

# Spelling Out the Noun Phrase: Interpretation, Word Order, and the Problem of 'Meaningless Movement'

David Hall  
Doctoral Dissertation  
Queen Mary, University of London

September 2015

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## Abstract

This thesis is an investigation of the nature of the syntax-semantics and syntax-phonology interfaces, focusing on the noun phrase. It is argued that, under the assumption that the mapping between syntax and semantics is homomorphic, employing movement operations which do not have semantic effects as an explanatory tool for understanding word-order variation cross-linguistically is undesirable. I argue for the non-existence of head movement as a narrow syntactic operation, on the grounds that it does not produce semantic effects, and I explain apparent head movement effects in terms of the nature of the spell-out operation which maps syntactic structure to phonology.

A Direct Linearization theory is proposed in which word-order effects purported to be the result of movement can be derived without appeal to any narrow syntactic operations; the explanatory burden shifts onto the mapping from syntax to phonology, which allows more than one head in a continuous complement line to be spelled out as a single morphological unit; morphological words can spell out at different positions along the extended projection of a root, giving rise to word order variation.

I support these claims with two empirical case studies:

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# Statement of originality

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# Acknowledgements

Firstly I thank David Adger, who has been a truly spectacular supervisor and mentor to me since I wandered into the world of Linguistics four years ago. Without his enthusiasm and support I would never have even started this PhD, and it is certainly in no small way due to his efforts that I have been able to finish it. There has never been a time when he has not had something interesting or challenging to say about my work (or anything else for that matter), and I cannot thank him enough for that.

I thank my second supervisor Hagit Borer for her support and feedback, and for her absolutely inspiring syntax lectures. Hagit has the ability to force you to look at what you considered to be basic concepts in an entirely new light, and from different angles that you would never have thought of. Her teaching has completely changed the way that I think about our field, and I consider myself incredibly lucky to have been taught by such an inspiring linguist.

I would also like to thank Paul Elbourne, Daniel Harbour, Luisa Martí and Linnaea Stockall for their teaching, knowledge, insight, intelligence and wit. Being surrounded by such a brilliant group of linguists has been incredibly stimulating and fun, and the variety of approaches to the study of language that each of them has forced me to constantly question my assumptions and methods, and to try to tackle problems from a variety of different angles. I find it completely fascinating that there could exist a group of individuals who manage to almost completely agree with each other while simultaneously violently disagreeing with each other. Somehow, they manage to pull it off.

To (in no particular order) Fryni, Tom, Annette, Catherine, Fangfang, Christina, Orm, Panpan, Abigael, Danniella, Chen, Anne, Zoe, Melisa, Shivonne, Dimitra, Reem and past LingLab members Eva, Philippa, Agnieszka, John, Rachelle, Barb, Sarah, Ricardo and Paula: thank you all for being a great team! It has been an absolute pleasure meeting and getting to know you all, and it really has helped having a bunch of wonderful intelligent people

around me every day. Special thanks go to Annette Zhao, Christina Liu, Fangfang Niu and Panpan Yao for putting up with my endless judgement tasks, and to Cherry Lam, Sara Leung and Joanna Wat for help with Cantonese judgements. Very special thanks to Fryni and Tom, my PhD soulmates: you've made my time at Queen Mary so much more fun than it likely would have been.

Finally, thanks to my friends and family. To my mum for being such an excellent parent and human being; everything I am and everything I have achieved is thanks to your hard work, strength and love. To my brother Patrick for being a great friend (with great hair), and to Dan, John, and Yok for being a bunch of top br'ers. Last, but the opposite of least, thank you to Sonoko for being a very supportive and generally wonderful person. I love you all.

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# Chapter 1

## The interfaces and the problem of ‘meaningless movement’

### 1.1 Minimalism and syntax-semantics mapping

The operation Merge (in its External and Internal instantiations) gives rise to hierarchically structured syntactic objects. Merge takes two syntactic objects as inputs, and outputs an unordered set, itself a syntactic object, containing both of the input. I take a standard definition of Merge to be the following (for the time being putting aside labelling):

- (1)  $\text{Merge}(X, Y) = Z$ , where  $Z = \{X, Y\}$ , and where  $X$ ,  $Y$  and  $Z$  are syntactic objects.

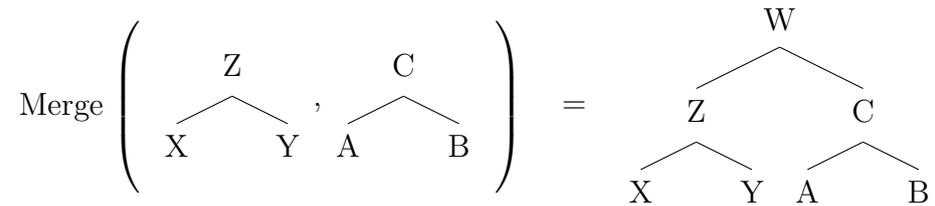
Iterated application of Merge can give rise to highly complex syntactic objects, and each object is related to the others through the notions of sisterhood and immediate containment, which are natural relations that fall out of the definition of Merge. Another relevant relation between subparts of a syntactic object is *c-command*, defined in Reinhart (1976) in the following way:

- (2) Node  $A$  *c-commands* node  $B$  if neither  $A$  nor  $B$  dominates the other, and the first branching node which dominates  $A$  dominates  $B$ .

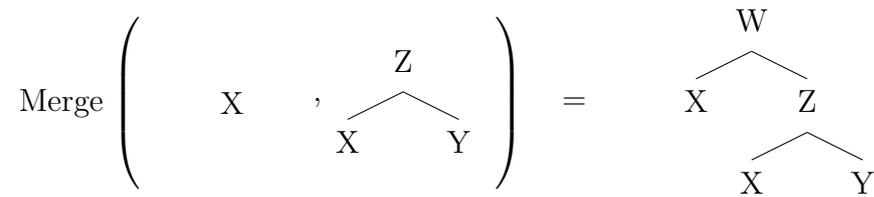
*C-command* has been shown to be relevant to a number of relations; particularly relevant here are scope relations between different syntactic objects and binding of pronouns.

Merge applied to two separate syntactic objects is External Merge, and Merge applied to two objects where one is part of the other is Internal Merge (Chomsky 2004). This is schematized in (3).

(3) a. External Merge



b. Internal Merge



I use tree representations here for illustrative purposes, but the inputs and outputs of Merge can be thought of as unordered sets as in the following, which is equivalent to (3):

(4) a. External Merge

$$\text{Merge} (\{X,Y\},\{A,B\}) = \{\{X,Y\},\{A,B\}\}$$

b. Internal Merge

$$\text{Merge} (X,\{X,Y\}) = \{X,\{X,Y\}\}$$

This better captures the fact that the output of Merge is not ordered; linear order is imposed on the nodes through a linearization algorithm. Z, C and W in (3) are intended to be stand-ins for labels which are determined in some well defined way: in a Bare Phrase Structure model (Chomsky 1995) the label is to be determined endocentrically through a minimal labelling algorithm (see also Chomsky 2013), or alternatively, in different phrase structure systems the label might be determined exocentrically, for example through a set of label transition functions (Adger 2013) which determine the label from an axiomatic set of possible transitions based on a universal functional sequence.<sup>1</sup>

On the assumption that the two instantiations of X in (3b) are identical to each other, that is, copies of each other, and that there is a general interface

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<sup>1</sup>I discuss the nature of Adger's label transition functions in chapter 2.

constraint which forces only one copy of any syntactic object to be interpreted at both LF and PF (Chomsky 1995), we can straightforwardly explain the properties of displacement operations in human languages: displacement is simply the result of Internal Merge.

An important consequence of movement as Internal Merge is that c-command relations between syntactic objects can be altered through the application of Merge. Take (3b): X in the structure  $\{Z, \{X, Y\}\}$  is dominated by, and therefore does not c-command, Z. However, in the output of Internal Merge, the higher copy of X now c-commands both Z and Y. This means that Internal Merge results in a structural reorganization which has an effect on c-command relations, and thus, wherever c-command is involved in the licensing of a dependency between two syntactic objects (binding, scope, etc.) movement will have a direct effect on the creation of dependencies.

### 1.1.1 A homomorphic mapping from syntax to semantics

A central tenet of most theorizing in the Minimalist framework (Chomsky 1995), et seq) is that there is a homomorphism between aspects of syntactic representations and semantic representations; that is to say that there is a direct one-to-one mapping from the syntax to the semantics.<sup>2</sup> As such, syntactic operations which affect structural relations are expected to have semantic consequences.

We saw above that Internal Merge, which is proposed as a model of displacement effects in human languages, by definition alters structural relations between syntactic objects through its operation. On the assumption that there is a homomorphic mapping between syntax and semantics, it must therefore be the case that Internal Merge produces semantic effects, and thus that movement should also produce semantic effects.

As an illustration of movement operations having a clear semantic effect, I take A and A'-movement. It can be shown that movement operations give rise to a variety of effects, such as reconstruction effects, scope effects and binding effects. The classic diagnostic tests for movement involve showing that a constituent X, which has moved from position  $\alpha$  to position  $\beta$  has properties

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<sup>2</sup>Of course, aspects of the semantic representation may not be relevant to the syntax and vice versa. The homomorphism that I have in mind is the kind that arises from a compositional semantics of the sort proposed in Heim and Kratzer (1998), where the meaning of an expression is computed over syntactic trees, through a set of rules of composition.

associated with both positions, and if it does not have the properties of one of the positions, it must be shown that this is the result of some independent interaction which forces the  $\alpha$  or  $\beta$  properties to be masked (see Pesetsky 2013 for an overview of such effects, and diagnostics for them). There is a huge literature on these effects, but I will illustrate here with a small number of clear examples.

In cases of A'-movement, a moved constituent has the properties associated with both its surface position, and also the position from which it moved. In the simplest case, we can see that a selectional requirement on a verb can be satisfied by a gap, suggesting that the gap has some of the properties of the moved element, while the semantics of the sentence suggest that the movement creates an operator-variable relation between the *wh*-element and the gap:

- (5) a. John devoured some cheese  
 b. \*John devoured  
 c. What did John devour \_\_\_\_?

*Devour* requires an object to Merge as its sister, but a left peripheral *wh*-element which is interpreted as the object of the sentence can also fulfil this selectional requirement of the verb. At the same time, the *wh*-element *what* behaves as an operator which binds a variable in the position of the gap, resulting in a meaning along the lines of *what x, such that John devoured x*.

To give a more complex example, we can see that the gap left behind by the moved element is sufficient to license a binding configuration (Fox 1999):<sup>3</sup>

- (6) a. Which of his<sub>1</sub> students did every professor<sub>1</sub> talk to \_\_\_\_?  
 b. \*Which of his<sub>1</sub> students \_\_\_\_ talked to every professor<sub>1</sub>

On the assumption that a bound reading of a pronoun requires that the pronoun be c-commanded by a relevant quantifier, we would expect that a bound reading of the pronoun *his* should be unavailable in (6a), unless the gap has the properties of the constituent *which of his students*. If it does, and there is

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<sup>3</sup>It is possible that the unacceptability of (b) is the result of a Weak Crossover effect, where *every professor* undergoes QR to a position above the pronoun. The following example avoids that possible confound (if QR is clause-bound), and remains unacceptable (under a bound reading for the pronoun):

- (i) \*Which of his<sub>1</sub> students did you say talked to every professor<sub>1</sub>?

a copy of *which of his students* which is interpreted in the position of the gap, then *every professor* c-commands the copy in that position (where *his* was base generated), and so the bound interpretation is available. In (6b), however, the gap is in the subject position and is not in the c-command domain of the quantifier. Therefore we can see that it is the movement that gives rise to this effect, not just a general property of *wh*-questions.

There are cases where semantic interpretation of a lower copy (reconstruction) gives rise to ungrammaticality because it feeds a negative condition, such as Condition C of Binding Theory. An example from Lebeaux (1990) illustrates:

- (7) a. [Which (of the) paper(s) that he<sub>1</sub> gave to Ms. Brown<sub>2</sub>] did every student<sub>1</sub> hope *t'* that she<sub>2</sub> will read *t*?
- b. \*[Which (of the) paper(s) that he<sub>1</sub> gave to Ms. Brown<sub>2</sub>] did she<sub>2</sub> hope *t'* that every student<sub>1</sub> will revise *t*?

Reconstruction to the *t'* position is fine in (7a), and the pronoun *he* is bound by the universal quantifier, receiving a bound reading as predicted. However, the same reconstruction in (7b) leads to a violation of Condition C, thus giving us the contrast in acceptability between the two.

In the same way, A-movement can be shown to give rise to semantic effects. With raising verbs, movement of a quantifier to a high structural position can create the conditions for a wide scope interpretation with respect to another quantifier, and reconstruction can produce the scope relation that would be expected if the raised element was interpreted where the gap is (example from Fox 1999):

- (8) a. John seems to a (#different) teacher *t* to be likely to solve every one of these problems
- $\exists > \forall; * \forall > \exists$
- b. [Every one of these problems] seems to a (different) teacher *t* to be likely *t* to be solved *t* by John
- $\exists > \forall; \forall > \exists$

In (8b), raising of the universal DP to a position where it c-commands the existential *a (different) teacher* means that the scope order  $\forall > \exists$  is available, whereas it is not available where no such movement takes place (8a). The ‘inverse’ scope order is also available, and can be plausibly taken to arise from

reconstruction of the universal to a lower position (that is, interpretation of a lower copy).

Scope reconstruction seems to feed Condition C in A-movement cases too. That is, in a configuration where interpretation of a lower copy would give rise to a Condition C violation, raised constituents fail to be able to reconstruct, and scope relations are fixed (i.e., not variable). Another example from Fox (1999) illustrates:

- (9) a. [A student of David's<sub>1</sub>] seems to him<sub>1</sub> *t* to be at the party  
 $\exists > seem, *seem > \exists$
- b. [A student of his<sub>1</sub>] seems to David<sub>1</sub> *t* to be at the party  
 $\exists > seem, seem > \exists$

In (9a), interpretation of *a student of David's* in the low position *t* would give rise to a Condition C violation, and thus the scope order  $seem > \exists$  is ruled out. This means that the sentence cannot be interpreted with the meaning that some student or other, but not any particular student that David has in mind, is at the party. However, in (9b) reconstruction does not feed Condition C, and we get variable scope order of *seem* and the existential, and that reading becomes available.

It is clear that the examples discussed here are cases of movement, in the sense that we can see that displacement of an element from one structural position to another (or rather, copying of an element to another structural position) results in an alteration in syntactic relations between that element and others, and thus visible scopal/*c*-command effects. This is precisely what we would expect if there is a direct mapping from syntax to semantics, and if these movements are instances of the operation Internal Merge.<sup>4</sup>

### 1.1.2 Minimalism and the simplification of UG

The logic of the argument from the poverty of the stimulus has the consequence that any distributional patterns which could not have been learned inductively (where there is simply not enough of the right kind of data in the input to

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<sup>4</sup>This is not to say that there are not alternative ways to interpret these phenomena, and it is by no means entirely uncontroversial that there even are movement operations in syntax (see, e.g., any monostratal theory of grammar such as GPSG (Gazdar, Klein, Pullum, and Sag 1985), HPSG (Pollard and Sag 1994), LFG (Kaplan and Bresnan 1982), CCG (Steedman 1996) or TAG (Joshi 1988)). The point is that on standard minimalist assumptions about the way that structure building and displacement work in language, displacement, modelled as Internal Merge, is expected to have visible semantic effects.

systematically produce the right generalizations), but which are present in the knowledge of language that speakers possess, have to be the result of some other fact(s) about the speaker, and not the result of any general inductive learning mechanism that humans possess. In early work in the Generative tradition, constraints on the development of a grammar in an individual were taken to be innate and part of UG, specified in the initial state of the language faculty, and the result of the (biological) process of evolution. However, this meant that more and more language specific rules and constraints had to be dumped into UG, and it became less and less plausible that such a complex set of rules and constraints could have arisen through the process of evolution over such a short period of time since the first appearance of symbolic behaviour in humans (~100,000-80,000 years ago, cf. Tattersall 2009).

Considering the language faculty to fundamentally be a biological ‘organ’, Chomsky (2005) proposes that the following three factors interact to give rise to the grammar that a learner attains:<sup>5</sup>

(10) The Three Factors in Language Design

1. Genetic endowment (UG)
2. Experience
3. Principles not specific to the faculty of language

As a result of the tension between the proliferation of language specific rules and the evolutionary implausibility of a complex UG, work in the framework of the Minimalist Programme aims to reduce the explanatory burden placed on first factor principles, and to shift explanation to the other two. The aim is to be able to explain generalizations that have been discovered over the past 60 odd years in terms of both language specific properties and general cognitive constraints. The tension between Plato’s problem and Darwin’s problem (Boeckx 2009) has led the field to attempt to reduce the content of UG to the bare minimum, leaving behind only essential operations that could plausibly be biologically specified, and which could have evolved in the appropriate time frame.

A concurrent goal of the Minimalist Programme is to reduce seemingly unrelated principles of UG to as small a set of underlying principles as possible,

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<sup>5</sup>Chomsky (2004) has the three factors in a different order (1 is experience, 2 is UG), and with different wording, but the principle is the same.

particularly where these principles cannot be explained as third factor principles. Again, this represents a way to reduce the complexity of the core of the language faculty which has to be encoded in UG. One such example is the reduction of Merge and Move to a single operation Merge (Chomsky 2004). Movement is ubiquitous in language, and requires explanation: the way that Merge is defined means that the availability of Move falls out for free. We would require a stipulation to prevent Merge from operating on subparts of syntactic objects, which are themselves syntactic objects.

There is a problem that comes with the drive for a minimal set of operations, coupled with the assumption of a universal similarity in the structure of clauses and other major extended projections: there is massive variation between languages with respect to word order. On the assumption that there is a simple linearization algorithm which maps syntactic objects onto linear strings, such as the LCA of Kayne (1994), maintaining a highly constrained syntax represents a huge challenge.

A natural extension to the minimalist way of thinking is to attempt to solve problems, like the word-order problem above, by making use of operations which are already independently available. We already know that the operation Merge, in its Internal instantiation, gives rise to the phonological displacement of the element that it operates on. Thus, regardless of the usual structural and therefore semantic effects associated with movement, it makes sense from a minimalist standpoint to employ movement in explaining word order variation across languages, if possible. If we have to assume that children come to the task of language acquisition with access to a basic computational operation which allows for the displacement of elements, then the most minimal and therefore the most elegant of theory will be one where movement does that job in all cases, and therefore there is no need to posit any additional operations. This means that syntax can be highly constrained, but still give rise to the wide variation that is observable.

Therefore, movement operations have generally been taken to be responsible for the variety of different word order effects that we see across languages. This is the case for both XP movement (particularly since Kayne 1994), and also for head movement (cf. Travis 1984, Pollock 1989 for pre-minimalist head movement accounts of word order effects; see also the vast literature in the framework of Distributed Morphology, beginning with Halle and Marantz 1993).

However, there is necessarily a fundamental contradiction between the two

central minimalist ideas that I have presented here. If there is a direct mapping from syntax to semantics, and word order variation is to be explained by appeal to the movement of syntactic objects, then we expect these movements to exhibit the kind of semantic effects that other movement operations have been shown to give rise to. If word order movements really are movements in the sense defined above, in that they are the result of an instance of Merge where a structural relation between one syntactic object and other syntactic objects is altered, and they are entirely semantically vacuous, then the homomorphism between syntax and semantics cannot be maintained.

The attempt to tie word order effects **across languages** with displacement effects **within a language** is a conflation of two processes that have entirely different properties. Although it is surely true that movement can in principle derive different word orders, there is often no independent evidence at all to suggest that the difference between, for example, the position of the verb in French and the position of the verb in English is the result of movement, outside of the fact that the position in which it is pronounced is different. It is my contention in this thesis that tying cross-linguistic word-order differences to head movement and phrasal word-order movement is mistaken, and that it is necessary to adopt an alternative which allows us to maintain the homomorphism between syntax and semantics, while also explaining the huge variety that we see in the world's languages.

It is a fact that different movement operations have different characteristics. A'-movement induces Weak Crossover effects, involves obligatory reconstruction for Principle C, and licenses parasitic gaps, whereas A-movement does not exhibit these properties (see, e.g., Mahajan 1990). However, they both clearly have the effect of altering syntactic relations between elements, and thus give rise to semantic effects. There is a current string of work which aims to unify A and A'-movement: success would again mean that in fact only one operation, i.e., Merge, is required to produce both sets of properties, given that some other facts hold (see van Urk 2015 for an attempt to tie the differences down to features involved, and Safir 2012 where a reformulation of the extension condition is taken to drive the difference). While I do believe that a unification of A and A'-movement is a goal worth pursuing, I take the position that head movement and XP-word-order movement should not be unified with A and A'-movement, based primarily on the fact that they do not give rise to any syntactico-semantic effects.

### 1.1.3 Word order and interpretation in the DP

In the previous sections I have discussed the effect of differing structural relations between syntactic objects in the clause. The main empirical domain of this thesis, however, is the noun phrase. The question is, then, whether we can see similar scopal effects within the noun phrase related to word order: my answer is that it is clear that there **are** scopal effects related to the relative structural position of elements in the noun phrase too. In general, it can be assumed that there is a fixed scopal hierarchy of functional elements in the DP, and that the order of composition of elements, coupled with their independent semantics, gives us the scope facts. For example, demonstratives tend to scope over numerals in the unmarked case (putting aside partitive structures), and thus *those three girls* does not mean a group of three from the set of girls over there, it means exhaustively the set of girls over there which has cardinality three.

Just as in the clause, differences in order can mean differences in scope. If we take the ordinal *second* and place it in a different position relative to the adjective *green*, then we get different interpretations for *the second green ball* and *the green second ball*. To see precisely what the difference is between the two interpretations, imagine the lottery draw in (11), with 4 balls of different colours drawn on three consecutive days. The utterances in (12) then highlight particular balls.<sup>6</sup>

(11)		First	Second	Third	Fourth
	Day 1	●	●	●	●
	Day 2	● <sub>(12a)</sub>	●	●	●
	Day 3	●	● <sub>(12b)</sub>	●	●

- (12) a. That's the second green ball we've seen! (Day 2, First)  
 b. That's the only green second ball we've seen! (Day 3, Second)

This example is not intended to show that it must be **movement** which is responsible for the differences in interpretation, but at least we can assume that a hierarchical difference gives rise to scope differences, which are then translated into interpretive differences on the surface.

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<sup>6</sup>Apologies if you are reading a black and white version of this text. I assure you that the relevant balls were typeset as green balls in the original, but have subscripted them with their associated utterance number for ease of reference.

The same goes for the relative order of certain ‘scope-taking’ adjectives. Svenonius (1994) points out that the order of adjectives forces very different interpretations, as shown in (13).<sup>7</sup>

- (13) a. a possible rich Republican  $\neq$  a rich possible Republican  
 b. a former happy camper  $\neq$  a happy former camper  
 c. broken valuable pottery  $\neq$  valuable broken pottery  
 d. a dangerous dead animal  $\neq$  a dead dangerous animal

To illustrate the difference for one example: a dangerous dead animal might be a deceased animal which is a carrier of some kind of infectious disease, and is thus to be considered dangerous, whereas a dead dangerous animal might be a lion, which was dangerous while alive, but which happens to have passed away (and, interestingly, is likely no longer dangerous).

Even non-canonical orderings of adjectives seem to have an interpretive effect. Languages tend to have an unmarked order of adjective classes, and the order has been claimed to be universal (Sproat and Shih 1991, Scott 2002). For example, English tends to put size adjectives before colour adjectives, so that, in the unmarked case, *the big black car* is preferred to *the black big car*. However, the marked order is only appropriate where the left-most element receives prominent stress, and something like a focus interpretation (the facts are not as straightforward as presented here, but see Truswell 2005, Szendrői 2010, and Panayidou 2013 for in depth discussion of meaning differences related to non-canonical orderings).

- (14) a. big black car (information-structurally unmarked)  
 b. black big car (focus on *black*)  
 c.??I have a black big car  
 d.<sup>ok</sup>All of my friends have a big car, but only I have a BLACK big car

It is clear that noun phrase internal elements exhibit the same kind of scopal relations that elements in the clause do, and it is plausible that those scopal relations are determined by structural relations. If this is the case, then we expect movement of elements inside the noun phrase to have semantic effects.

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<sup>7</sup>Intonation also has a role to play here, and comma intonation between adjectives generally has the effect of destroying any kind of scopal effect that is observed without pauses between elements. See Sproat and Shih (1991) and Panayidou (2013) on Parallel Modification and comma intonation.

This will become important in the discussion of cross-linguistic variation with respect to the order of noun phrase internal elements, particularly in chapter 5. It has been claimed that XP movement can elegantly account for the kind of variation that we see across languages (e.g., Cinque 2005, Simpson 2005), but these analyses of word order variation invariably ignore the fact that movement should be expected to come with an associated adjustment of the syntactic and thus semantic relations between elements in the DP.<sup>8</sup>

I do, however, think that it is reasonable to assume that word order differences which come with associated semantic effects can be analysed as the result of movement (given appropriate evidence). For example, as will be discussed in detail in chapters 4 and 5, I argue that in some cases movement of a constituent that is merged low in the noun phrase to a high position in a specific relationship with D can give rise to a definite interpretation. A structural alteration gives rise to a semantic alteration, and therefore it is reasonable to posit a movement as the cause. It is not my intention to do away with all narrow syntactic movement operations, and the past half-century of linguistic research has, in my opinion, shown quite convincingly that a number of long distance dependency phenomena should be analysed as movement operations, modelled as Internal Merge. It is my intention, however, to argue that not all ordering effects are the result of Internal Merge, and to argue that there is a class of ‘meaningless movements’ which should instead be analysed as the consequence of a parameterized mapping of syntactic structures to linearly ordered phonological objects.

## 1.2 ‘Meaningless movement’

The problem that I attempt to address in this dissertation is the problem of ‘meaningless movement’. Given the discussion above, and adopting the central assumptions that guide inquiry in the minimalist programme, I suggest that phenomena which have been argued to be the result of movement, but where that movement has no semantic effect, should be reanalysed as being the result of the mapping of syntax to phonology. The idea is not a new one, and the lack of any semantic effects of head movement has been discussed widely as a conceptual drawback of head movement as a narrow syntactic operation, and

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<sup>8</sup>I say ‘ignore’ here, but that is not entirely true. Simpson (2005), for example, does point out that one might expect there to be a difference in interpretation related to (movement driven) order differences, but ultimately chooses to put this worry aside. See chapter 5 for discussion.

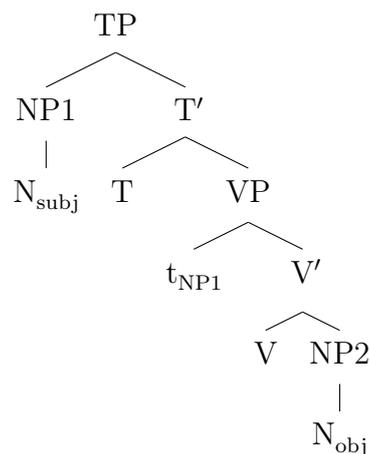
led Chomsky to propose that it must be a PF operation (Chomsky 2000). I intend this thesis to be a contribution to the debate, supporting the claim that head movement effects, and meaningless movement effects more generally, are the result of PF considerations, and not narrow syntactic operations.

Before presenting my alternative to movement accounts, I must clarify what I mean by meaningless movement with some examples. I take there to be two main types of meaningless movement, Phrasal Word-Order Movement (WO movement), and Head Movement.

### 1.2.1 Phrasal word-order movement

As discussed above, on the analogy with displacement effects within a language, movement has been utilized as a tool to explain word order differences cross linguistically. Kayne's (1994) LCA, where asymmetric c-command maps to linear precedence, coupled with the assumption of a universal underlying functional hierarchy, means that the only possible way to generate word order differences across languages is for movement to take place. To illustrate, let us consider an extremely simplified example which shows how SVO and SOV orders are generated. Ignoring the relationship between the verb and T, and focusing only on the relationship between the Subject, the Verb and the Object, the c-command relations between each in (15) gives the ordering SVO:<sup>9</sup>

(15) a.



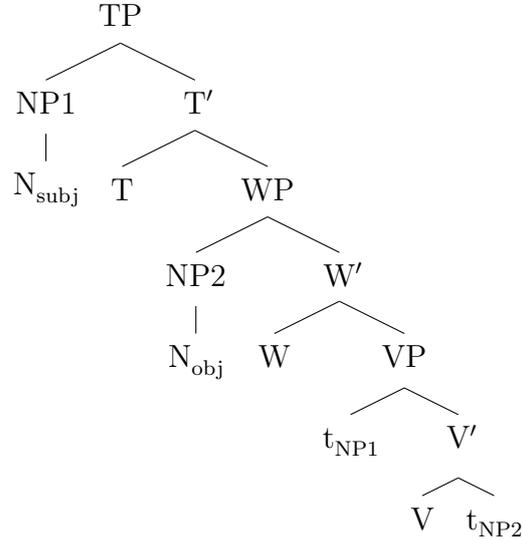
b. NP1 > V > NP2

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<sup>9</sup>Under a Bare Phrase Structure approach, there is no asymmetric c-command relation between the verb and the object, but I put this problem aside here. See Moro (2000), and also Kayne (2010), for in depth discussion of, and possible solutions to, this problem.

To generate an alternative order, such as SOV, the object has to move so that the c-command relations between the verb and the object are altered, and the correct order results.

(16) a.



b. NP1>NP2>V

The object is moved to a position in the specifier of a head W, whose sole purpose is to drive the movement of the object. The presence or absence of word order heads like W is parameterized, with the intuition being that the primary linguistic data will provide enough information for the child to posit the existence of such a head where necessary. Thus we get cross-linguistic variation.

This line of reasoning has been extended to variation in the order of DP internal elements. Cinque (2005) represents possibly the most impressive and far reaching study of such variation, and puts forward an explanation which relies on a constrained set of XP-movements to derive the attested orders, and rule out those that are unattested. The result of a large typological study of the 24 logically possible orders of demonstrative, numeral, adjective and noun is presented in (17).<sup>10</sup>

<sup>10</sup>The empirical results are largely confirmed by an extended corpus of 442 languages in Dryer (2009), with a few potential counterexamples which are addressed in a forthcoming paper, Cinque (2014a).

(17) Variation in the order of Dem, Num, A and N

1.		Dem	Num	A	N	Very many languages
2.		Dem	Num	N	A	Many languages
3.		Dem	N	Num	A	very few languages
4.		N	Dem	Num	A	few languages
5.	*	Num	Dem	A	N	∅
6.	*	Num	Dem	N	A	∅
7.	*	Num	N	Dem	A	∅
8.	*	N	Num	Dem	A	∅
9.	*	A	Dem	Num	N	∅
10.	*	A	Dem	N	Num	∅
11.		A	N	Dem	Num	very few languages
12.		N	A	Dem	Num	few languages
13.	*	Dem	A	Num	N	∅
14.		Dem	A	N	Num	very few languages
15.		Dem	N	A	Num	many languages
16.		N	Dem	A	Num	very few languages, possibly none
17.	*	Num	A	Dem	N	∅
18.		Num	A	N	Dem	very few languages
19.		Num	N	A	Dem	few languages
20.		N	Num	A	Dem	few languages
21.	*	A	Num	Dem	N	∅
22.	*	A	Num	N	Dem	∅
23.		A	N	Num	Dem	very few languages
24.		N	A	Num	Dem	very many languages

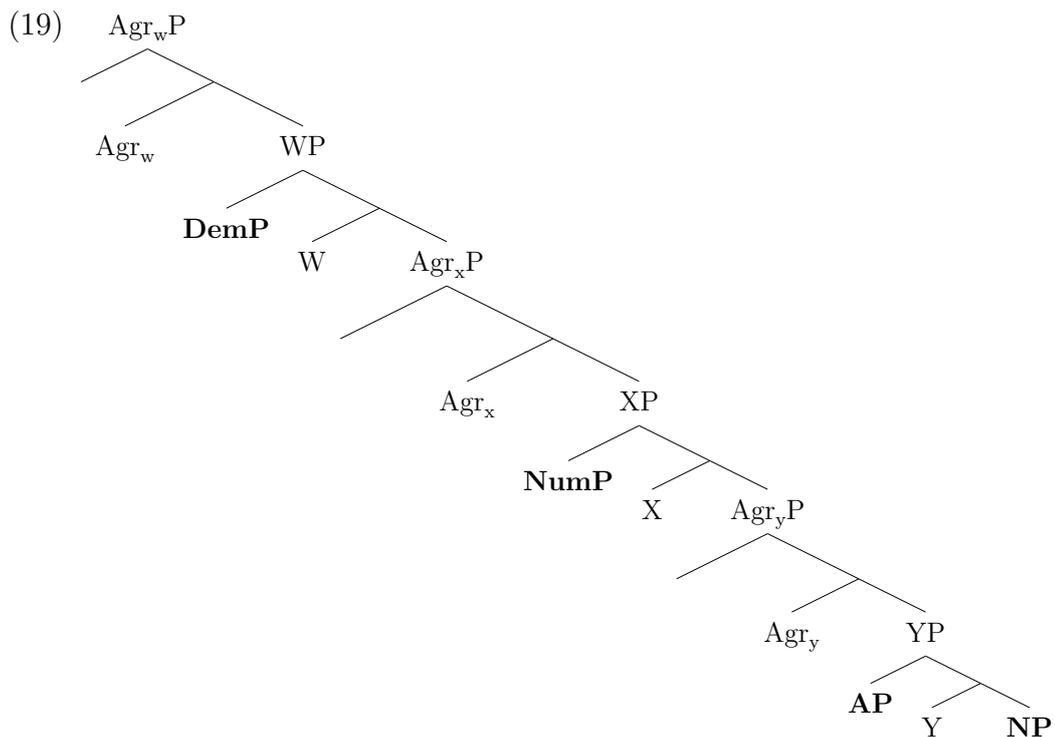
Cinque shows that each of the attested orders can be generated, and each of the unattested orders blocked, if the following constraints on movement operations are applied:

- (18) a. Merge order: [ . . . [WP Dem . . . [XP Num . . . [YP A [NP N]]]]]
- b. Parameters of movement
- i. No movement, or
  - ii. Movement of NP plus pied-piping of the *whose picture* type (movement of [NP[XP]]), or
  - iii. Movement of NP without pied-piping, or

- iv. Movement of NP plus pied-piping of the *picture of who* type (movement of [XP[NP]]).
- v. *Total* versus *partial* movement of the NP with or without pied-piping (either NP moves all the way up or only partially)
- vi. Neither head movement nor movement of a phrase not containing the (overt) NP is possible.

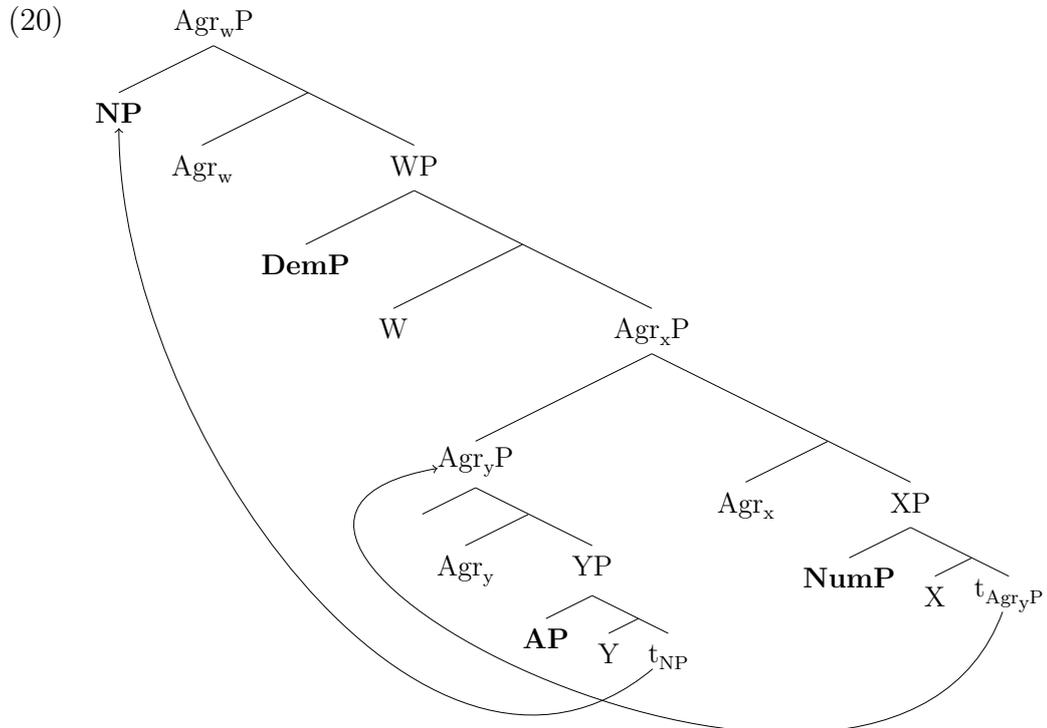
Each of the elements demonstrative, numeral and adjective are taken to be phrasal elements which merge in the specifier of a functional head. In each case of movement, the NP, or pied-piped constituent containing the NP, moves to the specifier of an Agr head above the contentful phrasal element. These Agr positions are in essence the same as the W heads discussed above.

