derivation along the following lines:

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[6] Where X+ is short for XX*.

[7] "Rightmost" is not quite accurate. When we consider adjunction, this will need to be adjusted slightly.

(419)

$$
\begin{array}{c}
> \\
\diagup \diagdown \\
+\text{the}_{\text{Det}} \qquad +\varepsilon_{\text{v}} \\
| \qquad\qquad | \\
+\text{girl}_{\text{N}} \qquad +\text{saw}_{\text{V}} \\
| \\
+\text{the}_{\text{D}} \\
| \\
+\text{boy}_{\text{N}}
\end{array}
$$
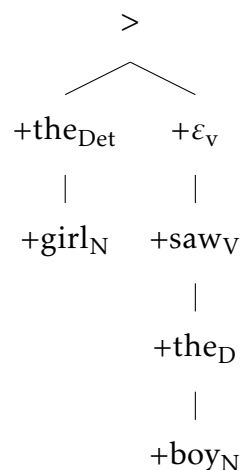
The binary branching node is labeled with $>$. The fact that it is V that projects when the two workspaces merge is encoded by the order of the sisters (the right daughter always projects).

Before considering how movement is encoded in derivation trees, we will need to briefly consider the role of features in driving movement. The theory of features and feature valuation assumed in the preceding chapters is simple and easily formalized. Each MGWSM specifies a finite set Φ of *feature types* (e.g. $\{K, \phi, \theta, \dots\}$) and finite set Υ of *feature values* (e.g. $\{\text{Nom}, \text{Acc}, 2\text{s}, 3\text{pl}, \dots\}$). There is no real need to group the feature values according to the feature types for which they are appropriate. For each feature type $\phi \in \Phi$, there is a corresponding *unvalued feature*, written $\phi_{\_}$, and set of *valued features* $\{\phi[v] \mid v \in \Upsilon\}$.

Each node will now need, in addition to a phonological form and a category label, a set of valued and unvalued features. For example, in (419), both determiners will bear valued θ features which value unvalued θ features on the v and V. In this case, as in many others, the actual values of the valued features are of little interest. I will adopt the convention of using '.' to represent an arbitrary value:

(420)

$$>$$

$+\text{the}_{\text{Det}}\{\theta[.], D[.]\}$ $+\varepsilon_{\text{v}}\{\theta\_\}$

$+\text{girl}_{\text{N}}$ $+\text{saw}_{\text{V}}\{\theta\_\}$

$+\text{the}_{\text{D}}\{\theta[.], D[.]\}$

$+\text{boy}_{\text{N}}$
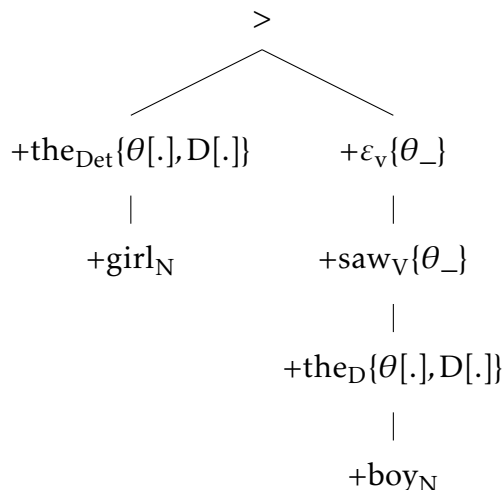
Notice that in the derivation tree, both the verbal heads are shown with unvalued θ features. In other words, the derivation trees capture the moment just before local feature valuation takes place. It is convenient to construct derivation trees in this way because it has the consequence that all of the unary-branching and leaf nodes are labeled with lexical items. (There is no v with valued θ features in the lexicon.)

The simplest case of movement is movement within a unary-branching treelet of the derivation tree. This corresponds to movement to a c-commanding position (i.e. non-sideward movement) As a first example, consider the raising of the object to [Spec,AgrP] to receive Case.The relevant lexical entries are as shown in (421). The determiner is given a valued 'D' feature solely in order to avoid a Minimality violation when it moves over V; this feature plays no interesting role in the derivation.

(421)   a. $\text{saw}_{\text{V}}\{\theta\_\}$

   b. $\text{the}_{\text{D}}\{K\_, \theta[.], D[.]\}$

   c. $\text{girl}_{\text{N}}\{\}$

   d. $\varepsilon_{\text{Agr}}\{K[\text{Acc}]\}$

The derivation tree for raising of the object to [Spec,Agr] is as follows:

(422)
$$\Uparrow^{\{K[Acc],\theta[.]\}} \varepsilon_{Agr} \; \{K[Acc]\}$$
|
$$+saw_V \; \{\theta[.]\}$$
|
$$+the_D \; \{K\_,\theta[.],D[.]\}$$
|
$$+girl_N \; \{\}$$

The root of (422) tree is labeled with $\Uparrow$ instead of +. The arrow indicates that the relevant step in the derivation consists of merger of a head followed by upward movement of another head or phrase to the original head or its specifier. Following Stabler (1999), MGWSMs take advantage of Minimality and the Left Branch Condition[8] to avoid the need to specify in the derivation tree itself *which* phrase undergoes movement. (This would be impossible, since derivation trees must be labeled with a finite alphabet, and there is a potentially unbounded number of moveable heads/phrases.) The phrase which moves is the highest phrase which:

  (i) is dominated by the node labeled $\Uparrow$,

 (ii) is not in or on a left branch, and

(iii) has a set of feature types identical to those of the superscript to $\Uparrow$.

If the phrase meeting these criteria cannot enter into a feature valuation relation with the target, movement is illicit (this may happen if, e.g., both the moved phrase and the target have valued features of the same type). In the example in (422), the phrase to be moved is DP, which has unvalued Case features. The feature set of the DP is copied up to the root node as a right superscript of $\Uparrow$, with the relevant unvalued features replaced by their valued counterparts. Crucially, apart from the feature set, nothing "moves" within the derivation tree itself – *the*

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[8] Ross (1967).

girl stays in its original position. As we will see in §4.6.5, it is the mapping from derivation trees to strings which ensures that *the girl* is pronounced to the left of T. To avoid unnecessary clutter in derivation trees, it will be useful to replace the feature set superscripted on the right of the $\Uparrow$ with a boxed reference to the feature set of the moved item:

(423)
$$\Uparrow^{[1]} \varepsilon_{Agr}\ \{K[Acc]\}$$
$$|$$
$$+saw_V\ \{\theta[.]\}$$
$$|$$
$$+the_D\ \{K\_, \theta[.], D[.]\}^{[1]}$$
$$|$$
$$+girl_N\ \{\}$$

A little care is required in interpreting this notation. The feature set that [1] replaces on the root node of the tree is not in fact *identical* to the feature set of the node labeled by $+the_D$ – rather, it is the set obtained by replacing all the unvalued features in this set which have corresponding valued features in the feature set of the root node. In other words, the feature sets superscripted to the arrows are the feature sets of the moved items *after* they have taken the opportunity to value unvalued features in their new position. The two instances of [1] should not be interpreted as "links" between two nodes in the derivation tree – the tree remains a tree, not a more general graph structure.

Sideward movement is encoded in essentially the same manner as upward movement, but using $\Rightarrow$ instead of $\Uparrow$. The $\Rightarrow$ indicates that the moved phrase is to be the highest phrase which:

(i) is a neighbor of the node labeled $\Rightarrow$,

(ii) is on a non-left branch, and

(iii) has a set of feature types identical to those of the superscript to $\Uparrow$.

Again, the arrow is unlicensed if there is no phrase meeting (i)-(iii) which can also enter into a valuation relation with the node bearing $\Rightarrow$. Sideward movement differs from upward movement in its ability to target both specifier and complement positions. The distinction between movement-to-complement and movement-to-specifier is not, however, explicitly marked in the derivation tree, since the information is easily recoverable. If $\Rightarrow$ attaches to a leaf node, then the movemed element will become the complement of that node (hence pronounced on the right). If $\Rightarrow$ attaches to a non-leaf node, then the moved element will become the specifier of that node (hence pronounced on the left). The $\Rightarrow$ has a right superscript giving the (modified) feature set of the moved item, just like the $\Uparrow$.

The treatement of head movement in the formalism developed here will be rather prefunctory, but adequate for present purposes. Heads may have in their feature sets at most one special "head feature" of the form #κ, where κ is a category label. These features indicate that the head must be targeted by head-movement of the closest head on a non-left branch bearing κ. Since the presence of a # feature on a head unambiguously indicates that it is the target of head movement, there is no need to add any additional diacritic to the derivation tree. Example (424) shows movement of V to v over an intervening Agr phrase. This example also shows the object raising to [Spec,AgrO] to receive Case (as in (423) above):

(424) $+\varepsilon_{\mathrm{v}}\{\#\mathrm{V}, \theta\_\}$

|

$^{[1]}\Uparrow \varepsilon_{\mathrm{Agr}}\ \{\mathrm{K[Acc]}\}$

|

$+\mathrm{saw}_{\mathrm{V}}\ \{\theta[.]\}$

|

$+\mathrm{the}_{\mathrm{D}}\ \{\mathrm{K}\_, \theta[.], \mathrm{D}[.]\}^{[1]}$

|

$+\mathrm{girl}_{\mathrm{N}}\ \{\}$

For each possible complex head, an MGWSM specifies a pronunciation. (Since head movement is constrained by Minimality, and there is a finite bound on the number of syntactic categories, the number of possible complex heads is bounded.)

Adjunction is very similar to merge of a base-generated specifier. Again, a binary-branching node is introduced. The node is labled &, and has the adjoined elment as its right child and the host as its left child. To illustrate the use of adjunction, (425b) shows the derivation for the vP of the example of adjunct control in (425a):

(425)   a.   The boy climbed the tree without [the boy] falling.

b.

$$
\begin{array}{ccc}
& \& & \\
& \diagup \quad \diagdown & \\
\Rightarrow^{[2]} \varepsilon_{\mathrm{v}}\{\#V, \theta\_\} & & +\mathrm{without}_{\mathrm{P}}\{\} \\
| & & | \\
\Uparrow^{[1]} \varepsilon_{\mathrm{Agr}}\{K[\mathrm{Acc}]\} & & +\mathrm{falling}_{\mathrm{V}}\{\theta[.]\} \\
| & & | \\
+\mathrm{climbed}_{\mathrm{V}}\{\} & & +\mathrm{the}_{\mathrm{D}}\{K\_, \theta[.], D[.]\}^{[2]} \\
| & & | \\
+\mathrm{the}_{\mathrm{D}}\{K\_, \theta[.], D[.]\}^{[1]} & & +\mathrm{boy}_{\mathrm{N}}\{\} \\
| & & \\
+\mathrm{tree}_{\mathrm{N}}\{\} & &
\end{array}
$$
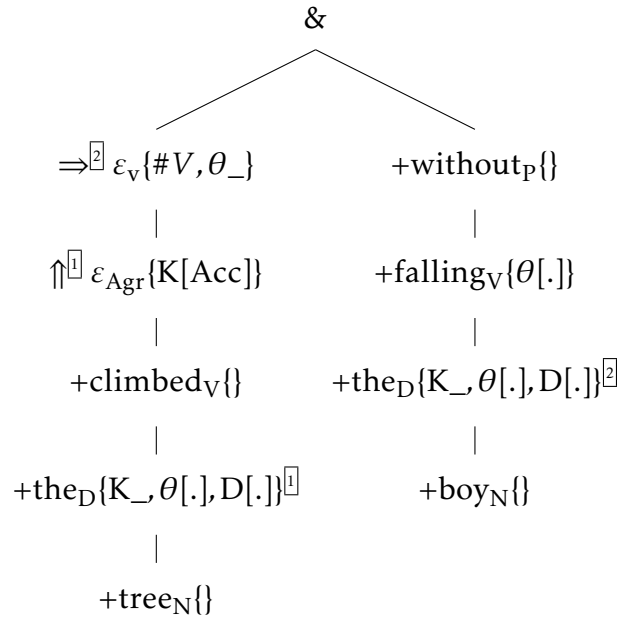
Here, the θ feature of v is valued under (sideward) movement. *Falling* is treated as an unaccusative of some sort (hence the absence of a v node in the adjunct). I have assumed that *without* does not assign Case, but a derivation tree could equally well be given on the assumption that it assigns Case to the small clause headed by *falling*. (The feature valuation conditions, as stated in §4.6, will permit the right daughter of a node labeled > to enter into a feature valuation relation with the mother of >.)

I will end this informal overview of the MGWSM derivation tree language by noting an important constraint on nodes labeled >: no node with this label may dominate another node with this label. This essentially rules out the possibility of a head having multiple base-generated specifiers. It is not absolutely necessary to impose this constraint, but it will save additional fiddling around later. There is no analogous constraint on &. However, there is an additional requirement that > may not dominate & (i.e., adjuncts must always merge after specifiers).

4.6 The MGWSM derivation tree language

This completes the informal overview of the derivation trees of MGWSMs. We can now state the requirements on licit derivation trees more precisely. First, it will be necessary to define the class of MGWSMs itself:

(426)   A MGWSM is a 7-tuple $\langle \Delta, K, \Phi, \Upsilon, \Lambda, R, \Psi \rangle$ where:

Δ is an alphabet (for the string language defined by the MGWSM), which may contain the empty string ε.

K is a set of categories.

Φ is a set of feature types.

Υ is a set of feature values.

Λ is a set of lexical items, where each $\lambda \in \Lambda$ is a 3-tuple of a phonological form (i.e. a member of Δ), a category from K and a possibly empty set of features. Each feature in the set is a member of F, where F is the union of:

(i) "valued phrasal features" $\phi[v]$, for $\phi \in \Phi$ and $v \in \Upsilon$,

(ii) "unvalued phrasal features" $\phi\_$, for $\phi \in \Phi$, or

(iii) "head features" $\#\kappa$, for $\kappa \in K$.

No λ may have a feature set containing more than one member from (iii). We write each λ as $\delta_\kappa\{x_1, \ldots, x_n\}$, where $\delta \in \Delta$, $\kappa \in K$, $n \geq 0$, and each $x_i \in F$.

R is a regular expression over over the alphabet L.