The first assumption, the merge order of the elements, gives us the following universal structure for the noun phrase:



The noun phrase can move to any of the Spec Agr positions (18biii), and can pied-pipe any constituent either in the form [NP[XP]] (18bii) or [XP[NP]] (18biv), and this movement can be partial (to one of the intermediate Agr positions), or complete (all the way to the highest Agr projection). Through a combination of movement steps, which must follow the constraints in (18), each of the attested orders can be derived. To illustrate, let's take the example of the order N>Dem>A>Num. In this case the noun moves to spec Agr\_xP

with pied-piping of the *picture of who* type of the AP (i.e., Agr<sub>y</sub>P moves). Subsequently NP moves to spec Agr<sub>w</sub>P, with no pied-piping:



A further result from Cinque (2005) is that none of the unattested orders can be derived. For example, the system cannot generate the order Dem>A>Num>N, because this would have to involve movement of the AP alone to the spec Agr<sub>x</sub>P position, which would violate the constraint which prevents movement of a constituent that does not contain the NP (18bvi). Thus the system presented appears to make entirely accurate predictions about what are possible and impossible word orders across languages.<sup>11</sup>

The simplicity of the LCA revolutionized thinking about the linearization of unordered syntactic objects, and with the general success of the LCA came a large body of work which attempted to derive a variety of differences in word order between languages though complex movement operations, often involving remnant roll-up structures. Work in the cartographic tradition (Rizzi 1997, Cinque 1999, et seq.) made use of such movements to explain huge swathes of data. While the work done in this tradition has produced impressive results, and while I also recognise the huge contribution to linguistic theory that

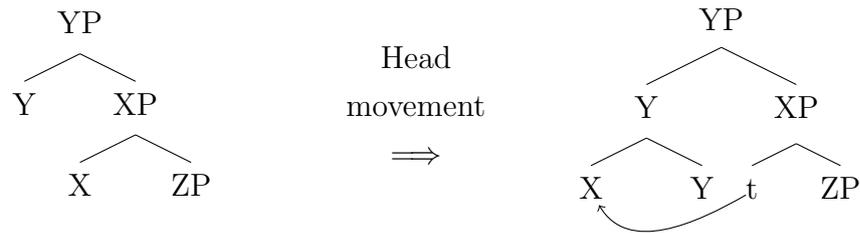
<sup>11</sup>See Abels and Neeleman (2012) for an argument that the same results can be attained with much fewer movements and a simpler set of assumptions, and without having to posit the LCA.

Kayne (1994) made, for the reasons presented in section 1.1 I believe that this approach to word order variation cannot be correct, and that there must be an alternative. On a conceptual level the movements are unattractive because, from a derivational perspective, they seem to suggest that word orders which are unlike English or Mandarin Chinese require more complex computations to produce them. However, this is not a strong argument against positing such movements; after all, we are interested in defining the competence grammar of the speaker, and so without a clear linking hypothesis between syntactic computations and a performance theory of real-time processing, it is nearly meaningless to claim that a theory is to be dispreferred because it seems computationally complex. However, it is indeed reasonable to argue that we should expect there to be semantic effects associated with the structural reorganisation that necessarily takes place within a theory of word order variation such as that presented above, and that the lack of any visible semantic difference between, say, the order Dem>Num>A>N (Urdu, Japanese, etc.) and N>A>Num>Dem (Thai, Loni, etc.), and any other order for that fact, is, in my opinion, a very strong reason to look for a theory of word order which does not require movement, since the alternative is to ditch the tight relationship between syntax and semantics.

### 1.2.2 Head movement

The second type of movement which falls under the title of ‘meaningless movement’ is head movement. Head movement over the past 10 to 15 years has been the subject of much debate, and starting in Chomsky (2001), there has been a push by some to relocate the operation to the phonological component, stripping it of its status as a narrow syntactic operation. The arguments against head movement being a narrow syntactic operation are based on the fact that the characteristics that head movement displays mean that it is quite unlike any other movement operation. A standard approach to head movement takes it to be movement of a head to a position left-adjoined to another head which is structurally superior to it:

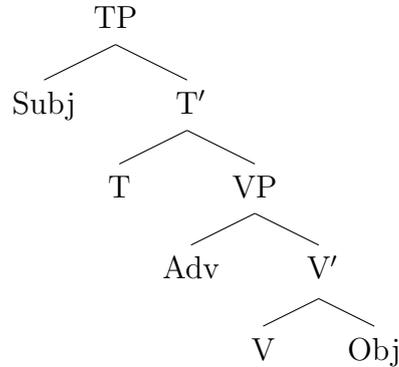
(21)



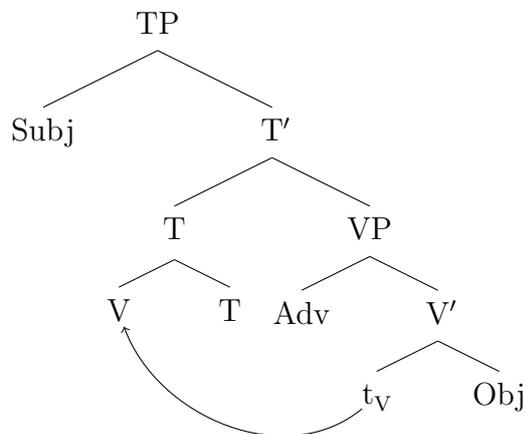
### What's right with head movement?

The classic example of head movement giving rise to cross-linguistic differences in word order comes from Pollock (1989), where V-to-T movement is parameterized, and movement of the verb, or lack thereof, gives rise to a difference in the order of the verb and adverbials, which, by assumption, are merged in a fixed position in the clause. If the general clausal architecture is as in (22), then verb movement in French results in the order Subj>Verb>Adv>Obj (23), and the lack of verb movement in English results in the order Subj>Adv>Verb>Obj (22), which is confirmed by data such as (24):

(22)

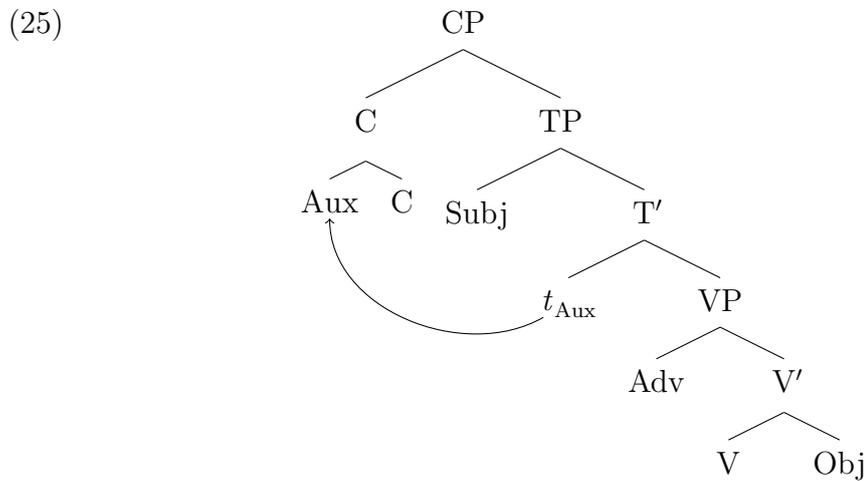


(23)



- (24) a. *Jean embrasse souvent Marie*  
 Jean often kisses Marie  
 b. \**Jean souvent embrasse Marie*  
 Jean often kisses Marie  
 c. \*John kisses often Mary  
 d. John often kisses Mary

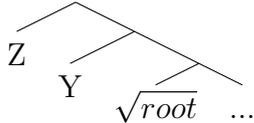
The same kind of movement from T-to-C can explain subject-auxiliary inversion in English. If auxiliaries are merged in T, then T-to-C movement in questions produces the order Aux>Subj>Verb>Object:



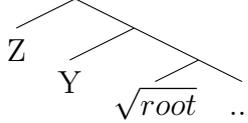
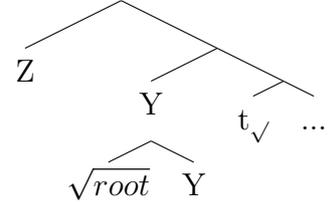
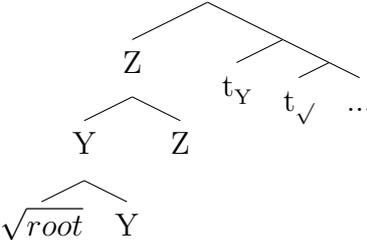
Another effect which is claimed to follow neatly from the nature of head movement is the Mirror Principle of Baker (1985):

- (26) The Mirror Principle  
 Morphological derivations must directly reflect syntactic derivations (and vice versa)

Concretely this means that inflectional heads which are structurally higher (in a more prominent syntactic position) appear further further away from the root than lower heads in the morphology. That is, the height of a head is mirrored by its linear position in a word. This means that an abstract syntactic structure of the sort shown in (27a) will generally map on to a linear string of the the sort given in (27b).

- (27) a. 
- b.  $\sqrt{root}\text{-Y-Z}$

This can be seen as a natural consequence of head movement if head movement is the driving force behind morphological word formation, since head movement is left adjunction, and excorporation is banned, meaning that each step of movement involves the pied-piping of other heads in a head complex:

- (28) a. Base 
- b. HM step 1 
- c. HM step 2 

While it is undoubtedly true that Mirror effects are real, and that this particular conception of head movement can capture those effects elegantly, it is also true that there are lowering effects seen in languages where a head has to have a high syntactic position, but the morphological instantiation of that element appears to be low (English Affix Hopping being a prime example), and also there are cases where a single exponent appears to be able to realize more than one head in particular cases (portmanteaux, or Fusion effects, in the terminology of Distributed Morphology).<sup>12</sup>

Nonetheless, head movement enjoys wide use as an explanatory tool for a number of effects across languages.

<sup>12</sup>See Brody (2000a) for an argument that the Mirror Principle does not in fact fall out so naturally from the properties of head movement.

### What's wrong with head movement?

That being said, it is also widely recognised that head movement suffers from a number of conceptual flaws, particularly under modern minimalist assumptions about phrase structure. The set of characteristics of head movement that make it conceptually problematic as a movement operation are summarized in (29).

- (29)
- a. HM is counter-cyclic, and does not obey the Extension Condition.
  - b. HM does not obey the Proper Binding Condition (at least not without a complication of the definition of c-command).
  - c. HM has to have a triggering feature which is distinct from the feature triggering XP movement.
  - d. The leftward nature of the adjunction has to be stipulated.
  - e. There is no excorporation; HM is not successive-cyclic like XP movement.<sup>13</sup>
  - f. Head movement can only operate within an extended projection, and not across embedded projections.<sup>14</sup>
  - g. The Head Movement Constraint applies regardless of the featural make-up of the head, unlike relativized minimality effects related to XP movement.
  - h. HM does not have interpretive effects.

There are varying responses to these conceptual problems, but reactions fall mainly into two camps: i) the Head Movement in Syntax (HMS) camp attempt to maintain that head movement is syntactic and to explain the unusual properties in some other way (Mahajan 2003, Surányi 2005, Matushansky 2006, Roberts 2010, among many others), and ii) the Head Movement at PF (HMPF) camp take head movement effects to be the result of some kind of PF operation, or as a result of linearization effects at spell-out (Brody 2000a, Boeckx and Stjepanovic 2001, Harley 2003, Platzack 2013, Adger 2013, among others).

The theories of HM that come out of the HMS camp are varied. I do not attempt to discuss them in detail, except for in chapter 3 where the theories of Roberts (2010) and Matushansky (2006) have more direct relevance to the problem of meaningless movement. A very brief summary of the special characteristics of each theory is as follows:

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<sup>13</sup>See Roberts (1991) for an argument that excorporation is possible.

<sup>14</sup>See Roberts (2001) for an argument that long distance head movement is possible.

- (30) a. Mahajan (2003): What appears to be head movement is actually phrasal movement of a remnant phrase which has been evacuated of all content other than the head
- b. Matushansky (2006): Head movement is movement of a head to a specifier coupled with a rebracketing operation that takes place in the morphological component.
- c. Roberts (2010): Head movement is left adjunction, but its unusual properties can be explained if we redefine the LCA, and if adjoining heads are featurally non-distinct (the goal's features are a proper subset of the probe's features).
- d. Surányi (2005): Head movement is movement with reprojection of the label of the moved head, and a reformulation of the labelling algorithm allows for the correct label to project.

However, none of the theories of the HMS camp tackles the problem of meaningless movement. The only serious response to this challenge is the claim that HM in fact **does** have semantic effects, and thus must be a syntactic operation. This position is argued for in Benedicto (1998), Lechner (2006), Roberts (2010) and Hartman (2011). These arguments are the topic of chapter 3, where I show that each of the arguments for Semantically Active Head Movement is unconvincing, and thus that the general conceptual problems related to head movement as a narrow syntactic operation remain.

### 1.2.3 The way forward

As a result of the preceding considerations, I posit the following as a general guiding principle:

- (31) No Meaningless Movement  
 Movement is to be posited as an explanation for word order variation only where that movement has some semantic effect.

A corollary of the principle of No Meaningless Movement is the following:

- (32) Variation through Spell-out  
 An apparent displacement that does not have any semantic effect must be explained by appeal to the linearization mechanism which forms part of the spell-out operation (or other properties of the phonological system).

This is not an entirely new principle, and can be thought of as an extension to the ‘Far-reaching Thesis’ of Chomsky (2013, p.36):

(33) The Far-reaching Thesis (T)

Order and other arrangements are a peripheral part of language, related solely to externalization at the SM interface, where of course they are necessary.

The result of the principle of No Meaningless Movement is that I must reject head movement as a syntactic operation, since it never has semantic effects (pace Benedicto 1998, Lechner 2006, Roberts 2010 and Hartman 2011) and therefore I must explain variation in the position of heads in some other way, namely as the result of the variable position of spell-out of extended projections.

Phrasal Movement of the A and A’ type clearly exhibit the properties that we would expect them to have if they were the result of Internal Merge, and so they are unaffected by the principle of No Meaningless Movement. On the other hand, purely word order related phrasal movements of the type posited in Cinque (2005) show no semantic effects. Therefore it would be desirable to rethink such variation as a consequence of variable linearization at the PF interface, with no movement.

The claim about head movement is a stronger claim; it is a claim that there is no head movement at all, regardless of whether the effects that have been put down to head movement are real or not (and I believe that many of them are indeed real effects). This is because head movement never has semantic effects, as I will argue in chapter 3. As far as phrasal word order movements are concerned, it is quite possible that it may be entirely reasonable to posit such movements in particular languages, provided that there is independent reason to do so, outside of a simple word order difference with respect to other languages. This is because XP movement has been convincingly shown to exhibit syntactico-semantic effects. Thus the denial of the existence of head movement qua syntactic operation is a central claim of this thesis, and will feature more prominently in the chapters to come, whereas discussion of word order phrasal movement will become relevant only where those movements are shown to categorically lack the kind of characteristics that are associated with A and A’-movement (see chapter 5).

If it is not a narrow syntactic operation that is driving variation in word order, or optional word order differences, then it must be the syntax-phonology

mapping. The idea that it ‘has to be’ movement that produces variation in word order stems from a very conservative perspective on how both linearization of syntactic structures and insertion of phonological exponents takes place. Conservatism can be a good thing, but if it leads to the kind of conceptual problems highlighted above, then it is worth reconsidering our position.

If we want to maintain the strict one-to-one mapping from syntactic structure to semantic structure, then the alternative approach requires the replacement of an LCA based linearization process with a mapping from syntax to phonology which is less constrained. One would require a spell-out operation which, through a set of instructions encoded in syntactic features and also in lexical entries, orders syntactic objects with respect to each other without having to rearrange their structural relations. With the development and success of a ‘syntax-all-the-way-down’ approach (Marantz 1997), which posits a central role for narrow syntactic operations in both phrase construction and word internal structure building, there are two distinct ordering facts that have to be taken into consideration: word internal ordering of morphemes, and the relative ordering of words and phrases. The development of a theory of linearization that allows us to generate variation without movement is the topic of chapter 2.

### 1.3 Summary

In this thesis I am claiming that it is necessary to rethink our general theory of word order, eschewing movement operations which have no clear semantic effect. This is necessary because, under standard assumptions, movement, modelled as Internal Merge, is predicted to give rise to structural change that should be reflected in the semantics. Head movement is an operation which has no semantic effects, and so could not involve structural reorganisation. Movement, i.e. Internal Merge, should only be posited where it is clear that a phenomenon has the kind of characteristics that are associated with structural reorganisation.

Since I am claiming that head movement never has semantic effects, it is necessary to tackle the arguments which claim that there are cases of Semantically Active Head Movement, which I do in chapter 3. If there is no head movement, then the kind of effects that have been analysed as resulting from head movement require reanalysis, and I follow some recent work (Svenonius 2012b, Bye and Svenonius 2012, Adger 2013, Ramchand 2014) in claiming that

these effects are more elegantly explained through a Mirror Theoretic approach to syntax-phonology mapping (Brody 2000a), where a set of spell-out rules determine the ordering of elements. The nature of the linearization algorithm, and the phrase structure system that I adopt, is the topic of chapter 2.

Once I have established precisely what this mapping looks like, I show in chapter 4 and chapter 5 that a number of interesting facts related to noun phrase interpretation and the order of noun phrase internal elements in classifier languages follow naturally, and further extend my analysis of noun phrase structure to an entirely unrelated non-classifier language, Icelandic.

## Chapter 2

# Spell-out: Extended Projections, Spans, and Linearization

The successes of research into the (universal) syntactic structure of the DP, and ongoing typological work has revealed a number of morphological peculiarities (and similarities) that different languages exhibit. This has led us into an interesting but challenging position. If we want to take seriously the results of ‘cartographic’ work on DP structure, which has uncovered the existence of a number of functional heads between N and D, and also to claim that what has been discovered is a set of universal facts about how the DP is structured, we also have to be able to account for the wide variety of morphological shapes that noun phrases can take cross-linguistically, and also the wide variety of orders of DP internal elements. To put it another way, we have to be able to provide a means by which underlying similarity can map onto surface dissimilarity.

In this chapter I present an overview of a number of related theories of syntax-phonology mapping which eschew head movement as an operation responsible for producing word order variation cross linguistically, as an operation responsible for the formation of morphologically complex words, and, as a consequence, as the operation which naturally gives rise to mirror effects (Baker 1985).

I will then lay out the details of the system that maps syntactic structures to phonological strings, in particular the operation of spell-out. I focus on the part of that operation which linearly orders the heads and phrases, but do not offer any insight into that part of the mapping between syntax and phonology which is responsible for phonological phrasing (see Cinque 1993, Selkirk 2011,

and Bye and Svenonius 2012 for theories thereof).

The type of theory of spell-out that I describe here, and which I ultimately adopt, is what Ramchand (2014) terms a Direct Linearization Theory (DLT). In such theories, cross-linguistic word order variation is achieved not through movement operations (either head movement or XP movement), but is instead encoded directly into features in the syntax which interact with the spell-out system. These features act as instructions to the phonological system, telling it how to order elements relative to each other. The benefits of such a system are numerous, but the main appeal is that with a direct linearization process, we can do away with ‘meaningless movement’, while still being able to account for the variation that is attested in world languages.

The DLTs that I outline in this chapter are all based on Mirror Theory of Brody (2000a, 2000b) and Brody and Szabolcsi (2003), and so I begin with an exposition of the central content of that theory.<sup>1</sup>

## **2.1 Mirror Theory: Morphology mirrors syntax**

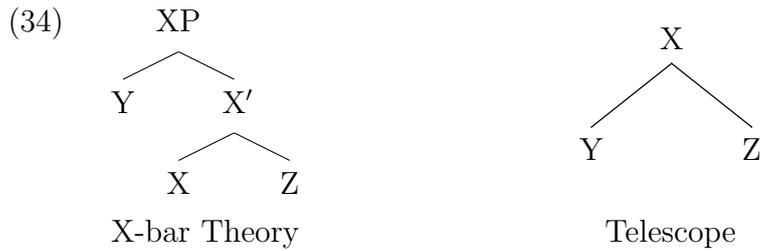
Brody (2000a) develops a theory of syntax where there is no distinction between  $X^0$  and XP projections, and where word structure can be read directly off of syntactic structure, with morphology mirroring syntax. The goal of the theory is to do away with head movement and derive the pervasive morphological mirror effects that natural language exhibits (Baker 1985) from the way in which syntactic structure is mapped to morphology. Brody’s theory will be the basis of the system that I adopt in this thesis, and so in this section I give an outline of Mirror Theory as described in Brody (2000a), and also the extension of the system proposed in Brody and Szabolcsi (2003).

### **2.1.1 Telescoped representations and Mirror**

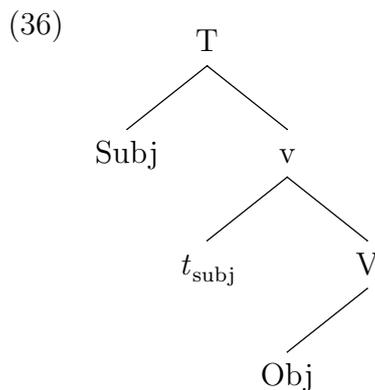
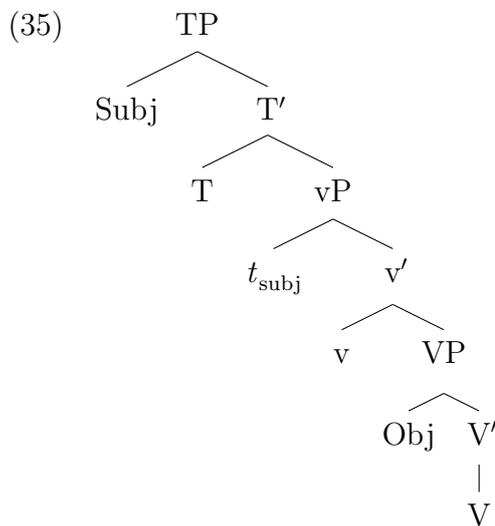
A central tenet of Mirror Theory is the principle of Telescope. In Mirror Theoretic syntactic representation, a head X ambiguously represents an  $X^0$  node and also a phrasal node of the same projection, XP. An X-bar theoretic tree can be represented in a reduced Telescoped form, in the following fashion:

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<sup>1</sup>I do not discuss direct spell-out systems that operate over entire subtrees, of the kind proposed by Starke (2009) and Caha (2009), and focus instead on the theories which have arisen as natural extensions to Mirror Theory, and which take spans of heads in extended projections to be the target for insertion of lexical items.



Y is the specifier of X, Z is the complement of X, and X is the head of the structure. The single node X in the Telescoped structure represents both the phrasal node which dominates both Y and Z, and also the head of the structure X. Taking a concrete example, the traditional (X-bar theoretic) structure in (35) can be collapsed to the ‘telescoped’ representation in (36):



V, V' and VP nodes have been collapsed into a single V node, which both heads the verb phrase and also dominates the object. The other headed projections, v and T, are also collapsed

The other central axiom of the system is Mirror, a principle which determines that the relationship between syntax and morphology is direct, but also that morphology is a mirror image of syntax.

(37) Mirror

The syntactic relation “X complement of Y” is identical to an inverse-order morphological relation “X specifier of Y”.

Syntactic complement lines such as V–v–T in (36) are referred to as ‘morphological words’, or ‘extended words’. This is to highlight the fact that the relation between two functional heads in a complement line, or a functional head and the lexical item that it dominates, is fundamentally word internal. Sequences of functional heads in a complement line are roughly equivalent to the extended projections of Grimshaw (1991). In Mirror Theory, word structure is not composed through successive steps of head movement (as in Distributed Morphology, for example), but instead is a direct relation imposed by Mirror. The fundamental relation in the system is between specifier and head, with specifiers being ordered to precede heads. Thus, in a morphological word (extended projection), higher heads in a projection will spell out to the right of lower heads, as the syntactic complement relation is identical to the morphological specifier relation. Syntactic specifiers, which are not part of a morphological word with the head that they are the specifier of, will precede that head, thus giving us specifier  $\succ$  (complex) head  $\succ$  complement order.<sup>2</sup>

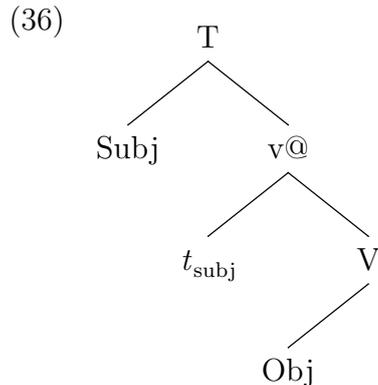
Applying Mirror to the complement line T–v–V (an extended word), gives the morphological order V–v–T. Each head is then spelled out as a chunk of morphology, in the mirrored order, capturing the Mirror Principle of Baker (1985). Syntactic specifiers (the subject and object) precede their heads. A spell-out position diacritic is introduced which determines the height at which the morphological word should be realized, allowing specifiers to be properly linearized with respect to the extended word spelled out by the complement line, and also capturing V-to-T or T-to-C movement effects. Fundamentally the spell-out position diacritic @ determines where the various specifiers which

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<sup>2</sup>Unless indicated otherwise, throughout this thesis I use the ‘successor’ symbol  $\succ$  to indicate linear order, where X $\succ$ Y should be read as ‘X precedes Y’. Affixal relations between morphemes in an extended word are sometimes indicated with a dash ‘–’, and square brackets at the word edges, with the order of morphemes also indicated by their left-right linear order on the page. Thus, [X–Y–Z] should be read as ‘a complex morphological word composed of X, Y and Z, in that order’

The ‘greater than’ symbol  $>$  indicates scope, where X $>$ Y should be read as ‘X takes scope over Y’.

are attached to the extended word will attach. For example, in English, following Pollock (1989), there is no V-to-T movement (in head movement terms), and the object follows the verb, so the spell-out position of the morphological word V–v–T is in v. Consider again the structure in (36), repeated here, with the spell-out position indicated with the @ symbol:



The structure maps onto the string Subj>[V–v–T]>Object. If we have a past tense T, then the result might be, for example, *John kiss-∅-ed Mary*, with v having null phonology.

Different positions of spell-out for extended words captures cross-linguistic variation. French, for example, would have @ in T, thus capturing the differences in the positioning of adverbs relative to the verb compared with English, but still generating SVO order (since the subject has to precede T). If no elements of the morphological word have a strong feature @, then the lowest possible head is the position of spell-out.<sup>3</sup>

<sup>3</sup>Brody (2013) lays out the following full linearization algorithm for the system (but also introduces some novel modifications).

- (i) Linearization Algorithm
  - a. if x immediately dominates (ID) y, then y precedes x.
  - b. ID entails adjacency
  - c. all nodes must be ordered
  - d. words are spelt out in their designated node

Furthermore, Brody explicitly states that the algorithm is intended to apply to both words and morphemes within words:

- (ii) a. “We assume that where ID is a word-external relation, [(i)] orders nodes of the tree, and where ID is a word-internal one [(i)] orders morphemes.”(p172)

### 2.1.2 Advantages of Mirror Theory

Brody’s theory has several advantages over more traditional theories, and the direct mapping from syntax to morphology also means that certain undesirable characteristics of head movement become non-problems, since there is no longer a head movement operation, this being replaced by a word formation algorithm which forces morphology to mirror syntax. The standard head movement account of the Mirror Principle faces certain problems, which Brody (2000a) discusses.

The first problem is empirical: head movement forces us into a ‘The-higher-the-bigger’ conception of morphologically complex words (cf. Abels 2003, p264), and some extra stipulation or extra operation (e.g., lowering) is required whenever a language exhibits what appears to be a low spell-out position for a word that includes an affixal instantiation of some functional element which is higher in the tree. Any case where, for example, a verb appears to be low in the clause, but has complex affixal tense and aspect morphology, is difficult to state in terms of head movement, because movement by its nature has to proceed up the tree.<sup>4</sup> The classic problem of affix hopping in English is a prime example (cf. Chomsky 1995).

There are also conceptual problems with the way that word formation is negotiated in the syntax (through head movement), and with the replication of information in the structure that is required to capture the correct relation between heads which are part of a complex morphological word. This is expressed clearly in Brody (2000a, p34):

“In syntax, the information that explicates the structure of words is expressed both word internally (i.e.,  $X^0$ -internally) and by the phrasal order given by the (inverse) structure of complementation. For example, given a word consisting of a V and an I morpheme, in that order, the associated complementation structure will be constructed from a projection of I, IP, and a lower projection of V, VP. It is not obvious that the account of this duplication, based on the conspiracy of the HMC and the No Excorporation condition, qualifies as a genuine explanation of this pervasive parallelism ... If both the HMC and the No Excorporation condition could convincingly be reduced to a simple theory of

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<sup>4</sup>See Adger, Harbour, and Watkins (2009) for one such example from Kiowa, and an analysis which makes use of Mirror Theory.

locality, then this point would become weaker, but still not all of its force would be taken away.” (p34)

There is a relationship of selection between any two heads X and Y in a morphological word (say, X selects Y, X being higher in the extended projection), but then a chain also has to be formed between the two heads to bring them together morphologically, through movement in most standard theories.

If we say that lexical items enter the derivation already encoded with the features that need to be checked, as in Checking Theory of Chomsky (1995) (employed to capture affix hopping), then we have a duplication of information: both the hierarchy of heads and the features on the merged head specify the information required for the Mirror Principle to be satisfied, which, Brody points out, is reminiscent of the redundancy in earlier instantiations of generative grammars: phrase structure rules and lexical items both specified the number of arguments that a verb could have.<sup>5</sup>

Traditionally, head movement has been held up as a shining example of a simple, minimal way to capture the Mirror Principle. Brody points out, however, that the Mirror Principle only really follows from head movement so long as i) head movement always results in left adjunction, not right adjunction, ii) excorporation is impossible, and iii) the c-command condition on traces is relaxed (see chapter 1 for discussion of the various conceptual problems that head movement faces).

Mirror Theory overcomes these problems, and also has a number of related advantages:

1. It does away with the Head Movement Constraint (Travis 1984), the effects of which now fall out directly from the mapping from syntax to morphology.
2. It explains fundamental differences between head movement and phrasal movement (there is only one type of movement).
3. It does not fall foul of the c-command requirement on traces (and the naturally related Extension Condition problem), because, again, nothing has moved, and the fundamental relation between elements in a ‘head chain’ is dominance.

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<sup>5</sup>See also my discussion of Roberts (2010) in section 3.2, where it is noted that Roberts’s novel theory of head movement also entails this duplication of features throughout the derivation.

### 2.1.3 Extending Mirror Theory: Brody and Szabolcsi

Brody and Szabolcsi (2003) extends the version of Mirror Theory presented above. The main goal of the paper is to explain the relationship between word order and quantifier scope in Hungarian, but the solution to the problem leads to an extension of Mirror Theory which means that the theory becomes better able to handle language internal word order variability, while preserving scope relations. We will see later that this extension will also become salient in the discussion of cross-linguistic word order variation. The increased flexibility of the system is justified by the empirical fact that there are word order differences which do not give rise to semantic effects.

The Hungarian quantifier facts are as follows:  $\forall$  must precede ‘few’ in the preverbal field regardless of which is the subject and which is the object.

- (38) a. *minden ember kevés filmet nézett meg*  
 every man-NOM few film-ACC viewed PRT  
 ‘Every man viewed few films’  $\forall_{\text{subj}} > \text{few}_{\text{obj}}$
- b. *minden filmet kevés ember nézett meg*  
 every film-ACC few man-NOM viewed PRT  
 ‘Few men viewed every film’  $\forall_{\text{obj}} > \text{few}_{\text{subj}}$
- c. \**Kevés ember minden filmet megnézett / nézett meg*  
 few men-NOM every film-ACC PRT-viewed / viewed PRT
- d. \**Kevés filmet minden ember megnézett / nézett meg*  
 few film-ACC every man-NOM PRT-viewed / viewed PRT

However, Hungarian is not a strictly verb final language, and most XPs can be left in postverbal position. Preverbal ‘few’ can scope over postverbal ‘every’, depending on stress.

- (39) a. *'Kevés filmet látott minden ember*  
 few film-ACC saw every man-NOM  
 ‘few > every’ ( $\forall$  destressed rel. to ‘few’)
- b. *'Kevés filmet látott 'minden ember*  
 few film-ACC saw every man-NOM  
 ‘Every > few’ (primary stress on both)

Summarizing, the universal can scope over ‘few’ when it precedes it or follows it, in the configurations in (40).<sup>6</sup>

- (40) a. ‘every’  $\succ$  ‘few’  $\succ$  V  
 b. ‘few’  $\succ$  V  $\succ$  ‘every’                      Both configurations:  $\forall >$  ‘few’

The puzzle is how to account for the fixed scope of the universal over ‘few’, regardless of the linear position of the universal relative to ‘few’.

Brody and Szabolcsi argue that universal quantifiers appear in the spec of a Dist(ributive) head, and quantifiers such as ‘few’ appear in the specifier of a Count head, where they check a feature. Both projections are above AgrSP, which contains the verb. The goal is to find a theory that can account for the scope and word order facts while also preserving the antisymmetric properties that languages appear to exhibit. The claim is that Mirror Theory can do exactly that, with a few adjustments to the theory outlined in the previous subsection.

The previous description of Mirror Theory imposes a strong morphological restriction on what can appear as a syntactic complement; morphological words are formed of complement lines, and specifiers are elements which do not have an affixal relation with a head. Brody and Szabolcsi adjust the theory to take into account two senses that the terms ‘specifier’ and ‘complement’ have. In the interpretive sense, the specifier is a feature-sharer and the complement is a selected dependent. In the structural sense, the specifier is a left daughter node and the complement is a right daughter node. The feature sharer will always be the left daughter, but the selected dependent can be the left or right daughter, depending on the kind of morphological relation the selected dependent has to the head. If the selected dependent forms a morphological word with the head, then it is a right daughter. If it is not a part of a morphological word with the head (i.e., the head does not have an affixal relation to it), then it is a left daughter. Therefore, where two heads have an unspecified morphological relation, their syntactic relation is also unspecified: one could be the specifier or the complement of the other (in the sense of left/right daughter). To summarize:

- (41) Interpretive sense of Specifier and Complement:

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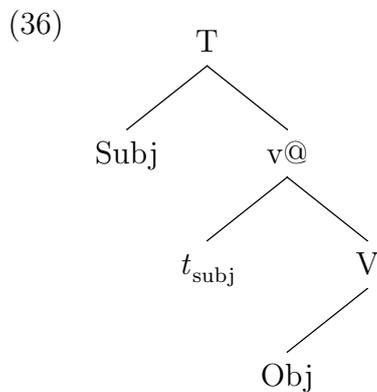
<sup>6</sup>I use English glosses in inverted commas in place of the Hungarian words for ease of exposition.

- a. Specifier is a feature sharer
- b. Complement is a selected dependent

(42) Structural sense of Specifier and Complement:

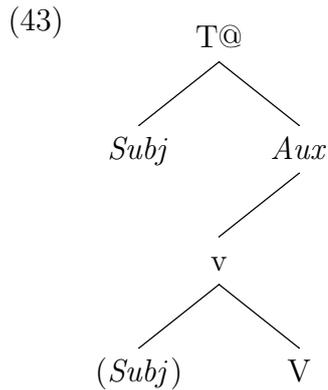
- a. Specifier is left daughter
- b. Complement is right daughter

An example from English will help to illustrate. In (36), repeated here, we saw that a tensed verb in English is the spell-out of a complement line, where the relation between each head is affixal, and the morphological word  $V-v-T$  spells out in  $v$ .



The subject and object are feature sharers of T and V respectively, and V is the selected dependent of v which is the selected dependent of T. V is the right daughter of v, and v is the right daughter of T, because they form a morphological word.

With an auxiliary verb, the morphological relation between the auxiliary and the main verb is not affixal; both the auxiliary and the main verb form separate morphological words. Therefore, the verb cannot be a (right-daughter) complement of an auxiliary, but it can be a left-daughter selected dependent. The following structure results:



V–v forms a morphological word, as does Aux–T. However, V–v–Aux–T does not form a morphological word, and so the relationship of v to Aux is that of a left-daughter selected dependent. With a strong feature on T forcing spell-out of Aux+T in T, we get the order Subj  $\succ$  [Aux–T]  $\succ$  [V–v] (e.g., *John will sing*).<sup>7</sup>

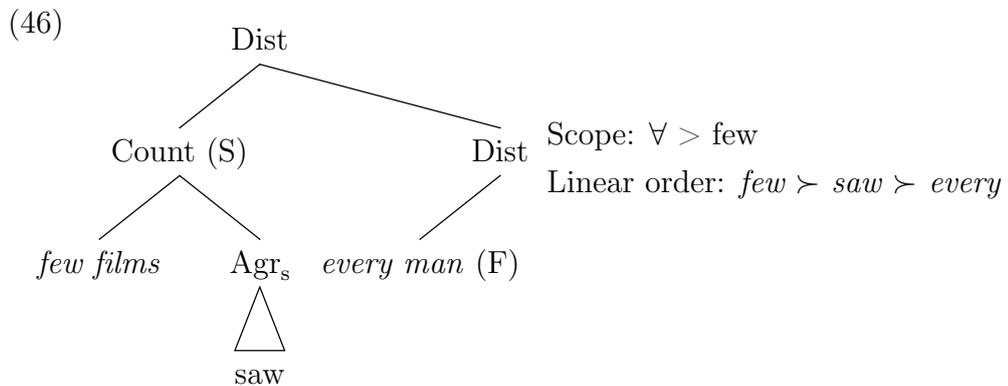
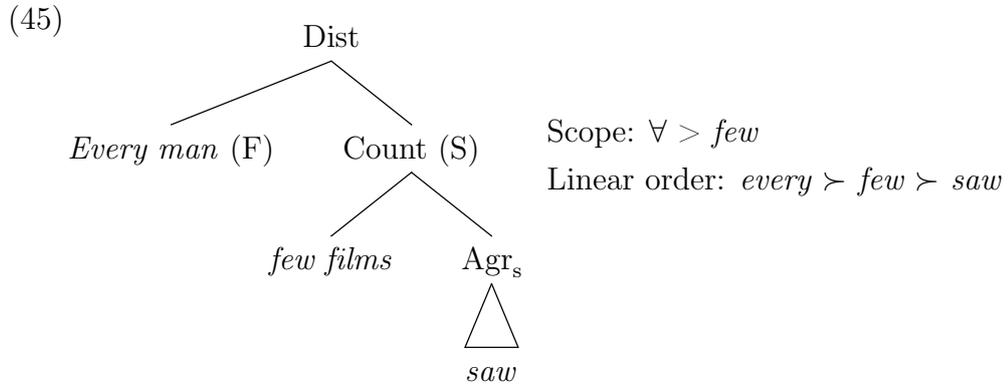
Since a null element cannot be said to necessarily be a suffix or a free standing element (unless there is independent evidence that it is one of these), heads which are systematically null will naturally be the kind of head that can either be a left or right-daughter selected dependent (as with v in the English example above). The checking heads Dist and Count in Hungarian, for universal quantifiers and quantifiers such as ‘few’, respectively, are precisely the type of head which can either be suffixal or a separate morphological word. Consider again the sentences above, both of which have ‘every’ scoping over ‘few’:

- (44)  $\forall >$  ‘few’
- a. *Minden ember kevés filmet nézett meg*  
 every man-NOM few film-ACC viewed PRT  
 ‘Every man viewed few films’
- b. *Kevés filmet látott minden ember*  
 few film-ACC saw every man-NOM  
 ‘Every man saw few films’

The Count head is a selected dependent of Dist, but its phonologically null nature means that it can be a left daughter or a right daughter. The quantificational noun phrases are feature sharers with the checking heads, and must

<sup>7</sup>There is no strong feature in the V–v projection, so the MW spells out in the lowest head.

be left daughters. Thus Brody and Szabolcsi propose the structures in (45) and (46) (F = feature sharer; S = selected dependent):



A few clarifying observations are in order here. First, the Dist head is a two segment head, which allows it to take two left daughters: a feature sharing left-daughter ('every man'), and also a selected dependent left-daughter (Count). Second, scope is not calculated through c-command, but dominance, with the following definition:<sup>8</sup>

(47)  $\alpha$  scopes over  $\beta$  iff  $\alpha$ 's features dominate  $\beta$ .