Ψ is a partial function from non-category-repeating[9] non-empty

---

[9] A sequence of (value-extended) lexical items is non-category repeating if no two lexical items in the sequence have the same category.

sequences of valued extensions of lexical items in Λ to Δ.

The definition of Ψ makes use of the term "value extension," which is defined as follows:

(427) λ' is a **value extension** of $\lambda \in \Lambda$ iff every feature in λ' is valued and the set of feature types of λ' is identical to the set of feature types of λ.

F has the subsets F_P, consisting of the union of (i)-(ii) of (426), and F_H, which is (iii). Where convenient, we may conflate the values in F_H with the corresponding categories, and vice versa (i.e., ignore the distinction between κ and $\#\kappa$). The category of a lexical item λ is cat(λ), its phonological form is phon(λ), its feature set is fs(λ), and the sets of its head and phrasal features are fs$_H$(λ) and fs$_P$(λ) respectively. For any set of phrasal features $f \in F_P$, we have the corresponding set of feature types fts(f) $\in \Phi$, which is $\{\phi \mid \phi_- \in f$, or $\phi[v] \in f$ for some $v \in \Upsilon\}$. As we have seen, each node of a MGWSM derivation tree is labeled with either:

(428)   (i)   >, &, or

         (ii)   A head of the form $\langle +, \lambda \rangle$, where $\lambda \in \Lambda$, or

         (iii)   A head of the form $\langle \langle \alpha, f \rangle, \lambda \rangle$

                 where $\alpha \in \{\Uparrow, \Rightarrow\}, f \subset F_P$.

For a node η of type (ii)-(iii), λ is given by lex(η). For a node η of type (iii), α is given by arr(η) and f is given by dfs(η) (the "derived features" of η).

Ideally, we would like to specify the derivation tree language of an MG-WSM in a manner that brings out the "derivational" character of the informal syntactic framework which it attempts to formalize. One way to do this is to define the language in terms of a deterministic bottom-up tree automaton (Gécseg and Steinby, 1984, 60).[10] This approach also has the practical advantage that it

[10] Gécseg and Steinby call these "frontier-to-root recognizers" recognizers rather than "bottom-up tree automata," but I will follow what seems to be the more usual terminology these days. An

makes it possible to allow successive-cyclic movement with very little additional work.

For a given alphabet Σ, a deterministic bottom-up tree automaton (dbut) is a Σ-algebra $\mathcal{A}$ over a state set Q, with a set $Q_f \subset Q$ of final states.[11] The dbut accepts a tree t iff $t^{\mathcal{A}} \in Q_f$ (when t is understood to be a term of $\mathcal{A}$).

In the case at hand, Σ will contain rank 2 function symbols > and &. In addition, both a rank 1 and constant symbols will be added for each node label of the form specified in (428ii), there will be a rank 1 function symbol for each $\Uparrow$ node, and both a rank 1 symbol and a constant symbol for each $\Rightarrow$ node.

Minimality, the Left Branch Condition and the Adjunct Island Constraint conspire to ensure that, at any given stage in a Minimalist derivation, there is a finite upper bound on the number of accessible phrases with unchecked/unvalued features.

Consider first the case of single workspaces (i.e. unary-branching treelets of the derivation tree). We must keep track of all feature sets of nodes in the workspace which (i) contain unvalued features and (ii) are not dominated by another node which is an intervener w.r.t. Minimality. If a $\Uparrow$ node is subsequently merged in the workspace, this information will be sufficient to determine whether or not it is licensed. Now consider the case of sideward movement. At

initial attempt at defining the class of MGWSM derivation trees made use of constraints stated directly over the trees in a form of weak monadic second order predicate logic. This was workable, and the constraints could be stated quite concisely and transparently. However, the essential simplicity of the constraints was obscured by complications required to state the conditions on successive-cyclic movement in representational terms. There was also a rather large intuitive distance between the logical formulae and the informal syntactic framework which they formalized. For this reason, it was questionable the extent to which the formalism captured the spirit of the informal framework.

[11] Some aspects of the presentation here follow that of Comon et al. (2008).

the point in a derivation where a $\Rightarrow$ node is merged, we cannot know whether not not it is licensed. This check must wait until the first $>$ or $\&$ node is merged. (Since sideward movement is only possible between neighboring workspaces, we need only wait for the *first* such node to be merged.) Thus, we must also keep track of the features superscripted to each $\Rightarrow$. We must also be sure to handle feature-valuation in base-generated configurations. This can be accomplished simply by storing the feature set of the "current head."

Given the preceding discussion, the states of our automaton will consist of q_*, which is a special "crash" state, together with additional states of the following form:

(429) $\langle m, s, c \rangle$, where

> $m \subset \mathcal{P}(F_P)$
>
> > (feature sets of phrases accessible to movement).
>
> $s \subset \mathcal{P}(F_P)$
>
> > (feature sets for as-yet-unresolved sideward movements)
>
> $c \subset F$
>
> > (feature set of the "current head")

The set of final (i.e. accepting) states will be defined at the end of this section. The automaton will be constructed in such a way that it always remains in the q_* state once it enters it. Given a variable q over the states in Q, we write $m(q)$, $s(q), c(m)$, to denote the relevant elements of q (in the case where $q \neq q_*$). We will ignore the following features of MGWSMs in the construction of the automaton:

(i) Head movement

(ii) The role of R.

(iii) The ban on the right child of a $>$-labeled node being labeled with an arrow.

(iv) The ban on a >-labeled node dominating a >-labeled node.

(v) The ban on a >-labeled node dominating a &-labeled node.

It is obvious that a dbut is capable of handling these parts of the grammar, and it would only confuse things unnecessarily to jumble up the machinary for dealing with (i)-(v) with the core machinary of syntactic feature valuation and phrasal movement. These features of the grammar will be dealt with briefly in §4.6.2.

The constant symbols, with the exception of those for $\Rightarrow$ nodes, are defined together with their interpretations in (430). I will use subscripts to indicate the rank of a symbol (0 for constants).

(430)

$$\langle +, \lambda \rangle_0 \qquad \mapsto \langle \{\}, \{\}, \mathrm{fs_P}(\lambda) \rangle \qquad \text{for all } \lambda \in \Lambda$$

Inserting a lexical item λ into a workspace amounts to setting the feature set of the "current head" c to the feature set of that lexical item, initializing the set of accessible head movement categories to λ's category, and initializing all the other contextual state information to null values.

Next to be considered are the rank 1 function symbols for each $\langle +, \lambda \rangle$. These determine whether the new head enters into a valuation relation with the head below it. If so, the new value of c must be adjusted to take this valuation into account (we cannot simply copy the feature set of the lexical item). The features of the lower head are now available for movement (since the movement would no longer be "short") and so they must be pushed over to m. In order to implement Minimality, it is necessary to remove from m any set of features f such that the feature types of $\mathrm{fs_P}(\lambda)$ are an (improper) superset of the feature types of f. These are the feature sets of nodes which no longer have any hope of being moved,

since they are dominated by nodes which have at least all of their feature types and possibly more.[12] If the new head bears any head features, we must see if these can be satisfied by one of the accessible heads lower down. If not, we go over to q_*. It will be useful to define the *valuation* of a feature set f with another feature set f':

(431)

$$\mathrm{val}(f, f') = \quad \{x \in f \mid x \text{ is valued}\} \cup$$

$$\{x \in f' \mid x \text{ is valued and there is an unvalued}$$

$$\text{feature of the same type in } f\}$$

We also define the predicates $\mathrm{block}(f_1, f_2)$ and $\mathrm{hasun}(f)$:

(432) $\mathrm{block}(f_1, f_2)$ iff the feature types of f_1 are an (improper) superset of those of f_2.

(433) $\mathrm{hasun}(f)$ iff f contains one or more unvalued features.

The rank 1 function symbols and their interpretations can now be given for the case where $\alpha = +$. For all $\lambda \in \Lambda$:

---

[12] As we will see shortly, it is important to remove these feature sets incrementally with each Merge step, because this ensures that if there are $f_1, f_2 \in \mathrm{m}(q)$ such that $f_1 \subseteq f_2$, then f_1 must have merged later than f_2. In other words, we can make good use of the partial order defined by $\subseteq$ over $\mathrm{m}(q)$, which would otherwise convey little information about the derivation.

(434)

$$\langle +, \lambda \rangle_1 (q_*) \mapsto q_*$$

$$\langle +, \lambda \rangle_1 (q \neq q_*) \mapsto \langle \{\mathrm{val}(\mathrm{c}(q), \mathrm{fs_P}(\lambda))\} \cup$$

$$\{f \mid f \in \mathrm{m}(q) \text{ and } \neg \mathrm{block}(\mathrm{fs_P}(\lambda), f)\},$$

$$\mathrm{s}(q),$$

$$\mathrm{val}(\mathrm{fs_P}(\lambda), \mathrm{c}(q)) \rangle$$

$$\text{if } \neg \exists f \in \mathrm{m}(q) \, [\mathrm{hasun}(f) \wedge \mathrm{block}(\mathrm{fs_P}(\lambda), f)]$$

$$\text{otherwise} \mapsto q_*$$

The if clause ensures that the derivation crashes if we "hide" a phrase with un-valued features.

Let us now consider sideward movement. Essentially, all we need do for a node labeled $\langle \langle \Rightarrow, f \rangle, \lambda \rangle$ is put the feature set f into storage. There is, however, one question: what do we do if $\mathrm{s}(q)$ already contains the feature set f? Certainly, this is a possible scenario in the intuitive syntactic framework of the preceding chapters, For example, in workspace 1 we merge two featurally identical phrases α and β, then in workspace 2, we merge heads α^H and β^H which can enter into valuation relations with α and β. After merger of α^H, α can move sideward to become α^H's specifier or complement, and after merger of β^H, β can move side-ward to become β^H's specifier. There is no reason to suppose that any of these movements should violate Minimality, under the usual understanding(s) of this condition. It seems, though, that within the formal system, we need to impose some kind of Minimality-like condition here, since $\mathrm{s}(q)$ cannot be a stack or mul-tiset of unbounded size. The obvious choice is a condition requiring that no node labeled $\langle \langle \Rightarrow, f \rangle, \lambda \rangle$ may be added to a workspace if $\mathrm{s}(q)$ contains a blocking fea-

ture set for f, or if f is a blocking feature set for some member of $s(q)$.[13] It is unfortunate that it is necessary to impose a condition within the formal system which has no obvious motivation within the conceptual framework of the intuitive system. However, the constraint appears to be empirically innocuous, in the sense that there appear to be no analyses in the literature on sideward movement that make use of derivations which violate it.

With all this in mind, we can define the rank 0 and 1 function symbols and their interpretations for the case where α is $\langle \Rightarrow, f \subseteq F \rangle$. For all $\lambda \in \Lambda$:

(435)

$$\langle \langle \Rightarrow, f \rangle, \lambda \rangle_0 \mapsto \langle \{\}, \{f\}, \mathrm{fs_P}(\lambda) \rangle$$

$$\langle \langle \Rightarrow, f \rangle, \lambda \rangle_1 (q_*) \mapsto q_*$$

$$\langle \langle \Rightarrow, f \rangle, \lambda \rangle_1 (q \neq q_*) \mapsto \langle \{\mathrm{val}(c(q), \mathrm{fs_P}(\lambda))\} \cup \{\mathrm{val}(f, \mathrm{fs_P}(\lambda))\} \cup$$

$$\{f' \mid f' \in m(q) \text{ and } \neg \mathrm{block}(\mathrm{fs_P}(\lambda), f')\},$$

$$s(q) \cup \{f\},$$

$$\mathrm{val}(\mathrm{fs_P}(\lambda), c(q) \cup f) \rangle$$

$$\text{if } \neg \exists f' \in s(q)[\mathrm{block}(f, f') \vee \mathrm{block}(f', f)],$$

$$\text{and } \neg \exists f' \in m(q)[\mathrm{hasun}(f') \wedge$$

$$(\mathrm{block}(f, f') \vee \mathrm{block}(\mathrm{fs_P}(\lambda), f'))]$$

$$\text{otherwise} \mapsto q_*$$

Some of this is the same boilerplate in (434). The differences are that (i) the feature set of the moved phrase (modulo valuation) is added to $m(q)$ so that subse-

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[13] This is a stronger condition than is really required – we could just require that $f \ni s(q)$ – but it is in line with the strong formulation of of Minimality which constraints other aspects of movement.

quent successive-cyclic movement is possible, (ii) f is added to $s(q)$, (iii) we check that f does not "hide" any phrases with unvalued features, and (iv) the new value for c is influenced by f, since features in the derived specifier may value features of the head (and vice versa).