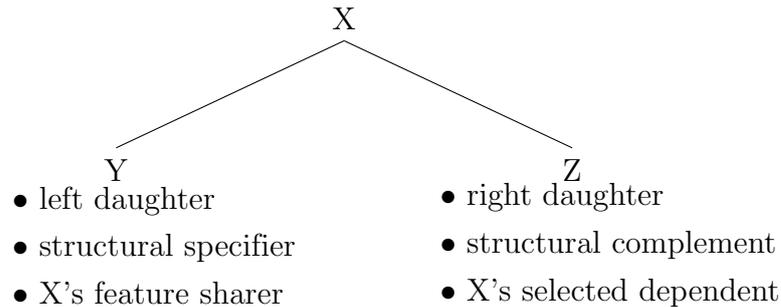
Furthermore, feature percolation from a feature sharer (specifier) to a head, and up to the highest segment of that head, is assumed. In the above example, (46),  $\forall$  agrees with Dist (Spec-head), and its features percolate up to the

<sup>8</sup>The fact that it is dominance rather than c-command which is the relevant relation is motivated through the fact that certain left embedded elements appear to be able to scope out of their containing phrase (e.g., *Every girl<sub>i</sub>'s father loves her<sub>i</sub>*), where traditional definitions of c-command would block this. Scope through dominance (with feature percolation from specifiers to heads) captures this naturally. See Brody and Szabolcsi (2003), section 6, for discussion of relevant Hungarian facts, and also Brody (2000a) for a more general claim that dominance is the relevant relation.

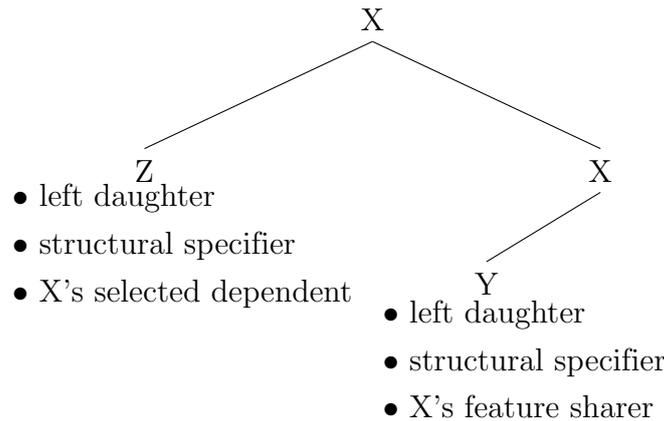
highest segment of Dist, where they dominate ‘few’ (Count), thus scoping over it.

Under these modified assumption about Mirror Theory, the word order and scope facts are neatly captured. The general result is that the theory now allows for two different structures generating two different linearizations even where the scopal properties of the structures remain the same.<sup>9</sup>

(48) a.



b.



In both structures Y is a feature sharer with X, and Z is the selected dependent of X. Furthermore, Y’s features take scope over Z’s features in both structures, by percolating up to the highest segment of the head with which it shares its features (in this case, X).

This allows for a much more flexible theory of word order, where a different ordering of elements can be generated without recourse to a movement operation, which is exactly the kind of theory that we require.

### 2.1.4 Summary of Mirror Theory

The following principles summarize the details of Mirror Theory:

<sup>9</sup>The two structures summarizing this fact in (48) are taken from Adger, Harbour, and Watkins 2009.

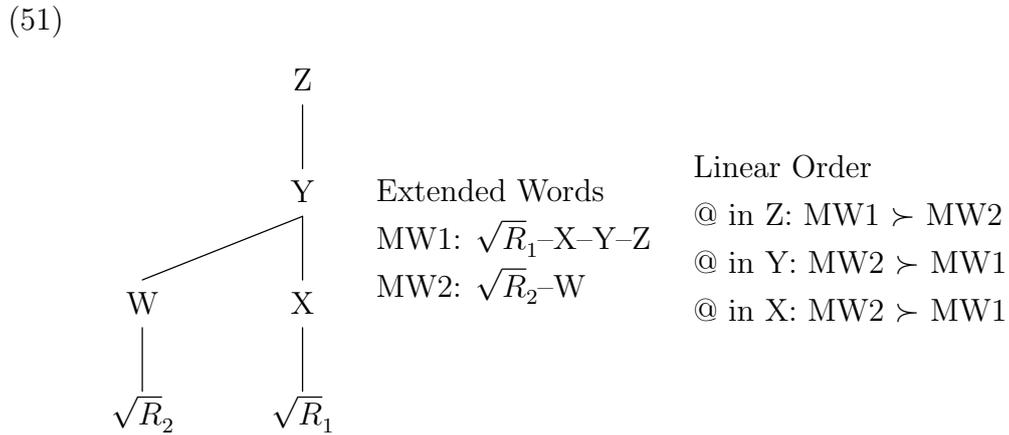
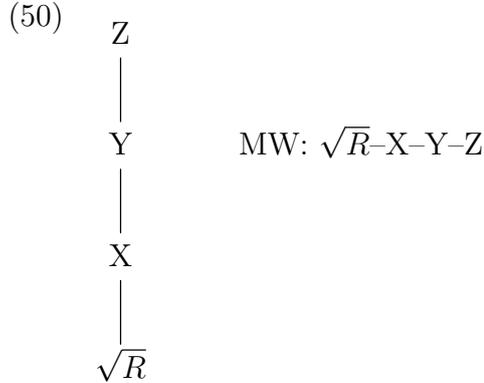
- (49) a. Telescope:  $X^0$  and phrasal XP projections are collapsed.
- b. Mirror: syntax maps directly to morphology where there is an affixal (right daughter) relation between heads in an extended projection, but the morphology is a mirror image of the syntax.
- c. A left daughter can be a feature sharer with the head (a specifier) or it can be a selected dependent which forms a separate morphological word (i.e., does not have an affixal relation with the head).
- d. Left daughters precede heads.
- e. The position of spell-out of a morphological word is set by a strong feature, or spell-out diacritic, @, which determines the position of the morphological word relative to left daughters.

I will take the basic insights of Brody (2000a) and Brody and Szabolcsi (2003) as the basis of a syntax-phonology mapping, which removes head movement as a narrow syntactic operation, and instead maps extended projections (complement lines) directly on to morphology.

In the theory of syntax-morphology that I adopt in this thesis, I follow work in neo-constructionist approaches to syntax (e.g., Borer 2005a) in taking the properties of extended projections to be imposed not from the nature of lexical items that merge at the bottom of the derivation, but rather from an exocentric system which builds structure on top of acategorial roots, which merge with semantically contentful functional heads, building syntactic structure above the root. Roots qua Lexical Items merged at the bottom of the tree do not have syntactic content, in the sense that they do not specify what kind of structure can be built above them. Argument structure and dependencies between syntactic objects are determined by the functional structure that is built around the root, not by the content of the root itself, and the functional structure itself is licensed by the existence of a universal hierarchy of projections (Rizzi 1997, Cinque 1999 among many others).

I follow Mirror Theory in taking the fundamental morphological relation between the root and the heads which merge in a complement line above it to be that of morphological wordhood. Extended projections are syntactic structures which build up words, sometimes morphologically complex (where each head is spelled out as an independent morpheme), and sometimes morphologically simplex (where there is a many-to-one mapping from heads to morphemes; see section 2.2.4). I also follow Mirror Theory in taking there to be two types of relationship between syntactic elements: there is one relationship which takes

two morphological words, or two extended projections, and combines them (51), and there is another relationship which takes subparts of a morphological word and puts them together into a single word-like unit (50).



In the next section, I look at some other Direct Linearization Theories (in the sense of Ramchand 2014), which build on the main insights of Mirror Theory and extend the theory of spell-out proposed by Brody. I will also introduce the notion of a morphological ‘Span’, which is a continuous sequence of syntactic heads that can be spelled out as a single morpheme, capturing suppletion/portmanteau effects. I will then return in section 2.3 to a discussion of two ways of implementing the two relationships of word formation and phrase combination, and question whether it is necessary to have two distinct combinatorial operations, or whether one operation alone is sufficient to generate the two relationships.

## 2.2 Ways of making ‘words’ and ‘phrases’

The theories of syntax-phonology mapping that I discuss in this chapter all present closely related spell-out systems, though each comes with a slightly different set of underlying assumptions, and with slightly different consequences. All of the systems are ‘Direct Linearization Theories’ (DLTs), which dispose of the LCA and word-order related movements, and take word order to be directly mapped from syntactic structure, with features in the syntax providing the phonological interface with the relevant information to give rise to the correct orderings. Asymmetry is derived through an axiom which identifies specifiers as feature sharers, or as non-affixal selected dependents (Brody), or as bearers of uninterpretable features which have to be checked through merge with a head in an extended projection (Adger). Specifiers are axiomatically linearized to the left of complement lines that they merge with.<sup>10</sup>

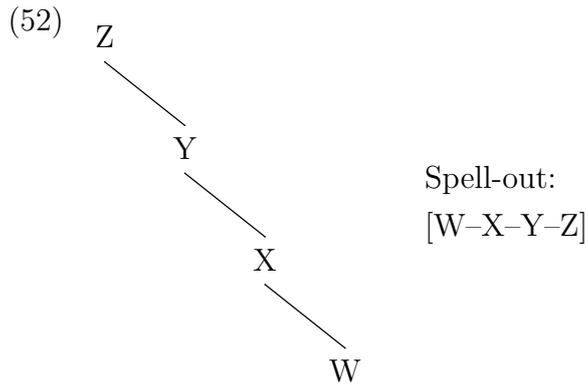
These theories all take extended projections (complement lines) to be mapped on to ‘morphological words’, but each theory provides a slightly different way to build words, with slightly different constraints on precisely what kind of syntactic object is able to map onto a word. In this section I will lay out the different ways that these theories propose that morphological words can be constructed, and the different ways that phrases composed of separate morphological words are built up.

### 2.2.1 Mirror and Wiggle

In Brody (2000a), morphological words are composed of a complement line spelled out in mirror order, with the lowest head spelling out in the leftmost position, and higher heads following in order of their structural height. Heads can have null phonology (thus giving the appearance that a head has been ‘skipped’), but each head spells out as an independent affix. The entirety of the complement line is a single morphological word: the extension of Mirror Theory in Brody and Szabolcsi (2003) means that a line of right daughters must be a morphological word, where the relation between each of the daughters is that of affixation.

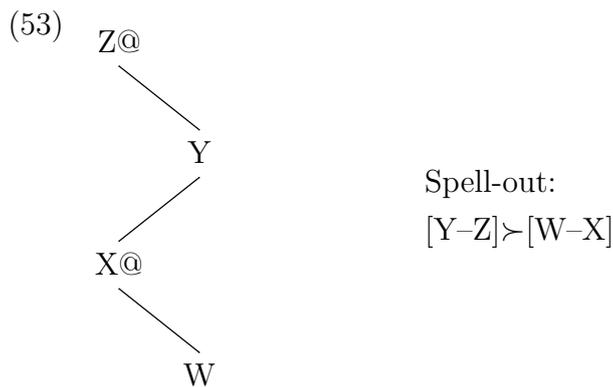
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<sup>10</sup>It might be argued that this is a point where the LCA is theoretically simpler and thus superior to DLTs, since it purportedly derives the specifier-head-complement order from the nature of *c*-command. However, Abels and Neeleman (2012) have argued forcefully that the LCA in fact does not derive this asymmetry without stipulation, and the LCA is merely **compatible** with standard assumptions about phrase structure (see in particular Abels and Neeleman (2012) section 4).



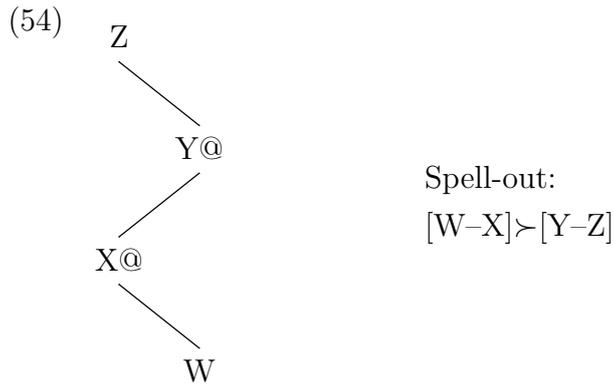
The position of the spell-out diacritic @ is irrelevant here, as we are not considering the relative position of specifiers. Wherever @ is placed, the heads map onto the same word structure.

Whenever there is a part of the extended projection that spells out as an independent morphological word, that word has to be in a specifier relation to some head, producing a ‘Wiggle’ structure:



Here the @ diacritic becomes important. The high position of spell-out for both morphological words ensures that the word Y–Z precedes the word X–W. With the spell-out position of the word containing Y and Z shifted to Y, the order of the two words is reversed:<sup>11</sup>

<sup>11</sup>The position of spell-out on the word containing W and X is in fact irrelevant in this case; it could be on W or X, and the order would remain the same.

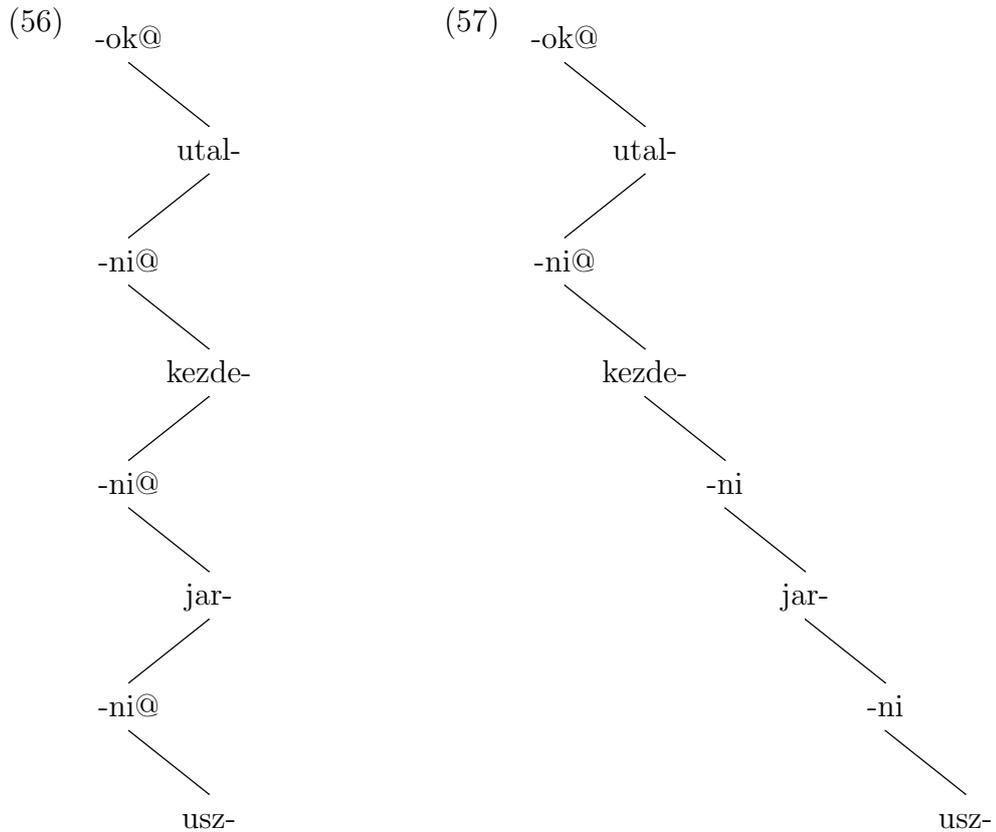


Brody (2000b) illustrates this effect with Hungarian verbal clusters. There are two possible word orders for verbal clusters, but the clusters behave differently depending on word order.<sup>12</sup>

- (55) a. *Utalok [kezdeni jarni uszni]*  
 hate.I begin.INF go.INF swim.INF  
 ‘I hate to begin to go swimming (regularly)’
- b. *Utalok [uszni jarni kezdeni]*  
 hate.I swim.INF go.INF begin.INF  
 — same

The infinitives in (55a) readily allow adverbials, or other material such as the subject, to intervene between them, whereas those in (55b), where the word order is flipped, do not. Brody suggests that in the flipped order structure in (b), the infinitives are behaving as bound morphemes, and form part of an extended word with the other infinitives, and in the (a) examples, each is an independent word. Thus, underlyingly the two orders have different structures, with the order in (55a) corresponding to the structure in (56), and the order in (55b) corresponding to the structure (57).

<sup>12</sup>See Dékány (2011) for the application of Wiggle structures to Hungarian DP structure.



As we saw in the discussion of quantifier scope from Brody and Szabolcsi (2003), the system is set up so that the notion specifier is expanded to two senses; that of the left-daughter which is a feature sharer with the head (the traditional sense of specifier), and that of the left daughter which is a selected dependent, but which does not form a single morphological word unit with the selecting head. The Wiggle structures result where a selected dependent is an independent morphological word.

### 2.2.2 Bye and Svenonius 2012

Bye and Svenonius (2012) also adopt a Direct Linearization Theory which is closely related to Brody’s Mirror Theory, but do away with Wiggle structures, and instead introduce an alternative way to account for the same effect, while maintaining the position that left daughters are only ever specifiers in the traditional sense, i.e., that they are feature sharers. This is achieved by allowing extended projections to be ‘chopped’ up into smaller chunks, which can then spell out as independent morphological words.

In their system, complement lines are licensed by universal functional hi-

erarchies of categorial features. They assume two such hierarchies, one for the extended nominal domain, and one for the extended verbal domain. Specifiers, on the other hand, are licensed by Spec features, which can vary from language to language. A Spec feature is ‘an instruction to Merge to create a dependency to a category of the specified type in the search domain’ (p435). Thus, a [Spec:D] feature on a head means that that head has to enter into a dependency with a D category through Merge.

Spell-out is a two step process which maps syntactic structure onto a phonological representation, linearizing nodes relative to each other, and selecting candidate lexical items for insertion (L-Match), before choosing which of those candidates is optimal, given its phonological environment (Insert). L-Match is only sensitive to the syntactic features on nodes, and features specified on listed lexical items which are matched to those nodes, and Insert is only sensitive to phonological features.<sup>13</sup>

The linear order of nodes is determined by an axiomatic specifier-head-complement order in the unmarked case, and a \* feature to mark where heads incorporate into each other, forming a morphological word, in the sense of Brody (2000a). This \* feature recreates the effects of head movement; it forces all of the heads that it dominates to incorporate into a single word, and the morphology mirrors syntax, spelling out the the structurally lowest head left-most, and then proceeding up the tree. Importantly, just as in Mirror Theory, this feature does not affect dominance relations in the way that a movement operation does. The \* feature forces all lower heads (in the complement line, but not heads of specifiers) to form a morphological word with it (to ‘incorporate’ into it, in Bye and Svenonius’s terms).<sup>14</sup> Furthermore, the \* feature indicates where in the complement line the morphological word is spelled out, relative to other syntactic objects, in the same way as the @ diacritic from Brody (2000a), with the default being the lowest head in the extended projection. Note that it is only heads in a complement line that can undergo incorporation where the \* feature is present; specifiers always form separate morphological words.

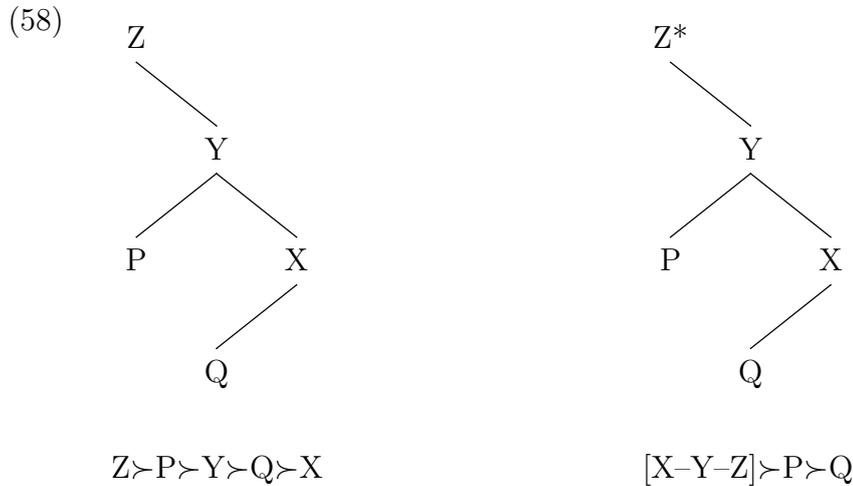
Let’s now consider how this set of rules governing linearization applies to syntactic structure. In the unmarked case, where each head spells out as

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<sup>13</sup>Insert is modelled in Bye and Svenonius (2012) as an Optimality Theory-based violable constraint ranking (Prince and Smolensky 1993) which selects the optimal candidate from those produced by L-Match.

<sup>14</sup>\* is a ‘second-order’ feature, in the sense of Adger and Svenonius (2011); it is a feature of a feature.

separate morpheme, and assuming that left branches indicate specifiers, (58) shows the different outputs that would be generated.



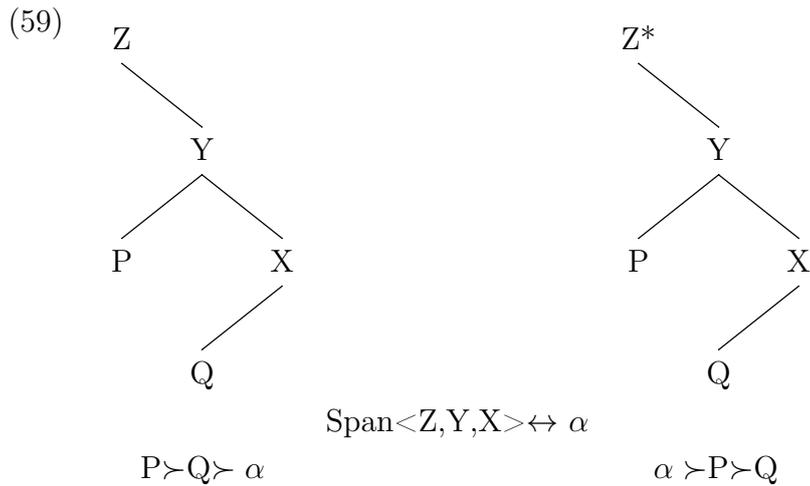
In the tree on the left, there is no ‘incorporation’ feature \*, and so each head in the complement line spells out as a separate morpheme. In the unmarked case, specifiers precede heads which precede complements, so the order is Z > P > Y > Q > X.<sup>15</sup> In the tree on the right, with a \* feature on Z, the X–Y–Z extended projection spells out as a morphological word in the position of Z, meaning that it precedes both specifiers, P and Q, and the morphemes that make up the word are in a mirror order to the syntactic complement order.<sup>16</sup>

Bye and Svenonius’s spell-out system also allows for the mapping of multiple heads in an extended projection line onto a single morpheme; that is, it recognises ‘spans’ of heads in an extended projection as the target of spell-out. I will expand on the details of this part of the theory in section 2.2.4 below, but show here briefly how that affects the output of spell-out. Consider the trees from (58) again, but this time with the assumption that contiguous heads in an extended projection can be mapped onto a single morpheme.

<sup>15</sup>See section 2.2.4 for a discussion of cases where this does not hold, i.e., where a single morpheme spells out a span of heads.

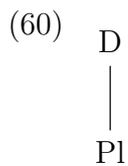
<sup>16</sup>Bye and Svenonius also allow particular lexical items to be specified as ‘Antitropical’, meaning that they do not align with the edge where they are introduced in the syntax. This means that a particular affix can be lexically specified as being a prefix (for example), and so will always appear in a left position. This is achieved through stating in the lexical entry of the affix that it does not align with a right edge of a word. An example lexical item x, which spells out a feature Y, is given here (the symbol • is read as ‘does not align with’, and ]<sub>ω</sub> represents a morphological word boundary):

(i) x • ]<sub>ω</sub> ⇔ <Y>

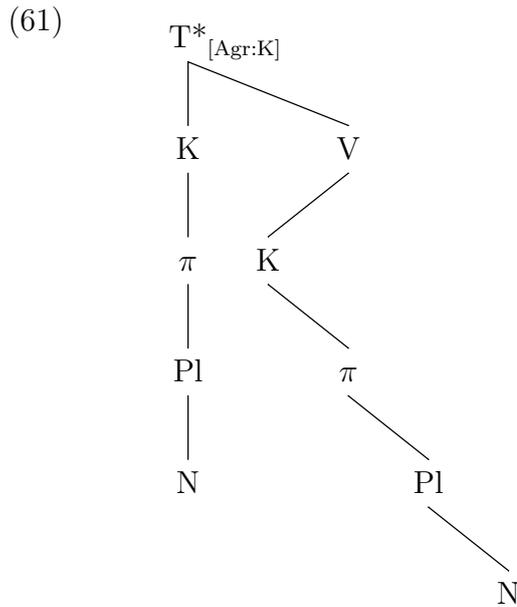


Assuming that the lexicon contains a lexical item  $\alpha$  which can spell out the features  $\langle Z, Y, X \rangle$ , in both trees the extended projection from X to Z will spell out as  $\alpha$ . The inclusion of the \* feature merely indicates the position of spell-out of the portmanteau morpheme, thus linearizing it relative to the specifiers P and Q. The lack of a \* feature in the left tree means that the portmanteau morpheme  $\alpha$  is spelled out in the lowest head in the span, X. Thus  $\alpha$  follows both P and Q, whereas it precedes both in the right-hand tree. A \* feature on Y would result in  $\alpha$  being spelled out between P and Q.

The morphological shape of a particular head can also be affected by long distance agree relations between heads. Bye and Svenonius indicate feature dependencies with vertical, non-slanting branches on a tree. For example, in (60), the head D has a (non-projecting) plural feature.



A probe can enter into an Agree relation with another projection, copying the features of that projection onto the head, without movement. This is illustrated with an Agr feature on the head, which marks the kind of Agree dependency that that head enters into. For example, a tense head can agree with a KP, and the result is agreement on that head with the KP:



The feature bundle copied on to T can be spelled out on T, which would be a verbal suffix in the example above. In this way, Subject agreement on the verb is straightforwardly modelled. Take a concrete example from Spanish, with a postverbal subject that the verb agrees with:

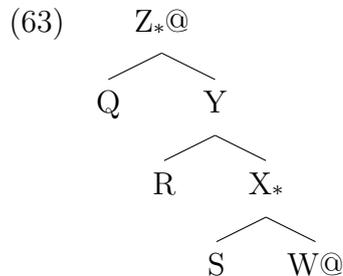
- (62) *En esta plaza cant-aron artistas (famosos)*  
 in this square sing-PAST.3PL artists famous  
 ‘(Famous) artists sang in this square’

The verb spells out as *cant-* and the feature bundle including the agreement features (N,Pl,π,K) and the T head spells out as inflectional suffix *-aron*, giving *cantaron*. The high spell-out position of the V–T word means that the verb (with inflection) precedes subject *artistas*, which is the spell-out of the KP (including person and number features).

### Ramchand 2014: A related system

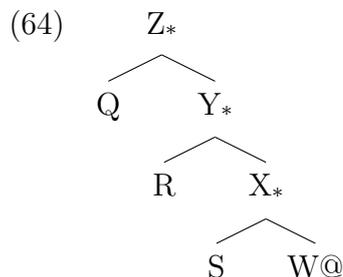
Ramchand (2014) presents a similar system to Bye and Svenonius. She decomposes the \* feature of Bye and Svenonius into two separate features. The two features on heads in extended projections are the familiar @ feature which indicates the position of spell-out of a sequence of morphemes in a complement line, and also a subscripted \* feature, which indicates that the head must form a Brodian morphological word with the head **immediately below** it in the extended projection. This makes Ramchand’s \* feature different to Bye and Svenonius’s, in that it does not indicate the position of spell-out (@ does this),

and also in that it only indicates that the head immediately below the head bearing the \* feature forms a Brody style morphological word with it, not all of the heads which it dominates, as in Bye and Svenonius. Ramchand offers the following abstract example to illustrate (p275):



Z has a \* feature and a @ feature, meaning that it forms a morphological word with Y, which it immediately dominates, and that the MW Y–Z spells out in the position of Z. X has a \* feature, indicating that it forms an MW with the head W that it immediately dominates. However, W has the @ feature, not X, meaning that the word W–X is linearized in the position of W. Heads are also universally assumed to precede complements where there is no morphological word-internal relation between them, and so the MW Y–Z precedes the MW W–X. Following Mirror Theory, heads which are part of an MW spell out in mirror order (a complement X to a head Y spells out to the left of Y), and also specifiers precede heads. Therefore, the linear order of the elements in the tree after spell-out is Q>[Y–Z]>R>S>[W–X].

A continuous affixal head sequence is the result when each head in an extended projection (save the lowest head) has a \* feature, illustrated in the following structure:

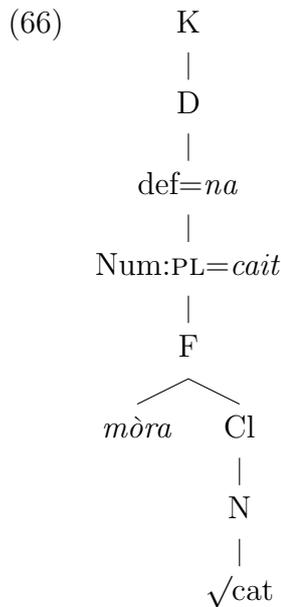


In this example, Z forms an MW with Y which forms an MW with X with forms an MW with W, thus making the whole sequence a single MW (all of which spells out in W, because of the @ feature). This gives the linear order Q>R>S>[W–X–Y–Z].

### 2.2.3 Adger 2013

Adger (2013) makes use of Flip structures, which closely resemble Wiggle structures from Brody (2000a, 2000b) and Brody and Szabolcsi (2003), and also allows both individual heads and also spans of multiple heads in the complement line to spell out as single morphemes. A head is taken to precede its complement when it spells out as a separate morpheme.<sup>17</sup> Take the Scottish Gaelic example of *na cait mòra* ‘the big cats’ (65), the structure of which is provided in (66):

- (65) *na cait mòra*  
 the.PL cat.PL big.PL  
 ‘the big cats’



The span from def to K head spells out as *na* in the position of def, preceding its complement. The span of heads from the root to Num spells out as *cait*, and the adjective merged as a specifier of a functional head spells out as *mòra*. *Mòra* follows *cait* because the spell-out position of the extended nominal projection is Num, which precedes the functional head F that introduces the adjective as its specifier. Thus, we get the order *na* > *cait* > *mòra*. See section 2.3.2 for a detailed discussion of Adger’s system.

<sup>17</sup>I use the term ‘head’ here for ease of exposition; Adger’s system in fact does away with the traditional notion of ‘head’, and replaces heads with labels of self merge which respect a universal functional sequence.

### 2.2.4 A many-to-one mapping: Spans

An important difference between Direct Linearization Theories and other late insertion models like Distributed Morphology, other than the eschewing of head movement for a direct mapping of syntactic heads onto morphemes, is that the DLTs that I have described here (with the exception of Brody’s Mirror Theory) all allow for a many-to-one mapping between syntactic heads and morphemes. DM captures portmanteau effects through a separate operation in the morphological component, Fusion, but the locus of insertion remains a single head in all cases; Fusion reduces multiple heads to a single  $X^0$ , combining the features of both input heads (Halle and Marantz 1993).<sup>18</sup>

A ‘span’ of functional heads can be the target of insertion of a single morpheme (Williams 2003, Abels and Muriungi 2008, Svenonius 2012b, Adger 2013, 2014).<sup>19</sup> Let’s take a concrete example from Adger 2014 to illustrate. An extended verbal projection above the root *be* in English, can be spelled out as a single morpheme *was*, as shown in the following example:

$$(67) \quad \left. \begin{array}{c} \text{C} \\ | \\ \text{T}_{[\text{past}]} \\ | \\ \text{v} \\ | \\ \text{V} \\ | \\ \sqrt{be} \end{array} \right\} \text{was} \quad /wɔz/ \Leftrightarrow \sqrt{be} \langle \text{V}, \text{v}, \text{T}_{\text{past}}, \text{C} \rangle$$

The lexical entry for *was* contains all of the relevant features on the heads which form the entire structure in (67), and is thus able to be inserted in place of the entire span of heads. It also has to be possible that each head in the structure can be spelled out on its own, as an individual morpheme (in a ‘trivial span’ of each head, in the terms of Svenonius 2012b). Therefore we cannot, without further stipulation, rule out  $be-\emptyset-\emptyset-d-\emptyset$  (corresponding to  $\sqrt{be}-\text{V}-\text{v}-\text{T}-\text{C}$ ) as a possible spell-out, which would produce *beed*.

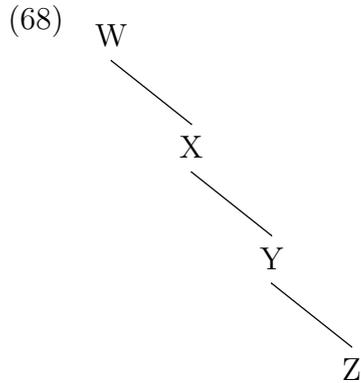
<sup>18</sup>Chung (2009) notes the paradoxical fact that Fusion precedes lexicalization (insertion), yet it must fail when the lexicon has no suppletive form.

<sup>19</sup>The idea of late substitution of phonological exponents for complex feature bundles can actually be traced back as far as Chomsky (1965) (see page 84-86 for a clear example). An idea which is close to that of spans in nature appears in Gruber (1967), where more than one terminal can spell out as a single morphological unit.

We appeal to a blocking principle to ensure that, *ceteris paribus*, the suppletive form which spells out a span of multiple heads is always selected over the spell-out of individual heads. This blocking is proposed as a general principle in much of the work in the framework of Nanosyntax, referred to as ‘Biggest Wins’ (spell-out of a tree proceeds cyclically in a bottom-up fashion, and where a morpheme can spell out a larger constituent, it overwrites previous attempts to spell out smaller constituents, Starke 2009), ‘Minimize Exponence’ (the optimal derivation is the one which realizes the maximum number of features with the minimum number of morphemes, Siddiqi 2009), or the ‘Union Spell-Out Mechanism’ (Spell out of contiguous heads with a single morpheme wins over spell-out of such heads by separate morphemes if there exists a single morpheme in the lexicon with a superset of the features of the contiguous heads, Muriungi 2009). Therefore, in the example above, we expect *beed* to be systematically ruled out as a possible form, except in the case of a slip of the tongue, where it is indeed quite possible that such a form would be produced. Adger (2014) suggests that the blocking effect is the result of a ‘routinization’ of certain structure-phonology mappings, such that the probability of a non-routinized form (e.g., *beed*) becomes so low (since it is virtually never present in the input), that it becomes ungrammatical as a form. The typical U-shaped developmental curve of inflectional morphology can be seen as a result of the conflict between the standard mapping of individual heads in syntax to morphemes and the routinized ‘span’ spell-outs that are learned from the input, and not generated independently.

Recall that for Bye and Svenonius (2012), the spell-out operation is split into two parts, L-Match and Insert. L-Match is only sensitive to syntactic features, and not to phonological features. It selects candidates for insertion from the lexicon, matching the features of lexical items with features in the syntactic representation. Insert, on the other hand, is sensitive only to phonological features of lexical items. Once L-Match has generated a set of candidates for insertion, Insert chooses the correct candidate given the nature of the phonological environment that it is to be inserted into. It is argued in Svenonius (2012b) that the target of insertion that L-Match operates on is the span, which is a contiguous sequence of heads in an extended projection (with individual heads themselves being trivial spans including only one head). A span consists of any continuous line of heads in an extended projection, but a span cannot consist of two heads which are not directly connected in a complement line with each other (i.e., two heads separated by another head do not form

a span). The structure in (68) contains the set of (nontrivial) spans given in (69), and the ill-formed spans (which skip heads) in (70):



- (69)
- a. Z–Y
  - b. Z–Y–X
  - c. Z–Y–X–W
  - d. Y–X
  - e. Y–X–W
  - f. X–W

- (70)
- a. \*Z–X
  - b. \*Y–W
  - c. \*Z–W

Spans across embeddings of extended projections are also ruled out; it is not possible, for example, for a v–V–D–N span to be targeted for insertion of a single morpheme, since the span would have to cross the boundary of the nominal extended projection, which is assumed to be ruled out in principle.<sup>20,21,22</sup> L–Match then operates on spans of heads, and produces candidates for insertion

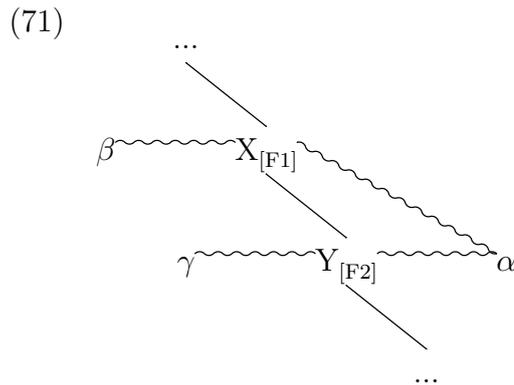
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<sup>20</sup>This seems to be the case with head movement too. N-to-D-to-v-to-T movement never takes place, and this is presumably ruled out through an appeal to the featural content of the heads (and thus the lack of a trigger for such movement). See, however, Roberts (2010) on romance clitics, and (?) on noun incorporation.