We can now move on to the rank 1 fuction symbols for $\alpha = \langle \Uparrow, f \subseteq F \rangle$. When a $\Uparrow$ node is introduced, it must check to see if $f \in m(q)$, and if it is, check that f is not blocked by another $f' \in m(q)$. If a Minimality violation is detected, the automaton moves immediately to q_*. Otherwise, $m(q)$ must be updated to reflect the valuation that has taken place. The following defines the rank 1 function symbols and their interpretations for the case where $\alpha = \langle \Uparrow, f \subseteq F \rangle$. For all $\lambda \in \Lambda$:

(436)

$$\langle \langle \Uparrow, f \rangle, \lambda \rangle_1 (q_*) \mapsto q_*$$

$$\langle \langle \Uparrow, f \rangle, \lambda \rangle_1 (q \neq q_*) \mapsto \langle \{\text{val}(c(q), \text{fs}_P(\lambda))\} \cup \{\text{val}(f, \text{fs}_P(\lambda))\} \cup$$

$$\{f' \mid f' \neq f, f' \in m(q) \text{ and } \neg \text{block}(\text{fs}_P(\lambda), f')\},$$

$$s(q),$$

$$\text{val}(\text{fs}_P(\lambda), c(q) \cup f)\rangle$$

$$\text{if } f \in m(q) \text{ and } \neg \exists f' \in m(q)[\text{block}(f', f)],$$

$$\text{and } \neg \exists f' \in m(q) \, [\text{hasun}(f') \wedge$$

$$(\text{block}(f, f') \vee \text{block}(\text{fs}_P(\lambda), f'))]$$

$$\text{otherwise} \mapsto q_*$$

The rank 2 function symbols > and & have the following interpretations:

(437)

$$>(q_*, q) \quad\quad\quad\quad \mapsto\; q_*$$

$$>(q, q_*) \quad\quad\quad\quad \mapsto\; q_*$$

$$>(q_1 \neq q_*, q_2 \neq q*) \quad \mapsto\; \langle\;\; \{\mathrm{fs_P}(q_1)\} \;\cup\; \{f \in \mathrm{fs_P}(q_2) \mid \neg\,\mathrm{block}(\mathrm{fs_P}(q_1), f\},$$

$$\mathrm{s}(q_2),$$

$$\mathrm{val}(\mathrm{fs_P}(\lambda), \mathrm{c}(q_2) \cup f)\rangle$$

$$\text{if } \neg\exists f \in \mathrm{m}(q_2)\,[\mathrm{hasun}(f) \wedge \mathrm{block}(\mathrm{c}(q_1), f)]$$

$$\text{otherwise } \mapsto\; q_*$$

$$>(q_*, q) \mapsto q_*$$

$$>(q, q_*) \mapsto q_*$$

$$>(q_1 \neq q_*, q_2 \neq q*) \mapsto \langle\;\; \{\mathrm{fs_P}(q_1)\} \;\cup\; \{f \in \mathrm{fs_P}(q_2) \mid \neg\,\mathrm{block}(\mathrm{fs_P}(q_1), f\}$$

$$\mathrm{s}(q_2),$$

$$\mathrm{val}(\mathrm{fs_P}(\lambda), \mathrm{c}(q_2) \cup f)\rangle$$

$$\text{if } \neg\exists f \in \mathrm{m}(q_2)\,[\mathrm{hasun}(f) \wedge \mathrm{block}(\mathrm{c}(q_1), f)]$$

$$\text{otherwise } \mapsto\; q_*$$

(438)

$$\&(q_*, q) \mapsto q_*$$

$$\&(q, q_*) \mapsto q_*$$

$$\&(q_1 \neq q_*, q_2 \neq q*) \mapsto \langle \mathrm{m}(q_1), \mathrm{s}(q_1), \mathrm{c}(q_1)\rangle$$

Finally, the set of accept states can be defined as follows:

(439)

$$Q_f = \{q \in Q \mid \neg \exists f \in \mathrm{m}(q)[\mathrm{hasun}(f)] \wedge$$

$$\mathrm{s}(m) = \{\} \wedge$$

$$\neg\, \mathrm{hasun}(\mathrm{fs}_\mathrm{P}(\mathrm{c}(m)))\}$$

This simply requires that there be no unvalued features remaining at the end of the derivation. (Since we periodically check that no phrases with unvalued features have been "hidden," this is sufficient.)

4.6.1   Value blindness

The automaton defined in the preceding subsection implements the logic for the "value blind" syntax assumed in this dissertation. Whether or not a movement is licit is determined solely by the feature *types* of the target and the moved phrase (together with Minimality, the Left Branch Condition, etc.) However, it would be easy to modify the automaton to impose the more orthodox requirement that each individual movement must lead to the valuation of at least one previously unvalued feature.

4.6.2   The regular expression R and head movement

A dbut for checking that conditions on head movement are satisfied can be defined as follows. The states are the crash state q_* together with $\mathcal{P}(K)$.

(440)

$$\langle \alpha, \lambda \rangle_0(q_*) \ \mapsto \ q_*$$

$$\langle \alpha, \lambda \rangle_0(q \neq q_*) \ \mapsto \ \{\mathrm{cat}(\lambda)\} \text{ or } q_* \text{ if } \lambda \text{ has a } \# \text{ feature.}$$

$$\langle \alpha, \lambda \rangle_1(q_*) \ \mapsto \ q_*$$

$$\langle \alpha, \lambda \rangle_1(q \neq q_*) \ \mapsto \ (q \cup \{\mathrm{cat}(\lambda)\}) \setminus \{\kappa \mid \#\kappa \in \mathrm{fs}_H(\lambda)\}$$

$$\text{or } q_* \text{ if } \exists \kappa \, [\#\kappa \in \mathrm{fs}_H(\lambda) \wedge \kappa \ni q]$$

$$> (q_1, q_2) \ \mapsto \ q_2$$

$$\&(q_1, q_2) \ \mapsto \ q_1$$

$$Q_f \ = \ \mathcal{P}(K)$$

Note that the forth definition of (440) is stated so as to rule out excorporation. Dbuts are closed under intersection (Gécseg and Steinby, 1984), so this dbut can simply be intersected with the one defined in the preceding subsection. A dbut to check that R is satisfied can be constructed in the same manner as finite-state string automaton recognizing the string language defined by R. It is also very straightforward to add additional state to the automaton to ensure that a >-labeled node never has a right child with an arrow, and to ensure that the other strictly local conditions on node-labeling are satisfied.

4.6.3   Recap

So far, we have defined a class of regular tree languages, MGWSM. The definition proceeded via construction of an automaton in such a way that there was

a reasonably close connection between the operations of the automaton and the operations of the informal framework assumed in the preceding chapters. However, the trees of MGWSM do not, in any straightforward manner, yield a usable string language. The next step is to establish a mapping from derivation trees to strings. This subsection will state a mapping from MGWSM derivation trees to strings which yields a string language within the MCS string languages. In particular, it will be shown that the class of MGWSM string languages is within the class of the string languages of a certain form of context-free graph grammar, hyperedge replacement grammar (Feder, 1971; Pavlidis, 1978; Bauderon and Courcelle, 1987).[14] I should, however, immediately assure the reader that there are no hypergraphs in the pages to follow!

The key formal result that I will rely on is presented in Bloem and Engelfriet (2000). Bloem and Engelfriet investigate the use of MSO to define relations between graphs.[15] We are interested in the special case of defining relations $T_1 \times T_2$ between sets of trees, where T_1 is a regular tree language.[16] Bloem and Engelfriet show that the range of all MSO-definable tree-to-tree relations over the regular tree languages is the class of tree languages which can be generated by hyperedge replacement grammars. In Engelfriet and Heyker (1991), it is shown that the corresponding string languages are MCS. Thus, by a rather roundabout route, we can use MSO to define a constrained mapping from derivation trees to strings.

---

[14] See Drewes et al. (1997) for further references.

[15] Since all of the structures we are dealing with here are finite, the question of whether or not we are permitted to quantify over infinite subsets of the domain will not arise.

[16] There are in fact two methods of using MSO to define relations of this sort. The first, of course, is simply to restrict the domain and range to trees. The second method relaxes the restriction on the range. A tree-to-tree relation is defined by "unfolding" the resulting graphs. This second method allows a wider variety of tree-to-tree relations to be defined, but is too powerful for our purposes.

A formal definition of MSO graph transducers (and hence MSO tree transducers) is given in Bloem and Engelfriet (2000, 10).[17] A more informal description of the operation of an MSO graph transducer can be given as follows. A graph g consists of a set of *vertices*, V_g, a set of *edges*, which are pairs of vertices with labels in Γ_g, and a labeling function lab_g assigning each $v \in V_g$ a label from an alphabet Σ. For the case of mixed binary/unary branching trees, we will assume that $\Gamma = \{1, 2\}$, with children ordered by the labels of the edges leading to them. An MSO graph transducer copies each node in the original graph, and then adds labels and edges to the new nodes in accord with conditions stated over the original graph. The logical language used to stated MSO graph transductions is MSO with the predicates $\text{lab}_\sigma(x)$, which holds in g iff $\text{lab}_g(x) = \sigma$, and $\text{edg}_\gamma(x, y)$, which holds in g iff there is an edge from x to y labeled γ. If no γ is subscripted to edg, $\text{edg}(x, y)$ is equivalent to $\bigvee_{\gamma \in \Gamma} \text{edg}_\gamma(x, y)$. The predicate $\text{path}(x, y)$ can (as Bloem and Engelfriet note) be explicitly defined as follows:

---

[17] "An MSO *graph transducer* from (Σ_1, Γ_1) to (Σ_2, Γ_2) is a triple $T = (C, \Phi, X)$ where C is a finite set of *copy names*, $\Phi = \{\phi_{\sigma,c}(x)\}_{\sigma \in \Sigma_2, c \in C}$, with $\phi_{\sigma,c}(x) \in \text{MSOL}(\Sigma_1, \Gamma_1)$, is the family of *node formulae*, and $X = \{\chi_{\gamma,c,c'}(x, y)\}_{\gamma \in \Gamma_2, c, c' \in C}$, with $\chi_{\gamma,c,c'}(x, y) \in \text{MSOL}_2(\Sigma_1, \Gamma_1)$, is the family of *edge formulae*.

"The *copy number* of T is $\#C$.

"The *graph transduction* $\mathcal{T}_{\text{gr}} : G_{\Sigma_1, \Gamma_2} \to G_{\Sigma_2, \Gamma_2}$ *defined by* T is defined as follows. For every graph g_1 over (Σ_1, Γ_1), $\mathcal{T}_{\text{gr}}(g_1)$ is the graph g_2 over (Σ_2, Γ_2) with

- $V_{g_2} = \{(c, u)|c \in C, u \in V_{g_1}$, and there is exactly one $\sigma \in \Sigma_2$ s.t. $(g_1, u) \models \phi_{\sigma,c}(x)\}$,

- $E_{g_2} = \{((c, u), \gamma, (c', u'))|(c, u), (c', u') \in V_{g_2}, \gamma \in \Gamma_2$, and $(g_1, u, u') \models \chi_{\gamma,c,c'}(x, y)\}$,

- $\text{lab}_{g_2} = \{((c, u), \sigma)|(c, u) \in V_{g_2}, \sigma \in \Sigma_2$, and $(g_1, u) \models \phi_{\sigma,c}(x)\}$

" MSOL here refers to monadic second order predicate logic (abbreviated as MSO in this dissertation).

(441)

$$\text{path}(x, y) = \forall X((\text{closed}(X) \land x \in X) \rightarrow y \in X)$$

$$\text{where } \text{closed}(X) = \forall x, y((\text{edg}(x, y) \land x \in X) \rightarrow y \in X)$$

In tree terminology, this defines the relation of reflexive domination. Explicit definitions can easily be given for $\text{leaf}(x)$, $\text{unary}(x)$, $\text{binary}(x)$, and $\text{unaryorlf}(x)$. The last of these holds of both unary-branching nodes and leaf nodes.

We can think of the specification of an MSO graph transducer as an answer to the following questions (where g_1 is the original graph and g_2 the output of the transduction):

(i) For $\sigma \in \Sigma_2$ and $u \in V_{g_2}$, what has to hold of u's original in g_1 for u to have the label σ in g_2?

(ii) For $\gamma \in \Gamma_2$ and $u, v \in V_{g_2}$, what has to hold of u and v's originals in g_1 for there to be an edge labeled γ leading from u to v in g_2?

Often as not, the answer to (i) is "u always has the same label in g_2 as its original in g_1." This can be expressed by defining the following family of *node formulae* ϕ_σ:

(442) $\phi_\sigma = \text{lab}_\sigma(x)$ for all $\sigma \in \Sigma$

This could be read as: "A node u in g_2 has the label σ if u's original in g_1 has the label σ." The formula in (442) is interpreted within g_1, with x assigned to the original node.

Questions (i)-(ii) presuppose that each node in g_2 corresponds to a single "original" in g_1. We can make g_2 smaller than g_1 by ensuring that for one or more of the original nodes in g_1, there is no label such that the conditions are met for the corresponding new node to have that label in g_2. However, we would also like

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to allow for the possibility that g_2 contains more nodes than g_1. To do this, we add a set of "copy names" to the specification of the transducer. If, for example, our copy names are A, B and C, then each node in g_1 has up to three copies in g_2. For each question (i), there will now be three questions: "...what has to hold...for the A copy of u to have...", "...what has to hold...for the B copy of u to have..." and "...what has to hold...for the C copy of u to have..." Similarly, for each question (ii) there will now be nine questions, corresponding to each possible ordered pair of copy names.

The answer to an (i)-type question is written as follows:

(443) $\phi_{C,\sigma} = f(x)$

Where C is a copy name, σ is a label in the alphabet of g_2, and f is an MSO formula with one free variable, x. (443) can be read as "There is a σ-labeled copy $u \in V_{g_2}$ of $u' \in V_{g_1}$ iff $f(x)$ is the unique ϕ_C formula which is true in g_1 under the assignment $x \mapsto u'$."

The answer to an (ii)-type question is written in a similar manner:

(444) $\chi_{\gamma,C_1,C_2} = f(x,y)$

Where γ is an edge label in Γ_2 of g_2, C_1 and C_2 are (possibly identical) copy names, and f is an MSO formula with two free variables, x and y. (444) can be read as "There is a γ-edge from a copy $u \in V_{g_2}$ of $u' \in V_{g_1}$ to a copy $v \in V_{g_2}$ of $v' \in V_{g_1}$ iff $f(x,y)$ is the unique χ_γ formula which is true in g_1 under the assignment $x \mapsto u', y \mapsto v'$."

4.6.4   Preparing derivation trees for mapping to the string language

There are two respects in which the derivation trees of an MGWSM are not ideal from the point of view of defining a mapping from derivation trees to strings.

In the next subsection, I will assume that the original derivation trees have been transformed into trees of a more suitable form prior to linearization. Of course, it is necessary to ensure that the range of this transformation is a regular tree language. I will not show this rigorously here, but the changes to be made are small, and I hope it will be clear that they are entirely innocuous. I will denote the derivation tree language of a given MGWSM G as $D(G)$.

The changes are as follows:

(i) In nodes of the pre-transformed trees of the form $\langle \alpha, \lambda \rangle$, λ is the original lexical item and may have some unvalued features. When mapping derivation trees to strings, it is much more useful to have λ be the lexical item updated with valued features. Thus, in the transformed trees, each λ is updated in this manner. This conversion can easily be performed by creating a relabeling bottom-up tree transducer based on the dbut in the preceding section. The transducer simply duplicates the operation of the automaton, replacing λ in each unary-branching or leaf node as it goes up the tree, and leaving all other labels unchanged.

(ii) Intermediate steps in successive-cyclic movements are of no consequence for linearization. This is especially so given that the form of Minimality which constrains MGWSM derivations is such that movement in "one fell swoop" is always licit if successive-cyclic movement is.[18] It is therefore useful to remove arrows indicating intermediate steps in successive-cyclic movements. For upward movement, this simply requires deleting the relevant arrows. Sideward movement is slightly more complex. Successive-cyclic sideward movement is impossible owing to the neighbor restriction.

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[18] Given the form of Minimality which constrains MGWSM derivations, any given phrase either can or cannot move over another phrase. The addition of intermediate steps makes no difference, since there is no sense in which a movement is "driven" by a particular feature or set of features.

However, a phrase which moves sideward may go on to move upward. In this case, merely deleting the intermediate $\Rightarrow$ node would yield an illicit derivation tree. It is necessary also to change the higher $\Uparrow$ to a $\Rightarrow$ to get the desired result.

In the next subsection, it will be assumed that derivation trees have been modified according to (i)-(ii).

4.6.5   Mapping derivation trees to strings

To begin with, let us consider how derivation trees with no movement operations can be mapped to strings via MSO tree transducers. All we really have to do is convert the unary-branching portions of the derivation tree into uniformly right-branching binary-branching subtrees, in such a way that all of the non-leafs become leaves. This is achieved by the addition of nodes which correspond to XP nodes in the informal framework. Pictorially (where p_i is the phonological form of λ_i):

(445)
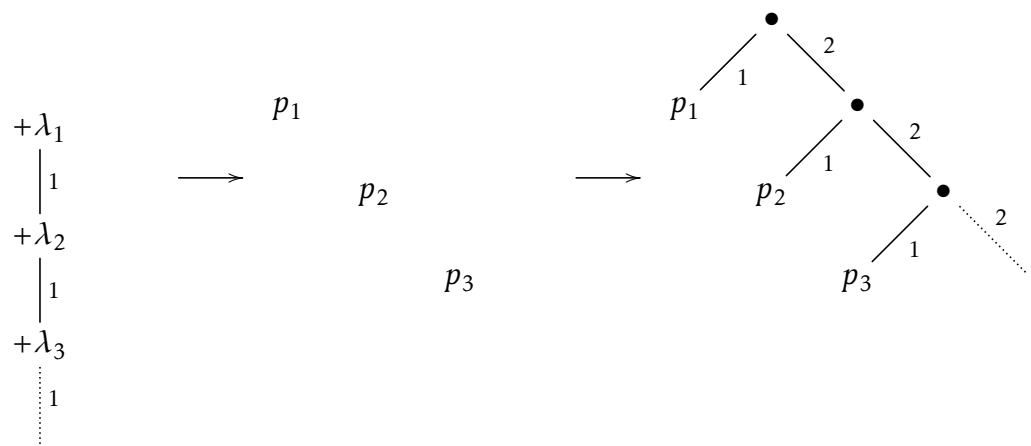
Every node of g_1 is mapped to two nodes in g_2. Thus, we will need two copy names, X (leaf) and XP (phrasal). Leaf nodes in g_2 will of course be labeled with

the phonological forms of the corresponding nodes in g_1. (Though we will complicate this slightly in a moment to handle head movement.) Since we are really only interested in the string yield of g_2, it doesn't matter much how we label the non-leaf nodes. However, we will see shortly that head movement can sometimes have the effect that the XP copy of a node is a leaf node in the output tree. For this reason, it will be convenient to label all XP copies with the empty string ε. Σ_2 will therefore be Σ_1 augmented with ε.

Expressions of the form $\text{lab}_{S(x)}(x)$, where S is an open sentence with parameter x, will be used as a shorthand for finite disjunctions of the form $(\ldots \text{lab}_{\sigma_1}(x) \vee \text{lab}_{\sigma_2}(x) \ldots)$. For example, $\text{lab}_{\text{cat}(x)=v}(x)$ holds for all nodes x of category v.

With these preliminaries in place, node and edge formulae can be defined as follows:

(446)   Node formulae (version 1, to be revised):

$$\phi_{X,\sigma} = \text{lab}_{\text{phon}(x)=\sigma}(x) \qquad\qquad \text{for all } \sigma \in \Sigma_2$$

$$\phi_{XP,\varepsilon} = \text{unaryorlf}(x)$$

(447)   Edge formulae (version 1, to be revised):

$$\chi_{i,X,X} = \text{false} \qquad\qquad \text{for all } i \in \{1,2\}$$

$$\chi_{i,X,XP} = \text{false} \qquad\qquad \text{for all } i \in \{1,2\}$$

$$\chi_{1,XP,X} = x = y$$

$$\chi_{1,XP,XP} = \text{false}$$

$$\chi_{2,XP,X} = \text{false}$$

$$\chi_{2,XP,XP} = \text{edg}_1(x,y)$$

This suffices to specify an MSO tree transducer implementing the transformation in (445). (The only difference being that the nodes labeled $\bullet$ in (445) are labeled ε in the output of the transduction specified by (446)-(447).)

We must now consider how head movement is to be handled. The first order of business is to ensure that heads which have been moved are not pronounced in their original positions. The predicates (x hashdmvdto y) ("x has head moved to y") and hashdmvd(x) ("x has head moved") can be defined as follows:

(448)

$$x \text{ hasmvdto } y \quad = \quad \bigvee_{\kappa \in K} \begin{array}{l} \text{apath}(y,x) \wedge \text{lab}_{\#\kappa \in \text{fs}_\text{H}(y)}(y) \wedge \text{lab}_{\text{cat}(x)=\kappa}(x) \wedge \\ \neg \exists z[\text{path}(y,z) \wedge \text{path}(z,x) \wedge \text{lab}_{\text{cat}(z)=\kappa}(z)] \end{array}$$

$$\text{hashdmvd}(x) \quad = \quad \exists y[x \text{ hashdmvdto } y]$$

The predicate 'apath' ("accessible path") is like 'path' except that it is sensitive to the restrictions imposed by the Left Branch Condition and the Adjunct Island Constraint. We can define it by replacing 'closed' in (441) with 'aclosed', which is defined in terms of 'aclosed'':

(449)

$$\text{aclosed}(X) = \text{aclosed}'(X) \wedge$$

$$\forall x, y[x \in X \wedge \quad ((\text{lab}_\&(x) \wedge \text{edg}_1(x,y)) \vee$$

$$(\text{lab}_>(x) \wedge \text{edg}_2(x,y))) \rightarrow y \in X]$$

$$\text{aclosed}'(X) = \forall x, y[x \in X \wedge ((\text{lab}_\&(x) \wedge \text{edg}_1(x,y)) \vee$$

$$(\text{lab}_>(x) \wedge \text{edg}_2(x,y)) \vee$$

$$(\text{unaryorlf}(x) \wedge \text{edg}(x,y)))$$

$$\rightarrow y \in X]$$

With the predicate hashdmvd(x) available, the node formulae in (446) can be replaced by those in (450), which ensure that moved heads are not pronounced in their original positions.

(450)   Node formulae (version 2, to be revised):

$$\phi_{\mathrm{X},\sigma} = \mathrm{lab}_{\mathrm{phon}(x)=\sigma}(x) \wedge \neg\,\mathrm{hashdmvd}(x) \qquad \text{for all } \sigma \in \Sigma_2$$

$$\phi_{\mathrm{XP},\varepsilon} = \mathrm{unaryorlf}(x)$$

Note that, according to the definition of an MSO tree transducer given in footnote 17, if an edge formula specifies an edge from or to a non-existent vertex copy, this edge isn't in the output graph. Thus, we can permit the edge formulae to continue linking XP and X copies of moved heads without any ill effect. Now suppose that λ_2 has head moved in (445). Then instead of the rightmost tree in (445), the formulae in (447) and (450) specify the tree in (451):

(451)
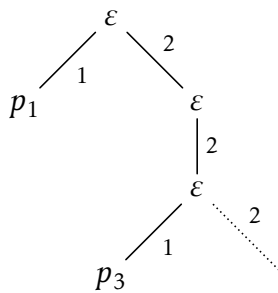
Of course, it will also be necessary to ensure that the moved head *is* pronounced in its new position. We return to this shortly.

For now, let us move on to the case of upward phrasal movement within a single unary-branching treelet, ignoring head movement and sideward movement. Handling this case turns out to be the bulk of the work. In any unary

branching treelet which contains two upward movements (i.e. which has two nodes labeled with ⇑), there are three possible configurations of these movements, once the option of successive-cyclic movement has been eliminated. These are illustrated in (452). X is a feature and '.' is used as an arbitrary value for this feature. Below the tree is written the resulting order of $p_1 \ldots p_7$ in the generated string. For clarity, arrows have been added to show movements. It is important to bear in mind that these arrows are just useful annotations and are not part of the structure.

(452)

$+\lambda_1$

$\Uparrow^{[1]} \lambda_2\{X\_,\ldots\} \leftarrow$

$+\lambda_3$

$\Uparrow^{[2]} \lambda_4\{Y\_,\ldots\} \leftarrow$

$+\lambda_5$

$+\lambda_6\{X[.],\ldots\}^{[1]}$

$+\lambda_7$

$+\lambda_8\{Y[.],\ldots\}^{[2]}$

$+\lambda_9$

1–6–7–2–3–8–9–4–5

(453)

$+\lambda_1$

$\Uparrow^{[1]} \lambda_2\{X\_,\ldots\} \leftarrow$

$+\lambda_3$

$\Uparrow^{[2]} \lambda_4\{Y\_,\ldots\} \leftarrow$

$+\lambda_5$

$+\lambda_6\{Y[.],\ldots\}^{[2]}$

$+\lambda_7$

$+\lambda_8\{X[.],\ldots\}^{[1]}$

$+\lambda_9$

1–8–9–2–3–6–7–4–5

(454)

$+\lambda_1$

$\Uparrow^{[1]} \lambda_2\{X\_,\ldots\} \leftarrow$

$+\lambda_3$

$\Uparrow^{[1]} \lambda_4\{X[.],\ldots\}$

$+\lambda_5$

$+\lambda_6\{Y\_,\ldots\}^{[2]} \leftarrow$

$+\lambda_7$

$+\lambda_8\{Y[.],\ldots\}^{[2]}$

$+\lambda_9$
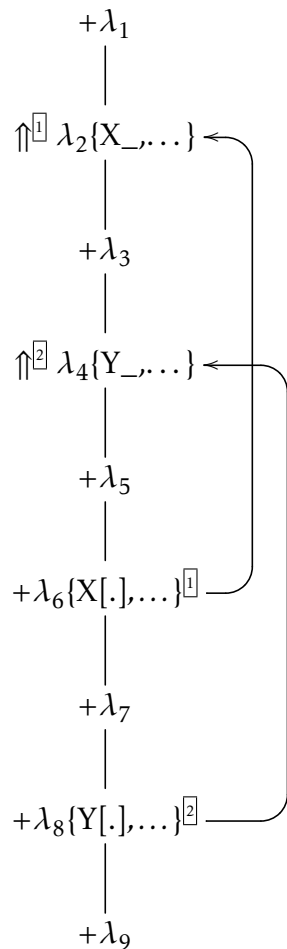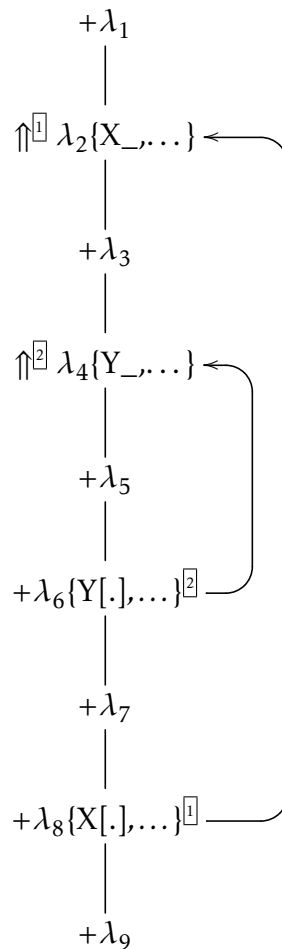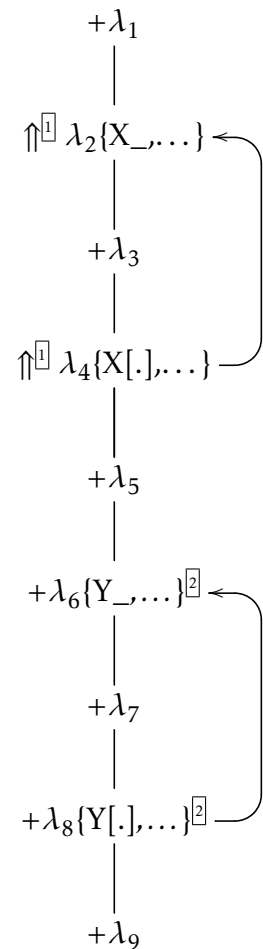
1–4–5–8–9–6–7–2–3

The treelet in (452) is the case of ordinary remnant movement; (453) shows countercyclic remnant movement – which effectively amounts to movement out of a moved constituent;[19] (454) shows movement within a constituent which is subsequently moved. Another configuration to consider is that which would be obtained if the lower arrow in (454) pointed at λ_4 instead of λ_6 (this is *not* successive-cyclic movement). However, this configuration is most usefully thought of as a special case of (454). In (455), the three arrow configurations stacked on top of each other, with movement driven by the same pair of features in each case:

(455)

---

[19] There is one significant difference between countercyclic remnant movement and movement out of a moved constituent: the latter does not allow Minimality to be obviated via "smuggling" (Collins, 2005). Thus, MGWSMs cannot encode smuggling derivations. Whether or not this is a good thing is an empirical issue which I will not attempt to settle here.