<sup>21</sup>The blocking of spans across extended projections can be independently ruled out as a possibility if we take any embedding to involve a separate rooted projection and thus to not instantiate a complement relation, which appears to be a consequence of adopting Adger’s (2013) system of phrase structure.

<sup>22</sup>Bye and Svenonius do not rule out spans across extended projections in principle; they suggest that, for example, the monomorphemic *arrive* could spell out V–Path, where Path is part of the Nominal extended projection (p435).

for spans of more than one head, as well as for trivial single-head spans. For example, in the following structure (with lexical items given in (72)), if there is a lexical item (i.e., a morpheme)  $\alpha$  which encodes the information  $X_{[F1]}$ , and also  $Y_{[F2]}$ , then L-Match can generate  $\alpha$  as a candidate of insertion for a span including the X and Y heads, even where there are independent lexical items  $\beta$  and  $\gamma$  which are the spell-out of X and Y respectively (squiggly lines represent lexical association to heads generated by L-Match):<sup>23</sup>



- (72) a.  $\alpha \Leftrightarrow \langle X_{[F1]}, Y_{[F2]} \rangle$   
 b.  $\beta \Leftrightarrow \langle X_{[F1]} \rangle$   
 c.  $\gamma \Leftrightarrow \langle Y_{[F2]} \rangle$

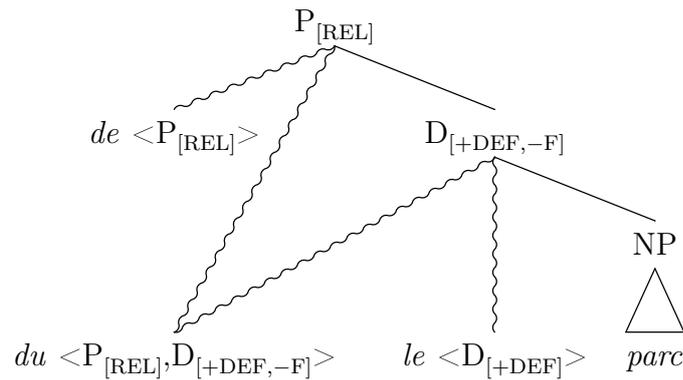
The two heads could potentially be associated with two separate morphemes  $\beta$  and  $\gamma$ , or they could collectively spell out as a single morpheme  $\alpha$ . Both possibilities are generated, but ultimately only one option is selected. the Union Spell-Out Mechanism guarantees that  $\alpha$  will be selected, since it spells out both heads with only one morpheme.

Svenonius (2012b) gives the concrete example of French P-D portman-teaux, where a single morpheme *du* is a candidate for insertion for the  $P_{[REL]}^- D_{[+DEF, -F]}$  span:<sup>24</sup>

<sup>23</sup>The lexical entries include an ordered set of features, demarcated with angled brackets ( $\langle, \rangle$ ), where precedence in the set indicates dominance in the syntax.

<sup>24</sup>The feature [REL] on P is simply a feature which distinguishes it from the P element which is realized as  $\hat{a}$ , which Svenonius annotates as  $P_{[LOC]}$ .

(73)



- (74) a.  $de \Leftrightarrow \langle P_{[REL]} \rangle$   
 b.  $du \Leftrightarrow \langle P_{[REL]}, D_{[+DEF, -F]} \rangle$   
 c.  $le \Leftrightarrow \langle D_{[+DEF]} \rangle$

P is associated with the morpheme *de*, because of its  $P_{[REL]}$  feature, but is also associated with the morpheme *du* together with the D head, because the P–D span together exhausts the feature content of *du*. *Le* is associated with  $D_{[+DEF, -F]}$ . Insert systematically prefers the portmanteau morpheme *du* because of the general constraint Biggest Wins/Minimize Exponence, discussed above, and thus *du* is selected by Insert as the candidate which is actually spelled out. *De le parc* is a possible output, but is ruled out because of the preference for minimizing exponence.<sup>25</sup>

## 2.3 Roots and extended projections

Tying a Brody-esque word morphology system to a late insertion model in which extended projections begin with acategorial roots potentially requires separating out two types of structure building: on the one hand we have rooted projections which build word-like elements from functional elements (rooted complement lines), and on the other hand we have to have a way of sewing together separate projection lines so that specifiers (which are complex extended projections themselves) can merge with an extended projection. The

<sup>25</sup>The portmanteau is systematically selected, unless there is some other phonological constraint which favours a different candidate, as in the case of vowel initial nouns in French (*de l'hôpital*). Note that L-Match is **not** sensitive to phonology, and selects all relevant candidates from the lexicon, and it is Insert that is sensitive to phonological features. Svenonius explains the vowel-initial noun facts through an Optimality Theory-based model of the Insert operation, where a ranking of constraints means that the portmanteau morpheme *du* is non-optimal.

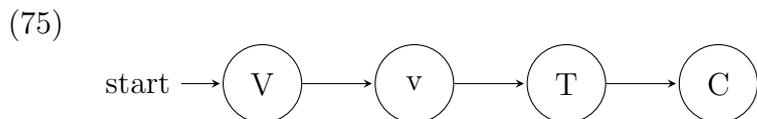
question that arises, then, is whether there are two separate operations which are responsible for these two structure building processes, or just one. In this section I outline two approaches, the first from Svenonius (2012a), which relies on two different structure building systems, and the second from Adger (2013), which relies only on a modified version of Merge to carry out both combinatorial operations.

### 2.3.1 Merge, Project and Bundle

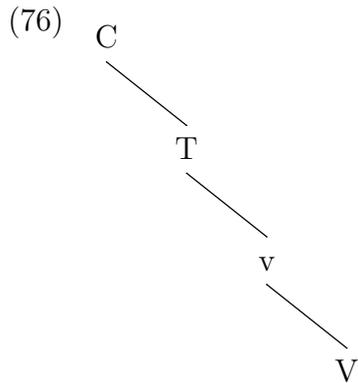
Svenonius (2012a) argues that extended projections can be modelled as Finite State Transition Networks, and that the operations Project and Merge should be treated as two separate combinatorial operations which build structure. Project is a finite state operation that builds extended projections, and Merge operates on the outputs of Project, combining separate extended projections. Finite state transition networks can model optionality of nodes, complementary distribution of categories, implicational dependencies between categories, and affix hopping effects for languages like English. Of course, it was shown as early as Chomsky (1957) that, while finite state machines can produce ‘infinite use of finite means’, they are inappropriate as models of human language, as human language can create dependencies that can be separated by an arbitrarily long structure, for example in recursively embedded *if...then* clauses. However, it seems for the most part that word formation does not require more power than a finite state machine (see Karttunen and Beesley 2005 for an overview of Finite State Morphology).

In the system proposed by Svenonius, Project does the work of building extended projections, but Merge is still required to capture the insertion of specifiers which are not part of the extended projection. Project creates unembedded extended projections, but Merge is necessary for the embedding of one category inside another.

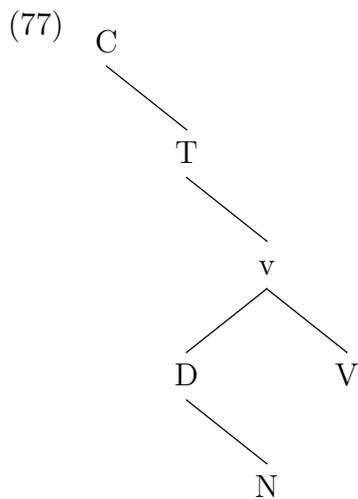
A few examples will illustrate. Take a simple verbal extended projection V-v-T-C. This can be modelled with a simple finite state transition network of four nodes:



This generates the following tree:

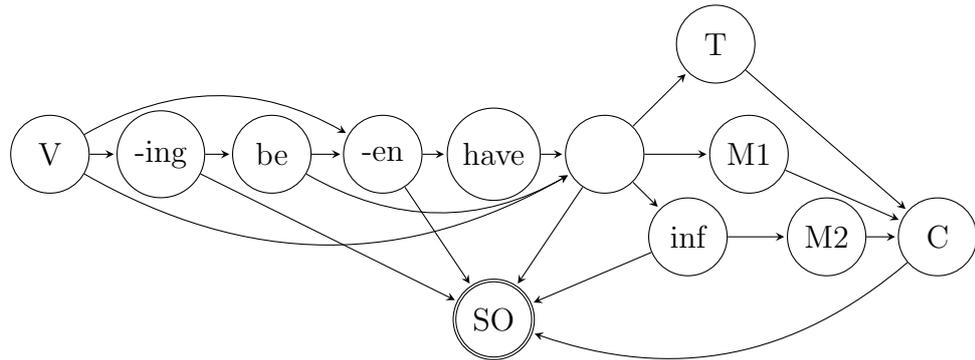


Accepting states in the networks can be thought of as operating like Edge features (Chomsky 2008): when a network reaches an accepting state, it becomes a syntactic object and is a possible argument for Merge (that is, Merge only operates on accepting states). Thus, if *v* is an accepting state in the Verbal EP in (75), then Merge can operate on *v* by combining it with another projection (right sloping lines represent Project, left sloping lines represent Merge):



Accepting states are modelled as a feature added to certain nodes which allows them to transition to an ‘SO’ (syntactic object) accepting state, as shown in the example finite state transition network from Svenonius (2012a, p10) reproduced here:

(78)

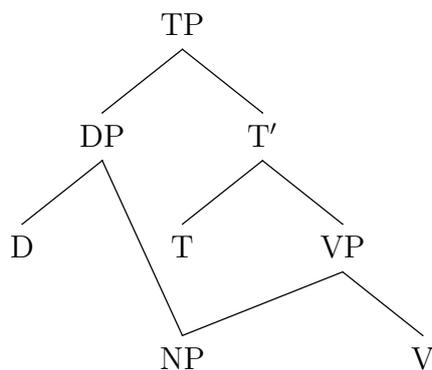


This network could produce a range of verbal extended projections, such as the following (among many other possibilities):

- (79) a. have eaten (V → -en → have → ∅ → inf → M2 → C → **SO**)  
b. was eating (V → -ing → be → ∅ → T → C → **SO**)

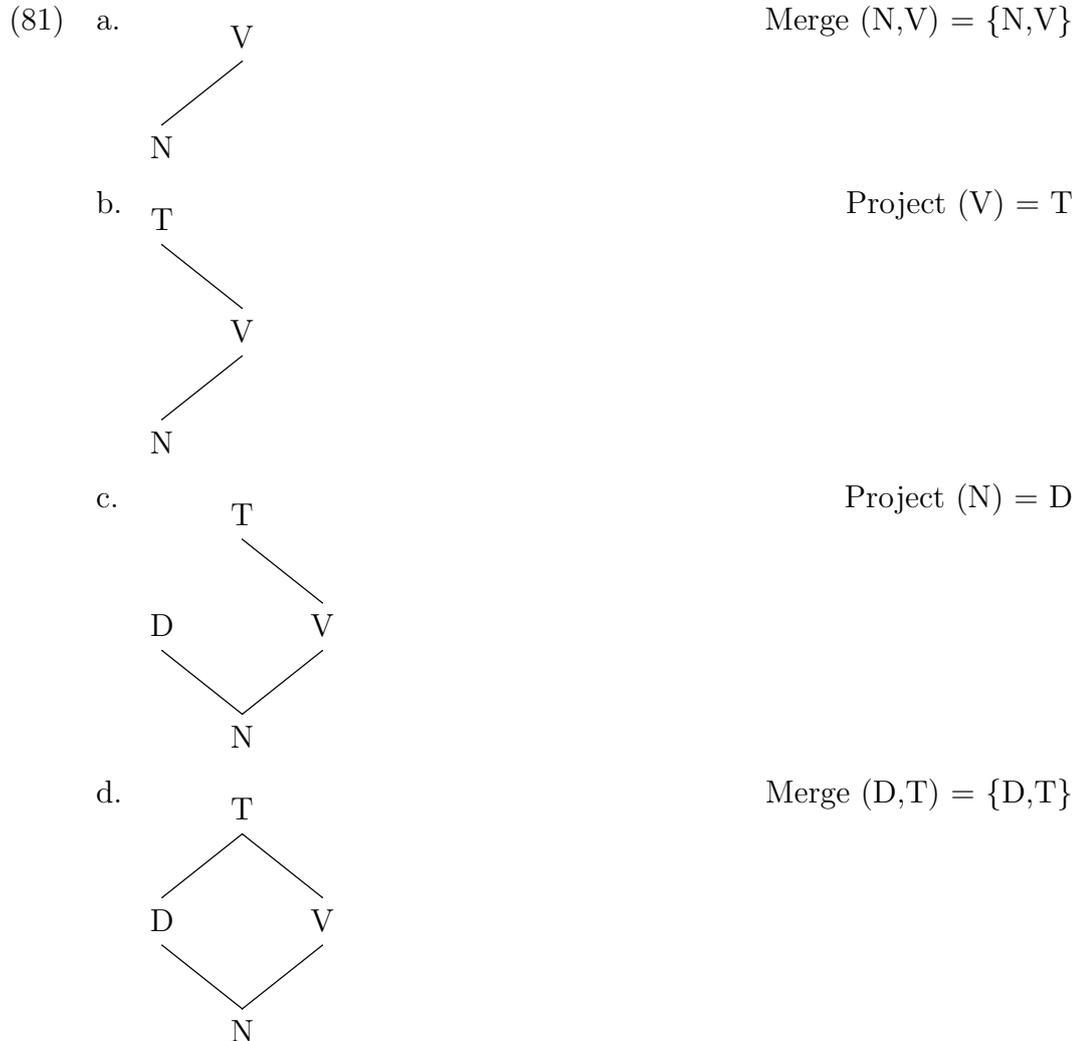
Svenonius points out that there is an interesting empirical consequence of the separation of Merge and Project: the system allows for constrained sideward movement. There is evidence to suggest that an argument merged inside the VP is not a complete DP, but rather some subpart (let's call it N). However when the argument is raised to T, it is interpreted as a full DP. What appears to be taking place here is that the argument that merges in the low position then merges as a complement of a D element in a higher (spec TP) position, which is movement into a complement (sideward movement), a violation of the Extension Condition. (80) illustrates.

(80)



If, however, we consider the operations of Project and Merge as entirely separate, then the mystery disappears: the nominal extended projection merges as a specifier of a verbal head in a low position, and then the verb projects up to

T. At this point, N projects to D, and then finally T merges with D. Thus, two ‘segments’ of the extended nominal projection are merged with two separate segments of the verbal extended projection, but since Merge and Project are separate operations, there is no violation of the extension condition (which is a condition on Merge). The full derivation of such a structure is shown in (81).



In summary then, there are two operations; Project builds extended projections (doing the job of morphology), and Merge combines projections.

### 2.3.2 Merge all the way down

Adger (2013) proposes a system which derives both kinds of structure building from the same operation, Merge. The system of phrase structure reformulates the notion of ‘head’, removing heads from the system entirely and replacing them instead with functional category labels which build semantic content on

top of acategorical roots, and which provide sites for the licensing of specifier XPs. Adger’s system also appeals to the notion of extended projection, and builds these projections with Merge. The main difference between the new system and Bare Phrase Structure lies in a change in the definition of Merge, removing a stipulated distinctness condition on the arguments of Merge, so that self-Merge becomes possible. Furthermore, Adger introduces an exocentric notion of labelling, to overcome the labelling problems that BPS has, as discussed in Chomsky (2013).

Adger gives a standard definition of Merge from Collins and Stabler (2009), which is appealed to in most standard theories of phrase structure in Minimalist syntax:

- (82) Let  $W$  be a workspace and let  $X, Y$  be syntactic objects where  $X, Y \in W$  and  $X$  and  $Y$  are distinct ( $X \neq Y$ ). Then,  $\text{External-Merge}_W(X, Y) = \{X, Y\}$

Alongside this definition of Merge, a labelling algorithm is also required in any phrase structure system (although see Collins 2002 for a theory of label-free syntax). This is so that the output of Merge carries the information that is required for it to enter into further computations (Merge or Agree). With simplex lexical items (LIs), or with an LI merged with a complex syntactic object (SO), this is unproblematic, as the label can be determined by minimal search, and the simplex LI (a head) determines the label (Chomsky 2013). However, where two complex SOs Merge, determining the label is not so straightforward, as minimal search cannot necessarily unambiguously determine which head should project. Adger thus puts forward two problems which require a solution for a minimal structure building system:

- (83) a. *The Specifier Problem*  
 In  $\{\alpha, \beta\}$ , where neither  $\alpha$  nor  $\beta$  are lexical items, how is the label to be determined?
- b. *The labelling Problem*  
 Is there a unified labelling algorithm that will suffice for all cases, and if so, what is it?

Adger’s solution to both of these problems is to remove the distinctness condition from Merge, which prevents an SO from merging with itself (“ $X$  and  $Y$  are distinct” from (82) above), and to take the sequence of functional projections (the hierarchy of functional projections) to fundamentally be an axiom of the

system, and therefore to be given by UG. Labels do not project from a lexical item; instead an acategorical root self-merges and semantically contentful labels are built on top of the root as part of an extended projection. Merge can operate on two arguments which are non-distinct: roots can self-Merge, the output being a set containing the root:

$$(84) \text{ Merge } (\sqrt{\text{cat}}, \sqrt{\text{cat}}) = \{\sqrt{\text{cat}}, \sqrt{\text{cat}}\} = \{\sqrt{\text{cat}}\}$$

Furthermore, the output of Merge has to be labelled. Thus, there are two lexicons required by the system:

$$(85) \text{ a. RLex} = \{\sqrt{1}, \dots, \sqrt{n}\}, \text{ the set of lexical items (roots)}$$

$$\text{ b. CLex} = \{l_1, \dots, l_n\}, \text{ the set of category labels}$$

Elements of RLex, and the outputs of Merge, are in the domain of Merge. CLex is a set of labels for the structures that Merge builds. The axiomatic Universal Extended Projections (UEP) are sequences of labels drawn from CLex ( $l_s, \dots, l_t$ ), where  $l_s$  is the Start Label and  $l_t$  is the Terminal Label. Merge can presumably operate on any two syntactic objects, but outputs are constrained by the fixed UEPs and also compositional semantics.<sup>26</sup>

A transition from one label to another is licensed if a language has a Label Transition Function which maps one label onto another. The binary Cartesian product of CLex is the set of Label Transition Functions (LTFs),  $\Lambda$ :

$$(86) \Lambda = \text{CLex} \times \text{CLex} = \{\langle N, \text{Cl} \rangle, \langle N, N \rangle, \langle \text{Cl}, N \rangle, \langle \text{Cl}, \text{Cl} \rangle, \langle N, \text{Num} \rangle, \dots\}$$

The assumption here is that this set is unconstrained, and as such could allow a mapping from any label to any other, but that for any particular language only a subset of those LTFs will be available, and part of the process of acquisition is paring down the set of LTFs, with evidence coming from patterns in the primary linguistic data. Available LTFs are also constrained by UEPs. The labelling function is defined so that the output of Merge can unambiguously be assigned a label. Adger gives definitions of two labelling functions, Transition labelling and Root labelling (Adger 2013, p22):

<sup>26</sup>UEPs are posited based on empirical generalizations which are the result of research in the Cartographic tradition (Rizzi 1997, Cinque 1999, among many others), but the existence of such hierarchies has resisted explanation in terms of general underlying principles. Thus, as noted above, they are simply axioms in Adger's system, and assumed to be a part of UG, pending an explanation of their nature in terms of third-factor principles. See Ramchand and Svenonius (2014) for an attempt to derive the nature of the functional hierarchy of the clause from general cognitive principles.

- (87) a. Transition labelling  
 If  $\alpha, \beta \in \gamma$ , then  $\text{Label}(\gamma) = \text{some } L \in \text{CLex}$ , such that there are (possibly nondistinct)  $f$  and  $g \in \Lambda$  such that  $f(\text{Label}(\alpha)) = g(\text{Label}(\beta)) = L$
- b. Root labelling  
 $\text{Label}(\{\sqrt{x}\}) = \text{some } L \in \{N, V, A\}$

Transition labelling means that the label of a mother node is assigned according to the labels of the daughter nodes, and is only assigned if there are label transition functions which take the labels of its daughters to the label of the mother. Root labelling labels a self-Merged root as one of  $N$ ,  $V$  or  $A$  (although this is a preliminary set, and the set of labels for roots has to be expanded later).

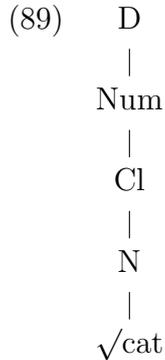
An extended projection is built through a process of iterated self-Merge, labels being assigned to the output of Merge at each stage, following a UEP, with each step of the labelling process being licensed by Label Transition Functions. Of course, any individual instantiation of Merge need not result in a label which is only one step ‘higher’ in a UEP than the last; that is, labelling is such that individual functional ‘heads’ can be (indeed in some cases, must be) skipped. This means that it is not the case that all parts of the UEP are necessarily merged in the structure even if they have no semantic contribution. It is only necessary that the projection proceed ‘up’ the extended projection in each case (as we will see in the definition of  $i$ -complement).

Let’s see how the system works with a concrete example of a derivation. Suppose that we want to build some nominal structure on top of the root  $\sqrt{\text{cat}}$ :

- (88) a. Merge  $\sqrt{\text{cat}}$  with  $\sqrt{\text{cat}} = \{\sqrt{\text{cat}}, \sqrt{\text{cat}}\} = \{\sqrt{\text{cat}}\}$
- b. Label  $(\{\sqrt{\text{cat}}\}) = N$  by Root labelling
- c. Merge  $\{\sqrt{\text{cat}}\}$  with  $\{\sqrt{\text{cat}}\} = \{\{\sqrt{\text{cat}}\}, \{\sqrt{\text{cat}}\}\} = \{\{\sqrt{\text{cat}}\}\}$
- d. Label  $(\{\{\sqrt{\text{cat}}\}\}) = \text{Cl}$  because there are  $f$  and  $g \in \Lambda$  such that  $f(N) = g(N) = \text{Cl}$  ( $f$  and  $g$  nondistinct =  $\langle N, \text{Cl} \rangle$ )
- e. Merge  $\{\{\sqrt{\text{cat}}\}\}$  with  $\{\{\sqrt{\text{cat}}\}\} = \{\{\{\sqrt{\text{cat}}\}\}, \{\{\sqrt{\text{cat}}\}\}\} = \{\{\{\sqrt{\text{cat}}\}\}\}$
- f. Label  $(\{\{\{\sqrt{\text{cat}}\}\}\}) = \text{Num}$  because there are  $f$  and  $g \in \Lambda$  such that  $f(\text{Cl}) = g(\text{Cl}) = \text{Num}$
- g. Merge  $\{\{\{\sqrt{\text{cat}}\}\}\}$  with  $\{\{\{\sqrt{\text{cat}}\}\}\} = \{\{\{\{\sqrt{\text{cat}}\}\}\}, \{\{\{\sqrt{\text{cat}}\}\}\}\} = \{\{\{\{\sqrt{\text{cat}}\}\}\}\}$

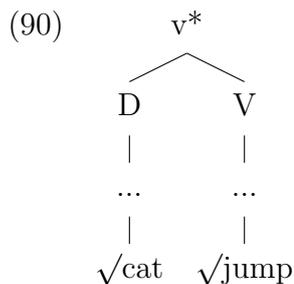
- h. Label ( $\{\{\{\{\sqrt{\text{cat}}\}\}\}\}) = D$  because there are  $f$  and  $g \in \Lambda$  such that  $f(\text{Num}) = g(\text{Num}) = D$

The resulting structure can be illustrated with a tree structure containing a root and a sequence of labels.



Such a structure can be taken to represent a traditional complement line, and, as Adger points out, is roughly equivalent to the telescoped structures of Brody (2000a), only constructed through different means.

What of specifiers? Merge, a binary operation, can also operate on two distinct syntactic objects. So, if we were to take the structure in (89) and merge it as the subject of an unergative verb (also built up from a root), then we might have the following structure (ignoring the intermediate structure built on top of the roots):



$D$  and  $V$  projecting to  $v^*$  is possible because there are LTFs  $f$  and  $g$  such that  $f(V) = g(D) = v^*$ . However, the structure is still entirely symmetrical, with no way to distinguish between complement and specifier. Adger defines the notions of *i*(nterpretive)-complement and *i*(nterpretive)-specifier, with *i*-specifiers only being defined when an *i*-complement is defined:

- (91) In a unary labelled structure  $[_\gamma \beta]$ ,  
 $\beta$  is assigned the syntactic relation of being an *i*-complement of  $\gamma$  iff

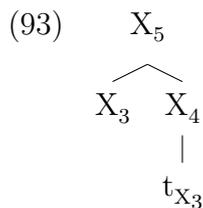
there is a rooted extended projection  $\Sigma$  such that (i)  $\beta$  and  $\gamma \in \Sigma$  and (ii)  $\text{label}(\gamma) \geq \text{label}(\beta)$  in  $\Sigma$ .

- (92) In a binary branching labelled structure  $[\gamma \alpha \beta]$ ,
- a.  $\beta$  is assigned the syntactic relation of being an i-complement of  $\gamma$  iff there is a rooted extended projection  $\Sigma$  such that (i)  $\beta$  and  $\gamma \in \Sigma$  and (ii)  $\text{label}(\gamma) \geq \text{label}(\beta)$  in  $\Sigma$  and (ii)  $\alpha \notin \Sigma$  and
  - b.  $\alpha$  is assigned the syntactic relation of being an i-specifier of  $\gamma$  if  $\beta$  is an i-complement of  $\gamma$ .

These definitions mean that complement lines must ‘go up’ the extended projection, and also that the i-specifier relation is the elsewhere condition defined only where there is also an i-complement relation. An interface condition *Full Interpretation of labelled Structures* (FILS) ensures that there is a unique successful assignment of syntactic relations to mother-daughter pairs, so that there is never more than one way to interpret the structure; if there is no unique assignment, then the structure is ill-formed.

### A consequence: No roll-up movement

Adger’s system has an interesting consequence: roll-up movement of part of an extended projection to a specifier higher in that same projection is not well-formed. To see why, consider the following structure, where  $X_3$ , a subpart of  $X_4$ , and in its extended projection, has been internally merged with  $X_4$ :



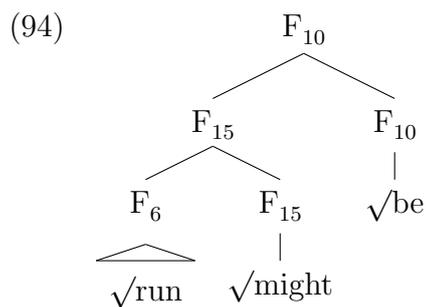
The definition of i-complement, and FILS, means that this structure is ill-formed, because for  $X_4$  to be an i-complement of  $X_5$ ,  $X_3$  cannot be in the same extended projection. Therefore, this kind of structure is always ruled out, and Move can therefore only operate on i-specifiers. This is a welcome consequence, as the architecture of the system itself blocks the availability of one type of meaningless XP movement.

The phrase structure system developed in Adger (2013) might appear to have two fundamental combinatorial relations: one builds rooted extended

projections (complement lines), and another attaches rooted extended projections together (specifier attachment). However, both are achieved with a single computational operation, Merge, with a labelling function providing the label of the output at each step. Self-Merge, simply another instance of the same operation where both arguments are non-distinct, creates the kind of complement lines which end up as word-like elements when mapped to phonology (Brodyesque ‘extended words’), and binary structures where two rooted extended projections merge together result in phrase-like elements. Just as the operation Move and Merge have been reduced to subcases of a single operation Merge (Chomsky 2004), Self-Merge is a third sub-case which becomes available once we remove the distinctness condition from the definition of Merge. Indeed, the distinctness condition is a stipulation, and without it we have a truly minimal combinatorial operation.

### An Extension to the system: Uninterpretable feature projection

The system as discussed above comes with a problem: when an element is merged as a specifier of an extended projection, there is no way to prevent that specifier from having a label which is ‘higher’ in the extended projection of the element that it merges with.<sup>27</sup> Being an i-complement ensures that the label must transition to equal or higher label in the extended projection, but the notion of i-specifier is simply the elsewhere case, and thus no such requirement is built into the definition. Take the following structure as an example:



Here the constituent  $F_{15}$  is higher in the extended projection than  $F_{10}$  begins, but there is nothing in the system that could prevent it from merging here.

Adger (2015a) proposes a solution to this problem, which involves a rethink of the relationship between i-specifiers and i-complements. Above, LTFs could

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<sup>27</sup>Klaus Abels and I both pointed out this problem independently in separate talks given by David Adger. The problem has therefore taken on the moniker ‘the Hall-Abels problem’.

follow a rooted extended projection, or they could map from one extended projection into another. The intuition behind the new proposal is that all transitions should involve the extension of an extended projection line. The new definitions of i-complement and i-specifier are given here:

- (95) In a labelled structure  $[\gamma \dots \beta \dots]$ ,  $\beta$  can bear a syntactic relation to  $\gamma$  iff  $\gamma$  and  $\beta$  are in a Universal Extended Projection  $\Sigma$  and  $\text{label}(\gamma) \geq \text{label}(\beta)$  in  $\Sigma$
- (96) a. In a labelled structure  $[\gamma \alpha \beta]$ ,  $\beta$  is assigned the syntactic relation of being an i-complement of  $\gamma$  iff the categorial feature of  $\beta$  is interpretable.
- b. In a labelled structure  $[\gamma \alpha \beta]$ ,  $\alpha$  is assigned the syntactic relation of being an i-specifier of  $\gamma$  iff  $\beta$  is assigned the syntactic relation of being an i-complement of  $\gamma$ .

(95) ensures that syntactic relations are only defined in the case that they extend a UEP: all label transitions follow a Universal Extended Projection. If a daughter node does not project to a mother node which is labelled with a higher label in a UEP, then it is impossible to define a syntactic relation between the two. This ensures that a structure such as in (94) is ruled out, as no syntactic relation can be assigned to the daughter-mother pair  $F_{15}$  and  $F_{10}$ . The definition in (96) means that the difference between being an i-complement and being an i-specifier lies in the type of categorial feature relation the daughter's label has to the mother's, while also leaving the prediction that there can be no roll-up movement untouched. Uninterpretable features on labels that top off extended projections allow those projections to merge with another extended projection, agreeing with the interpretable feature on the label that it merges with.<sup>28</sup>

The definitions of syntactic relations allow for Spear and Wiggle structures. Spear is produced wherever a single extended projection is produced through

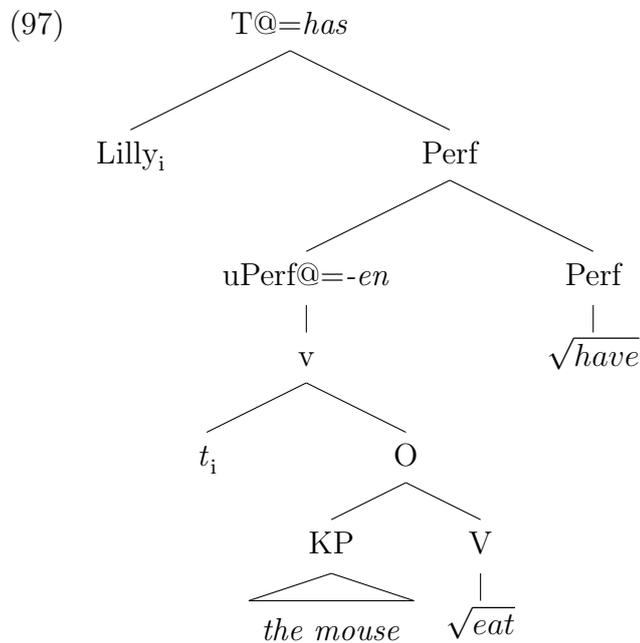
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<sup>28</sup>Adger (2015a) also suggests that this might be one way of thinking about case on arguments. When an argument is merged in a specifier position, it is licensed by the presence of a particular uninterpretable feature:

- (i) a. uV/uv: associated with argument licensing in the verbal extended projection (nominative, accusative, etc.).
- b. uN: associated with argument licensing in the nominal extended projection (genitive, other 'prepositional' cases).

Self Merge, where the categorial feature of each head (label) is interpretable. Wiggle results where a subpart of a projection line is topped off by an uninterpretable feature, and then merges with the (separately rooted) interpretable head in the continuation of that same extended projection.

Adger further proposes that the uninterpretable feature on the label which gives rise to a Wiggle structure can have a morphological realization. One example is the *-en* morpheme on the participial form of the verb which occurs in the perfect in English. If we assume, along with Brody and Szabolcsi (2003) (see example (43) in section 2.1.3) that auxiliaries in English involve a Wiggle structure, then *Lilly has eaten the mouse* would have the following structure (adapted from Adger 2015a):



The verbal projection is merged with the rooted auxiliary projection at the Perf head, and a uPerf head spells out as *-en* which suffixes to the verb root. This allows us to capture the nature of auxiliaries as free functional morphemes, and also explains why the verb has to take a participial form when it merges with an auxiliary.<sup>29</sup>

<sup>29</sup>See also Adger 2015b for Gaelic event passive examples, where the verbal projection merges with a rooted Pass projection, and uPass which mediates this merger is spelled out as a preposition-like element.

### 2.3.3 Interim summary

In this chapter so far we have seen some examples of Direct Linearization Theories which map syntactic structures to ordered phonological strings but crucially without appealing to movement operations to generate variation in word order. The way that this is achieved varies between theories, but a consistent string of ideas is present. First, DLTs take heads to map directly on to morphemes, and generally take extended projections to have some kind of word-like internal consistency. Brody takes that internal consistency to be the result of a mapping from syntactic (rightward) complement on to morphological affix. Bye and Svenonius, Ramchand and Adger allow for more flexibility in the kind of relationship that heads in extended projection lines have to one another: they may be affixal (if specified as such by a syntactic feature), or they may be free morphemes. Specifiers in all systems are fundamentally different in nature. They are separate extended projections and thus are necessarily non-affixal in nature, and are spelled out as separate morphological words.

Variable word order is produced by second-order features in the syntax, or by the implementation of a Wiggle/Flip structure, or by some combination of the two. Of course, none of the DLTs allow movement for purely word-order reasons.

## 2.4 Adopting a system

Our theory of syntax-phonology mapping should be constrained, that is, it should rule out certain possibilities, particularly where those possibilities are unattested. However, it should also not undergenerate, and as we will see in chapter 5, when we consider a broad typology, it is clear that the system has to be powerful enough to capture a wide range of word orders, without appealing to movement operations where those operations have no semantic effect.

Ultimately, what the correct theory of the syntax-phonology mapping is is an empirical question, and continued testing of hypotheses generated by theories such as those presented in this chapter will hopefully allow us to entirely rule out particular theories, or it will lead to adjustments, resulting in a tighter, more constrained theory. While that empirical research is ongoing, however, it is necessary to adopt a set of concrete assumptions so that we can meaningfully generate hypotheses and predictions. Thus, by way of a summary, I present here the spell-out system that I adopt for the remainder of the thesis.

### 2.4.1 The functional sequence and extended projections

I adopt here Adger’s phrase structure system, where labels are assigned exocentrically, based on a universal functional sequence (fseq). Within the noun phrase, transitions between heads are licensed by the sequence given in (98), where  $>$  indicates superiority.<sup>30</sup>

- (98) Universal Nominal Functional Sequence:  
 $D > \text{Deix} > Q > \text{Num} > G_{\text{Adj}} > \text{Cl} > F_{\text{Adj}} > n$

A complement line of heads within the extended projection of the noun must follow this hierarchy. Some heads can be skipped, since their main function is to introduce modifier like elements as specifiers (F and G for Adjectives, Q for Numerals and Deix for Demonstratives). D can be skipped as its main semantic contribution is to introduce definiteness, and is not present in indefinite noun phrases. I do not include a discussion of the the role of each of the heads in the nominal extended projection, putting off an explanation until chapters 4 and 5.

#### Spear

Where an extended projection is projected in a single complement line (without a Wiggle) then we refer to the structure as a Spear.<sup>31</sup> Such a configuration would give rise to a straightforward mirrored morphological structure, with some of the heads possibly being null, or alternatively the entire projection can be the target for insertion of a single morpheme (the entire projection is a single span). As a general linearization rule in this case, heads above the root spell out as affixes in a mirrored order, precisely as in Mirror Theory. To illustrate, take the (abstract) extended projection  $C > B > A$  in (99).

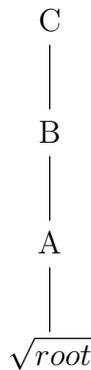
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<sup>30</sup>Everything that I assume in this chapter, and throughout this thesis, takes for granted that there is a hierarchy of functional heads, and that this hierarchy is universal. It is not clear whether this hierarchy is a part of the genetic endowment (UG), or whether its existence can be derived from general cognitive constraints. A minimalist theory of the functional sequence would ideally be able to explain its existence without recourse to stipulating it as a part of UG, but currently there is very little work attempting to derive it from general principles (on this, see Ramchand and Svenonius 2014). Purely speculatively, I think that it is likely that the hierarchy can ultimately be explained as being the result of general cognitive-semantic principles which determine the way in which concepts can be combined, but have nothing intelligent to say about it here.