$$+\lambda_1$$
$$\Uparrow^{\boxed{1}}\lambda_2\{\text{X}\_,\ldots\}$$
$$+\lambda_3$$
$$\Uparrow^{\boxed{2}}\lambda_4\{\text{Y}\_,\ldots\}$$
$$+\lambda_5$$
$$+\lambda_6\{\text{X}[.],\ldots\}^{\boxed{1}}$$
$$+\lambda_7$$
$$+\lambda_8\{\text{Y}[.],\ldots\}^{\boxed{2}}$$
$$+\lambda_9\{\text{X}\_,\ldots\}$$
$$+\lambda_{10}$$
$$\Uparrow^{\boxed{3}}\lambda_{11}\{\text{X}\_,\ldots\}$$
$$+\lambda_{12}$$
$$\Uparrow^{\boxed{4}}\lambda_{13}\{\text{Y}\_,\ldots\}$$
$$+\lambda_{14}$$
$$+\lambda_{15}\{\text{Y}[.],\ldots\}^{\boxed{4}}$$
$$+\lambda_{16}$$
$$+\lambda_{17}\{\text{X}[.],\ldots\}^{\boxed{3}}$$
$$+\lambda_{18}$$
$$+\lambda_{19}$$
$$\Uparrow^{\boxed{5}}\lambda_{20}\{\text{X}\_,\ldots\}$$
$$+\lambda_{21}$$
$$\Uparrow^{\boxed{5}}\lambda_{22}\{\text{X}[.],\ldots\}$$
$$+\lambda_{23}$$
$$+\lambda_{24}\{\text{Y}\_,\ldots\}^{\boxed{6}}$$
$$+\lambda_{25}$$
$$+\lambda_{26}\{\text{Y}[.],\ldots\}^{\boxed{6}}$$
$$+\lambda_{27}$$
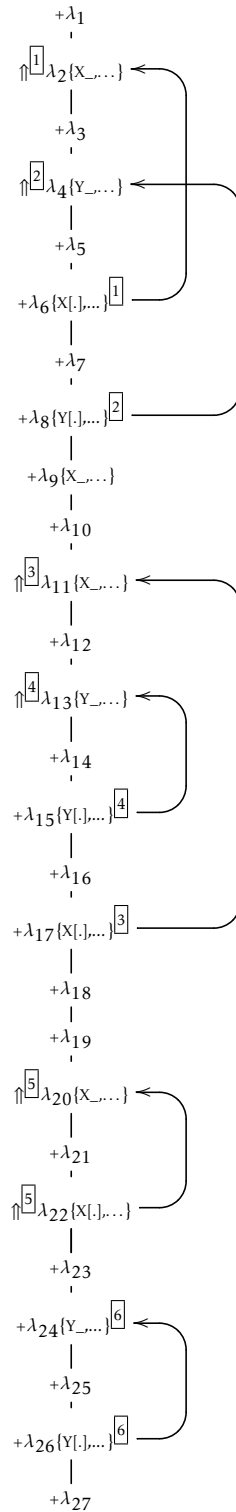
1–6–7–2–3–8–9–10–17–18–19–22–23–26–27–24–25–20–21–11–12–15–16–13–14–4–5

To implement the mapping, it will be simplest to treat derived specifiers as left sisters of the head they target. A Spec-Head-Comp structure maps to a

ternary branching treelet. To give a more concrete example, (456) shows the tree that (452) maps to under this scheme:

(456)
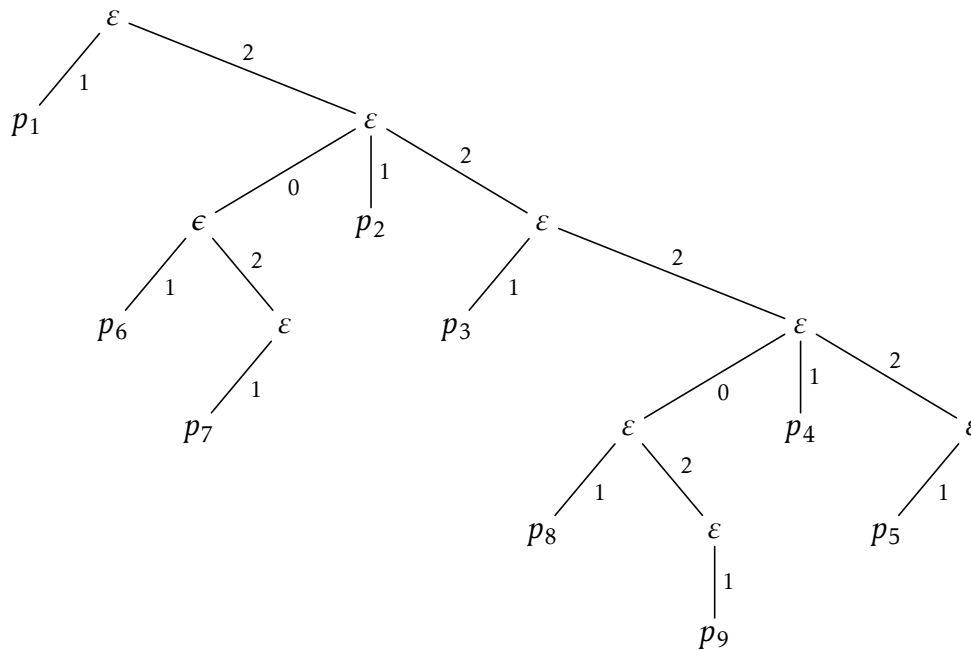
(Note that the string yield of this tree matches that which is shown below (452).) In effect, the right sister of p_7 is the trace of the phrase headed by λ_8, and the right sister of p_5 is the trace of the phrase headed by λ_6. There would be no difficulty in adding traces and other such annotations to the trees if desired, but this is not helpful for present purposes.[20] The edge label 0 is used to insert specifiers before the head and the complement. Thus, 0 must be added to Γ_2. It will also be convenient to add 3 to Γ_2. When a head gains a complement via movement, we will add a 3-edge from its XP copy to the moved phrase. The output trees never

---

[20] This section has the rather limited goal of showing that the class of MGWSM string languages is within the class of MCS string languages. For this reason, I will not exploit MSO tree transducers to reconstruct "real" trees from derivation trees. This is, however, a potentially interesting research project in its own right. See for example Morawietz (2003), which makes a much more sophisticated use of MSO tree transductions.

have any nodes with more than three children, so it is not absolutely necessary to add 3 to Γ_2. However, doing so allows a greater separation of concerns when specifying the formulae for the transducer.

As a further example, (457) shows the tree for (453):

(457)
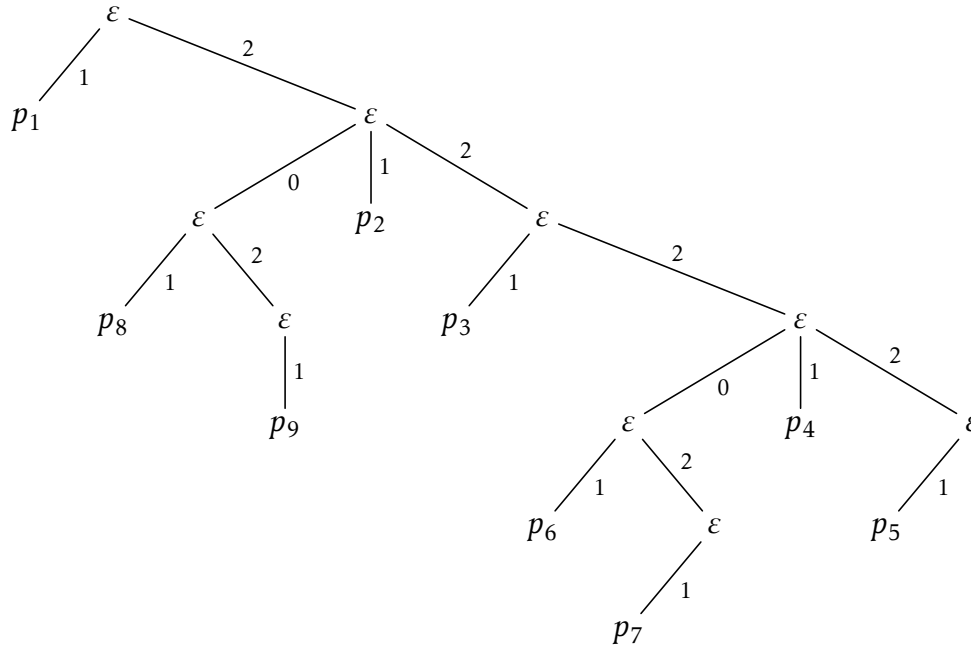
Updating the MSO transducer to handle phrasal movement within unary branching treelets turns out to be quite easy. The basic idea is the following. 2-edges going from XP copies to XP copies are broken if x immediately dominates y and y has moved. 0-edges or 3-edges from XP-copies to XP copies are added if there is an arrow from y to x. A 0-edge is added for movement to a specifier position and a 3-edge for movement to complement.

(458)   Node formulae (version 3, to be revised):

$$\phi_{X,\sigma} = \text{lab}_{\text{phon}(x)=\sigma}(x) \wedge \neg\text{hashdmvd}(x) \qquad \text{for all } \sigma \in \Sigma_2$$

$$\phi_{XP,\varepsilon} = \text{unaryorlf}(x)$$

(459)   Edge formulae (version 3, to be revised):

$$\chi_{i,\text{X,X}} = \text{false} \quad \text{for all } i \in \{0,1,2,3\}$$

$$\chi_{i,\text{X,XP}} = \text{false} \quad \text{for all } i \in \{0,1,2,3\}$$

$$\chi_{0,\text{XP,X}} = \phi_{3,\text{XP,X}} = \text{false}$$

$$\chi_{0,\text{XP,XP}} = \neg \text{leaf}(x) \wedge y \text{ hasmvduto } x$$

$$\chi_{3,\text{XP,XP}} = \text{leaf}(x) \wedge y \text{ hasmvduto } x$$

$$\chi_{1,\text{XP,X}} = x = y$$

$$\chi_{1,\text{XP,XP}} = \text{false}$$

$$\chi_{2,\text{XP,X}} = \text{false}$$

$$\chi_{2,\text{XP,XP}} = \text{edg}_1(x,y) \wedge \neg \text{hasmvdu}(y)$$

The edge formulae are defined in terms of the two-place predicate 'hasmvduto' ("has moved upward to") and the one place predicate 'hasmvdu' ("has moved upward"):

(460)

x hasmvduto y =

$$\text{lab}_{\text{arr}(y)=\Uparrow}(y) \wedge$$

$$\text{hasmvdu}(x) \wedge$$

$$\text{apath}(y, x) \wedge$$

$$\text{fmatch}(x, y) \wedge$$

$$\neg \text{edg}(y, x) \wedge \textit{(Ban on short movement)}$$

$$\neg \exists z [z \neq x \wedge$$

$$\text{hasmvdu}(z) \wedge$$

$$\text{apath}(y, z) \wedge$$

$$\text{apath}(z, x) \wedge$$

$$\text{fmatch}(z, y) \wedge$$

$$\neg \text{edg}(y, z)]$$

hasmvduto(x) = $\exists y [x$ hasmvduto $y]$

The statement $\text{fmatch}(x, y)$ tests that the feature types of x are identical to the derived feature types of y. The 'fmatch' predicate could be explicitly defined as a (very large, but finite) disjunction of binary conjunctions of the form in (461).

(461)

$$\ldots \vee (\text{lab}_{\sigma_1}(x) \wedge \text{lab}_{\sigma_2}(y)) \vee (\text{lab}_{\sigma_3}(x) \wedge \text{lab}_{\sigma_4}(y)) \vee \ldots$$

We can now consider sideward movement. The main task is to define 'hasmvdsto' – the equivalent of 'hasmvduto' for sideward movement. To do this, we need to formalize the 'neighbor' relation:

(462)

$$\text{neighbor}(x,y) = \exists z[(\text{lab}_>(z) \vee \text{lab}_\&(z)) \wedge$$
$$\text{path}(z,x) \wedge \text{path}(z,y) \wedge$$
$$\neg \text{path}(x,y) \wedge \neg \text{path}(y,x) \wedge$$
$$\neg \exists z'[\text{path}(z,z') \wedge \text{path}(z',x) \wedge \text{path}(z',y)]]$$

Note that nodes which stand in a reflexive domination relation are not neighbors by this definition. The 'hasmvdsto' ("has moved sideward to") predicate can now be defined as in (463). As might be expected, it is basically the same as 'hasmvduto′', but for the fact that 'neighbor' is used to "hop over" to the neighboring workspace before searching for the moved phrase. The part of (460) which references the Minimality constraint on upward movement is not required. If there is a feature-matching phrase in the neighboring workspace which has moved, this *must* be the phrase that has moved to y (i.e. to the node which is the second argument of 'hasmvdsto').

(463)

$$x \text{ hasmvdsto } y =$$
$$\text{lab}_{\text{arr}(y)=\Uparrow}(y) \wedge$$
$$\text{hasmvds}(x) \wedge$$
$$\text{neighbor}(x,y) \wedge$$
$$\text{fmatch}(x,y)$$

Now we can simply replace every instance of (x hasmvduto y) in (459) with
((x hasmvduto y) ∨ (x hasmvdsto y)). We will write (x hasmvdto y) for this disjunction. Similarly, hasmvd(x) is equivalent to (hasmvdu(x) ∨ hasmvds(x)), and
lab$_{\{\&,>\}}$(x) is a shorthand for (lab$_\&$(x) ∨ lab$_>$(x)).