<sup>31</sup>The terminology is adopted from Adger (2015a)

(99) Spear

Possible spell-out:



1.  $\sqrt{R}$ -A-B-C (with any of A, B, C possibly null)
2.  $\sqrt{R}$ -Z (Z a Portmanteau morpheme)

Either the functional heads A, B and C can each have an independent morphological realization and are spelled out as suffixes, or some set of them can form spans which also attach to the root as a suffix.

Furthermore, I assume that the shape of the stem can also be conditioned by the span that forms a morphological word with it, where such a condition on allomorphy is specified in the lexicon. A possible lexical entry would appear as follows:<sup>32</sup>

- (100) a.  $\sqrt{R}$  in the context of  $\langle C,B,A \rangle \Leftrightarrow /b\text{lip}/$   
b.  $\sqrt{R}$  (Elsewhere)  $\Leftrightarrow /p\text{lip}/$

This leads to the question of how to capture competition between the spell-out of roots. One approach is to take there to be no competition, and morphophonological readjustment rules are required (Halle and Marantz 1993) to adjust the spell-out of the root. Alternatively, there is competition, with spell-out being sensitive to the heads in the projection line above the root (Siddiqi 2009). I adopt the second position here, and assume that the spell-out of the stem can be sensitive to a span of heads above it (see section 5.3.3 for an example of span conditioned stem allomorphy).

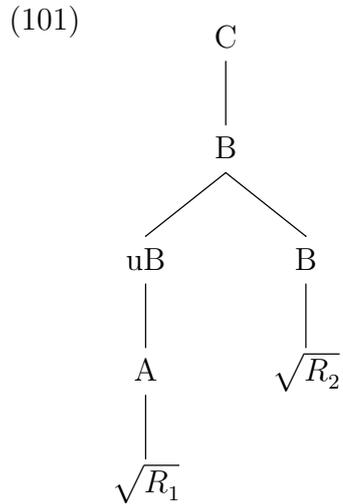
## Wiggle

Following Adger (2015a), I take Wiggle structures to be licensed by the presence of an uninterpretable feature on the specifier-like element (the left daugh-

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<sup>32</sup>There is much debate over whether lexical roots can undergo suppletion, and over whether functional elements could be treated as being rooted in the same way as lexical elements. See Harley (2014) for an argument that true root suppletion does exist for non-functional elements, and Borer (2014) for a skeptical reply. See also Svenonius (2014) for a discussion of the overstatement of the contrast between lexical and functional elements.

ter). A transition from one head to another in a non-complement relation is licensed by the projection of an uninterpretable copy of a feature which agrees with the head that it adjoins to. Therefore, the same abstract functional projection line as above,  $C > B > A$ , could in principle involve more than one separate rooted projection, and thus a Wiggle structure. Consider (101).<sup>33</sup>



The two possible structures for the same extended projection lead to the following question: what would lead a child to posit one over the other? I suggest here that the Wiggle structure is posited under one of two conditions: either i) there is morphological evidence that there are two separate rooted projections, or ii) there is semantic evidence that there is a separate conceptually contentful projection implicated in a structure. That is to say, in the example above, the Wiggle structure can be reasonably posited either if there are two rooted morphological words in the input, or if there is only one, but the other, while phonologically null, is semantically contentful. This gives us the following general schema, where X and Y are separate morphological words, but may themselves be morphologically complex, formed of a root and affixes:

- (102)  $[X]_{\omega_1} [Y]_{\omega_2} \rightarrow$  Posit Wiggle  
 $[X]_{\omega_1} \rightarrow$  Posit Spear or Wiggle, depending on  
 other syntactico-semantic evidence

Where a single portmanteau morpheme spells out an entire projection line, then only a Spear structure is possible, as the system only allows spans which

<sup>33</sup>Note that I do not make a distinction between vertical lines and lines sloped to the right: both are intended to represent a complement relation, and indicate that the heads are part of the same morphological word. Left sloping lines always represent a specifier relation.

are sequences of complements, and does not allow spans which spread across specifiers and complements.

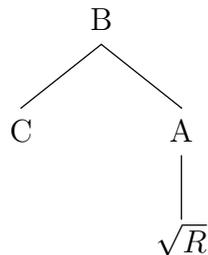
### 2.4.2 Wiggle, and Spear, but no Chop

The set of linearization possibilities that the DLTs discussed in this chapter present us with is too unconstrained when taken together, and leaves us with an embarrassment of riches. So far we have discussed two possible structures, Spear structures and Wiggle structures, which give rise to different types of linearizations of heads. However, Bye and Svenonius (2012) and Ramchand (2014) allow for subparts of extended projections in a Spear structure to be ‘chopped up’ and spelled out at varying heights; this, in combination with Spear and Wiggle, appears to allow for far too many analytical possibilities. To illustrate, take the abstract morphological output in (103), where A, B and C and  $\sqrt{R}$  are morphemes, with R being the root, and brackets with subscript  $\omega$  separate these into separate morphological words (potentially separate prosodic domains, such as two separate phonological words):

$$(103) \quad [C]_{\omega_1} [\sqrt{R}\text{-A-B}]_{\omega_2}$$

Let A, B and C be elements of the same extended projection (for example, this might represent a demonstrative (C) and a noun with a number suffix ( $\sqrt{R}$ -A-B)). If our phrase structure coupled with our spell-out system can make use of Wiggle structures and Chop (indicated with the \* diacritic from Bye and Svenonius 2012), then the two following analytical possibilities are open to us:

(104) a. Wiggle:

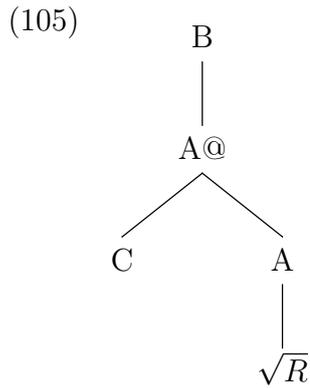


b. Chop:

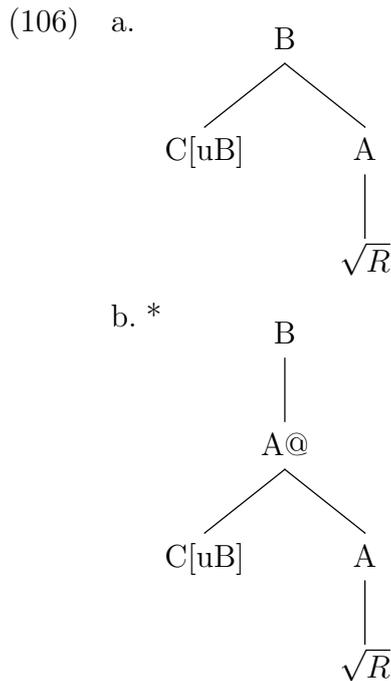


Both structures generate the output  $[C]_{\omega_1} [\sqrt{R}-A-B]_{\omega_2}$ . The first because the specifier  $C$  precedes the rooted projection  $\sqrt{R}-A-B$ , the elements of which are ordered in the usual Mirror Theoretic fashion. The second because  $C$  precedes its complement,  $B$ , which forms a morphological word with the elements that it dominates by virtue of the presence of the  $*$  feature. In some cases there may be a way to tell the two apart. For example, if it were independently the case in a language that  $C$  could undergo movement to some higher position, then we would have to assume that the Chop structure is the incorrect option under a phrase structure system like that developed in Adger (2013, et seq), because a subpart of a Spear projection may not move. In the absence of any independent evidence, and also without a commitment to Adger-type structure building, there is no preferable option. There is nothing about the system of Bye and Svenonius (2012) that would rule out roll-up. Ideally our system should be set up so that this kind of over-abundance of options never comes about. Since I adopt Adger’s phrase structure system here, it follows that two separate morphological words are always the product of a Wiggle structure, and I operate under the assumption that Chop is not a general principle available to the spell-out system.

The Wiggle structure could also produce the output in (103) with a different position for the specifier  $C$ , and a low spell-out position for the  $\sqrt{R}$  projection (go to the next section for a full explanation of the spell-out position diacritic @):



Which structure is well-formed, though, is constrained by the universal fseq, and by the possible transitions between heads. Adopting Adger’s (2015a) claim that uninterpretable features drive the availability of a transition of a specifier’s label to that of the head that it attaches to, I take all attachments of this sort to be feature driven. Therefore, the well-formed structure would be (106a), not (106b):



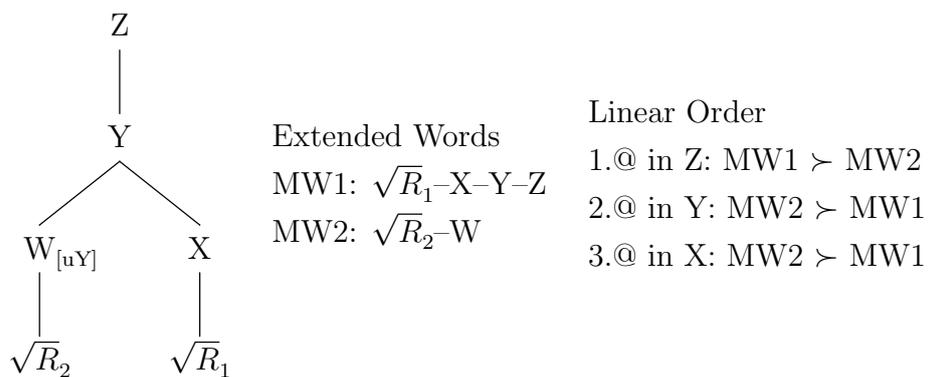
For the child, working out the correct structure from the input string here would involve first identifying the kind of semantic work that a particular element is doing, and thus being able to determine which position in the fseq a particular phonological string corresponds to. Clearly it cannot be phonological input alone that guides the positing of structure. It is perhaps the case that both the structures (106a) and (106b) are posited upon identifying the sequence [ C ]<sub>ω1</sub> [ √R–A–B ]<sub>ω2</sub> as well formed, and then at some later point

one option, i.e., (106b), becomes systematically dispreferred because of other contextual cues, possibly semantic in nature.

### 2.4.3 Position of spell-out and linearization

The relative order of specifiers and the spell-out of the complement lines that they attach to is also partly determined by the spell-out position diacritic @. The general linearization rule places specifiers before heads that they attach to, but if the spell-out position of the morphological word that that head forms a part of is higher than the head itself, then it is possible for a specifier to follow a morphological word. (51), repeated here, illustrates the simplest case, where the specifier word  $\sqrt{R_2}$ -W can precede or follow the word  $\sqrt{R_1}$ -X-Y-Z depending on the position of @.

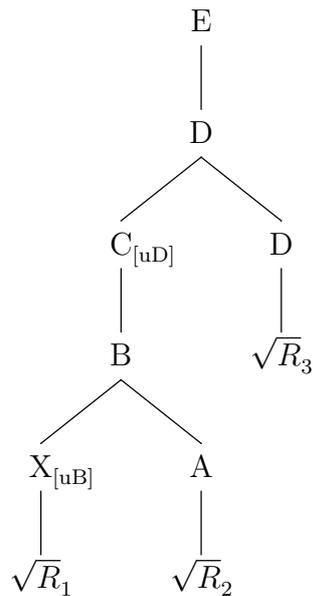
(51)



Linear order 1 involves the spell-out of MW1 in Z. This means that the full projection from the root  $\sqrt{R_1}$  to Z is linearized in the position of Z. As suffixes, X and Y morphologically precede Z as part of the word M1. Specifiers linearize to the left of the heads that they attach to, but the fact that MW1 linearizes higher than the the head that MW2 attaches to means that MW1 precedes MW2. If the projection line of  $\sqrt{R_1}$  spells out in Y or X, which W precedes, then the order is MW2  $\succ$  MW1.

Therefore, the two words can be ordered relative to each other in two different ways. The situation becomes more complicated when there are more MWs involved. To show the kind of variation that this can potentially give rise to, consider the more complicated example in (107).

(107)



There are three extended projections, and thus there are three spell-out diacritics that have to be introduced so that the structure can be properly linearized. Let's run through all of the possible orderings of the three words.

- (108) a. MW1:  $\sqrt{R_1}$ -X  
MW2:  $\sqrt{R_2}$ -A-B-C  
MW3:  $\sqrt{R_3}$ -D-E
- b. @ in X, B/A and D → MW1>MW2>MW3  
@ in X, C and D → MW2>MW1>MW3  
@ in X, B and E → MW3>MW1>MW2  
@ in X, C and E → MW3>MW2>MW1

This has the consequence that the lower two projections, MW1 and MW2, can never be separated from each other by the higher projection, where they are organised in the way illustrated in (107).

## 2.5 Conclusion

In this chapter I have laid out what a direct linearization theory that makes no use of head movement might look like. I have built on Mirror Theory (Brody 2000a, Brody and Szabolcsi 2003) and other related linearization theories from the more recent literature (Bye and Svenonius 2012, Svenonius 2012b, Adger 2013, 2014, Ramchand 2014), and adopted a system which produces variation in linear order through a spell-out diacritic @, which orders a complement line

and its specifiers with respect to each other, and also through the fundamental difference between Spear and Wiggle structures. I furthermore take the Span to be the target of insertion of lexical items, meaning that a many-to-one mapping from heads to morphemes is possible. The benefit of the system is that it allows for a (relatively constrained) range of variation, but does not rely on movement operations to derive the effects of head movement. As a result, various unusual properties of head movement become unproblematic, as summarized in (109).

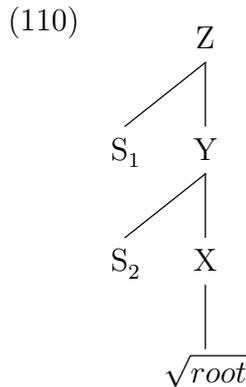
- (109) a. HM is counter-cyclic, and does not obey the Extension Condition.  
DLT: high spell-out does not involve movement, so Extension Condition is not relevant.
- b. HM does not obey the Proper Binding Condition.  
DLT: No movement, so this condition is not relevant (there is no trace to be bound).
- c. HM has to have a triggering feature which is distinct from the feature triggering XP movement.  
DLT: still requires a stipulated relation between heads which triggers mirror-like morphological effects, but this is not related to movement operations.
- d. The leftward nature of the adjunction has to be stipulated.  
DLT: there is no adjunction, but linear order is imposed by an axiomatic set of rules.
- e. There is no excorporation;  
DLT: excorporation is not expected, since there is no movement.
- f. Head movement can only operate within an extended projection, and not across embedded projections.  
DLT: this follows from the nature of extended projections and the definition of *i*-complement.
- g. The Head Movement Constraint applies regardless of the featural make-up of the head, unlike relativized minimality effects related to XP movement.  
DLT: Intervention effects are not expected to be similar to XP movement.
- h. HM does not have interpretive effects.  
DLT: not expected to have semantic effects similar to XP movement.

Some of the explanations for head movement effects remain stipulative under the DLT adopted here, particularly those effects related to linearization. The point is, however, that treating head movement as a species of movement means that more problems arise than do under the alternative. We need to have an axiomatic set of linearization rules regardless of whether we adopt head movement or not (e.g., the set of morphological rules that are required in Distributed Morphology) and so this is a reasonable price to pay in order to unburden ourselves of various other conceptual problems.

Having shown that there is a way to push head movement effects out of the syntax and into the syntax-phonology interface, in the next two chapters I consider two quite different empirical domains in which head movement has been implicated. First, in chapter 3, I critically assess claims that there are in fact examples of head displacement with an associated semantic effect. I discuss four arguments from the literature, and conclude that none are convincing, meaning that head movement remains an example of meaningless movement, and thus that there is no reason to assume that it must be a narrow syntactic operation. Second, in chapter 4, I discuss an apparent covert head movement effect in Mandarin Chinese and Cantonese, where there is no visible displacement of a head, but where head movement has been employed as a tool to explain interpretive effects. I show that a head movement approach fails to capture the correct generalizations about the word order and interpretation of noun phrases in those languages, and that the DLT proposed here succeeds where a head movement account fails.

## 2.A Appendix: The Head-Final Filter

An immediate consequence of the theory of syntax-phonology mapping discussed above is that a specifier of the highest head in a functional projection which is a part of a potential target for lexical insertion (the specifier of the highest head in a span), will always precede the morphological word which spells out the span. Take the abstract structure in (110):



Specifier position  $S_2$  could either precede or follow the morphological word which spells out  $\sqrt{root}\text{-X-Y-Z}$ , depending on the position of spell-out of the word. With @ in the Y or X position, the resulting order would be  $S_2 \succ \sqrt{root}\text{-X-Y-Z}$ , and with @ in the Z position, the resulting order would be  $\sqrt{root}\text{-X-Y-Z} \succ S_2$ .

However, regardless of the position of @,  $S_1$  will **always** precede  $\sqrt{root}\text{-X-Y-Z}$ . This means that whenever there is a rightward specifier like element, the only way that the system can account for it is by positing some higher functional head (above Z in the example above) which can act as a strong spell-out position, and let the highest specifier spell out to the right. Of course, positing such a higher functional head counts as an unwelcome stipulation in cases where there is no independent evidence that such a functional head exists, and so a higher head should only be posited with good evidence that it need be.

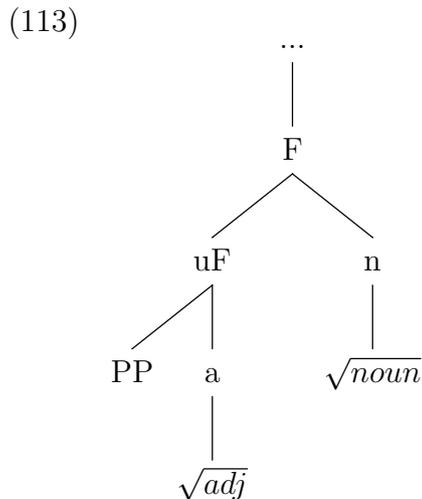
A case where something that could reasonably be assumed to be a specifier can only precede a word in one configuration, but may precede or follow it in another is the that of complements to adjectives in Germanic. There is a generalization, referred to as the Head Final Filter in Williams (1982), that attributive (pre-nominal) APs in Germanic which include a complement must be head final (111). On the other hand, adjectives in a predicative construction

with the copula can be either head initial or head final (112).<sup>34,35</sup>

- (111) *Een* | $\surd$  *op zijn vader*| *trotse* |\**op zijn vader*| *man*  
 An of his father proud man  
 ‘A man proud of his father’

- (112) *Tobias is* | $\surd$  *op zijn vader*| *trots* | $\surd$  *op zijn vader*|  
 Tobias is of his father proud  
 ‘Tobias is proud of his father’

If we take the structure of an attributive adjective modifying a noun to involve the merger of the extended adjectival projection as a specifier of some functional head above a nominal categorizer *n*, and assume that the complement to the adjective merges as a specifier of a head merged above an adjectival head *a*, then, we have the following structure for an attributive adjective modifying a noun:

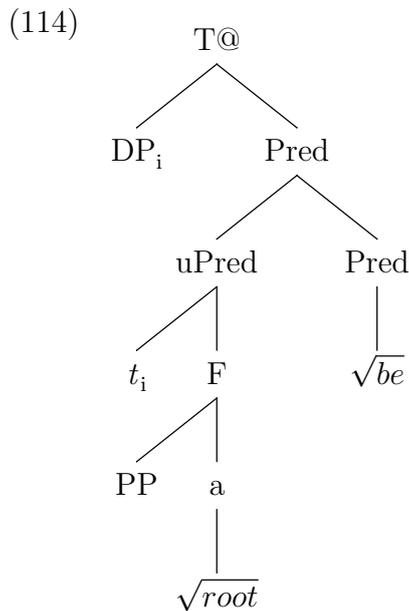


<sup>34</sup>Vertical bars around a constituent ( |XP| ) are used to indicate possible position; note that having a complement in both positions would lead to unacceptability.

<sup>35</sup>There have been a number of attempts to account for these facts, which I will not discuss here, as this section is intended only as a brief discussion of a potential positive consequence of the spell-out system adopted in this thesis. See Neeleman (1994) for a PF-checking approach; see Hawkins (1994) for a functional account based on parsing costs; see Escribano (2004) for an account based on the nature of structure building and the LCA; see Sheehan (In preparation) for an attempt to derive the Head Final Filter from the Final-over-Final Constraint. For earlier discussion of the facts, see also Emonds (1976) (Surface Recursion Restriction), Giorgi and Longobardi (1991) (Consistency Principle). Some relevant data is also discussed in Cinque (1993), particularly pages 251 and 252.

Given this structure, the highest possible spell-out position for the extended adjectival projection is uF, and the complement to the adjective (PP) therefore **must precede it**. This means that the complement can never follow the adjective when it is attributive.

Now consider the predicative example. Taking a reasonably standard approach to the syntax of predicative sentences of the sort under discussion, I follow Bowers (1993), Svenonius (1994) and Adger and Ramchand (2003) in taking the predication relation to be introduced by a functional head Pred, which has the ‘subject’ in its specifier (which then moves to spec TP):



In this case, if we take the span  $\sqrt{root}$ -a-F-uPred to be a target for insertion (a morphological word), spelling out as the adjective, and we take the copula to be a realization of a separate projection starting in the root  $\sqrt{be}$  and spelling out in T, then it is possible to generate both of the orders in (115), depending on the position of the spell-out position diacritic @ in the adjective root projection.

- (115) a. @ in uPred: Total order = DP  $\succ$  *be*  $\succ$  Adj  $\succ$  PP  
 b. @ in F: Total order = DP  $\succ$  *be*  $\succ$  PP  $\succ$  Adj

Of course, this is relying on two assumptions: (i) that there is no detectable meaning difference between the two orders of the adjective and the PP, and (ii) that, if there is no difference in meaning, then ‘meaningless’ word order variation is the result of the variable position of the spell-out position of a span of functional heads. Cross-linguistic variation in word order is taken to be the

result of different spell-out positions for spans of heads, but in this case we are applying the same logic to intralinguistic variability, which is not the same thing. If there is a difference in interpretation between the two word orders, then potentially a movement operation would have to be implicated. However, it seems in this case that there is not an easily detectable difference, meaning that an account which makes use of variable spell-out positions is appealing.

So, to summarize, the restriction of the complement to the position left of the head is forced in the attributive case because the complement is the specifier of the highest functional head which can form part of the span that spells out as the adjective, and such specifiers necessarily precede the head. However, in the predicational cases, there is independent motivation for a Pred head which merges with the adjectival extended projection, and the presence of this higher head means that the adjective is able to spell out higher than the position of the head which introduces its complement. Thus, the complement is able to follow the head in such a configuration. The fact that it can also precede the head is taken to follow from intralinguistic variability in the possible height of spell-out of the extended adjectival projection, under the assumption that there is no difference in meaning related to the different word orders, and thus that this is a purely PF effect, and not syntactic.

This is by no means an exhaustive analysis of the phenomenon; there are a number of factors which have to be taken into account in a full explanation of the (quite diverse) facts. For instance, English (prenominal) attributive adjectives do not take complements at all, but adjectives in a predicative position can.<sup>36</sup>

- (116) a. \*A proud of his son man  
 b. \*An of his son proud man  
 c. John is proud of his son.

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<sup>36</sup>*Tough*-constructions, where the *tough*-type adjective takes a TP complement are generally much more acceptable (although a little degraded for most speakers):

- (i) a. ?This is an easy to use machine  
 b. ?They often discuss difficult to grasp concepts  
 c. ?The mixture of turmeric and oil produces a bright, tough to remove stain

It is noteworthy that 9 out of 10 of the top results from a Google search of ‘difficult to grasp’ have the phrase hyphenated (‘difficult-to-grasp’). Purely speculatively, this could suggest that these attributive *tough*-constructions have undergone a reanalysis and are treated as a compound of some sort.

Why should this be the case? A potential answer is that English attributive adjectives lack the functional structure necessary to project a complement. However, it is well known that postnominal modifiers do allow a complement, to the right:

(117) John is most certainly a man proud of his son

I contend here that these postnominal cases are structurally distinct from prenominal attributive adjectives. Postnominal attributives are restricted to heavy constituents (118a) unless they are contrasted with another noun phrase (118b). Conjunction also makes postnominal modifiers acceptable, which is possibly the same effect as making the constituent heavy (118c).

(118) a. ??John is most certainly a man proud.

b. It's better to be a man proud than a man disappointed.

c. ?John is a man proud and introverted.

Post-nominal APs also have certain restrictions on their interpretation which lead Cinque (2010) to conclude that they are in fact reduced relative clauses.

German data from Cinque (1993) further complicates matters. Cinque notes that in predicative constructions in German, PP complements are able to be freely positioned to either the left or the right of the adjective (119a), but case marked DP complements (or KPs) can only appear to the left of the adjective, not to the right (119b).

(119) a. *Er ist |<sup>✓</sup>über seinen Freund| ungehalten |<sup>✓</sup>über seinen Freund|*  
 He is over his friend angry

‘He is angry at his friend’

b. *Er war |<sup>✓</sup>dem Mann| böse |\*dem Mann|*  
 He was the.DAT.SG.M man nasty

‘He was nasty to the man’

These facts suggest that the nature of the relationship between the KP complement and the adjective, and the PP complement and the adjective is not identical. The dative complement can be seen to intervene between the copula and the adverb *oft* ‘often’, and it is unacceptable when it is immediately adjacent to the adjective, which might suggest that it is in a reasonably high structural position:

- (120) *Er war |✓dem Mann| oft |\*dem Mann| böse*  
He was the.DAT.SG.M man often nasty  
He was often nasty to the man

A more in-depth analysis of the facts may reveal that a spell-out analysis such as that sketched here is not correct, and so I leave this as merely one possible approach to the HFF generalization, which has not previously been proposed.

# Chapter 3

## Against Semantically Active Head Movement

### 3.1 Introduction

As I am adopting a position whereby the linearization of heads in an extended projection is negotiated through a mapping between syntax and phonology, and not through a narrow syntactic movement operation (at least in cases where there are no semantic effects to word order differences), it is necessary to show that there are no semantic effects of realizing extended projections in different positions; in other words, I need to tackle those arguments in the literature which make the claim that head movement does in fact have semantic effects.

In this chapter I critically analyse four arguments given in support of the Semantically Active Head Movement hypothesis (SAHM, from Lechner 2006). I conclude that, in each case, the effects which are claimed to be the result of head movement are analysable in an alternative fashion which does not require movement, as defined in chapter 1, or that, under any available conception of what head movement is, we end up making the wrong predictions if we posit a movement operation to explain those effects. I therefore conclude that the evidence for Semantically Active Head Movement is not compelling, and certainly not compelling enough given the theoretical problems faced by head movement which were discussed in the last chapter.

## 3.2 Roberts: Head movement and NPI licensing

Roberts (2010) discusses a simple argument that head movement can have semantic effects, based on McCloskey (1996). He begins with the fact that NPIs have to be c-commanded by a licenser, and that it is the case that phrasal movement can create such licensing configurations. Take the example of raising-to-subject:

- (121) a. \*After the meeting, it seemed to anybody that nobody was satisfied with the outcome.  
b. After the meeting, nobody seemed to anybody to be satisfied with the outcome

In the example in (121a), the NPI *anybody* is not licensed because it is not in the scope of a licensing element, in this case *nobody*. When *anybody* is in the scope of *nobody* as in (121b), it is licensed and the sentence becomes acceptable.

The question is, then, whether head movement can create the same kind of contexts in which NPIs are licensed, in the same way as phrasal movement. Roberts answers in the affirmative, giving the following paradigm from McCloskey (1996), involving subject-auxiliary inversion in English:

- (122) a. \*Which one of them does anybody like?  
b. Which one of them doesn't anybody like?  
c. \*They succeeded in finding out which one of them anybody liked  
d. \*They succeeded in finding out which one of them anybody didn't like  
e. They succeeded in finding out which one of them wasn't liked by anybody

(122b), a case where a negative auxiliary has moved to C and thus c-commands the NPI, is fully grammatical, whereas in (122d), an example where there is no subject-auxiliary inversion, and the negative auxiliary remains in T, the NPI is not c-commanded by negation and thus the result is unacceptable. Furthermore, in (122e), a passivized version of (122d), the NPI is placed in a by-phrase which is c-commanded by negative auxiliary in T and thus is licensed. T-to-C

movement can feed NPI licensing, and therefore, head movement must be a narrow syntactic operation.

So far so straightforward. If NPI licensing is calculated structurally at LF (in English), and is not related to the linear order of elements, then this looks very much like an instance of head movement giving rise to an interpretive effect. However, for the argument to fully go through, we need to see that it is really head **movement** that is giving rise to the effect discussed above. We thus need to show that, on reasonable assumptions about the way in which head movement proceeds, as a syntactic operation, that the correct predictions are made. That is, we need to show that it is head movement that is responsible for moving the negation and the auxiliary into a position where it can license the NPI. Roberts therefore lays out a brief analysis of the English facts, giving the details of a derivation which results in the negative auxiliary being in C and c-commanding the NPI in spec TP.

First, he argues that, in examples such as (122b), that

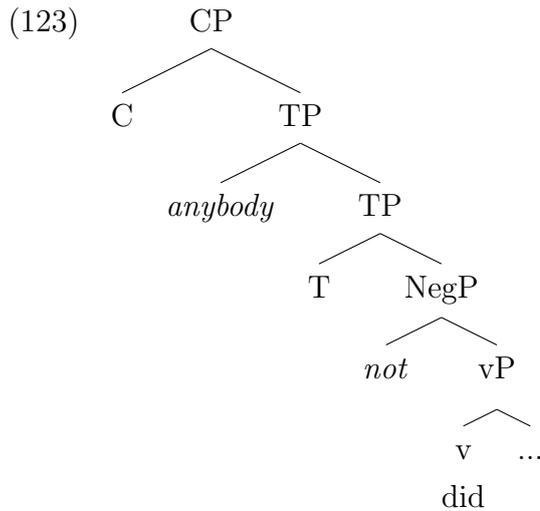
*n't* optionally cliticizes to T from a lower position ... occupied by *not* ... the negation is raised to C in [(122b)] with the auxiliary: this operation must be syntactic because it affects LF.” (p12)

The underlying structure, before any movement takes place, would have to be something like the following, with T being above a Neg position which hosts negation, which in turn is structurally higher than v, where Aux originates:<sup>1</sup>

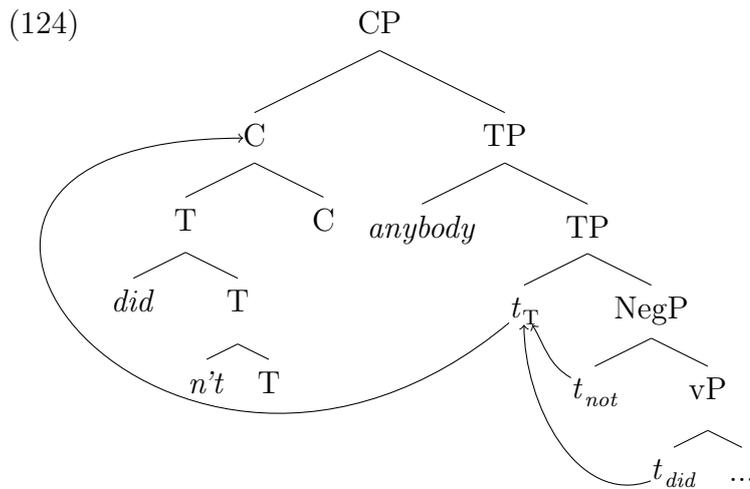
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<sup>1</sup>It is in fact not clear in the main text of Roberts (2010) where Aux originates, but there is a suggestive passage in endnote 6 of chapter 1 which suggests that Roberts is adopting a structure similar to the one I present in (123):

“It [an alternative analysis presented in Biberauer and Roberts (2010) – DH] also avoids a potential problem for the analysis sketched in the text involving countercyclic cliticization of *not* to T followed by movement of the auxiliary to T (if it is correct that auxiliaries may move from v to T, which seems likely ... )” (p218)



Subject-Auxiliary inversion, under a standard left-adjunction analysis of head movement is then the result of three independent head movement operations: (i) *not* cliticizes to T, and contracts to *n't*, (ii) the auxiliary *did* moves to adjoin to *n't*+T, (iii) the Aux-*n't*-T complex moves up to C:



As far as linear precedence is concerned, this analysis captures the facts exactly. However, there is a clear problem with this analysis: if the licensing condition imposed on an NPI involves it being c-commanded by a relevant licensor, then the structure above will fail to give rise to an appropriate licensing configuration. The complex head which ends up in C contains the negative element which must c-command the subject to license the NPI, but the negative element is too deeply embedded to be able to c-command the subject. We have here an example of the conceptual flaw that an adjunction analysis of head movement faces, and which has been widely discussed in the literature: c-command out of the complex head is impossible unless we reformulate our

definition of c-command.

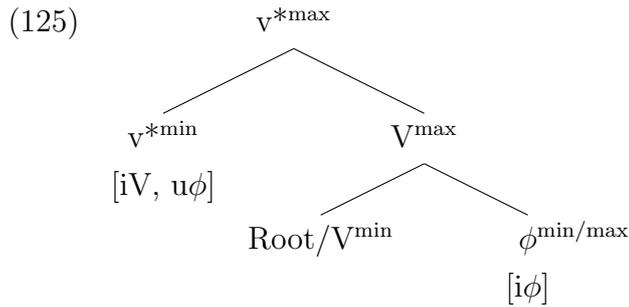
Roberts proposes an alternative account of head movement which appears to overcome this problem. In the next subsection I sketch an outline of Roberts's theory of head movement and its consequences, but ultimately conclude that adopting his story means that we no longer have an argument that it is **movement** that gives rise to the observed NPI licensing effect; rather it is the relationship between a Neg feature already present in C and the NPI which does the work. Thus we either face the c-command problem, or we have no reason to think that movement, qua Internal Merge, giving rise to a change in structural relations, is what drives the licensing of the NPI.

### 3.2.1 Roberts's theory of clitic incorporation and head movement

Fundamentally, the novel theory of head movement proposed in Roberts (2010) treats the effects of head movement as a special case of Agree between a probe and a goal. The special case involves feature valuation on the probe, but specifically feature valuation through an Agree relation which 'exhausts the content of the goal' (p60). That is, a goal is 'defective', and can cliticize onto a probe if and only if the goal's formal features are a proper subset of those of the probe (p62). Where Agree takes place between a probe and a defective goal, the goal is copied and internally merges with the probe (in a special head adjunction configuration), and the lower copy of the goal is deleted through a process of chain reduction, following Nunes (2004). This is possible because the features on the probe which are valued in the Agree operation now c-command the position of the lower copy of the goal; those valued features form a chain and the lower copy deletes. The moved element does not have to c-command the position of its lower copy because the head that it merges with has identical features to it, and those features can c-command the lower copy.

Both object clitic incorporation and V-to-T movement are taken to be instances of the same process: the features of the goal are properly included in the features of the probe, and Agree leads to valuation of features on the probe and deletion of the goal.

Consider the case of an object clitic attached to a verb in French (e.g., *le voit*), where we have so far built up the structure in (125), and the object of the verb is only specified for phi features, and nothing else, and thus is labelled as a  $\phi$ -phrase.



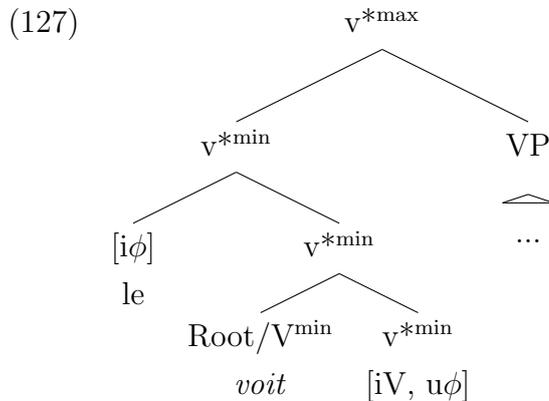
The notation  $uF$ , where  $F$  is a feature, is intended to informally stand in for a feature which has an unvalued attribute, and  $iF$ , a feature with a valued attribute. Thus,  $u\phi$  on  $v^*$  is shorthand for  $[\phi: \_ ]$ , where  $[Attribute: Value]$  is the general notation for a feature.  $[i\phi]$  on the direct object stands in for a feature bundle of valued  $\phi$ -attributes, and so could represent, for example, the bundle  $[Person:3, Number:sg]$ . In example (125),  $v^*$  has unvalued phi-features, and so probes into its c-command domain. It agrees with the verb root and the direct object, and as a result they incorporate into  $v^*$ . Why? Let's consider the case of Agree between  $v^*$  and the clitic object, which proceeds as follows:

- (126) a. Trigger for Agree  
 $v^*[Pers: \_, Num: \_ ] \quad \phi_{clitic}[Pers:a, Num:b]$
- b. Outcome of Agree  
 $v^*[**Pers:a, Num:b**] \quad \phi_{clitic}[Pers:a, Num:b]$

The values of the person and number features of the object copy on to the probe. Roberts proposes that ‘incorporation’<sup>2</sup> can take place between two minimal categories only if two conditions are satisfied: (i) the two syntactic objects are nondistinct in features (elsewhere stated as a proper subset relation), and (ii) an Agree relation exists between the two syntactic objects. In the case of  $v^*$  and  $\phi$  above, we can see that they are non-distinct in features (the clitic is just  $\phi$ -features, which are a proper subset of the features on  $v^*$ ), and subsequent to the establishment of an Agree relation between the two elements, we have two identical feature bundles in  $v^*$  and in  $\phi$ . Following this, Roberts assumes that Chain Reduction (Nunes 2004) takes place, and deletes the lower copy of the  $\phi$ -features in the object position. The head of the chain, that is, the  $v^*$  head which now has identical  $\phi$ -features to the lower copy of  $\phi$ , remains.

<sup>2</sup>Roberts uses the term ‘incorporation’ to refer to the special case of Agree between two heads with movement of the goal where the features of the goal are a proper subset of the features of the goal, i.e., Agree with a defective goal.