Virtually all that remains to be done is to add an additional copy name to
deal with nodes labeled > and &. We will use B (for "binary"). The translation of
> and & nodes is straightforward: they take as their children the XP copies those
of their original children which have not moved. (This has the slightly odd effect
that derived specifiers have two sisters whereas base-generated specifiers have
one.) There is one complication in relation to movement of phrases with base-
generated specifiers and phrases with adjuncts. This complication derives from
the fact that 'hasmvdu' and 'hasmvds' predicates will apply not to the nodes labeled &/>, but to their left/right children respectively. Thus, simply moving the
nodes picked out by these predicates would have the effect of moving $\overline{\mathrm{X}}$ without
its specifier. When a node is the head of a phrase labeled & or >, we need to
ensure that the entire phrase moves. The following predicates will be useful:

(464)

$$x \text{ headof } y = ((\mathrm{lab}_\&(y) \wedge \mathrm{edg}_1(y,x)) \vee$$
$$(\mathrm{lab}_>(y) \wedge \mathrm{edg}_2(y,x)))$$

(465)

$$\mathrm{headofp}(x) = \exists y[x \text{ headof } y]$$

The revised node and edge formulae are as follows:

(466)   Node formulae (version 4, to be revised):

$$\phi_{X,\sigma} = \mathrm{lab}_{\mathrm{phon}(x)=\sigma}(x) \wedge \neg\,\mathrm{hashdmvd}(x) \qquad \text{for all } \sigma \in \Sigma_2$$

$$\phi_{XP,\varepsilon} = \mathrm{unaryorlf}(x)$$

$$\phi_{B,\varepsilon} = \mathrm{lab}_{\&}(x) \vee lab_{>}(x)$$

(467)   Edge formulae (version 4, final version):

Formulae which are identical for all edge labels:

$$\chi_{i,X,X} = \text{false} \qquad \text{for all } i \in \{0,1,2,3\}$$

$$\chi_{i,X,XP} = \text{false} \qquad \text{for all } i \in \{0,1,2,3\}$$

$$\chi_{i,X,B} = \text{false} \qquad \text{for all } i \in \{0,1,2,3\}$$

$$\chi_{i,B,X} = \text{false} \qquad \text{for all } i \in \{0,1,2,3\}$$

Formulae for 0 and 3 edges from and to nodes labeled $>$ and $\&$:

$$\chi_{0,XP,B} = \neg\,\mathrm{leaf}(x) \wedge \exists z[z \text{ headof } y \wedge z \text{ hasmvdto } x]$$

$$\chi_{3,XP,B} = \mathrm{leaf}(x) \wedge \exists z[z \text{ headof } y \wedge z \text{ hasmvdto } x]$$

Formulae for 1 and 2 edges from and to nodes labeled > and &:

$$\chi_{i,B,XP} = \text{edg}_i(x,y) \wedge (\neg\text{hasmvd}(y) \vee y \text{ headof } x)$$

for all $i \in \{1, 2\}$

$$\chi_{i,XP,B} = \text{edg}_i(x,y) \wedge \neg\exists z[z \text{ headof } y \wedge \text{hasmvd}(z)]$$

for all $i \in \{1, 2\}$

$$\chi_{i,B,B} = \text{edg}_i(x,y)$$

for all $i \in \{1, 2\}$

Formulae for 0 and 3 edges between unary-branching nodes:

$$\chi_{0,XP,X} = \phi_{3,XP,X} = \text{false}$$

$$\chi_{0,XP,XP} = \neg\text{leaf}(x) \wedge y \text{ hasmvdto } x \wedge \neg\text{headofp}(x)$$

$$\chi_{3,XP,XP} = \text{leaf}(x) \wedge y \text{ hasmvdto } x \wedge \neg\text{headofp}(x)$$

Formulae for 1 and 2 edges between unary-branching nodes:

$$\chi_{1,XP,X} = x = y \wedge \neg\text{hashdmvd}(x)$$
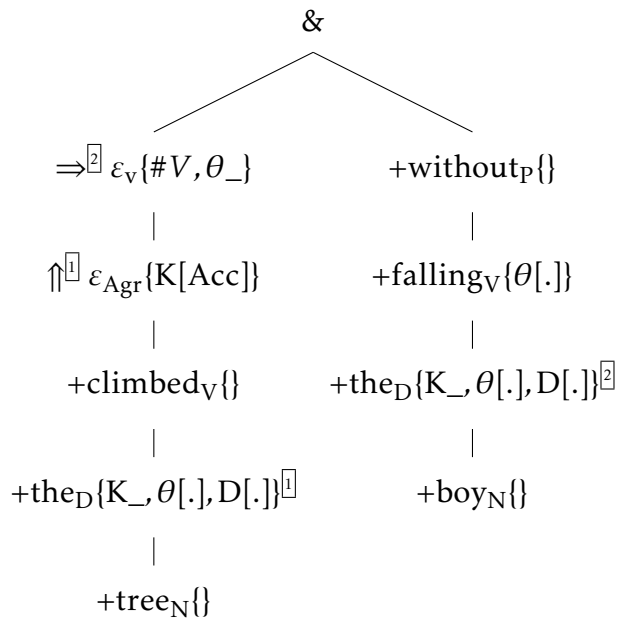
$$\chi_{1,XP,XP} = \text{false}$$

$$\chi_{2,XP,X} = \text{false}$$

$$\chi_{2,XP,XP} = \text{edg}(x,y) \wedge \neg\text{hasmvd}(y)$$

As an example, (469) shows the output of the transducer for the derivation tree in (425b), repeated here as (468). The resulting string is incorrect insofar as *climbed* is missing. This is because the transducer is not yet capable of reposition-

ing moved heads.

(468)

$$
\begin{array}{c}
\&\\
\diagup\quad\diagdown\\
\Rightarrow^{\boxed{2}}\varepsilon_{\mathrm{v}}\{\#V,\theta\_\}\qquad\qquad +\mathrm{without}_{\mathrm{P}}\{\}\\
\mid\qquad\qquad\qquad\qquad\mid\\
\Uparrow^{\boxed{1}}\varepsilon_{\mathrm{Agr}}\{K[\mathrm{Acc}]\}\qquad +\mathrm{falling}_{\mathrm{V}}\{\theta[.]\}\\
\mid\qquad\qquad\qquad\qquad\mid\\
+\mathrm{climbed}_{\mathrm{V}}\{\}\qquad +\mathrm{the}_{\mathrm{D}}\{K\_,\theta[.],D[.]\}^{\boxed{2}}\\
\mid\qquad\qquad\qquad\qquad\mid\\
+\mathrm{the}_{\mathrm{D}}\{K\_,\theta[.],D[.]\}^{\boxed{1}}\qquad +\mathrm{boy}_{\mathrm{N}}\{\}\\
\mid\\
+\mathrm{tree}_{\mathrm{N}}\{\}
\end{array}
$$

(469)
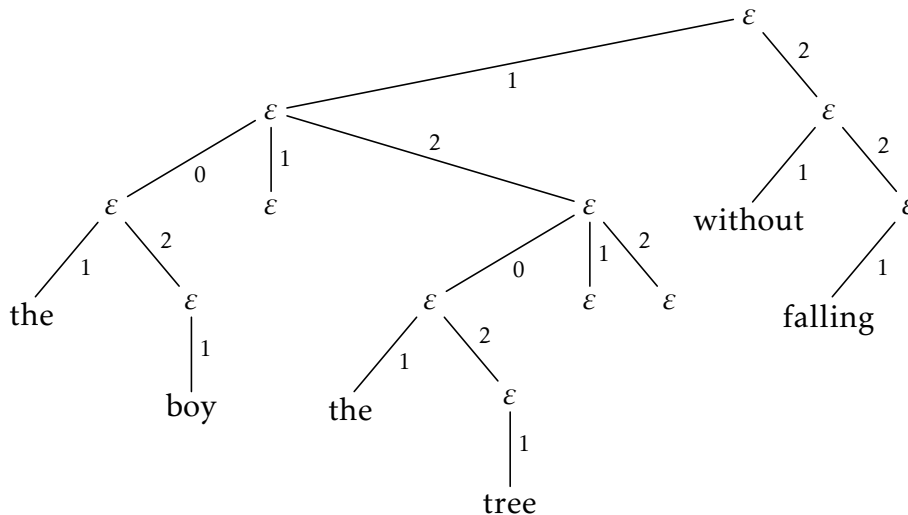
The steps necessary to implement head movement are basically straightfor-
ward, but formally rather ugly and tedious. First, we must decide what to do if
Ψ is not defined for any given sequence of value-extended lexical items. In this
case, we will adopt the convention that the resulting complex head is spelled out
as ε. (In practice, any sensible MGWSM will be specified such that Ψ defined for

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all possible simplex or complex heads, so nothing of significance hinges on this decision.) The definition of $\phi_{X,\sigma}$ in (470) replaces the one in (466). It makes use of $\text{lab}_\Omega(x)$, a predicate which holds of x iff $\text{lab}(x) \in \Omega$, $\text{lab}_\Omega(x,y)$, which holds of x and y iff $\langle \text{lab}(x), \text{lab}(y) \rangle \in \Omega$, and so on for higher arities. Each of these predicates can be explicitly defined. $\phi_{X,\sigma}$ is specified as the disjunction of a finite set of formulae $\phi_{X,\sigma}^n, 1 \leq n \leq k$. In (470), these formulae are defined for $1 \leq n \leq 3$. I.e., for simplex heads and for complex heads $[_{H_1}\ H_1\ H_2]$ and $[_{H_1}\ [_{H_1}\ H_1\ H_2]\ H_3]$. The generalization to higher values of n is straightforward. Since a complex head cannot contain more than one head of any given category, and since there are a finite number of categories, there is a finite upper bound on n for for any given MGWSM. Note that, given the changes to the derivation tree described in the preceding subsection, none of the lexical items on nodes of any licit derivation tree will contain unvalued features.

(470)

$$\phi_{X,\sigma}^1 = \text{lab}_\Omega(x) \wedge \neg\,\text{hashdmvd}(x) \wedge \neg\exists y[y\ \text{hashdmvdto}\ x]$$

where $\Omega = \{\sigma' \in \Sigma_1 \mid \Psi(\text{lex}(\sigma')) = \sigma$ or,

$$\Psi(\text{lex}(\sigma')) = \bot \text{ and } \sigma = \varepsilon\}$$

$$\phi_{X,\sigma}^2 = \neg\,\text{hashdmvd}(x) \wedge \exists y[\quad \text{lab}_\Omega(x,y) \wedge y\ \text{hashdmvdto}\ x \wedge$$

$$\neg\exists z[z\ \text{hashdmvdto}\ y]]$$

where $\Omega = \{\langle \sigma', \sigma'' \rangle \in \Sigma_1 \times \Sigma_1 \mid \Psi(\text{lex}(\sigma'), \text{lex}(\sigma'')) = \sigma$ or,

$$\Psi(\text{lex}(\sigma'), \text{lex}(\sigma'')) = \bot \text{ and } \sigma = \varepsilon\}$$

$$\phi^3_{X,\sigma} = \neg\,\mathrm{hashdmvd}(x) \wedge \exists y, z[\quad \mathrm{lab}_{\Omega'}(x, y, z) \wedge$$

$$y\ \mathrm{hashdmvdto}\ x\ \wedge$$

$$z\ \mathrm{hashdmvdto}\ y\ \wedge$$

$$\neg\exists z'[z'\ \mathrm{hashdmvdto}\ z]]$$

$$\text{where } \Omega = \{\langle\sigma', \sigma'', \sigma'''\rangle \in \Sigma_1^3 \mid \Psi(\mathrm{lex}(\sigma'), \mathrm{lex}(\sigma''), \mathrm{lex}(\sigma''))) = \sigma \text{ or,}$$

$$\Psi(\mathrm{lex}(\sigma'), \mathrm{lex}(\sigma''), \mathrm{lex}(\sigma''))) = \bot \text{ and } \sigma = \varepsilon\}$$

$$\ldots$$

$$\phi_{X,\sigma} = \bigvee_{i=1}^{k} \phi^i_{X,\sigma} \text{ for all } \sigma \in \Sigma_2$$

By replacing the first line of (466) with the sequence in (470), we now obtain (471) instead of (469), on the assumption that $\Psi(\varepsilon_v\{\#V, \theta[.]\},\ \mathrm{climbed}_V\{\}) =$ 'climbed':

(471)

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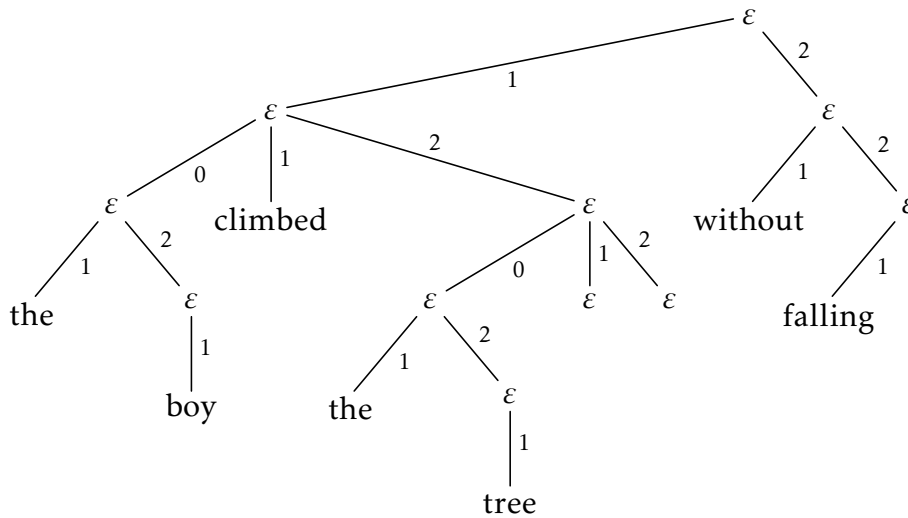
4.7 Stating Merge over Move using Tree Transducers

Graf (2010) points out that the reference set for Merge over Move, along with a number of other global economy conditions, is best defined in terms of derivation trees. Traditionally, as is implicit in definition (14), the reference set for Merge over Move has was taken to be the set of all convergent derivations from the same starting numeration. There is, perhaps surprisingly, no empirical evidence whatever that such a large comparison set is necessary. In every instance where Merge over Move has been exploited in the literature, the favored derivation and its competitors (or at least, those of its competitors which linguists have actually considered) yield trees which have virtually identical geometry. They also have virtually identical derivation trees, as Graf notes.

Graf shows that the reference set for Merge over Move can be computed by a linear tree transducer. To figure out whether a given derivation D is licit according to Merge over Move, the tree transducer is fed D's derivation tree, and it is then determined whether or not the output of the transduction contains a derivation more greatly favored by Merge over Move. Some additional background is required to explain the significance of the observation that reference sets can be specified in this manner. Graf notes that global economy conditions can be modeled in terms of optimality systems (Frank and Satta, 1998; Karttunen, 1998):

(472) An *optimality system* over languages L, L' is a pair $\mathcal{O} := \langle \text{GEN}, C \rangle$ with $\text{GEN} \subseteq L \times L$ and $C := \langle c_1, \ldots, c_n \rangle$ a linearly ordered sequence of functions $c_i : \text{GEN} \rightarrow N$. For $a, b \in \text{GEN}, a \not\lessgtr b$ iff there is a $1 \leq k \leq n$ such that $c_k(a) < c_k(b)$ and for all $j < k, c_j(a) = c_j(b)$.

Optimality systems are designed as a formal model of optimality theory (Smolensky and Prince, 1993).[21] Thus, they specify a generating function and a set of

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[21] The background material on optimality systems in the next few paragraphs is copied from

ranked constraints. Each constraint is modeled as a function from generated structures to a constraint violation count. The optimal input-output pairings are defined as in (473). This corresponds to the notion of optimality familiar from standard informal presentations of optimality theory.

(473)   Given an optimality system $\mathcal{O} := \langle \text{Gen}, C \rangle$, $\langle i, o \rangle$ is *optimal* with respect to $\mathcal{O}$ iff both $\langle i, o \rangle \in \text{Gen}$ and there is no o' such that $\langle i, o' \rangle \in \text{Gen}$ and $\langle i, o' \rangle \lessdot_{\mathcal{O}} \langle i, o \rangle$.

(474)   The transduction induced by $\mathcal{O}$ is given by $\tau := \{\langle i, o \rangle \mid \langle i, o \rangle$ is optimal with respect to $\mathcal{O}\}$. The output language of $\mathcal{O}$ is $\text{ran}(\tau)$.

Optimality systems, as defined in (472), impose no requirements on what kinds of language L and L' are. There is, however, a key result of Frank and Satta (1998) which holds for the special case where the domain of Gen is a regular string or tree language:

(475)   Let $\mathcal{O}$ be an optimality system such that

- dom(Gen) is a regular string/tree language,

- Gen is a rational relation,

- all $c \in C$ are output markedness constraints,

- each $c \in C$ defines a regular tree language (i.e. each $c \in C$ is a binary constraint), and

- $\mathcal{O}$ is globally optimal

Then the transduction τ induced by the OS is a rational relation and $\text{ran}(\tau)$ belongs to the same formal language class as $\text{dom}(\tau)$.

(476)   Given an optimality system $\mathcal{O}$, $c \in C$ is an *output-markedness constraint* iff $c(\langle i, o \rangle) = c(\langle i', o \rangle)$ for all $\langle i, o \rangle$, $\langle i', o \rangle \in \text{Gen}$.

the useful summary given in Graf's paper.

A rational relation, for the case of regular tree languages, is a relation which can be defined by a linear tree transducer.

For the purposes of this chapter, the significance of Frank and Satta's result is as follows. For any given MGWSM, Merge over Move can be modeled using an optimality system where the both L and L' are the tree language of the MGWSM. Merge over Move is specified as an output markedness constraint, and the reference set computation (i.e. GEN) is specified using a linear tree transducer. Unless the transducer is very careful – and the one to be defined here isn't – it will generate reference sets containing many trees which are not in the derivation tree language of the MGWSM. However, the range of the transducer can be intersected with the derivation tree language of the MGWSM to obtain the desired rational relation. Merge over Move can then select the optimal $\langle i, o \rangle$ pairs. By these means, we can specify the language formed of the set of trees which are both (i) in the tree language of the original MGWSM, and (ii) compliant with Merge over Move. The trees of this language will be labeled from the same alphabet as the trees of the original MGWSM.[22] Thus, the tree-to-tree transduction defined in §4.6.5, can be used to map this new tree language to an MCS string language. We thereby obtain a class of grammars incorporating a Merge over Move constraint which are known to have string languages within the class of MCS string languages.

As soon as any attempt is made to formalize Merge over Move, it becomes clear that there are many possible statements of the condition. A number of these are discussed in detail in Graf (2010), with reference to the analysis of *there* existentials in Chomsky (2000). Recall from (14) of chapter 1 the informal definition of Merge over Move assumed in this dissertation:

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[22] In fact, as we will see shortly, these trees will be labeled with a slightly extended alphabet, but the additional diacritics are easily removed using yet another tree transducer.
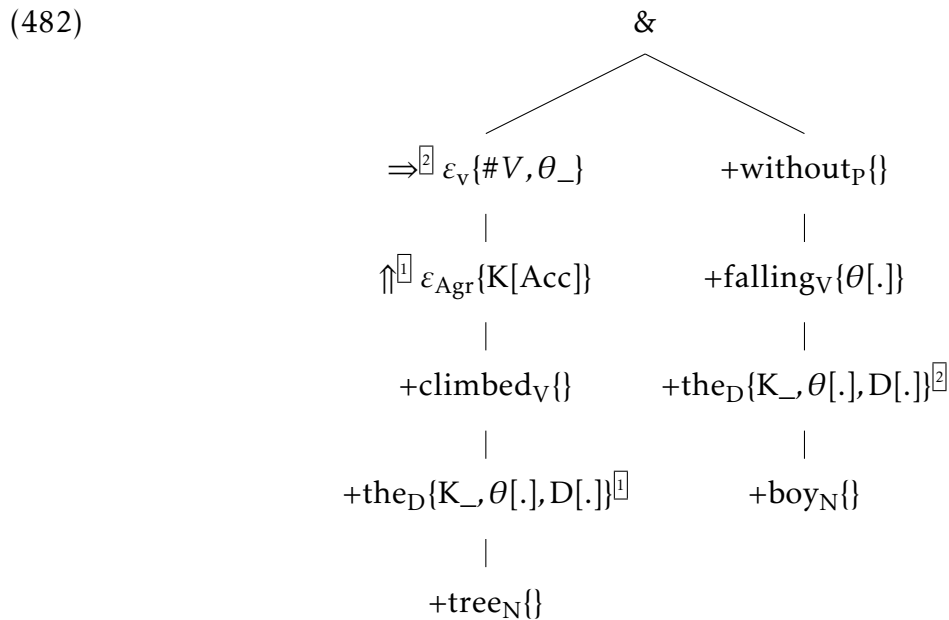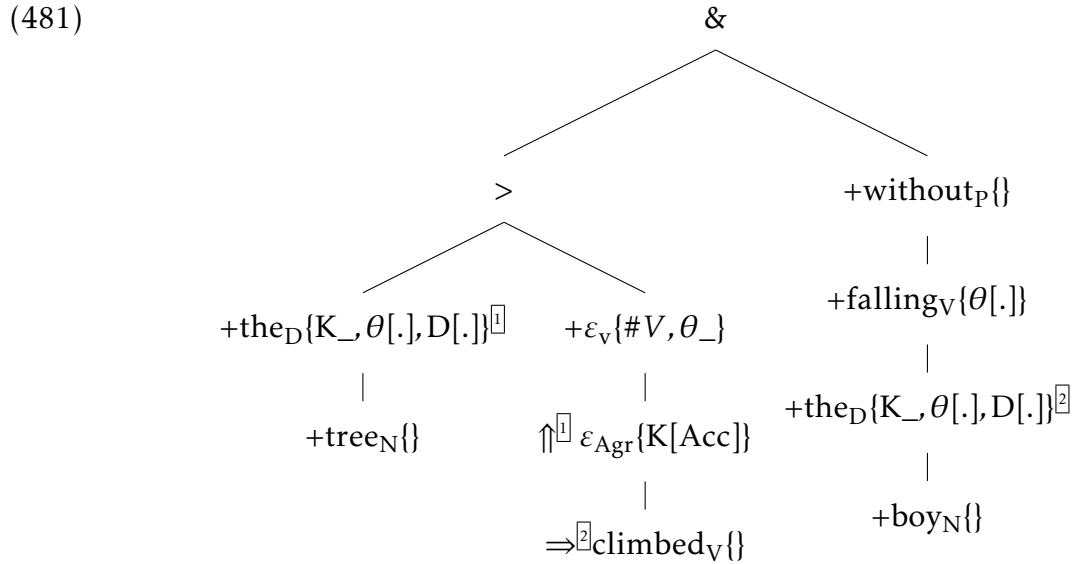
(477)   **Merge over Move:** A head or phrase X may not move at a stage S of a derivation D if there is a convergent derivation D' such that

   (i) D and D' begin from the same numeration,

   (ii) D' is identical to D up to S,

   (iii) at S of D', a head or phrase merges in the position that X moves to at S of D, and

   (iv) X later moves in D' to value the same features that it did at S of D.

For the moment, let us ignore the effect of condition (iv), which adds additional complications. A version of Merge over Move incorporating conditions (i)-(iii) can be stated over MGWSM derivation trees as follows:

(478)   For an MGWSM G, a tree T in $D(G)$ is licensed by Merge over Move if there is no tree T' in the *Merge-over-Move comparison set* such that the total length of *bottom paths to arrow* is longer in T' than in T.

(479)   The *bottom paths to arrow* of a given tree T of $D(G)$ are all of the paths in T which lead from bottom nodes to nodes labeled with ⇑ or ⇒. (We only care about the lengths of the paths, so any notion of path will do here.)

(480)   The *Merge-over-Move comparison set* for a given tree T of $D(G)$ is the set of trees formed by "swapping" one of the move operations in T with one of the Merge operations. A swap proceeds as follows. A subtree t of T is chosen, where the root node of t is labeled with an arrow. A >-labeled node n is chosen which dominates t, with t' and t'' the subtrees rooted in the left and right children of n. The node n is deleted and t'' becomes the child of the former parent of n. The subtree t' is then repositioned as a base-generated specifier of t's root if t's root is a non-leaf node, or as the child of t's root if t's root is a leaf. The arrow on

> t' is replaced with a +. The + on t is replaced by an arrow bearing a randomly chosen feature superscript.

The definition in (480) will be more easily understood with reference to an example. (482) is one of the trees which is in the comparison set for (481). In this case, t = *climbed* of (481), and t' = *the tree*:

(481)

$$
\begin{array}{c}
\&\\[2ex]
\diagdown \qquad\qquad\qquad\qquad\qquad\qquad\diagup
\end{array}
$$

&

> $\qquad\qquad\qquad\qquad$ +without$_P${}

+the$_D${K_, θ[.], D[.]}$^{[1]}$ $\qquad$ +ε_v{#V, θ_} $\qquad$ +falling$_V${θ[.]}

| $\qquad\qquad\qquad\qquad$ | $\qquad\qquad\qquad\qquad$ |

+tree$_N${} $\qquad\qquad$ ⇑$^{[1]}$ ε_{Agr}{K[Acc]} $\qquad$ +the$_D${K_, θ[.], D[.]}$^{[2]}$

$\qquad\qquad\qquad\qquad\qquad$ | $\qquad\qquad\qquad\qquad\qquad$ |

$\qquad\qquad\qquad\qquad$ ⇒$^{[2]}$climbed$_V${} $\qquad\qquad$ +boy$_N${}

(482)

&

⇒$^{[2]}$ ε_v{#V, θ_} $\qquad\qquad$ +without$_P${}

| $\qquad\qquad\qquad\qquad\qquad\qquad$ |

⇑$^{[1]}$ ε_{Agr}{K[Acc]} $\qquad\qquad$ +falling$_V${θ[.]}

| $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ |

+climbed$_V${} $\qquad\qquad$ +the$_D${K_, θ[.], D[.]}$^{[2]}$

| $\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ |

+the$_D${K_, θ[.], D[.]}$^{[1]}$ $\qquad\qquad$ +boy$_N${}

|

+tree$_N${}

As expected, on the definition of the comparison set given in (480), object-oriented adjunct control in (481) is blocked by the availability of the convergent derivation

in (482), in which control is subject-oriented.

There are two barriers to formalizing the definition of the comparison set in (480) using a linear tree transducer. First, a linear tree transducer can't, in general, move a subtree from one location to another. It can only move subtrees of bounded size. However, in order to achieve the desired effect, it does not matter if t' "morphs" somewhat in the course of moving to its new position. All that matters is that the morphed tree has the same consequences for the rest of the derivation as t'. Intuitively, given Minimality, the Left Branch Condition and the Adjunct Island Constraint, there are only a finite number of trees which are distinguishable in this sense. In fact, we need not rely on intuition here, since this is immediately confirmed by the extension of the Myhill-Nerode theorem to regular tree languages. For any given MGWSM, we can construct a finite set E which contains a single representative selected from each congruence class of one of the suitable congruences. The tree transducer need only remember which congruence class t belongs to. It can then delete t' and insert the member of E which is in the same congruence class as t' in the new position.

The second issue relates to the specfication of the constraints of the OT system. Constraints must be binary (see (476)), so although counting can be "faked" using multiple binary constraints, there is an upper bound on how high a count can be maintained. Thus, we cannot actually count the length of each bottom path to arrow. In fact, there is no need to count at all. The transducer to the Merge-over-Move comparison set can be stated in such a way that its range contains, apart from the original derivation itself, only those derivations which are "better" than the original derivation. Thus, a derivation tree t is optimal iff its comparison set is $\{t\}$. All that is required is a trivial constraint which punishes the original tree by some amount but which does not punish any other tree. As we will see, the transducer outputs trees which (if they are not the original tree)

contain a node marked with a $*$ diacritic. The constraint we require, then, is simply one which is violated by any tree which does not contain a $*$-marked node.

For any given MGWSM, the transduction from a derivation tree to is comparison set for Merge over Move can now be defined as the composition of two non-deterministic top-down tree transducers. The first of these implements the full transduction but for the fact that it does not delete the specifier. Instead, it relabels the parent of the specifier as $>^*$. The second tree transducer, which I will not define explicitly here, simply deletes the $>^*$ node and its left child, such that the right child of the $>^*$ node becomes the child of the $>^*$ node's former parent. A $*$ diacritic is then added to some other node in the tree, so that the tree does not incur a violation of the trivial constraint just mentioned.

Non-deterministic top-down tree transducers, like bottom-up tree transducers, map regular tree languages to regular tree languages. (Non-determinism adds nothing to the power of a bottom-up tree transducer, but deterministic top-down tree transducers are rather less powerful than their non-deterministic cousins.) A non-deterministic top-down tree transducer can be defined as follows:[23]

(483)   A non-deterministic top-down tree transducer is a 5-tuple $\mathcal{A} := \langle \Sigma, \Omega,$ $Q, Q', \Delta \rangle$, where Σ, Ω are the alphabets of the input and output tree languages, $Q' \subset Q$ is the set of initial states, and Δ is a set of production rules of the form $q(f(x_1, \ldots, x_n)) \to t$, where $f \in \Sigma$ is of rank n, $q \in Q$, and t is a tree with node labels drawn from $\Omega \cup \{q(x) \mid q \in Q, x \in \{x_1, \ldots, x_n\}\}$.