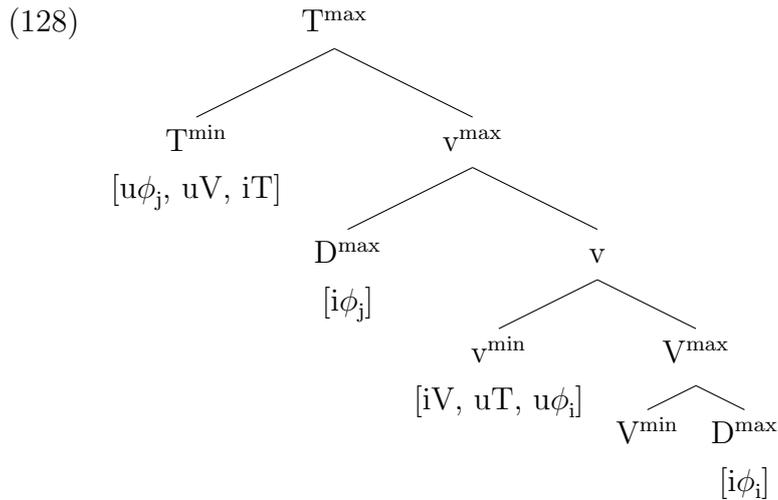
To summarize then, agree with first V, and then  $\phi$ , forms the following complex head:<sup>3</sup>



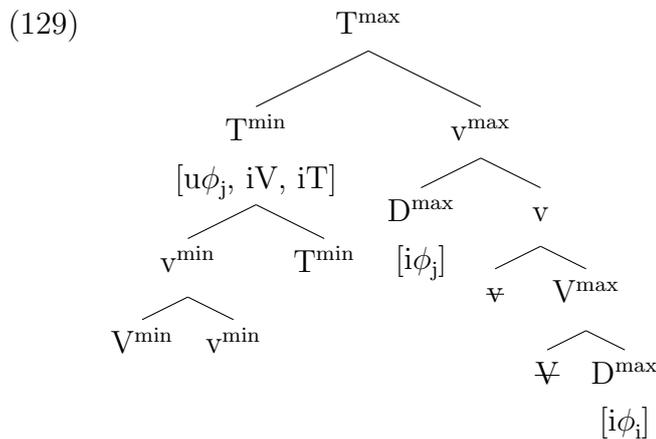
All instances of head movement, including V-to-T movement, are to be analysed in the same way: in a language where V-to-T movement is available, T probes v/V because T has an unvalued V feature, and T probing v/V gives rise to ‘incorporation’ in the same way as with clitics, i.e., the features present on v/V are a proper subset of the features on T and the lower v/V head deletes after valuing features on T. Since the features of v/V have to be a proper subset of the features on T for head movement to take place, V is assumed to have uninterpretable tense features, which are also valued through Agree with T. The layout of the clause, without any movement having taken place, is as follows:<sup>4</sup>

<sup>3</sup>Roberts explains the ordering of Agree (V then  $\phi$ ) through the notion of the relative **prominence** of the two heads (a notion which he defines), the leftward nature of the cliticization through a modified version of the LCA, and the unusual phrase structure status of intermediate  $v^{*min}$  heads through a redefinition of minimal and maximal category in terms of distinctness of labels. See Roberts (2010), chapter 3 (especially section 3.2). Below, in section 3.2.2, I review an undesired consequence of the revised LCA that Roberts adopts.

<sup>4</sup>To account for cross-linguistic variation with respect to V-to-T movement, Roberts proposes that languages like English which do not have verb movement simply lack a V feature on T.



The same process as above results in the following structure:

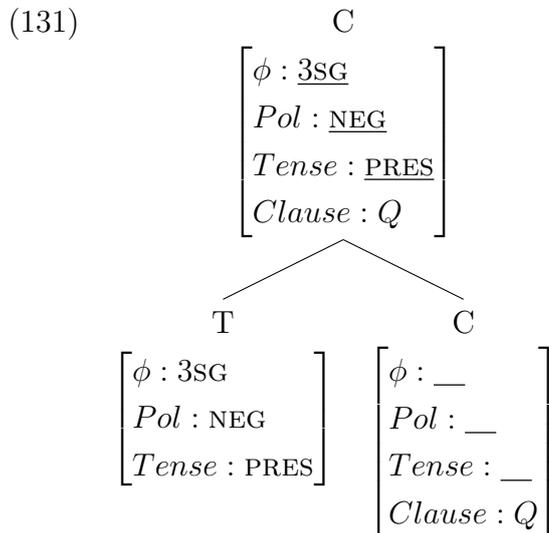


Returning to the object clitic example, the c-command condition (Proper Binding Condition) on traces, which is problematic for left adjunction approaches to head movement, is claimed to disappear, because the features on  $v^*$  c-command the position of the deleted object  $\phi$ :  $v^*$  has to c-command this position in order to be able to form an Agree relation with it in the first place. The goal moves, but it is the head that it ‘incorporates’ into that contains the features which c-command the lower copy. With this theory of head movement, we are in a position to account for the NPI licensing ability of the negative auxiliary that has moved to C. The contrast is restated here:

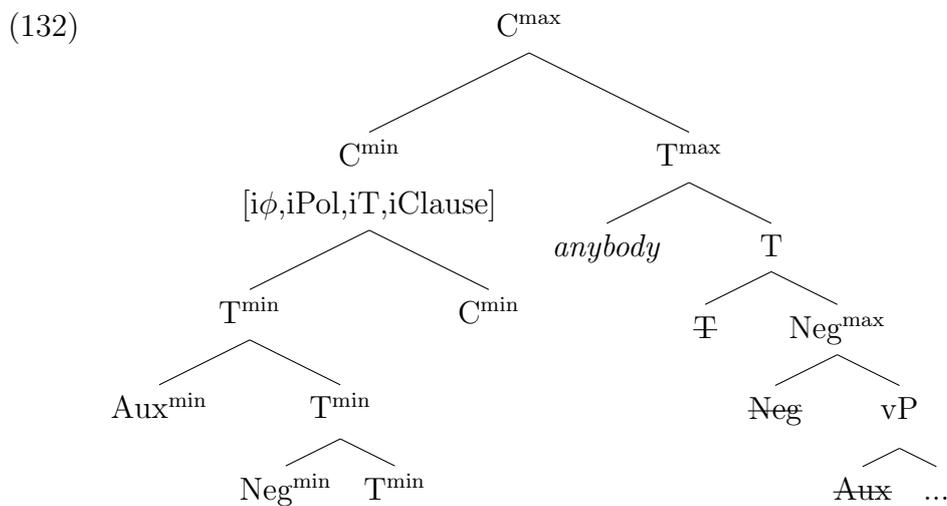
- (130) a. \*Which one of them does anybody like?  
 b. Which one of them doesn’t anybody like

The negative feature of the auxiliary, which has already ‘incorporated’ into T, becomes a value of a feature of C when C probes T. This means that both T

and C enter the derivation with an unvalued polarity feature, and agreement with a defective goal means that this feature is valued. The Agree relation which licenses head movement of T-to-C would result in the following feature valuations :



This results in the following structure, where all values of C have been valued:



The valued polarity feature on C, which c-commands the subject position, can act as a licenser for the NPI, and the contrast is explained. Where there is no T-to-C movement, C does not have a valued polarity feature which can license the NPI, and thus the sentence is unacceptable. Head movement being, in essence, a case of feature valuation on a head means that the licenser for the NPI can unproblematically c-command it.

### 3.2.2 Problems with the account

There are two points that I would like to make with respect to the claims in Roberts (2010), the first related to feature proliferation, and the second a general consequence related to the status of head movement as a movement operation.

First, given that agree with cliticization can only take place in the case where the goal's features are a proper subset of the probes, and given that we need successive cliticization from v-to-T-to-C (i.e., v's (or rather Aux's) features must be a proper subset of T's, which must be a proper subset of C's), the theory of head movement proposed means that there will necessarily be massive replication of features throughout the clause. Any head which has another head incorporate into it must have **all of the features** on the head that incorporates into it. To give a concrete example, let's take the English subject-auxiliary inversion case presented above. For the complex negative auxiliary verb to eventually end up in C, the following feature bundles would have to be present in the derivation (at least):<sup>5</sup>

$$(133) \quad \begin{array}{l} \text{a. } v = \begin{bmatrix} \phi : \_ \\ V : V \\ Tense : \_ \end{bmatrix} \\ \text{b. } Neg = \begin{bmatrix} pol : NEG \end{bmatrix} \\ \text{c. } T = \begin{bmatrix} \phi : \_ \\ V : \_ \\ pol : \_ \\ Tense : PRES \end{bmatrix} \\ \text{d. } C = \begin{bmatrix} \phi : \_ \\ V : \_ \\ pol : \_ \\ Tense : \_ \\ Clause : Q \end{bmatrix} \end{array}$$

v's  $\phi$ -features are valued through agreement with the object, and if the object is a (defective goal) clitic, then it is incorporated into v. T probes Neg, valuing its own polarity feature and incorporating Neg, and then T probes v and values T's V feature, also leading to incorporation of v. C then probes T, and values

<sup>5</sup>These featural specifications are inadequate (e.g., T has no features which would attract a subject to spec TP), but suffice for the purpose of illustration.

its  $\phi$ , V, polarity and tense features, and T is incorporated into C.<sup>6</sup> If any of these features are lacking, then head movement is impossible.

However, this means that C has that set of unvalued features only when it is necessary for incorporation to take place; that is, the features on C must not be a superset of the features on T when, say, we have a subject Wh-extraction in a (non-negative polarity) question, since there is no subject-auxiliary inversion:

(134) Which one of them likes John?

If T is a defective goal when C Agrees with it in this case, we would expect incorporation to take place. The reason that C would not have the correct featural specification for incorporation of T in the case of a subject Wh-extraction is entirely mysterious. There are two ways to think about this. We could say that C can come specified with a certain set of features, and in the case where it lacks the necessary feature for subject-auxiliary inversion (in this case, [Tense: \_\_]), no incorporation of T takes place. However this would lead to the prediction that cases of object extraction where the impoverished C merges should lead to questions such as *Who John likes?*, which is clearly ungrammatical. Alternatively, we would have to say that there are two types of C<sub>Q</sub>, one which comes with a subject extraction feature and no [Tense: \_\_], and one which comes with an object extraction feature and [Tense: \_\_]. This is possible, but amounts to just restating the facts.

The general consequence of this theory is that subject-auxiliary inversion having an effect on NPI licensing is no longer a fact about **movement**: it is a consequence of a Neg feature, which is **already present** on C, being valued. This can all be restated as a spell-out effect: the valuation of the feature is syntactic, but the fact that the auxiliary precedes the NPI is simply the result of the spell-out of a feature on C. The semantic consequences of head movement of the type discussed here is not the result of the movement itself; rather it is a result of valuation of a feature. This should mean that NPI licensing becomes possible regardless of whether a language happens to allow **movement** of a negative polarity item to C: Agree without movement should suffice to produce the same effect.<sup>7</sup> The negation is always able to take scope over the subject, because it is a feature of C. In a sense, then, Roberts's analysis of the NPI

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<sup>6</sup>Since V-to-T movement does not take place in English (only aux-to-T does), it would probably make sense to either take the auxiliary to not Merge in *v* (if we have short verb-root movement to *v*), or to take the verb to not incorporate into little *v* at all and have the auxiliary merge there.

<sup>7</sup>See Adger and Ramchand 2005 for an argument that both Agree (feature valuation) and Movement can have the effect of displacement, but that the two have different properties.

licensing facts turns out to be very much in line with the kind of theory I am endorsing in this thesis: while an element of the operation is indeed syntactic (Agree), the displacement of the feature that we see is not a displacement which arises from a reorganisation of structural relations between elements in the computation, but is the effect of Agree between heads in a projection line. The NPI licenser never moves, it is merely activated by a relationship between C and a polarity head in the extended verbal projection.

### Linearization and the order of heads

In this subsection I point out an unwelcome consequence of the revised definition of the LCA that Roberts adopts. This is not part of the core argument against SAHM effects, but I include it here to show that this theory of head movement too needs to stipulate the fact that moved heads always adjoin to the left of the host.

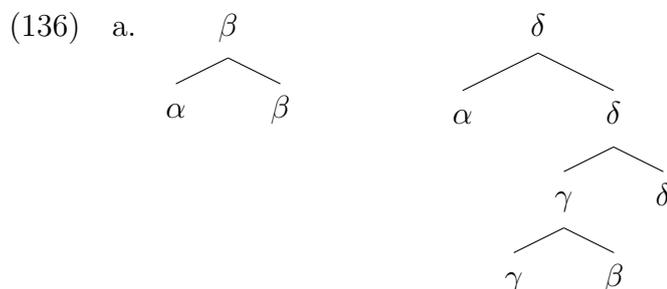
First, I introduce the notion of Prominence, which Roberts uses as a relation that derives asymmetry between heads, and thus which allows for linearization, and also locality effects related to movement (from Roberts 2010, p52, modified):

(135) **Prominence:**

$\alpha$  is more prominent than  $\beta$  iff either:

- a.  $\beta$  projects the label of  $\{\alpha, \beta\}$ , or
- b. there is a category  $\gamma$ ,  $\gamma$  a mergee for  $\beta$  (i.e.,  $\gamma$  merges with  $\beta$  and  $\gamma$  projects), such that  $\delta$  a mergee for  $\alpha$  (reflexively) dominates  $\gamma$ .

In the example structures in (136),  $\alpha$  is more prominent than  $\beta$ .

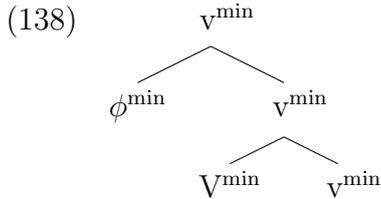


The LCA no longer has c-command as the central relation which determines precedence. Instead, it is reformulated to the following:

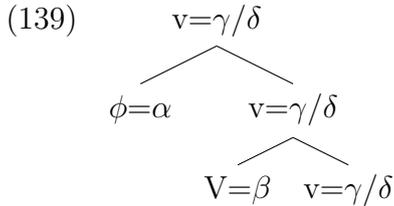
(137) **LCA** (Defined through prominence relations):

If  $\alpha$  is more prominent than  $\beta$ , then  $\alpha$  precedes  $\beta$

However, if we now take the complex head adjunction structure in (127), shown in a simplified form in the next example, we see that there is a contradiction in the precedence relations which exist between the nodes:

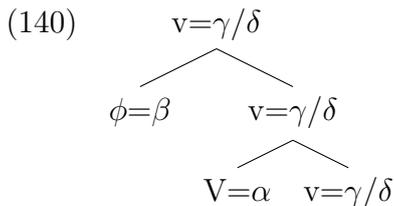


Let us consider the linearization of each of the heads in turn. First,  $\phi$  and  $v$  are in a relation  $\{\phi, v\}$ , where  $v$  projects, and so by the first disjunct of (135),  $\phi$  is more prominent than  $v$ , and therefore  $\phi$  precedes  $v$ .  $V$  and  $v$  are in the same kind of relation,  $\{V, v\}$ , where  $v$  projects, meaning that  $V$  is more prominent than  $v$ , and therefore  $V$  precedes  $v$ . Now what of  $\phi$  and  $V$ ? This is where the second disjunct of (135) becomes relevant. The second disjunct of the definition states that  $\delta$  reflexively dominates  $\gamma$ , and so we can take  $v$  to stand in for both  $\delta$  and  $\gamma$ , and replace  $\phi$  with  $\alpha$ , and  $V$  with  $\beta$ , giving the following tree:



According to the definition, in this configuration,  $\alpha$  is more prominent than  $\beta$ , and so in the complex head above,  $\phi$  precedes  $V$ .

However, if we instead allow  $\alpha$  to stand for  $V$ , and  $\beta$  to stand for  $\phi$ , we get the following configuration:



The definition of prominence also means that  $\alpha$  in (140) is more prominent than  $\beta$ . Therefore,  $V$  precedes  $\phi$ . Consequently, by the definitions of Prominence and the LCA, the structure in (138) maps onto the following precedence relations:

- (141) a.  $\phi$  precedes  $v$   
 b.  $V$  precedes  $v$   
 c.  $\phi$  precedes  $V$   
 d.  $V$  precedes  $\phi$

The precedence relations (141c) and (141d) are contradictory, and thus the structure cannot be linearized. Therefore it is not the case that the leftward nature of head adjunction can be explained by reformulating the LCA in the way proposed by Roberts. More generally, any structure of the sort  $[\gamma \alpha [\gamma \beta \gamma ] ]$  necessarily results in contradictory precedence relations.

### 3.3 Benedicto: Verb movement and DP interpretation

Benedicto (1998) gives an analysis of the interpretive properties of bare plural subjects in English and Spanish, arguing that it is the relative position of the verb and the bare plural subject which gives rise to different interpretations of the subject, and thus that verb movement can affect subject interpretation.

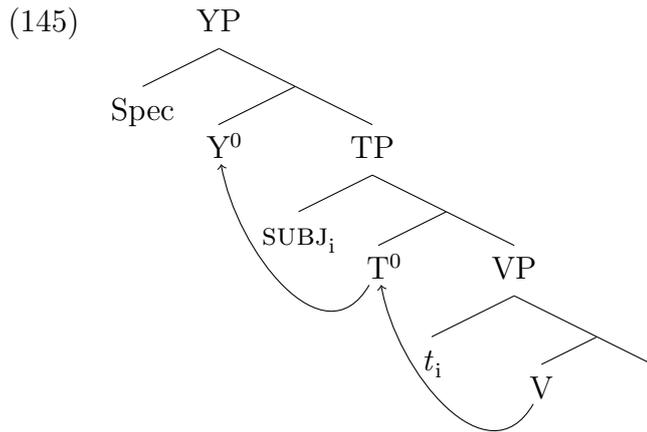
Spanish bare plural subjects are generally unacceptable in preverbal position,<sup>8</sup> but postverbally they are acceptable and have only an existential interpretation, never a generic interpretation.

- (142) a. *En el Pacífico Sur aparecen tifones*  
 in the Pacific South appear.3PL typhoons  
 ‘Typhoons appear in the South Pacific’ ( $\exists$ /\*GEN)  
 b. *En las maratones corren mujeres*  
 in the marathons run.3PL women  
 ‘Women run in marathons’ ( $\exists$ /\*GEN)

---

<sup>8</sup>Bare plural subjects are acceptable preverbally in Spanish if they are modified, focused, or appear in a conjunction with another bare plural.





A consequence of this is that preverbal subjects are not in an argument position in Spanish: they instead merge in spec YP. Benedicto's reasoning here is the following: if the preverbal subject position is not argumental, then we expect it to be filled by other constituents, which appears to be true.<sup>10</sup>

- (146) *Los sábados compra Marta el pan*  
 the Saturdays buy.3SG Marta the bread  
 'Marta buys the bread on Saturdays'

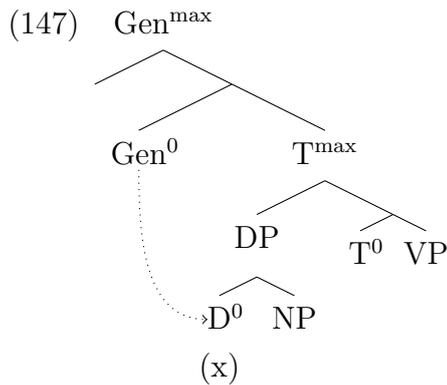
So, how does the distribution of interpretations for bare plural subjects come about, and how is it related to verb movement? The argument is as follows: bare plurals (following Longobardi 1994) are DPs with an empty D head which introduces a variable that needs to be bound by an operator. An existential operator  $\exists$ , and a generic operator GEN can bind this variable, and give rise to an existential and generic reading respectively. Benedicto assumes that GEN is merged as the Y head in the structure above in the case of a generic sentence. She further assumes the 'Existential-with-the-event' ( $\exists$ -with-*e*) condition: existential closure is introduced with the event argument of the predicate, and the scope of the operator  $\exists$  is its c-command domain.

<sup>10</sup>However those preverbal constituents can cooccur with a preverbal subject (ia), and in fact, without the preverbal constituent, we get a contrastive focus on the post-verbal subject (ib):

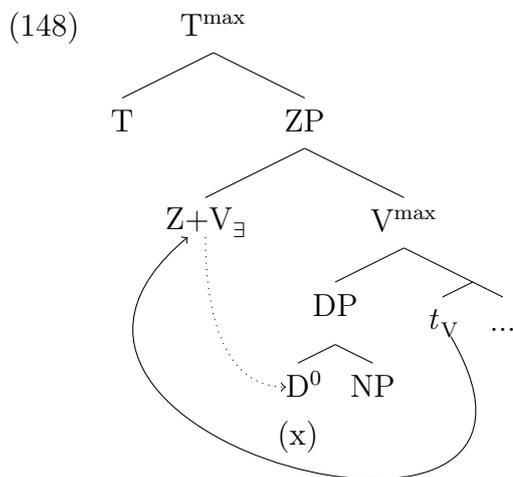
- (i) a. *Los sábados Marta compra el pan*  
 the Saturdays Marta buy.3SG the bread  
 'Marta buys the bread on Saturdays'
- b. *compra Marta el pan*  
 buy.3SG Marta the bread  
 '**Marta** buys the bread'

Simplifying, the  $\exists$ -operator is associated with the verb, and “the quantifier will follow the syntactic steps of the verb it is associated with”(p33). So the scope of the  $\exists$ -operator is set by how high the verb moves in the clause.

In English, the verb stays low, and the variable in the bare plural subject is bound by GEN, giving rise to a generic interpretation (dotted arrows indicate binding):



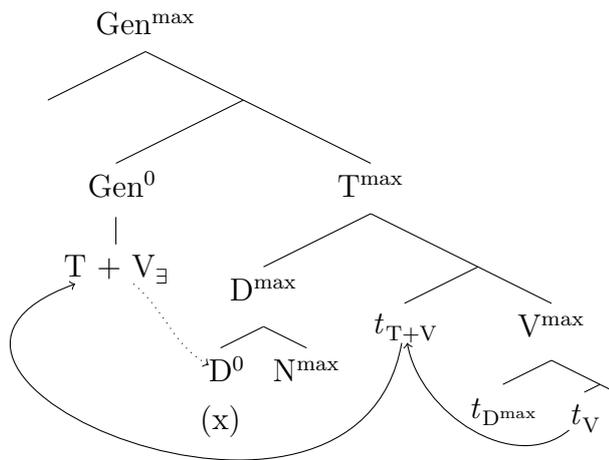
This predicts that only the generic reading would ever be available in English, contrary to fact. Benedicto suggests that V in English undergoes short verb movement to a projection above VP but below TP in cases where a bare plural is interpreted existentially.



The position that V moves to c-commands the base position of the subject, and can bind the variable in D, on the assumption that the subject reconstructs to its base position. Thus the ambiguity observed with English bare plurals is the result of the optionality of reconstruction of the subject into its base position: if the subject reconstructs, we get an existential interpretation, and if it does not, then we get a generic interpretation.

In Spanish, on the other hand, the verb always moves, rolling up through T, then on to adjoin to the GEN head, which is the highest functional projection in a generic sentence. From this high position, the  $\exists$ -quantifier can bind the variable in D, and thus the bare plural gets an existential reading. The generic reading is blocked, because “the  $\exists$  operator intervenes between the variable in  $D^0$  and the  $\text{Gen}^0$  operator”(p33). I reproduce the tree from Benedicto (1998, p34) here:

(149) Generic sentence (Spanish)



The Gen head in Spanish, then, is never able to bind a variable, and only interacts with elements in its specifier position. The only way for a generic interpretation of a DP to arise in Spanish is through Spec-Head agreement between that DP and the  $\text{Gen}^0$  head. This is not a case of variable binding, and no notion of m-command is appealed to; this is why generics in Spanish require a definite article, as a null D of a DP generated in spec GenP would remain unbound.

Supporting evidence for the above analysis of the interpretation of bare plurals comes from Hebrew, where a postverbal bare plural subject can only have an existential interpretation, while preverbal bare plurals can only have a generic interpretation:

- (150) a. *Ba-'aviv nodedot ciporim be-mehirut cafona*  
 in-the-spring travel birds quickly North  
 ‘In the spring, (some) birds travel North quickly’ ( $\exists$  only)
- b. *Ba-'aviv ciporim nodedot be-mehirut cafona*  
 in-the-spring birds travel quickly North  
 ‘Birds travel North quickly in the spring’ (Gen only)

The claim here is that the verb in Hebrew can appear in one of two positions: if it moves above the subject to a higher functional head which hosts the generic operator, then the  $\exists$ -operator blocks binding by the GEN operator, and binds the variable in D itself, resulting in an existential interpretation for the bare plural. If the verb does not move up, then the variable in D is bound by the GEN operator, and the subject receives a generic interpretation.

### 3.3.1 Problems with the analysis

If it is head movement that gives rise to these effects, rather than some other fact, then the main criticism that can be levelled against the analysis is that whatever approach to head movement one takes (left adjunction, reprojection, Internal Merge and m-merger, Agree with Defective Goal), there are two problems that the analysis faces; either (i) it makes the wrong predictions about which operator should be able to bind the variable in empty D (if binding takes place in the c-command domain of an operator, and if ‘blocking’ of a binding relation is possible where a lower operator intervenes between the variable and a high operator) or (ii) it predicts that the  $\exists$ -operator should never be able to c-command out of the complex head that it forms a subpart of whenever the verb moves.<sup>11</sup>

In the following subsections I show how each different approach to head movement faces this same problem.

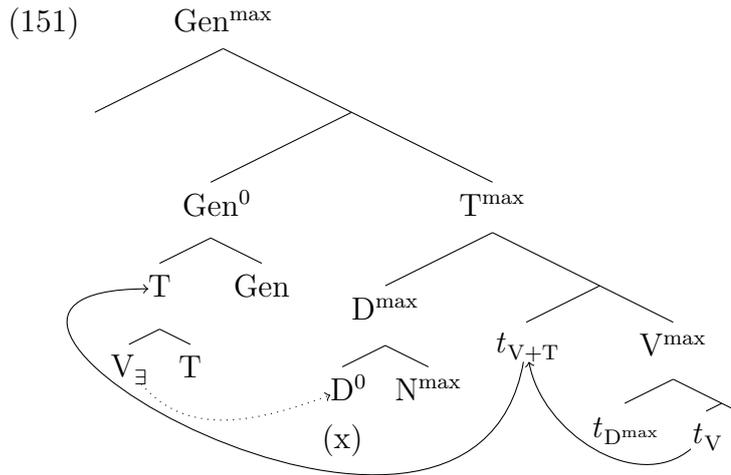
#### Left adjunction

On the standard left adjunction story of head movement, we would have the following structure for a generic sentence in Spanish with a postverbal subject:

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<sup>11</sup>There is no precise characterization of intervention in Benedicto (1998), so I adopt a standard definition, assuming that the relevant notion is hierarchical intervention:

- (i) Z intervenes between X and Y iff Z c-commands Y and X c-commands Z.



V left-adjoins to T first, and then T+V moves to Gen. The complex head generated in the Gen head position now includes a V head carrying an  $\exists$  operator, but that operator cannot c-command out of the complex head and bind the variable in D. On this interpretation of head movement, the prediction made is that a postverbal bare plural subject should never receive an existential interpretation, and should instead only ever be interpreted as generic (and only if the generic operator is able to c-command out of the complex head). On this conception of head movement, there is no way that the verb raising to the Gen head would result in it intervening between the variable and the Gen operator.

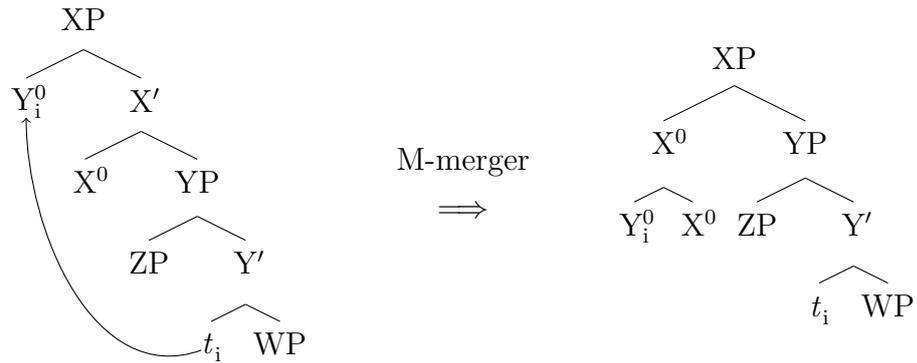
This is one of the central conceptual problems that head movement faces (as discussed above), and follows as a corollary of the fact that the counter-cyclic nature of left adjunction to a host head means that it only c-commands the head that it adjoins to, and unlike other movement operations, does not c-command the base position that it moves from.<sup>12</sup>

### Merge and m-merger

Matushanksy's (2006) approach to head movement takes the merger of two heads to be the result of two operations: (i) syntactic movement of the lower head to a specifier position of the higher head, in accordance with the Extension Condition, and (ii) a morphological operation m-merger which forms a complex head from the host head and its specifier, as shown in (152).

<sup>12</sup>A solution to this is to say that the verb always projects (its label and associated features) when it merges with another head (see, e.g., Chomsky 2015). However, this is a purely stipulative solution, and does not follow from any general principle of labelling.

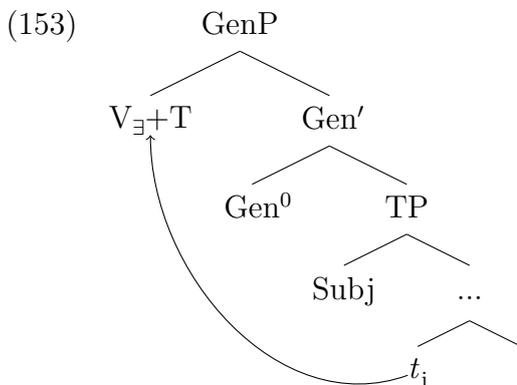
(152)



Although m-merger is an operation which takes place in the morphological component of the grammar, its output, a flat set of syntactic features, has to feed back into the syntax so that successive ‘snowballing’ movement of the complex head can take place up the tree. Once a complex head has been spelled out, its structure becomes opaque to syntax, but the featural content of the combined heads remain visible, as a single bundle.

Applying this to the story proposed by Benedicto would mean that the verb, carrying the existential quantifier, would have to merge above T, and then the two heads become morphologically merged in a post-syntactic m-merger operation.<sup>13</sup> Subsequently, the V+T featural bundle would merge in the specifier position above the Gen head, and then again undergo m-merger, producing a complex V+T+Gen feature bundle.

The question that then arises is: where are scope relations calculated? If scope relations have to be read off of a structure prior to transfer to the morphological component then we would have the hierarchical structure in (153) being used to calculate binding:



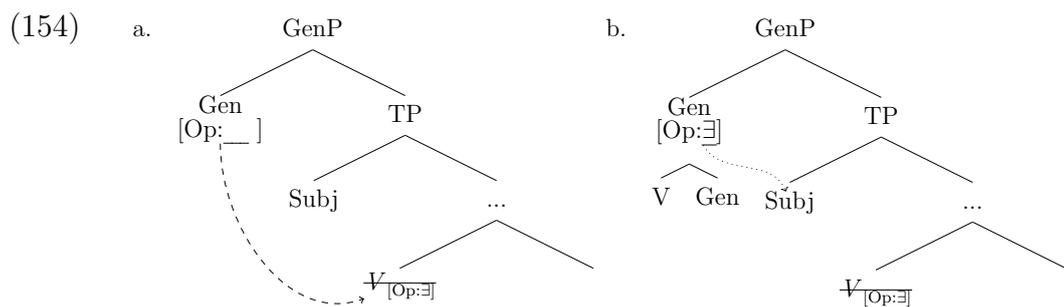
<sup>13</sup>I put aside here the general conceptual problem that arises if we take the output of morphological operations to feed back into the syntax., which would result in phonological features being implicated in syntactic computations. See, e.g., Zwicky and Pullum (1986) for arguments that there is never reference to phonology in the syntax.

In this configuration, the Gen operator intervenes between the  $\exists$ -quantifier and the subject, and thus, we would expect that the DP would always receive a generic interpretation.<sup>14</sup>

If scope relations are only calculated after m-merger of the V+T feature bundle and the Gen head, then there would be no way to create an intervention effect: the feature bundle that is the output of the m-merger operation is by definition unstructured, and thus both the existential operator and the generic operator should be able to bind the variable in the subject. Therefore, we still make the wrong predictions.

### Defective goal and agree

The only conception of head movement that could rescue Benedicto's story from the c-command problem is Ian Roberts's Defective Goal approach. As discussed in section 3.2, Roberts's (2010) theory of head movement takes head movement to be a case of Agree between a probe and a goal where the probe has a feature (or features) valued, and where the Agree operation exhausts the content of the goal. The features on the head that moves up and adjoins to the host are a subset of the features on the host, and it is the valued feature on the host that c-commands out of the complex head, not the features on the 'incorporated' head. Under this conception of head movement, in a generic sentence in Spanish with a bare plural subject, the Gen head would presumably have an unvalued Op feature that would be valued through Agree with a  $\exists$  feature on the verb (154a).<sup>15,16</sup>



<sup>14</sup>Note that even if m-merger is taken to be an operation which takes place in the narrow syntax, the  $\exists$ -quantifier would still not be able to c-command out of the complex head that it forms with the Gen head, in the same way as discussed above for a standard left adjunction analysis of head movement.

<sup>15</sup>The dashed arrows indicate Agree, and the dotted arrows indicate binding.

<sup>16</sup>More precisely, the Gen head would enter an agreement relation with the T head into which V('s feature) has already incorporated into.

In that case, the Gen head, now with an  $\exists$  feature, c-commands the subject position and thus can bind the variable in D (154b).

While this approach solves the c-command problem, it faces a separate problem. Since head movement is simply feature valuation on a probe, to be able to host the  $\exists$ -quantifier, the Gen head has to enter the derivation with an unvalued operator feature, and also a V feature, so that through Agree with the goal V, it exhausts the content of V (i.e., V's features are a proper subset of Gen's). This means that the Gen head has to come with both an interpretable operator feature valued as GEN (since it is a generic operator) and also an unvalued operator feature which can host an existential quantifier. I do not know how to make sense of this, but even if the head could host two operators in this way, it would be difficult to constrain them such that one would have to take precedence over the other (acting as an 'intervenor'), unless we introduce an ordering to features, or a structured feature matrix where late-valued features are hierarchically superior to early-valued features. An Agree relation with incorporation of the verb into the higher head would be possible even if an operator feature were not valued in that Agree relation (e.g., Gen could carry an uninterpretable V feature), but the point of Benedicto's account of the data is that V has to carry the existential quantifier with it: under Roberts's system, the only way to do that is to value an unvalued feature on the higher head.

Furthermore, as noted in section 3.2, even if we accept that the Gen head carries two operator features which are in competition, it could not be taken as evidence that head movement has semantic effects; rather it shows that an Agree relation between a probe and a goal, in which a high goal has a feature valued, gives rise to semantic effects. The feature was always on the higher head, and thus this is not movement proper, as defined in chapter 1.

### 3.3.2 Further problems

There are two further objections to be raised against the claims in Benedicto (1998), suggesting that the facts cannot be so straightforwardly explained.

In footnote 9 I noted that English does (marginally) allow post-verbal bare plural subjects, so long as there is a preverbal locative modifier present (so-called locative inversion constructions). The availability of these bare plurals appears to be strictly constrained, in that they sound odd when they appear bare, and are improved only by the addition of a modifier, or if they appear in a conjunction.

- (155) a.?? Across the room stood girls.  
 b. Across the room stood girls with bows in their hair.  
 c. Across the room stood girls and boys.  
 d.?? Under the bridge lived trolls.  
 e. Under the bridge lived trolls as ugly as sin.  
 f. Under the bridge lived trolls and demons.

When they are acceptable, they unambiguously have an existential reading. The fact that these examples from English bear such a striking resemblance to the Spanish examples that Benedicto uses to motivate her analysis suggests that they should be amenable to the same explanation. However, this would mean that the subject is presumably in spec TP (for case reasons, as in the Spanish examples), and in order for the existential operator to bind the variable in D, the verb would have to move to a position higher than T in English too. If we accept that this is a possibility, then we have to accept that verb movement takes place in English, which would be contrary to work following from Pollock (1989), and contrary to Benedicto's own claims. The short verb movement to a position below T but above the base position of the subject could potentially account for the availability of an existential reading, but then the question remains as to why reconstruction of the subject should be obligatory in this case, but optional when we have a preverbal bare plural subject in English.

The second objection is the following: how is a bare plural object ever interpreted generically in English? Presumably the object is always in the scope of the verb (especially if there is short verb movement of the verb to a position which c-commands the base position of the subject), thus seemingly predicting that if we have a bare plural subject and bare plural object, then the subject should be bound by either the  $\exists$ -operator or Gen, depending on whether it reconstructs, and the object should only ever be bound by the  $\exists$ -operator, as the verb always intervenes between the Gen head and the object position.

It is certainly not true that English sentences with a bare plural subject and a bare plural object obey such a constraint. There are clearly cases where both the subject and the object receive a generic interpretation.

- (156) a. Cats love cookies.  
 b. Bears eat children .

- c. Over a hundred years ago, cats ate cookies.

To avoid facing such a problem, we would have to posit either a shift of the object at LF to take it out of the c-command domain of the verb, or an optionality to the appearance of the  $\exists$ -operator on the verb with unselective binding of the variables in both the subject and the object by Gen. But if the  $\exists$ -operator is optionally present, then we can no longer account for the distribution of different bare plural interpretations in Spanish.

The failure of any approach to head movement to correctly capture the c-command relations which would be required for Benedicto's binding account of bare plural interpretation in Spanish, and incorrect predictions made by the account itself lead me to reject the conclusion that this is a case of Semantically Active Head Movement.