The transduction defined by a non-deterministic top-down tree transducer is specified in (484):

(484)   (We write $t \to t'$ to denote that t' is obtained from t by applying some

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[23] The presentation here follows that of Graf (2010, 5).

rule in Δ to a single state in t. A sequence $t_1 \rightarrow t_2 \rightarrow \cdots \rightarrow t_n$ may be written as $t_1 \rightarrow^* t_n$.) For a non-deterministic top-down tree transducer as defined in (483), the transduction computed is $\{t' \in T_{\Sigma'} \mid q[t] \rightarrow^* t'$ for $q \in Q', t \in T_\Sigma\}$, where T_Σ and $T_{\Sigma'}$ are respectively the sets of all Σ and Σ'-labeled trees.

The first transducer has a state set Q consisting of states q_1, q_c, and $q_{2(t)}$, $q_{3(t)}$, $q_{4(t)}$ and $q_{e(t)}$ for all $t \in E$. Q' is $\{q_1\}$, and Σ is the alphabet of the MGWSM's derivation tree language augmented with $\succ^*$. The state q_c is a "copy state": when the transducer goes into this state at a subtree t, it simply copies t. The $q_e(t)$ state requires some discussion, since the transition rules for this state are not defined below. The key point here is that it is possible to define a top-down tree transducer which finishes only for trees which are members of the congruence class to which t belongs.[24] When the transducer goes into state $q_e(t)$ at a subtree t', it begins a transduction which finishes if t' belongs the the congruence class containing t, and which fails to finish otherwise. (In the case where it finishes, it does not matter what the output (sub)tree is, since it will be deleted in any case by the second transducer.)

The transition rules are as follows:

---

[24] Each set of trees in the congruence class is a regular tree language (since the union of any subset of the congruence classes is a regular tree language). Thus, for any of the congruence classes, a top-down tree transducer can be defined which finishes for all and only trees in that congruence class.

(485)

$$q_1(\sigma) \quad \rightarrow \sigma \qquad \forall\ \sigma{\in}\Sigma$$

$$q_1(\sigma(x)) \quad \rightarrow \sigma(q_1(x)) \qquad \forall\ \sigma{\in}\Sigma$$

$$q_1({>}(x,y)) \quad \rightarrow\ {>}(q_1(x),q_c(y))$$

$$q_1({>}(x,y)) \quad \rightarrow\ {>}(q_c(x),q_1(y))$$

$$q_1(\&(x,y)) \quad \rightarrow\ \&(q_1(x),q_c(y))$$

$$q_1(\&(x,y)) \quad \rightarrow\ \&(q_c(x),q_1(y))$$

$$q_1({>}(x,y)) \quad \rightarrow\ {>}^*(q_{e(t)}(x),q_{2(t)}(y)) \qquad \forall\ t{\in}E$$

$$q_{e(t)}(\sigma(x_1,\ldots,x_n)) \quad \rightarrow\ \ldots \qquad n{\geq}0$$

$$q_{2(t)}(\langle+,\lambda\rangle) \quad \rightarrow\ \langle\langle\alpha,f\rangle,\lambda\rangle \qquad \forall\ \alpha{\in}\{\Uparrow,\Rightarrow\}, f{\subseteq}F, \lambda{\in}\Lambda$$

$$q_{2(t)}(\langle+,\lambda\rangle(x)) \quad \rightarrow\ \langle\langle\alpha,f\rangle,\lambda\rangle(q_3(x)) \qquad \forall\ \alpha{\in}\{\Uparrow,\Rightarrow\}, f{\subseteq}F, \lambda{\in}\Lambda$$

$$q_{3(t)}(\sigma) \quad\rightarrow \sigma \qquad\qquad \forall\ \sigma{\in}\Sigma$$

$$q_{3(t)}(\langle+,\lambda\rangle(x)) \quad\rightarrow \langle+,\lambda\rangle(q_{3(t)}(x)) \qquad\qquad \forall\ \lambda{\in}\Lambda, t{\in}E$$

$$q_{3(t)}(\langle\langle\alpha,f\rangle,\lambda\rangle(x)) \quad\rightarrow \langle\langle\alpha,f\rangle,\lambda\rangle(q_{3(t)}(x)) \qquad \forall\ \lambda{\in}\Lambda,\alpha{\in}\{\Uparrow,\Rightarrow\},f{\subseteq}F,t{\in}E$$

$$q_{3(t)}(\langle\langle\alpha,f\rangle,\lambda\rangle(x)) \quad\rightarrow\ >(q_c(t),q_{4(t)}(x))) \qquad \forall\ \lambda{\in}\Lambda,\alpha{\in}\{\Uparrow,\Rightarrow\},f{\subseteq}F,t{\in}E$$

$$q_{3(t)}(\langle\langle\alpha,f\rangle,\lambda\rangle) \quad\rightarrow \langle+,\lambda\rangle(t) \qquad \forall\ \lambda{\in}\Lambda,\alpha{\in}\{\Uparrow,\Rightarrow\},f{\subseteq}F,t{\in}E$$

$$q_{3(t)}(>(x,y)) \quad\rightarrow\ >(q_c(x),q_{3(t)}(y)) \qquad\qquad \forall t{\in}E$$

$$q_{3(t)}(\&(x,y)) \quad\rightarrow \&(q_{3(t)}(x),q_c(y)) \qquad\qquad \forall t{\in}E$$

$$q_{4(t)}(\sigma) \quad\rightarrow \sigma \qquad\qquad \forall\ \sigma{\in}\Sigma$$

$$q_{4(t)}(\langle\langle\alpha,f\rangle,\lambda\rangle(x)) \quad\rightarrow \langle+,\lambda\rangle(q_c(x)) \qquad \forall\ \lambda{\in}\Lambda,\alpha{\in}\{\Uparrow,\Rightarrow\},t{\in}E$$

$$q_c(\sigma) \quad\rightarrow \sigma \qquad\qquad \forall\ \sigma{\in}\Sigma$$

$$q_c(\sigma(x_1,\ldots,x_n)) \quad\rightarrow \sigma(q_c(x_1),\ldots,q_c(x_n)) \qquad\qquad \forall\ \sigma{\in}\Sigma,n{\geq}1$$

4.7.1 Condition (iv) of Merge over Move

Condition (iv) of (14)/(477) can be incorporated via some modifications to the transducer defined above. As a terminological preliminary, we will require a means of referring to the connection between an arrow in a derivation tree and the phrase which undergoes movement due to the presence of the arrow. Let us say that the arrow is "linked to" this phrase. Now consider the arrow which is moved in the transformation from the original derivation to one of is comparison derivations. We can implement (iv) by ensuring that this arrow is linked to the same phrase in both the original and the comparison derivations. Clearly, one precondition for this is that both arrows have the same direction and feature su-

perscripts. Thus, the automaton will have to be modified to save the arrow and its superscript as part of the q_2 and q_3 states.[25] When we compare the comparison derivation to its original, we see that the arrow has moved up the tree (e.g., compare the position of $\Rightarrow$ in (481) – original – vs. (482) – comparison). We need to ensure that the arrow does not move up far enough that it ends up being linked to a different phrase. In the case of a right arrow r, this happens if r moves over another right arrow r' such that the feature types of the feature superscript of r' are a superset of those of r. In the case of an up arrow u, the same holds with regard to crossing another up arrow; it is also necessary to prevent u crossing a node n whose feature types are a superset of those of the superscript of u. All of this can easily be ensured if the q_2 and q_3 states store the direction and feature superscript of the arrow.

4.8   The MGWSM string language

This chapter has shown that MGWSMs, with Merge over Move, have string languages within the class of MCS string languages. This strongly suggests that Merge over Move does not raise any serious issue of computational complexity. I have not yet placed any lower bound on the class of MGWSM string languages. It is not necessary really necessary to do this in order to achieve the main aim of this chapter, which is to show that Merge over Move can be formulated in a non-computationally-adverse manner. However, since it is not difficult to see that MGWSMs can at least generate all context-free string languages, it may be worth going over this quickly.

Consider a CFG in Chomsky normal form, such that every production rule is of the form $A \rightarrow BC$, for A, B, C non-terminals, $A \rightarrow \alpha$, for α a terminal, or

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[25] Since the arrow is moved up the tree, the transducer will have to non-deterministically "guess" the direction of the arrow and its feature superscript in the transition from q_1 to q_2.

$S \to \varepsilon$. To construct an MGWSM which generates the same string language as the CFG, we proceed as follows. For each rule $A \to BC$, we add a feature type A to Φ, add categories A, A_l and A_r to K, and add the lexical items to Λ necessary to ensure that a treelet of the following form is licit in the derivation tree language of the MGWSM:

(486)

$$
\begin{array}{c}
> \\[4pt]
\varepsilon_{A_l}\{A\_\} \quad \varepsilon_A\{A[.]\} \\[6pt]
\mid \\[4pt]
\varepsilon_{A_r}\{\}
\end{array}
$$
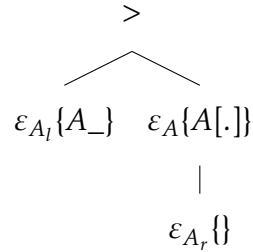
Here, the A feature is used to bond the ε_{A_l} specifier to the ε_A head. R is used to ensure that the child of any head of category A is of category A_r. R is also specified such that heads of category A_l can have children of category B, and such that heads of category A_r can have children of category C. For each rule of the form $A \to \alpha$, we add a lexical item $\alpha_\kappa\{\}$, and ensure that R is specified such that nodes of category A_r require children of category κ. If the CFG has a rule $S \to \varepsilon$, we ensure that R accepts the empty string.

Chapter 5

Conclusion

In this chapter, I will briefly review the preceding chapters to give an overview of the issues discussed in this thesis.

The thesis has developed an approach to the analysis of binding phenomena within a unified theory of grammatical dependencies developed from the proposals of Nunes (1995), Hornstein (2001), Hornstein (2009). If this approach is correct, binding relations, understood as chain dependencies, have two essential characteristics. First, they span multiple thematic positions. Second, they are pronounced by language-specific spellout rules, not by the default spellout rule. Ideally, nothing more than this need be said. There are perhaps no grammatical principles or rules of interpretation which pick out binding dependencies as such.[1]

Any kind of of chain may be exploited to encode dependencies between theta positions. Thus, in English, both A-chains and $\overline{\text{A}}$-chains are exploited in this manner, yielding reflexive binding and some instances of pronominal binding. The general moral here is that the search for a universal binding domain, to the extent that this is still a focus of current work in binding theory, is misguided. There is no theory of locality whose proprietary domain is binding dependencies. There are as many binding domains as there are syntactic domains.

The role of c-command in the GB binding theory is taken on in this dissertation by the Merge over Move constraint. In some respects, this constraint

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[1] There may however be certain extragrammatical or interface principles which do so, such as (246) of chapter 2, or, if some version of it is correct, Montalbetti's (1984) Overt Pronoun Constraint.

is more relaxed than c-command, since it permits adjunct control and control into DP possessors. In other respects it is more restrictive, since it imposes a highest-DP-orientation requirement.

Merge over Move is not sufficiently lax to permit binding out of PP. Chapter 3 has attempted to revive the reanalysis hypothesis to account for the possibility of binding in this configuration. It has also sketched an analysis of pseudopassivization in terms of reanalysis, and attempted to account for the link between pseudopassivization and preposition stranding.

Chapter 4 has shown that Merge over Move does not have adverse computational implications. The class of Minimalist grammars formalized in chapter 4 does not include all of the syntactic technology developed in chapters 1 to 3 (e.g., it does not formalize language-specific spellout rules), but it seems unlikely that the addition of these additional complexities would lead to any adverse interaction with Merge over Move.

I would like to conclude by discussing very briefly an issue which has not been addressed explicitly in the rest of the dissertation. This is the status of syntactic features with regard to pronouns and reflexives. If the preceding chapters are correct, it seems that there may be no need to postulate syntactic features distinguishing different types of pronoun, or pronouns from reflexives. Pronouns are either base-generated as bundles of ϕ-features, or are the spellouts of the ϕ-features of a copy in a chain. The difference between e.g. a strong and a weak pronoun may reduce entirely to a difference in phonological form, and may not be a distinction encoded in the narrow syntax at all. Similarly, restricting our attention for the moment to bound pronouns which spell out copies in a chain, it may be that the only difference between a reflexive and a bound pronoun is phonological. If this is a viable position, we seem to have obtained the best possible result. The phonological differences are irreducible, so why postulate other

differences if the phonological differences suffice?

This dissertation leaves unresolved a number of issues regarding the relation between phonology and interpretation. Lidz and Idsardi (1998) postulated a level of "phono-logical" form which was the input to interpretation and which contained both syntactic and phonological information. For example, on Lidz and Idsardi's account, the interpretative distinction between reflexives and reciprocals derived from the sensitivity of the relevant interpretative principles to the phonological distinction between *himself* and *each other*. This is not, I think, as outrageous a proposal as it may first appear. A textbook account of the interpretative distinction between *himself* and *each other* would simply postulate an additional syntactic distinction (perhaps a +/-reciprocal feature) mapping directly to the phonological distinction rather than via a syntactic intermediary. Lidz and Idsardi propose to eliminate this redundant feature by having the interpretative distinction linked directly to the phonological distinction. This dissertation leaves as an open question the extent to which phonological information feeds directly into interpretation. This is, it should be emphasized, a robustly empirical issue. There are no weighty conceptual reasons, Minimalist or otherwise, for supposing that interpretative rules cannot "see" phonological information. The key is to ensure that we capture the generalization that only a limited set of grammatical formatives can have any special interpretative effects. (That is, *each other* can trigger a special interpretative rule, but *John* cannot.[2]) It seems that we must appeal to a distinction which was implicit in the architecture of early transformational grammar: the distinction between base-generated morphemes

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[2] There is a crucial distinction here between special interpretations and special *rules* of interpretation. In a certain sense, *John* clearly does have a special interpretation – it can be used to refer only to people who are called John. However, *John* does not trigger a special rule of interpretation since it is semantically integrated with the rest of the sentence in the same manner as any other name.

and morphemes introduced by transformational rules. Within the framework of this dissertation, the language-specific chain spellout rules take on the role of the transformational rules in this respect.

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