### 3.4 Lechner on split scope and modal movement

Lechner (2006) presents an argument for what he terms the SAHM Conjecture: the conjecture that there are instances of Semantically Active Head Movement.<sup>17</sup> The argument is broken into 4 steps: (i) modals can be shown to move and then to reconstruct into their base generated position; (ii) this reconstruction has an effect on the scope of the modal relative to other quantificational elements; (iii) movement of the modal from its base position to its derived position is an instance of head movement; (iv) therefore head movement can have semantic effects.

The logic of the argument is simple, but it relies on a number of ancillary assumptions. In what follows I first of all give a short summary of the argument presented by Lechner, and then show that there are a number of problems with the assumptions that he makes, and that therefore the argument, while valid in form, fails to show conclusively that there is a semantic effect of head movement.

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<sup>17</sup>There are two versions of the paper that I am discussing here: Lechner (2006), which is published in an edited volume, and a longer, edited version of that paper, Lechner (2007), which is an unpublished manuscript. Where I informally refer to 'Lechner' and his claims, I mean to refer to the published version of the paper. Whenever I refer to some difference between the two papers I make it clear by referencing the particular paper that I am referring to. The line of argument in both the papers is the same, as is the majority of the content.

### 3.4.1 Background assumptions

The goal of the argument is to show that in sentences such as (157), the availability of the two possible readings is a consequence of head movement and reconstruction of the modal.

(157) *Not every boy can make the team*  $\neg\Diamond > \forall / \neg\forall > \Diamond / *\Diamond > \neg\forall$

- a.  $\neg\Diamond > \forall$ : modal moves to a position between Neg and where DP is interpreted
- b.  $\neg\forall > \Diamond$ : modal reconstructs to base position

The difference between the split *de dicto* reading ( $\neg\Diamond > \forall$ ) and the *de re* reading ( $\neg\forall > \Diamond$ ) is subtle, but the two can be teased apart with an informal description of their relative truth conditions. The *de re* reading holds in a world in which it is not true of each individual boy that that boy could ever get on the team. That is, if there are no possible worlds in which Dan can get on the team, then that reading's truth conditions are satisfied. The split *de dicto* reading, on the other hand, is true where there is no possible world in which all of the boys makes the team. The following model (adapted from Lechner (2007)) helps to clarify:

(158)	a	b	c	For any $x \in D_e$ and $w \in D_w$	
	$w_0$	●	○	○	'○': x doesn't make the team in w
	$w_1$	○	●	○	'●': x makes the team in w
	$w_2$	●	○	●	

This model does not satisfy the *de re* reading, because each of the boys (a, b and c) make the team in some world or other. It does, however, satisfy the split *de dicto* reading, as there is no world in which all three boys make the team. The introduction into the model of  $w_3$ , in which a, b and c all have a black circle assigned to them would mean that it fails to satisfy the split *de dicto* reading, as there is now a world in which every boy makes the team.

Another important fact is that the *de dicto* reading in which the negative universal takes narrow scope relative to the modal appears to be unavailable: that is to say, *not every boy can make the team* cannot mean 'there exists some world in which not all of the boys make the team'.

In order to show that these scope facts are the result of head movement of the modal and not some other process, Lechner presents arguments for each of the following assumptions:

1. NegDPs bear a syntactic [+neg] feature which is licensed in the scope of an abstract negation operator. The DP itself is interpreted as its contradictory, i.e.,  $\llbracket \text{not every boy} \rrbracket = \llbracket \text{every boy} \rrbracket$ .
2. Strong DPs cannot reconstruct below  $T^0$ .
3. Modals are base generated in  $T^0$  and move to a higher derived position.

Lechner has to show that the position of interpretation of the subject is necessarily above the base position of the modal, and therefore that the modal must have moved in cases where the subject is interpreted in the scope of the modal. We now look in detail at the motivation for each of the assumptions that are required to make the argument go through, and then assess their validity.

### Negative DPs

Following von Stechow (1993) and Penka (2002), Lechner adopts the assumption that negative indefinites bear a syntactic [+neg] feature “which has to be licensed in the immediate scope of a possibly abstract semantic negation (NOT)... The morphologically negative NPs themselves are assigned the meaning of their contradictories (e.g., *solution* for *no solution* and *everyone* for *not everyone*)” (p3). Lechner takes the availability of a split scope reading for a sentence such as *John can find no solution* to result directly from the abstract negative operator NOT taking scope over the modal, and agreeing with the [+neg] feature on the NegDP, which is interpreted as a positive indefinite:

$$(159) \quad \text{John} \llbracket_{\text{NegP}} \text{NOT} \llbracket \text{can find} \llbracket \text{no solution} \rrbracket_{\text{[+neg]}} \rrbracket \quad \neg \diamond > \exists$$

The example sentences that are used to make the argument for SAHM contain, crucially, negative universally quantified DPs rather than negative indefinites, but the idea is that the analysis of negative indefinites can be extended to universals unproblematically.

### Constraints on the reconstruction of quantificational DPs

Lechner invokes two empirical generalizations concerning reconstruction effects involving quantified noun phrases (hereafter QDPs) to find the lowest structural position that a QDP can occur in, and uses this position as a probe for plausible positions of elements which scope above the QDP.

First, it is argued on the basis of the data in (160) and (161) that, unlike weak DPs, strong DPs do not reconstruct below raising predicates.

- (160) a. A critic seemed to like the movie *de re/de dicto*  
 b. It seemed that a critic liked the movie *de dicto*
- (161) a. Every critic seemed to like the movie *de re/\*de dicto*  
 b. It seemed that every critic liked the movie *de dicto*

The reading that is forced in (161b) is claimed to be unavailable in (161a). An example given in (162) with a relative clause is presented to help clarify this contrast.

- (162) a. Every movie which was promoted by a critic *de re/\*de dicto*  
 seemed to impress the jury  
 b. It seemed that every movie which was promoted *de dicto*  
 by a critic impressed the jury

The claim is that for (162a) to be true, the people promoting the movie have to be actual critics in the evaluation world, but that the *de dicto* reading presented in (162b) can be true in the case that those people are in fact not critics but only appear to be. This means that the *de dicto* reading is simply unavailable in (162a), and that therefore the QDP cannot reconstruct below the raising predicate.

A much clearer contrast which gives evidence for the impossibility of reconstruction of at least strong DPs in A-chains comes from non-verbal intensional operators, from Lasnik (1999):

- (163) a. Every coin is 3% likely to land heads  
 $\forall > 3\% \text{ likely} / *3\% \text{ likely} > \forall$   
 b. It is 3% likely that every coin will land heads  
 $3\% \text{ likely} > \forall$

In (163a), the only available interpretation is the absurd one, in which each individual coin has a 3% chance of landing heads. The interpretation in which the universal scopes below *likely* would be true in a situation in which 5 coins are tossed (i.e., the chances of all of 5 coins landing heads is in fact 3%), and such an interpretation is available in (163b). This interpretation is clearly not available for the (a) example, even though it is pragmatically strongly preferred.

This, taken together, gives us the first formulation of the ‘Strong Constraint’:

(164) Stong QPs do not reconstruct below raising predicates.

Lechner then goes on to modify his generalization because of facts related to reconstruction with ECM predicates. On a raising-to-object analysis of ECM, the scopal properties of the following sentence (with the structures given below) are unexpected if strong DPs are not allowed to reconstruct at all:<sup>18</sup>

- (165) I expected everyone not to be there  $\forall > \neg / \neg > \forall$
- a. I expected<sub>1</sub> [ everyone<sub>2</sub> [VP t<sub>1</sub> [NegP not [TP t<sub>2</sub> T<sup>0</sup> to be ] ] ] ] ]
- b. I [~~everyone~~ [VP expected [NegP not [TP everyone to be ... ] ] ] ] ]

This is evidence that reconstruction of strong DPs is in fact possible, but is restricted in some way. Thus, Lechner must reformulate the strong constraint, and restates it as follows:

- (166) Strong Constraint  
A strong NP cannot reconstruct below T<sup>0</sup>

The overall goal of this section of the paper is to show that strong QDPs can reconstruct a little, but not too much. This will become essential in the argumentation later.

### The position of modals

Lechner then argues that “there is good reason to believe that English modals are generated in a VP-external position, from where they move into a higher head which is located above clausal negation and (some aspectual) adverbs.” (p6). The effect of this movement can be seen in the following:

- (167) a. John can<sub>i</sub> not t<sub>i</sub> come along today ( $\neg > \diamond /?? \diamond > \neg$ )
- b. He can<sub>i</sub> always t<sub>i</sub> count on me (*always* >  $\diamond /*\diamond > \textit{always}$ )
- c. He can<sub>i</sub> never t<sub>i</sub> do that (*never* >  $\diamond /*\diamond > \textit{never}$ )

The fact that modals here uniformly precede adverbs but are interpreted in their scope can be easily understood if we take the modal to move to a position above the adverb, and then to reconstruct into their base position. The base

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<sup>18</sup>Lechner does not reference the source of these examples, but they are discussed in Chomsky (1995) and Lasnik (1999), and both agree with the judgements that Lechner presents. I for one certainly cannot get the reading of (165) where the universal scopes below negation, but leave aside these dialectal differences here.

and derived position of the modal are identified with  $T^0$  and  $\text{AgrS}^0$  respectively. The modal moves from its base position in  $T$  through a Neg head and then up to  $\text{AgrS}$  (example from Lechner (2007, p11)):<sup>19</sup>

(168) John [<sub>AgrSP</sub> can<sub>1</sub> [<sub>NegP</sub> not  $t_1$  [<sub>TP</sub>  $t_1$  come along today ]]]

For the argument that modals raise and reconstruct to go through, Lechner needs to rule out a ‘Neg-raising’ analysis, where the modal stays *in situ* and the negative operator raises, which he does based on the following sentence.<sup>20</sup>

(169) It can sometimes not be avoided to confront the enemy  
*sometimes* >  $\neg\Diamond$

This example crucially involves a positive polarity item (PPI) *sometimes*, which is infelicitous in the scope of negation. Thus, a derivation which results in the reading involving Neg-raising, *sometimes* >  $\neg\Diamond$ , would have to proceed as in (170).

(170) a. It can sometimes not ...  
       b. not<sub>1</sub> it can sometimes  $t_1$  (Covert Neg-raising)  
       c. sometimes<sub>2</sub> not<sub>1</sub> it can  $t_2$   $t_1$   $t$  (QR of *sometimes*)

Neg-raising leaves the derivation in a position where *sometimes* is in the scope of negation, so it has to QR in order to be outside of the scope of negation, and gives us the correct reading. To adjudicate between the two analyses, Lechner looks at a certain class of weak indefinite PPIs which, according to Szabolcsi (2002), have the property of having to both scope above negation, but also of not being able to escape a negative island. These contradicting requirements lead to the ill-formedness of (171)

(171) \*John doesn’t appreciate this somewhat

*Sometimes* appears to behave similarly to *somewhat*, in that the requirements that it scope above negation, but also the fact that it cannot escape a negative island mean that the following example is also ill-formed:

<sup>19</sup>The structure given here suggests that *not* in English is a specifier of a Neg head, which is the same position as the abstract negation operator given in the structure below in (173).

<sup>20</sup>Native English speakers that I have consulted uniformly judge this sentence as unacceptable. I am therefore not entirely convinced that a Neg Raising analysis is ruled out (since the argument against Neg Raising hinges entirely on this sentence). However, for argument’s sake, I will accept Lechner’s assumption that it is not the shifting position of negation that gives rise to the relative scope of negation and modals. Note also that Ian Roberts repeats the example in Roberts (2010), so presumably it is acceptable to some English speakers.

(172) \*John didn't sometimes come to class

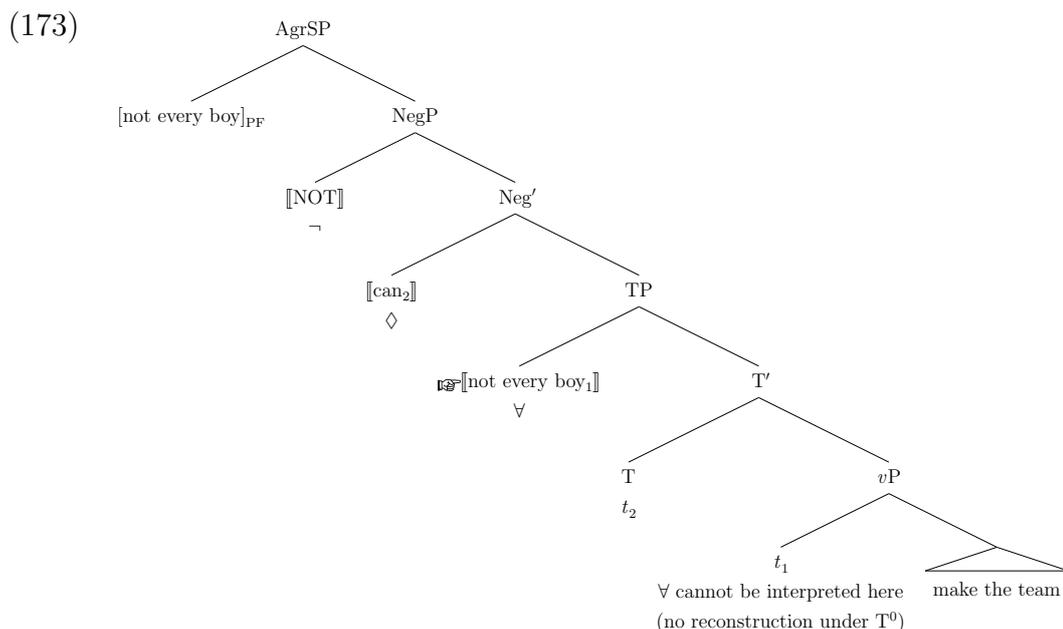
Thus, the derivation in (170) involves an illicit step in (c), since *sometimes* should not be able to escape the negative island which it becomes trapped in as a result of Neg raising. Therefore, the Neg-raising story is untenable, as it would require QR of *sometimes* above negation, after Neg-raising. Thus, Lechner adopts the modal raising analysis.

### 3.4.2 Analysis

In the preceding subsections I have given Lechner's arguments for the assumptions that his argument requires in order to go through. I recapitulate those assumptions here:

1. NegDPs bear a syntactic [+neg] feature which is licensed in the scope of an abstract negation operator. The DP itself is interpreted as its contradictory, i.e.,  $\llbracket \text{not every boy} \rrbracket = \llbracket \text{every boy} \rrbracket$ .
2. Strong DPs can potentially reconstruct, but not below  $T^0$ .
3. Modals are base generated in  $T^0$  and move to a higher derived position (Neg and AgrS), and can reconstruct.

These assumptions work together to give an account of the different possible interpretations of the sentence *not every boy can make the team*, shown in detail in the tree in (173) ( $\llbracket \cdot \rrbracket$  shows where the DP is interpreted, subscript PF shows where it is pronounced).



The tree as it is shown generates the split scope reading ( $\neg\Diamond > \forall$ ) given in (157a). If the modal reconstructs to its base position in T ( $t_2$ ), then we capture the *de re* reading in (157b) ( $\neg\forall > \Diamond$ ). NegDPs have to appear in local scope of the abstract NOT operator, and thus the DP *not every boy* cannot be interpreted in its highest derived position, although it is pronounced there. This correctly rules out the unavailable reading ( $\forall > \neg\Diamond$ ).<sup>21</sup> The constraint on reconstruction of the strong DP into a position lower than Spec TP means that it must be interpreted above the base position of the modal. Given that the modal is interpreted above the subject in the split reading ( $\neg\Diamond > \forall$ ), it follows that the modal must have moved to alter scope relations, and thus we have evidence for Semantically Active Head Movement.

### 3.4.3 Discussion

For the argument to go through two claims are central: (i) strong DPs cannot reconstruct into a position lower than Spec TP, and (ii) modals have to both move to a derived position, and also have the option of reconstructing into their base generated position. If strong DPs could reconstruct into a position lower than T, then the split reading could be unproblematically analysed as arising from reconstruction of the subject DP to a position lower than the base position of the modal, and therefore it would not be head movement that gives rise to the availability of the split interpretation. Also, if modals cannot be shown to be able to reconstruct then there is no real evidence that there is a head movement operation taking place.

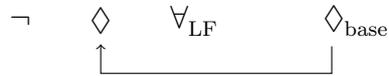
I will discuss here potential counter evidence for the claim that strong DPs cannot reconstruct below TP, and then show that this also bears on the way that reconstruction of the modal works. I will consider two possible counter examples to Lechner's Strong Constraint. The first from Sauerland (2003), I will argue, can be accounted for under Lechner's system (as Lechner himself points out) if we are willing to accept that certain modals move and obligatorily reconstruct, while others must not be able to reconstruct. The second argument builds on Iatridou and Sichel (2011), where it is shown that at least a part of a NegDP must be able to reconstruct to a low position in the clause (and definitely below TP).<sup>22</sup>

<sup>21</sup>Lechner (2007) points out that this analysis does not rule out the *de dicto* reading  $\Diamond > \neg\forall$ , as the highest position of the modal is AgrS. I discuss this below.

<sup>22</sup>There are a number of assumptions that Lechner makes about the syntax of the English clause that are not uncontroversial, including the following

The ultimate point of this discussion is to show that the analysis in (175) is simpler and superior to the analysis in (174):

(174) Modal Movement drives split scope



(175) XP reconstruction drives split scope



I want to show that reconstruction of a moved XP can explain the split scope readings just as well, if not better, than head movement of the modal.

### Reconstruction of the subject: How low can you go?

Lechner points out that there is a potential counter example to his Strong Constraint, which prevents strong DP subjects from reconstructing below TP. This evidence comes from Sauerland (2003), a squib which argues that a subject DP moves through intermediate positions on its way from its VP internal position up to Spec TP. The claim is that quantified DPs can reconstruct into a position below negation and a modal, and this position is equated with a vP adjoined position. Take the following example:

(176) Every student mustn't get an A. (At most a third of them can get an A.)

The reading here is one in which the universal scopes below negation ( $\square > \neg\forall$ ). Sauerland gives the following context, in which this reading is salient (p309):

- 
- ((i))
- a. The head of the NegP is an empty head, which is filled by a modal which obligatorily moves there from its base position which is T, and then up to AgrS.
  - b. Neg merges above T (see Cormack and Smith 2002 for arguments against this).
  - c. The surface subject position is Spec AgrS.
  - d. Adverbial adjuncts must be able to merge with T before its specifier does.
  - e. A-movement of the subject gives rise to  $\lambda$ -abstraction for Spec v to Spec T movement, but not Spec T to Spec AgrS movement of the subject.

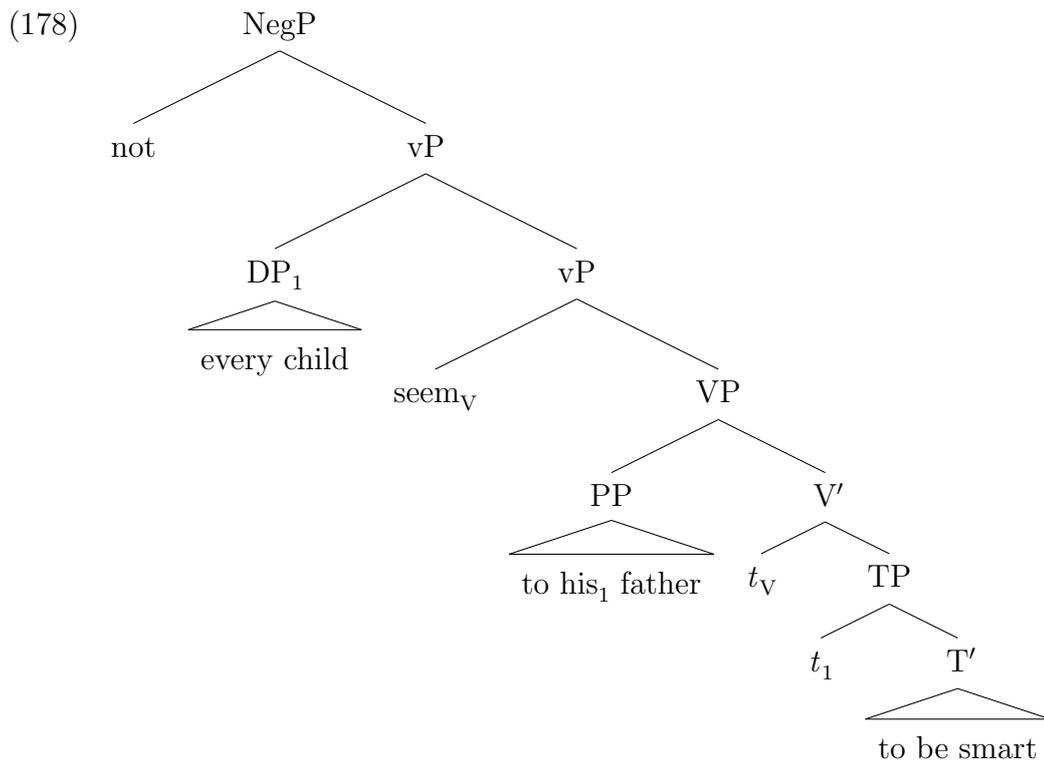
However, for argument's sake I give Lechner's analysis the benefit of the doubt with respect to these points, and focus instead on the core empirical claims that he makes in my discussion of his analysis.

“A junior teacher gave every student in his class an A. However, the school has a rule that only a third of all students may get an A, to prevent grade inflation. A senior teacher could then use [(176)] to reprimand his junior colleague ... this interpretation is dependent on a particular intonation contour with a fall on *every*, a rise on the negation, and destressing of the material between the two.”

A further example is given to show that a strongly quantified DP has to be able to reconstruct to a position below negation, but also high enough to bind a pronoun in an experiencer with the verb *seem*:

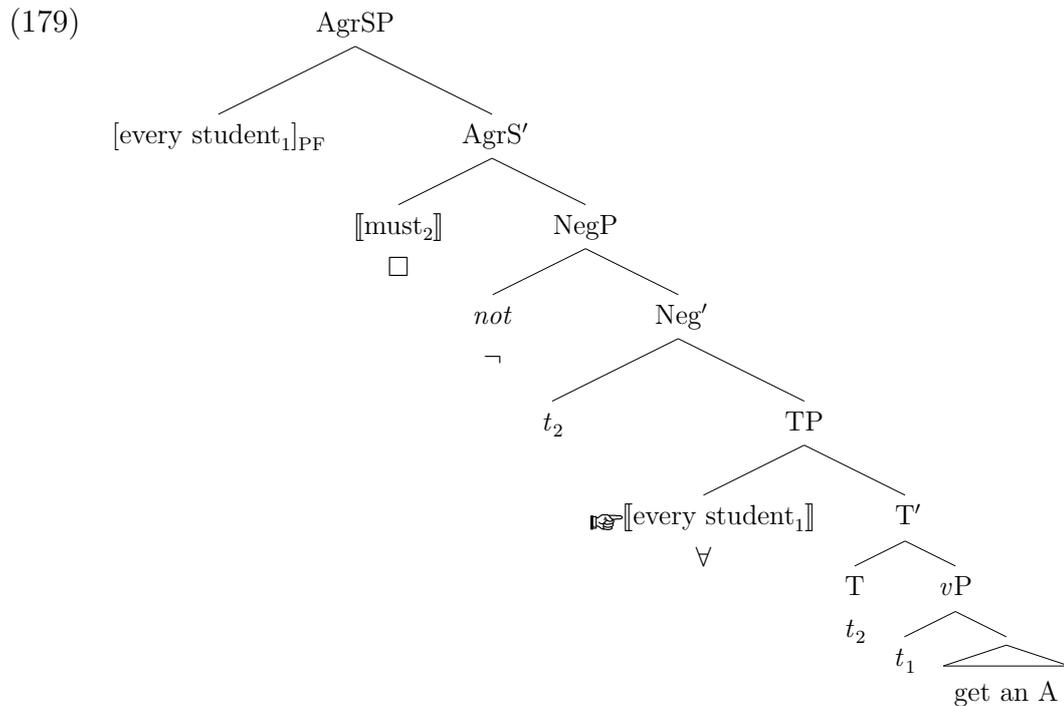
(177) Every child<sub>i</sub> doesn't seem to his<sub>i</sub> father to be smart

This sentence can have an interpretation where the universal takes scope under negation and above *seem*, and so the subject must reconstruct from its surface position. Sauerland gives the following representation of the structural configuration of all of the elements where they are interpreted.



For Lechner, this example is not problematic, as negation is above TP for him, and so the subject can be in Spec TP in this case and still be in the scope of negation, and high enough to bind the lower pronoun. The example with the modal, however, is problematic, as the modal has to take scope above

negation, and thus needs to be interpreted in a projection above NegP. Lechner points out (2006 p9, fn11) that this can be accounted for in the system that he proposes by taking the modal to be interpreted in the highest position that it moves to, AgrS, where it takes scope over negation and the subject (Spec TP).



This means that modals have to be able to scope in AgrS, i.e., that they need not always reconstruct.

### Reconstruction of the modal: Obligatory or optional?

This leads to a slight conundrum, however. The argument that modals move from a base position in T to a higher functional head, and then reconstruct below that position, is premised on the fact that modals which linearly precede adverbials and sentential negation are interpreted as scoping below them (repeating example 167):

- (167) a. John can<sub>i</sub> not t<sub>i</sub> come along today ( $\neg > \diamond /?? \diamond > \neg$ )  
 b. He can<sub>i</sub> always t<sub>i</sub> count on me (*always* >  $\diamond / * \diamond > \textit{always}$ )  
 c. He can<sub>i</sub> never t<sub>i</sub> do that (*never* >  $\diamond / * \diamond > \textit{never}$ )

Note that in these examples, the modal **obligatorily** reconstructs into a position below the adverbial/negation. In the target sentence also (*not every boy*

*can make the team*), reconstruction of the modal from AgrS to either Neg or T is obligatory, but the choice of which position the modal reconstructs to is free; only reconstruction from the surface position is necessary. Lechner points out himself that the unavailability of a reading where *can* takes scope in AgrS ( $\diamond > \neg\forall$ ) remains a mystery.

This is all not entirely mysterious when we take into account the well known empirical fact about modals that some modals unambiguously scope above negation, others below. A summary of the relative scope of different modals with respect to negation is given in (180), adapted from Iatridou and Sichel (2011).

(180)	Neg > Modal	Modal > Neg
	have to	must
	need to	should
	can	ought to
	may	

If we treat these scope facts to be a result of the fact that different modals have the status of either Negative or Positive Polarity Items, as Iatridou and Zeijlstra (2013) do, then obligatory or unavailable reconstruction of the different modals can be accounted for. NPI modals like *can* have to be interpreted in the scope of negation, and thus obligatorily reconstruct. *Must*, on the other hand, as a PPI modal, is interpreted in its highest position, above negation. Therefore, as far as the position of modals is concerned, Lechner’s account is not challenged by Sauerland’s proposal.

Having considered and dismissed one possible challenge to Lechner’s account, I now move on to consider a second challenge to the Strong Constraint on reconstruction, and conclude that this challenge stands, and in fact leads to a more straightforward account of the split-scope reading without appealing to head movement.

### **NegDPs and A-reconstruction: Iatridou and Sichel 2011**

Lechner’s argument for SAHM is also premised on the claim that it is the movement of the modal that creates the different scope relations giving rise to the available readings. However, there is some evidence to suggest that split scope readings with indefinite NegDPs must be analysed as resulting from A-reconstruction of (at least a part of) the subject DP. Iatridou and Sichel (2011) argue that NegDPs do not undergo A-reconstruction, but that part of

the NegDP, in particular an existential, can reconstruct under a scope-taking predicate. The negation cannot undergo reconstruction, because the scope of the negative part of a NegDP is fixed by the position of sentential negation. I will not go through the entire argument in detail, and instead only give an outline here, focusing on the parts of the argument that are relevant to the discussion of Lechner's account of split scope with NegDPs.

They first of all show that passivized ECM constructions behave in a similar way to modals as far as scope relative to negation is concerned. Passivized ECM predicates such as *was proven/was shown/was expected* scope under negation, just like modals such as *can* and *have to*.

(181) This theory was not proven to be false  $\neg > proven$

The example cannot mean that the theory was shown to be not false, i.e., true, and therefore it is impossible for the ECM verb to scope above negation.

With a NegDP subject instead of overt sentential negation, the situation becomes more complicated. While it is true that an entire NegDP (i.e., both the negative and the existential component) cannot undergo reconstruction to a position below a passivized ECM predicate (182c), a split reading whereby the existential component is in the scope of the ECM predicate which is in turn in the scope of negation is available (examples from p607).

(182) No Mersenne number was proven to be prime

a. *de re*:  $\neg > \exists > proven$

There is no specific Mersenne number such that it was proven to be prime

b. *Split*:  $\neg > proven > \exists$

It was not proven that there is a prime Mersenne number

c. \**de dicto*:  $proven > \neg > \exists$

It was proven that there does not exist a prime Mersenne number

*Be expected to* can also be shown to have a split reading with a NegDP subject, as the following example illustrates:

(183) *Split*:  $\neg > expected > \exists$

No cheetah is expected to be born in this zoo next year

'It is not expected that a cheetah will be born next year'

This example also rules out the possibility that the reading could be *de re* in disguise, as wide scope for the NegDP would require that some cheetah be presupposed to exist; however there can be no presupposition of the existence of a cheetah which does not exist yet.

So far, we have only shown that the scope of negation, the ECM verb and the existential DP can interact, but we have not shown that it is reconstruction of the DP, rather than verb movement, as in Lechner’s story, which gives rise to the split scope reading. To show that it must be reconstruction, Iatridou and Sichel give an example in which certain binding requirements are placed on elements in the sentence. If the verb moves to generate the correct scope relations, and there is no reconstruction of the subject, then we expect that there should be no effect of binding conditions. Compare the two examples in (184). When an additional binding requirement is imposed such that it would be violated under reconstruction, we would expect the split scope reading to be unavailable (if it is A reconstruction which creates split scope).<sup>23</sup>

- (184) a. No new book about him<sub>1</sub> is expected by Nixon<sub>1</sub> to be written next year.  
          ‘Nixon doesn’t expect any new book about him to be written next year’
- b.#No new book about Nixon<sub>1</sub> is expected by him<sub>1</sub> to be written next year.

In (184a), reconstruction results in no violation of a binding condition, and so the split reading is available. In (184b), on the other hand, where reconstruction of *no new book about Nixon* to a position below *by him* would lead to a Principle C violation, the split reading is degraded. The contrast in the two examples goes unexplained if it is movement of some other element that gives rise to the availability of the split scope reading.

This shows that the subject NegDP is able to undergo reconstruction to a position below Spec TP.

### **What about universal NegDPs and modals?**

So, there is evidence that NegDPs, or at least the non-negative part of them, can indeed reconstruct below T. In order to extend this, and produce an argument against Lechner’s interpretation of the split scope readings, it is necessary

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<sup>23</sup>The example again excludes the *de re* reading through a ‘contradiction in content’; i.e., there can be no existence presupposition for a book which has not been written yet.

to show that a similar effect is observable with Universal NegDPs and modal *can*. I give an argument in this subsection that such an effect is indeed also observable, and thus that the Strong Constraint on reconstruction is too strong.

In a similar vein to the argument that Iatridou and Sichel put forward for the necessity of appealing to reconstruction to account for the split scope reading with NegDP subjects and raising predicates, we are looking for a case in which reconstruction of part of the NegDP is forced because of an independently imposed binding requirement. Take the following sentence:

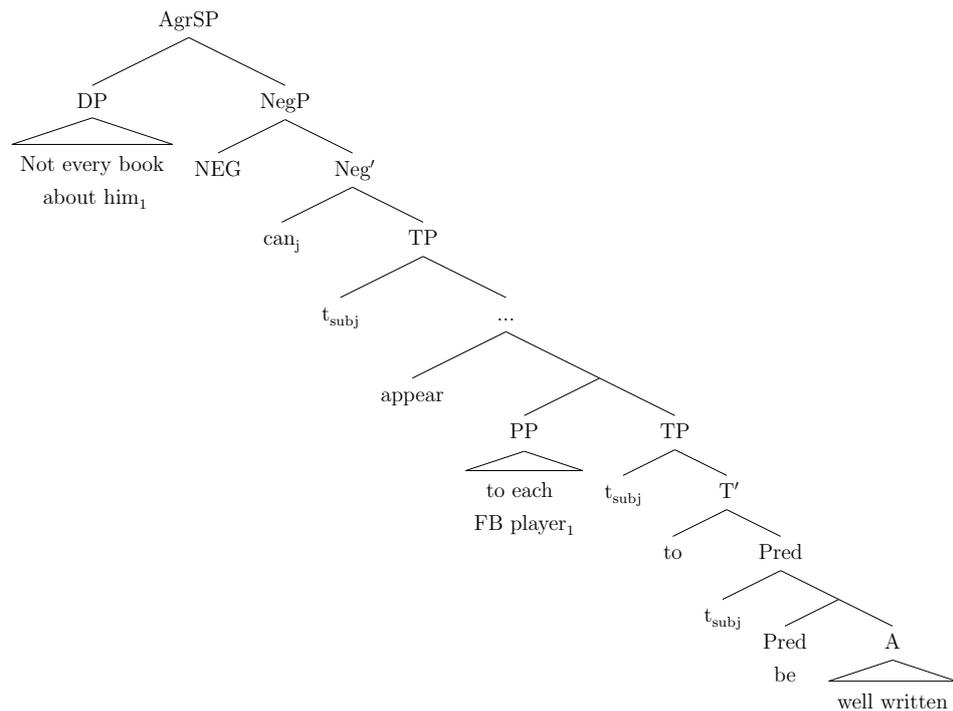
- (185) Not every book about  $him_1$  can appear to each footballer<sub>1</sub> to be well written

In the same way as *not every boy can make the team*, this example also has a split scope reading whereby negation scopes over the modal *can*, which in turn scopes over the universal (*not*) *every book*, giving the scope order  $\neg > \diamond > \forall$ . However, if we follow Lechner in taking this reading to result from head movement of the modal above the position of the universal, then we cannot account for the fact that the pronoun *him* in the subject DP can have the bound interpretation where books vary according to football players. For the bound interpretation to be possible, the subject DP has to be able to reconstruct below the binder *each*, presumably to a low subject position in a small clause; we have an example here of a Strong DP reconstructing below T.

- (186) [ [Not every book about  $him$ ]<sub>i</sub> [ NEG [ can [  $t_i$  [ appear to each footballer  
[  $t_i$  [ to [<sub>SC</sub>  $t_i$  be [ well written ]]]]]]]]]

The NegDP has to reconstruct to one of the trace positions below *appear* to be able to be bound by *each*. This is shown in the tree in (187):

(187)



The subject has to reconstruct into one of the positions labelled  $t_{\text{subj}}$ , and so at least as high as Spec TP in the embedded TP complement of the raising verb *appear*. This would give rise to a reading paraphrased in (188).

(188) It is not the case that it is possible for it to appear to each footballer that every book about him is well-written.

To see that such a reading is available for the sentence, imagine the following situation. There are a number of authors who write about football players. Some writer has written several books about a number of different football players, and despite his success in the past writing football player autobiographies, a few of the players have disliked the recent works about them that this author has written. His agent, in attempting to make him feel better about his writing skills, says: *Not every book about him can appear to each football player to be well written.*

This analysis requires the universal quantifier to bind out of the PP experiencer of the raising verb. Since it is embedded in the PP, it seems unusual that this is possible. However, it is the case that even without raising, binding out of the experiencer is possible. This is shown in (189).<sup>24</sup>

<sup>24</sup>I have used a cleft construction here because it makes the sentence feel more natural. The same binding is possible without a cleft, but the sentence has a slightly awkward feel to it as a whole:

(189) It seems to [every teacher]<sub>1</sub> that it is his<sub>1</sub> students that are the best

This is a general fact that I will not comment on here; all that is relevant is that it is possible for binding to take place out of the PP experiencer complement of the raising verb.

Given that it appears that (at least in the case of strongly quantified NegDPs) reconstruction below T must be available, Lechner's invocation of head movement as the sole possible explanation for the split scope reading is no longer feasible. We have now shown that a more straightforward account of the split scope reading with NegDPs, in line with the account for 'existential' NegDPs that Iatridou and Sichel (2011) propose, is available. The less controversial operation of XP reconstruction is implicated in the production of split scope effects; thus it is not necessary to appeal to head movement as a narrow syntactic operation in explaining the scopal interaction of negation, modals and universal quantifiers.

To summarize, Lechner argues that the generalization in (190) holds.

(190) Strong QPs do not reconstruct below T of a non-finite complement to a raising predicate.

The discussion of reconstruction of NegDPs that I presented leaves us with the generalizations about reconstruction of strong DPs in (191).

- (191) a. The existential component of weak NegDPs can reconstruct at least as low as spec TP of a non-finite complement of a passive ECM verb (Iatridou and Sichel 2011);
- b. The universal component of strong NegDPs can reconstruct at least as low as spec TP of a non-finite complement of a raising verb (187).

(190) and (191b) conflict with each other. I can only offer two possible reasons for this conflict. First, the generalization in (190) is proposed because of the contrasts in acceptability presented in (160) and (163), coupled with the example in (165) which show that reconstruction must be possible to a certain extent, but no lower than T. I find the judgements in each of those examples to be quite weak, except for (163). *3% likely* does appear to block reconstruction

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(i) ?It seems to every teacher that his students are the best

The cleft forces a contrastive reading, but it is clear that the bound reading is acceptable in both cases.

of a strong QP (I share the judgement that Lechner presents), but it is not clear that *likely* alone behaves in the same way. Take the following example:

(192) Every runner is likely to arrive simultaneously.

If *every runner* is unable to reconstruct below *likely*, then this would force the wide-scope reading, which is expected to be nonsensical, since a paraphrase would be *every runner is such that he is likely to arrive simultaneously*. I find the sentence in (192) to be fully acceptable on the narrow scope reading of *every runner*, suggesting that *likely* allows reconstruction of the strong DP. *3% likely*, then, appears to exhibit a stronger blocking effect than a simple raising predicate. The weakness of the other judgements suggests that the generalization (190) as it stands is perhaps too strong, which is why we see reconstruction in other cases, like with strong NegDPs.

Another explanation for the conflict between the two generalizations is that strong QPs and strong NegDPs simply do not behave in the same way with respect to reconstruction. I do not have an explanation for why that should be the case, but showing that they behave differently is enough to invalidate the argument that Lechner presents. Under either interpretation of the conflict between the generalizations, the argument for SAHM is considerably weakened.

### 3.5 Hartman 2011: Traces of head movement as semantic variables

Hartman (2011) argues that A'-movement, A-movement, and head movement all produce traces that are in variable binding configurations with  $\lambda$ -operators at LF, and that thus head movement cannot be a PF effect, and must be a narrow syntactic operation. The article aims to explain certain interactions between VP-ellipsis and extraction operations, and argues that an ellipsis constraint, MaxElide, along with a parallelism constraint, is responsible for the varying availability of VP-ellipsis. Here I give a summary of the ellipsis facts and Hartman's account of them, but focus on the relevant head movement effects, putting aside discussion of other theoretical consequences and implications of the paper.

### 3.5.1 Ellipsis Parallelism and trace binding

The constraint MaxElide (Merchant 2008) forces ellipsis to operate on the largest possible constituent. This can account for cases where VP-ellipsis is disallowed, because of the availability of sluicing in the same clause:<sup>25</sup>

- (193) a. Mary was kissing someone, but I don't know who (\*she was)  
b. You play a wind instrument. Which one (\*do you)?  
c. Mary was reading. This question is: what (\*was she)?  
d. You admire a woman in this room. Tell me who (\*you do).

Hartman follows Takahashi and Fox (2005) in taking this blocking of VP-ellipsis to follow from the interaction of MaxElide and a further semantic parallelism constraint on elided constituents. The definitions of the two constraints are given here (Hartman 2011, p369, slightly modified):

- (194) a. For ellipsis of EC [elided constituent] to be licensed, there must exist a constituent which reflexively dominates EC<sup>26</sup>, and satisfies the parallelism condition in (b). [Call this constituent the *parallelism domain* (PD).]  
b. *Parallelism*: The parallelism domain (PD) satisfies the parallelism condition if PD is semantically identical to another constituent AC (antecedent constituent), modulo focus-marked constituents.  
c. *MaxElide*: elide the biggest deletable constituent reflexively dominated by the PD.

The parallelism constraint has the important consequence that in a situation in which the elided constituent contains a variable whose binder is outside of the elided constituent, the PD has to be large enough to include the binder too, otherwise the PD would include a free variable and would not be semantically identical to its antecedent. A concrete example will illustrate. In (195), the structure for (193a), *wh*-movement leaves a trace, the binder of which is a  $\lambda$ -operator. In the AC, QR of the indefinite creates a operator-variable pair which is parallel.

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<sup>25</sup>I find VP-ellipsis in each of these examples to be acceptable, particularly with stress on the *wh*-element, which would not follow from Hartman's analysis.

<sup>26</sup>XP dominates YP or  $XP = YP$ .

(195) someone [ $\lambda y$ . Mary was [<sub>VP</sub> kissing  $y$ ]] ... who [ $\lambda x$ . she was [<sub>VP</sub>kissing  $x$ ]]

The PD cannot be the VP, because it contains a free variable  $x$ ; this relies on the assumption that there is a ban on ‘meaningless coindexation’ (Heim 1997), so that the free variable in the antecedent is not accidentally assigned the same index as the variable in the elided constituent. Without the relevant binder being included, the two VPs are not semantically identical, and thus parallelism is not satisfied. Therefore, the only way that ellipsis can go forward is if the PD is extended to the binder in the EC, and thus we get sluicing:

(196) someone  $\underbrace{[\lambda y$ . Mary was [<sub>VP</sub> kissing  $y$ ]]}\_{AC} ... who  $\underbrace{[\lambda x$ . she was [<sub>VP</sub>kissing  $x$ ]]}\_{PD}

With the larger PD encompassing the  $\lambda$ -operator, the variable is bound in both the AC and the PD, and the parallelism constraint is satisfied, meaning that sluicing is possible.

MaxElide only predicts that there will be competition between ellipsis options in a given parallelism domain, so it does not force ellipsis of a larger constituent wherever possible; if there is more than one possible PD then either can be elided:

- (197) a. Mary [said that you would [leave]], and Sue also [said that you would [leave]]  
 b. Mary [said that you would [leave]], and Sue also **did** [~~said that you would [leave]]~~]

In this case ellipsis of the lower or higher VP is an available option, as there are two PDs which both satisfy parallelism. The only cases where we expect to see competition are the ‘rebinding’ cases discussed above, where extraction of an element in the EC leaves a variable behind, and so the PD must include its binder for parallelism to be satisfied.

Hartman goes on to show that a number of interesting asymmetries in the availability of VP-ellipsis can be explained with appeal to MaxElide and parallelism, and argues that the unavailability of VP-ellipsis in certain cases provides evidence that all types of movement must leave behind a trace which can have an effect on the size of the PD.

Now I turn to the argument that a trace of head movement must also count as a semantic variable which requires binding, and that, therefore, head movement must be semantically active.

### 3.5.2 Head movement leaves a trace

Hartman observes that there is a contrast between *wh*-adverbials in embedded questions and in matrix questions with respect to whether they trigger Max-Elide violations. *Wh*-adverbials extracted from an embedded question allow VP-ellipsis, but with matrix question *wh*-adverbials VP-ellipsis is blocked and only sluicing is possible:<sup>27</sup>

(198) Embedded question *wh*-adverbial

- a. Mary was trying to kiss someone, but I have no idea why (she was).
- b. You say you'll pay me back, but you haven't told me when (you will).
- c. Susan practices her violin. I'm just not sure how frequently (she does).

(199) Matrix question *wh*-adverbial

- a. A: The guests left already  
B: Really? When (\*did they)?
- b. A: I'm depressed.  
B: Why (\*are you)?
- c. A: Susan practices yoga.  
B: Where (\*does she)?
- d. A: The workers have gone on strike.  
B: For what reason (\*have they)?

Hartman argues that the difference between the two can be accounted for only if we accept that head movement and A-movement leave behind variables. We can see why if we consider the LF representations for both configurations.

In (200), we have the LF for an embedded question *wh*-adverbial.<sup>28</sup>

(200)  $[_{CP} \text{ when } \lambda x. [_{TP} x [_{TP} \text{ she } \underline{\lambda y. \text{ will } [_{VP} y \text{ leave } ]}] ] ] ]$  Adv. Emb.

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<sup>27</sup>Note that the low construal of the adverbial in embedded questions is blocked under VP-ellipsis (only the matrix construal is available), but is available under sluicing. This follows from the fact that movement of the adverbial from its low position would create a rebinding configuration, which forces the PD to extend up to the binder that follows the adverbial's surface position, thus only licensing sluicing, and not VP-ellipsis.

<sup>28</sup>Underlining indicates a possible PD.

The subject A-moves to Spec TP, leaving behind a variable, *y*, in the VP which has to be bound. The adverbial merges high as a TP adjunct, and moves up to its surface CP position, also leaving behind a variable, *x*. Since the *wh*-element is merged high, its movement does not interact with the lower PD, and thus VP ellipsis is possible (as is sluicing).

In (201), we have the LF for a *wh*-adverbial matrix question.

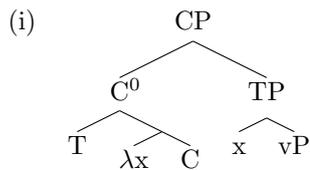
(201) [<sub>CP</sub> When  $\lambda x$ . will  $\lambda z$ . [<sub>TP</sub> *x* [<sub>TP</sub> she  $\lambda y$ . *z* [<sub>VP</sub> *y* leave ]]]]] Adv. Main

In this case, the matrix question clause forces subject-auxiliary inversion, here modelled as T-to-C movement. The lack of Aux movement in the embedded question *wh*-adverbial case means that  $\lambda yP$  is a legitimate PD, but in the matrix question case the movement of the auxiliary means that there is now another variable introduced, *z*, meaning that parallelism is not satisfied. Furthermore, movement of the auxiliary past the trace of the *wh*-adverbial means that the PD has to extend even further, as summarized in (202):<sup>29</sup>

(202) Adv. Main:

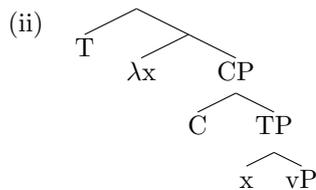
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<sup>29</sup>Hartman's analysis relies heavily on the introduction of lambda operators into the syntactic structure through a process of Predicate Abstraction (Heim and Kratzer 1998), which results whenever a movement takes place. A potential problem that I can see with this approach relates to where exactly in the structure the lambda operator should be placed, given the unusual nature of head movement. There are two possibilities. The first, under a head movement-as-left-adjunction approach, would have to place the binder within the complex head that the moved head forms:



This option is untenable, however, as the operator would not bind the trace, resulting in semantic ill-formedness.

The second option would require a Matushansky style movement-to-spec-plus-m-merger operation, where the first step results in the following configuration:



This is possible, but what is clear is that the semantics would have to be calculated before morphological merger takes place. Hartman does not explicitly discuss the nature of Predicate Abstraction, so it is not clear what kind of position he adopts.

- a.  $[_{CP} \text{ When } \lambda x. \text{ will } \lambda z. [_{TP} x [_{TP} \text{ she } \lambda y. z [_{VP} y \text{ leave } ]]]]$   
(Not possible: y)
- b.  $[_{CP} \text{ When } \lambda x. \text{ will } \lambda z. [_{TP} x [_{TP} \text{ she } \lambda y. z [_{VP} y \text{ leave } ]]]]$   
(Not possible: z)
- c.  $[_{CP} \text{ When } \lambda x. \text{ will } \lambda z. [_{TP} x [_{TP} \text{ she } \lambda y. z [_{VP} y \text{ leave } ]]]]$   
(Not possible: x)
- d.  $[_{CP} \text{ When } \lambda x. \text{ will } \lambda z. [_{TP} x [_{TP} \text{ she } \lambda y. z [_{VP} y \text{ leave } ]]]]$   
(Possible)

Therefore, VP-ellipsis is (correctly) blocked. If we did not count the trace of T-to-C movement, then we would not have to expand the PD beyond  $\lambda yP$ . So without it, we cannot explain the contrast between matrix question adverbial extraction and embedded question adverbial extraction, and would predict that VP-ellipsis should be licensed in both cases. Furthermore, traces of A-movement must also be taken into consideration when calculating the PD, as without the variable  $y$  in (202), the VP could undergo ellipsis unproblematically, in the absence of a rebinding configuration. Thus, A'-movement, A-movement and head movement are all implicated.

Further evidence that it is indeed head movement which is driving this effect comes from Indian Vernacular English. In this variety of English, there is T-to-C in embedded questions, but no such movement in matrix questions: it is the mirror image of English, as shown in (203).

(203) Indian Vernacular English

- a. What he has eaten?
- b. How much interest they charged you?
- c. They know who has Vijay invited tonight
- d. I wonder where does he work

Thus, the prediction is that we should have the opposite effect to English when it comes to the availability of VP-ellipsis with *wh*-adverbials; that is, VP-ellipsis should be unavailable with embedded question *wh*-adverbials, and available with matrix question *wh*-adverbials. This prediction is borne out:<sup>30</sup>

<sup>30</sup>Hartman does not indicate whether sluicing is acceptable or not in the embedded cases, which could bear on the final analysis of these data.

(204) Embedded:

- a. \*Mary will leave, but I don't know when will she
- b. \*John's baking a cake, but I'm not sure why was he
- c. \*I fixed the car, but I can't remember how did I

(205) Main:

- A: Mary will leave.
- B: When she will?

This suggests that it is in fact an interaction between T and C that is driving this contrast.

### 3.5.3 Messick and Thoms 2014: An alternative

Messick and Thoms (2014) (henceforth M&T) put together a set of counter-arguments to Hartman's paper, proposing that, instead of MaxElide, the parallelism condition coupled with standard assumptions about derivational economy leads to an account which is able to capture a wider range of empirical phenomena related to the availability of VP-ellipsis. What is important for the present discussion is that they show that some of the contrasts that Hartman discusses cannot possibly be explained with appeal to parallelism and MaxElide, simply because parallelism does not hold. M&T argue that a more successful account of the generalizations requires that traces of A-movement not be considered in the calculation of parallelism, and also show that the contrast in availability of VP-ellipsis with extraction of embedded question adverbials and matrix question *wh*-adverbials does not follow from Hartman's proposal.

Consider again the main-question *wh*-adverbial case that led Hartman to conclude that the trace of head movement (and A-movement) has to be a semantically interpreted variable, and thus that head movement is semantically active.

(206) We know that Mary will resign. The only question is: when (\*will she)?

VP-ellipsis is not possible, because, as Hartman argues, auxiliary movement from T-to-C and A-movement of the subject creates a crossed rebinding configuration, and the PD must be large enough to 'catch' the trace and the binder of both:

(207)  $[_{CP} \text{ When } \lambda x [_{C'} \text{ will } \lambda y [_{TP} x [_{TP} \text{ she } \lambda z [_{T'} y [_{VP} z \text{ resign } ]]]]]]]]$

However, VP-ellipsis can be salvaged in such configurations if the auxiliary is focused:

(208) If Anna isn't going to resign today, then when WILL she?

The availability of VP-ellipsis is contingent on the structure meeting the parallelism constraint, including when the auxiliary is focused. However, M&T note that when we take a closer look at the antecedent clause, there is no parallel T-to-C movement. Thus, even including a covert indefinite *at-some-time* to match the raised *wh*-adverbial at the CP level, the AC and EC fail to match semantically, and thus parallelism is violated:

(209) AC:  $[_{CP} \text{ at-some-time } \lambda x [_{C'} \text{ } [_{TP} x [_{TP} \text{ she } \lambda z [_{T'} \text{ will } [_{VP} z \text{ resign } ]]]]]]]]$   
 EC:  $[_{CP} \text{ when } \lambda x [_{C'} \text{ will } \lambda y [_{TP} x [_{TP} \text{ she } \lambda z [_{T'} y [_{VP} z \text{ resign } ]]]]]]]]$

If the only possible PD in the EC extends as far up as  $\lambda xP$ , then there is no parallelism between EC and AC, because the AC does not contain a variable left behind by the movement of the auxiliary, nor a higher binder. Therefore, VP-ellipsis should not be a viable option at all, even with a focused auxiliary, and parallelism coupled with MaxElide does not explain the contrast between embedded and main *wh*-adverbials.

M&T's alternative account relies on a notion of derivational economy, whereby derivations with fewer instances of movement operations are always preferred. The argument goes that sluicing bleeds T-to-C movement, and thus that it is predicted that we always expect sluicing in these cases instead of VP-ellipsis, because sluicing always gives rise to a more economical derivation.

T-to-C movement is assumed to be driven by a PF-condition on the  $C_{+wh}$  head, which is affixal in nature and requires the support of an overt head. If the elided constituent includes the C head, then the PF condition is avoided, and no movement of the auxiliary is required for the derivation to converge. VP-ellipsis would leave the C head intact, and would force movement of the supporting T head to C. Since the sluicing derivation has one less movement step, it is more economical and thus always preferred, *ceteris paribus*.<sup>31</sup>

<sup>31</sup>This is related to a second claim that M&T make, that sluicing can also bleed successive-cyclic A'-movement. Where there is sluicing, A'-movement proceeds in one fell swoop (Fox and Lasnik 2003, Fox and Pesetsky 2005). This is also motivated through an appeal to derivational economy, and the phonological nature of the 'stopping off' of successive-cyclic movement (Fox and Pesetsky 2005, Bošković 2007). This accounts for cases where the AC

This makes the correct prediction that intervening focus will have an ameliorating effect on VP-ellipsis (208), since the focused element forces *ceteris* to be *non paribus*, assuming that focus marked constituents cannot be deleted because of their prosodic prominence.

M&T still require head movement under their account of the ellipsis effects, particularly to explain the unavailability of VP-ellipsis with extraction of a *wh*-object. Matrix question *wh*-object extractions are not ameliorated by focus in the EC.

(210) Mary will kiss Bill. Who will JOHN \*(kiss)?

This would appear to follow directly from parallelism (since there is no parallel T-to-C movement in the AC), but only if we do not take into account the successive-cyclic nature of *wh*-movement. If we have successive-cyclic movement through vP on the way to CP, then we get the following PD (ignoring A-traces, since M&T argue for their semantic inertness):

(211)  $[_{CP} \text{ who } \lambda x. [_{C'} \text{ will } \lambda y. [_{TP} \text{ John } [_{T'} y [_{vP} x \lambda x' \underline{[_{VP} \text{ kiss } x'} ]]]]]]]]$

However, as indicated with underlining in the example, a low PD created by the first step of *wh*-movement would lead to the prediction that VP-ellipsis is available, which it is not. To capture the effect correctly, the first step of movement of the *wh*-object has to ‘overtake’ the trace of another moved element, so that there will be a free variable in the low PD and thus a bar on VP-ellipsis. Therefore, M&T propose that the auxiliary originates in v, and undergoes v-to-T-to-C movement. It is the variable left behind by v-to-T movement of the auxiliary that blocks VP-ellipsis.

(212)  $[_{CP} \text{ who } \lambda x. \underline{[_{C'} \text{ will } \lambda y. [_{TP} \text{ John } [_{T'} y \lambda y' \underline{[_{vP} x \lambda x' \underline{[_{v'} y' \underline{[_{VP} \text{ kiss } x'} ]]]}} ]]]}} ]]]]]]$

The trace of the auxiliary  $y'$  ensures that the smallest PD is  $\lambda xP$ , and thus it is predicted that focus will not have an ameliorating effect on VP-ellipsis. Where the AC also contains T-to-C movement, satisfying parallelism, we see that VP-ellipsis is salvageable under focus:

(213) Who will Mary kiss, and, more importantly, who will JOHN?

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correlate of an extracted *wh*-element in the EC is a wide scope indefinite which is analysed as taking wide scope via a choice function, and thus there are no variables left behind in the AC to parallel those of the successive steps of *wh*-movement.

### 3.5.4 Discussion

The main criticism that can be levelled against Hartman's account of the VP-ellipsis asymmetries is that there seem to be many cases where VP ellipsis is allowed under non-parallelism. If parallelism is not required for VP-ellipsis in all cases, then it does not follow that the contrast between embedded *wh*-adverbials and matrix *wh*-adverbials is a result of the latter leaving a head movement trace and the former not.

M&T point out that parallelism is not satisfied when VP-ellipsis is available under focus of an auxiliary with a matrix *wh*-adverbial (209). This is because the AC does not contain T-to-C movement, and the EC does. Gary Thoms (p.c.) also offers the following example:

(214) If we can't eat the cake, then what CAN we?

VP-ellipsis is fully acceptable (with focus on the auxiliary), even though the EC is a matrix question with T-to-C movement of the auxiliary, and the AC has no such movement.

How about if we switch things around, and have T-to-C in the AC but no T-to-C in the EC? It seems that VP-ellipsis is indeed available (as is sluicing), even though parallelism is again not satisfied:

- (215) a. When will she retire? Seriously, I want to know when (she will).  
b. How many times has he done this? I've lost count of how many times (he has).  
c. Why does he hate me? I really wish I knew why (he does/did).

If none of these cases can be explained under a parallelism constraint, then that constraint could not be responsible for the difference observed in the availability of VP-ellipsis, where variables left behind by head movement are claimed to block VP-ellipsis. More strikingly, in every case where there is a lack of parallelism due to T-to-C movement in the AC or EC and the lack thereof in the other constituent, sluicing is allowed even when VP-ellipsis is blocked; this suggests then that sluicing is not subject to the parallelism constraint (or at least the effect of free variables), and would require a separate set of licensing conditions from VP-ellipsis.

A potential work around is to weaken Hartman's claim. The claim would have to be that it is not parallelism which must hold between (some subpart of) the EC and the AC, but rather that ellipsis cannot operate on a constituent

that includes a free variable. Take the following example, which M&T use to illustrate the lack of parallelism.

- (216) a. We all know that Mary will resign. The only question is: when (\*will she)?
- b.  $[_{CP} \text{When } \lambda x [_{C'} \text{will } \lambda y [_{TP} x [_{TP} \text{she } \lambda z [_{T'} y [_{VP} z \text{resign } ]]]]]]$

There is no parallel T-to-C in the AC, but sluicing is still acceptable. VP-ellipsis would be blocked because the target of ellipsis, the VP, contains a free variable, *z*.

However, even this weaker claim turns out not to be true: embedded *wh*-adverbials can undergo VP-ellipsis where the binder is not part of the deleted constituent.

- (217) a. Mary said she would leave, but I don't know when she will.
- b.  $[_{CP} \text{when } \lambda x. [_{TP} x [_{TP} \text{she } \lambda y. \text{will } [_{VP} y \text{leave } ]]]]$

The elided constituent, the VP, contains a free variable *y* (following Hartman's account), but still VP-ellipsis is perfectly acceptable. So both the stronger claim and the weaker condition fail to be satisfied.

### 3.5.5 Summary

I have argued in this section that Hartman's analysis of the interaction between head movement and the availability of VP-ellipsis does not show that there is Semantically Active Head Movement, since VP-ellipsis appears to be allowed even where there is no parallelism between the AC and the EC. The appeal to traces of head movement as blockers of parallelism fails, because there are cases where VP-ellipsis is available with non-parallel 'T-to-C movement' in either the AC or the EC, meaning that there must be some other mechanism involved in constraining ellipsis options. Although it is an interesting question, I do not speculate on what that mechanism might be in this thesis. It suffices that I have shown that Hartman's argument does not demonstrate that it must be head movement that is responsible for the VP-ellipsis effects.

## 3.6 Conclusion

In this chapter I have shown that arguments for Semantically Active Head Movement, that is, for the existence semantic effects resulting from reorder-

ing of constituents through head movement, are unconvincing when examined closely. There are various ways in which these arguments fail:

1. the effects are unachievable through head movement, and the solution is to explain the effect as something which is not the result of movement at all (Roberts);
2. any approach to head movement would make the wrong predictions (Benedicto);
3. the effects can be explained without head movement (Lechner);
4. the effects do not seem to be consistent, and thus it is not clear that head movement is implicated at all (Hartman).

Since these are taken to be the four major arguments for the existence of SAHM, the case for a semantic effect of head movement remains unconvincing, and it is reasonable to proceed with the assumption that there are no semantic effects of head movement. It is indeed striking that there are so few arguments that have been offered in favour of SAHM: if head movement is indeed semantically active, then we would expect its effects to be more widely detectable. Therefore, an alternative direct linearization story of head movement effects seems more and more attractive.

The topic of this chapter was displacement effects which have traditionally been analysed as cases of head movement having a semantic effect. In the next chapter, I turn to a more empirically complicated problem, and the topic of discussion is instead semantic effects which have been analysed as being the result of head movement, even though there are no visible displacement effects. Having shown that head displacement does not have semantic effects, I want to show that semantic effects which do not result in displacement can also be accounted for without positing movement, and that those effects can be explained elegantly with a direct linearization theory.

## Chapter 4

# Noun phrase interpretation in Mandarin Chinese and Cantonese

### 4.1 Introduction

In the previous chapter, I focused on head displacement which has been claimed to have semantic effects, arguing that those effects are illusory, or better explained in some other way. In this chapter I focus on a very different domain in which head movement accounts have been proposed as an explanation, namely cases where there is no visible displacement effect, but where there is a clear semantic effect. Concretely, I will discuss an account of interpretive effects in the noun phrase in Mandarin Chinese and Cantonese that have been analysed as resulting from head movement, even where the moved heads do not exhibit any displacement (i.e., there is no associated word order effect).

In section 4.2, I present the relevant facts from MC and Cantonese, describing the different shapes that the noun phrase can take, and the constraints on interpretation associated with each configuration of noun-phrase internal elements. In section 4.3 I develop an analysis of those facts based on the direct linearization theory of syntax-morphology mapping, and show that the assumptions that I make about the syntax and semantics of the extended nominal projection lead to a parsimonious account of the data. I propose that nouns combine with a separate rooted classifier projection through a Wiggle structure, and that the projection from the classifier to D means that classifiers are able to give rise to a definite interpretation in Cantonese. In section 4.4, I go on to show that the analysis developed, coupled with conditions that

I introduce on the licensing of a definite head *D*, has the advantage of neatly explaining an interesting quirk of MC and Cantonese, namely that a modifier in a high structural position in the noun phrase forces a definite interpretation.

In section 4.5, I show that an alternative analyses from the literature which takes head movement to be the driving force behind the differences in interpretation are faced with a word-order problem, which is avoided on the analysis presented here. I argue that movement accounts in general are problematic, because the nature of movement is such that it forces elements to be higher in the structure, even when on the surface they appear to spell-out low. This is the benefit of the direct linearization approach: it allows for the low spell-out of elements that appear low, even where they may appear to enter into some kind of dependency with a higher functional element, as far as interpretation goes. Further, I argue that a covert head movement account is conceptually flawed, because capturing the difference between Mandarin Chinese and Cantonese parsimoniously requires an ‘overtness’ condition on *D*, and covert movement cannot fulfil such a condition.

## 4.2 Noun phrase interpretation

Both Mandarin Chinese (MC) and Cantonese are what I will refer to as ‘classifier languages’, that is, languages which employ a set of morphemes to categorize or classify the noun that they co-occur with. The classifiers discussed here are sometimes referred to as Numeral Classifiers (Aikhenvald 2000), particularly given that they obligatorily appear when a numeral is present. Both languages allow bare nouns, noun phrases composed of a classifier-noun sequence (henceforth *Cl-N* phrases) and noun phrases composed of a numeral-classifier-noun sequence (henceforce *Numeral-Cl-N* phrases) in argument position. However, there are a number of interesting constraints on where each type of noun phrase can appear, and on the type of interpretation available for each configuration. Constraints on the possible interpretation of different noun phrase types also differ between the two languages as discussed in depth in Cheng and Sybesma (1999).

Jenks (2012) points out that the difference between MC and Cantonese noun phrase distribution and interpretation can be subsumed under a larger generalization that appears to hold quite robustly across a number of Sino-tibetan and Austroasiatic classifier languages including Hmong, Cantonese,

Mandarin, Min, and Vietnamese.<sup>1</sup> The generalization takes the form of two one-way entailments: if a classifier language has bare nouns which can be interpreted as definite, then Cl-N phrases will not be interpreted as definite; if a classifier language has Cl-N phrases which can be interpreted as definite, then bare nouns will not be interpreted as definite.

(218) Noun phrase interpretation in classifier languages

- |    |   |                 |
|----|---|-----------------|
| a. | Bare N [ $\pm$ def] $\rightarrow$ Cl-N [ $-$ def] | Type A language |
| b. | Cl-N [ $\pm$ def] $\rightarrow$ Bare N [ $-$ def] | Type B language |

In order to account for this, Jenks proposes that the pattern can be understood as resulting from the way in which different parts of functional structure are spelled out in the two different language types. The proposal relies on the notion of a morphological span, as discussed in chapter 2 (see section 2.2.4). Simply put, Jenks proposes that Type A languages have available to them a span over [ D<sub>[def]</sub> [ Cl [ N ] ] ] which can be spelled out as a noun, and Type B languages have a span over [ D<sub>[def]</sub> [ Cl ] ] which can be spelled out as a classifier, but that no span over [ D<sub>[def]</sub> [ Cl [ N ] ] ] is available. This captures the crosslinguistic generalization very neatly.

In this chapter, I take Jenks's observations as a starting point, and expand on them to show that each of the interesting differences in noun phrase interpretation between MC and Cantonese can be captured by the direct linearization theory of syntax-morphology mapping from 2, and further argue that alternatives that employ movement (head movement or phrasal movement) are inferior. While the situation is not entirely as straightforward as Jenks' proposal suggests, the intuition is correct, and adjusting his general proposal allows us to capture all of the empirical facts. The account developed places cross-linguistic variation in the lexicon, and in the ways in which syntactic structure maps to a phonological output stored therein.

In turn I now present data from MC and Cantonese, and discuss the differences in the distribution of noun-phrase internal elements, and the different interpretations associated with each noun phrase type.

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<sup>1</sup>Note that Trinh (2011) claims that bare nouns cannot be definite in Vietnamese, but Nguyen (2004) and Jenks claim otherwise. See also Simpson, Soh and Nomoto (2011) for a challenge to the complementarity of definite bare Ns and definite Cl-N phrases.

## 4.2.1 Mandarin Chinese - A ‘Type A’ classifier language

### Bare nouns

Mandarin is what I will refer to as a ‘type A’ classifier language (following the generalization in (218)).<sup>2</sup> In postverbal object position, bare nouns can have either definite or indefinite interpretation whereas in preverbal subject position (or topic position), bare nouns cannot be interpreted as indefinite (219a), because of a general restriction on the preverbal subject position which means that indefinite noun phrases cannot appear there (Huang, Li, and Li 2009, p288, and references cited therein). Noun phrases with a demonstrative (which are obligatorily accompanied by a classifier) are also acceptable in preverbal subject position (219b).

- (219) a. *gou chi-le dangao*  
dog eat-PRF cake  
‘The dog ate the cake/a cake.’ NOT ‘a dog ... ’
- b. *nei-zhi gou chi-le dangao*  
that-CL dog eat-PRF cake  
‘That dog ate the cake/a cake.’

Bare count nouns are number neutral, and thus can refer to either singular objects or pluralities. Bare nouns can also refer to mass objects (examples taken from Cheng and Sybesma 1999, with some modification):<sup>3</sup>

- (220) a. *Hufei mai shu qu le*  
Hufei buy book go SFP  
‘Hufei went to buy a book/books/the book(s).’
- b. *Hufei he-wan-le tang*  
Hufei drink-finish-PRF soup  
‘Hufei drank the soup/some soup.’

---

<sup>2</sup>Note that throughout I discuss sortal classifiers, and not mensural classifiers, or ‘massifiers’ in Cheng and Sybesma (1999)’s term. I believe that massifiers have a different structure, and is evidenced by their different properties (a modifier can appear between the massifier and the noun, an modification marker *de* is optionally present). See Cheng and Sybesma (1999) for discussion.

<sup>3</sup>Note that I focus here on definite and indefinite interpretations, and put aside kind and generic interpretations. For discussion of kind and generic interpretations in MC, see Krifka (1995).

## Cl-N and Numeral-Cl-N

Where a noun is accompanied by a numeral, a classifier is obligatorily present (221),<sup>4</sup> and the Numeral-Cl-N phrase is obligatorily indefinite. Cl-N phrases are also possible without a numeral, and are obligatorily indefinite and singular (222).<sup>5</sup> Because of the ‘definiteness constraint’ on preverbal subject position, Cl-N and Numeral-Cl-N phrases are degraded in this position (223).

(221) *wo xiang mai liang \*(ben) shu*  
I want buy two CL book  
‘I want to buy two books.’

(222) *wo xiang mai ben shu*  
I want buy CL book  
‘I want to buy a book.’ NOT ‘I want to buy (some) books.’

(223) a.?? *san-ge xuesheng chi-le dangao*  
three-CL student eat-PRF cake  
Intended: ‘Three students ate the cake.’  
b.?? *ge xuesheng chi-le dangao*  
CL student eat-PRF cake  
Intended: ‘A student ate the cake.’

Given that Cl-N and Numeral-Cl-N in Mandarin have the same interpretations available to them,<sup>6</sup> it could be claimed that Cl-N is simply Numeral-Cl-N with a phonologically reduced *yi* (‘one’) as the numeral. Here I reproduce an argument from Cheng and Sybesma (1999) against taking Cl-N phrases to involve a phonologically reduced *yi*.

The argument is straightforward and relies on the fact that there are environments in which Numeral-Cl-N is well formed, while Cl-N is unacceptable. First, what Cheng and Sybesma (1999) and Sybesma (1999) refer to as

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<sup>4</sup>Although see Tao (2006) for a discussion of the phenomenon of classifier reduction (of the general classifier *ge*) in spoken Beijing Mandarin Chinese.

<sup>5</sup>A possible exception is the classifier-like plural marking element *xie*, which I discuss in detail in section 4.2.3, ultimately concluding that it is not in fact a plural classifier.

<sup>6</sup>Although see Cheng and Sybesma (1999) for the claim that Cl-N phrases must always be a weak indefinite, whereas Numeral-Cl-N phrases can have a strong indefinite interpretation. See Li (2013, p239) for a counter-example to this claim.

‘bounded predicates’<sup>7</sup> are unacceptable with Cl-N phrases (224c,d), but are completely acceptable with Numeral-Cl-N phrases (224a,b):

(224) Bounded predicates

- a. *wo chi-wan-le yi-kuai binggan*  
 I eat-finish-PRF one-CL cookie  
 ‘I finished a cookie.’
- b. *wo he-wan-le yi-wan tang*  
 I drink-finish-PRF one-CL soup  
 ‘I finished a bowl of soup.’
- c. \**wo chi-wan-le kuai binggan*  
 I eat-finish-PRF CL cookie
- d. \**wo he-wan-le wan tang*  
 I drink-finish-PRF CL soup

Second, secondary predication is possible with Numeral-Cl-N phrases, and unacceptable with Cl-N phrases:

(225) Numeral-Cl-N (with secondary predication)

- a. *Wo jiao-guo yi-ge xuesheng hen congming*  
 I teach-EXP one-CL student very intelligent  
 ‘I once taught a student who was very intelligent.’
- b. *Ta xie-guo yi-ben shu hen youyisi*  
 He write-EXP one-CL book very interesting  
 ‘He once wrote a book that was very interesting.’

(226) Cl-N (with secondary predication)

- a. \**Wo jiao-guo ge xuesheng hen congming*  
 I teach-EXP CL student very intelligent  
 Intended: ‘I once taught a student who was very intelligent.’
- b. \**Ta xie-guo ben shu hen youyisi*  
 He write-EXP CL book very interesting  
 Intended: ‘He once wrote a book that was very interesting.’

---

<sup>7</sup>There is no explicit definition of what constitutes a bounded predicate in Cheng and Sybesma (1999): I take that it means temporally bounded, and having a clear and natural end point.

Given the different syntactic distributions of these types of phrase, it is reasonable to assume that they are structurally (or semantically) distinct, and that CI-N phrases are not phonologically reduced *yi*-CI-N.

Here is a summary of the different interpretive qualities of each of the different noun phrase configurations that we have discussed so far:

(227)	Noun phrase config	Definite	Indefinite	Number
	Mandarin			
	N	✓	✓	Neutral
	CI-N	*	✓	Sg
	Numeral-CI-N	*	✓	Sg/Pl

#### 4.2.2 Cantonese – a ‘Type B’ classifier language

Cantonese is what I will refer to as a ‘type B’ classifier language (following the generalization in (218)). In postverbal object position, CI-N phrases can have either definite or indefinite interpretation (228) whereas in preverbal subject position (or topic position), CI-N phrases can only be definite (229). As with MC, CI-N phrases are always singular.<sup>8</sup> Bare nouns, on the other hand, are obligatorily indefinite (thus being unacceptable in preverbal subject position, (229a)), and are number neutral. Examples here are from Cheng and Sybesma (1999).<sup>9</sup>

(228) *Ngo<sup>5</sup> soeng<sup>2</sup> maa<sup>5</sup> bun<sup>2</sup> syu<sup>1</sup> (lei<sup>4</sup> tai<sup>2</sup>)*  
 I want buy CL book come read  
 ‘I want to buy a book (to read).’

(229) a. \**gau<sup>2</sup> soeng<sup>2</sup> gwo<sup>3</sup> maa<sup>5</sup>lo<sup>6</sup>*  
 dog want cross road  
 Intended: ‘the dog wants to cross the road.’

b. *zek<sup>3</sup> gau<sup>2</sup> soeng<sup>2</sup> gwo<sup>3</sup> maa<sup>5</sup>lo<sup>6</sup>*  
 CL dog want cross road  
 ‘The dog wants to cross the road.’, NOT ‘a dog ... ’

<sup>8</sup>Again, this is with the exception of nouns that appear with the ‘plural classifier’ *di<sup>1</sup>*, which I discuss in section 4.2.3.

<sup>9</sup>Superscript numbers on Cantonese glosses indicate tone.

- (230) *Wufei heoi<sup>3</sup> maai<sup>5</sup> shu<sup>1</sup>*  
 Wufei go buy book  
 ‘Wufei went to buy a book/books.’

As with Mandarin, Numeral-Cl-N phrases are always interpreted as indefinite, and thus are infelicitous in preverbal subject or topic position (examples elicited from a native Cantonese speaking informant). Here I include a Cl-N phrase (which gets a definite interpretation) for contrast.

- (231) a. *zek<sup>3</sup> gau<sup>2</sup> sik<sup>6</sup>-gan<sup>2</sup> juk<sup>6</sup>*  
 CL dog eat-PROG meat  
 ‘The dog is eating meat’  
 b. \**loeng<sup>5</sup>-zek<sup>3</sup> gau<sup>2</sup> sik<sup>6</sup>-gan<sup>2</sup> juk<sup>6</sup>*  
 two-CL dog eat-PROG meat  
 Intended: ‘the two dogs are eating meat.’

Including the Cantonese facts, we have the summary in (232):

(232)	Noun phrase config	Definite	Indefinite	Number
	Mandarin			
	N	✓	✓	Neutral
	Cl-N	*	✓	Sg
	Numeral-Cl-N	*	✓	Sg/Pl
	Cantonese			
	N	*	✓	Neutral
	Cl-N	✓	✓	Sg
	Numeral-Cl-N	*	✓	Sg/Pl

A brief glance at the table shows that the difference between MC and Cantonese relates to what type of noun phrase is able to have a definite interpretation. Note again that for both languages, the presence of an overt numeral forces an indefinite interpretation (with a crucial exception, to be discussed in section 4.4). MC and Cantonese thus exhibit the properties associated with the two language types that Jenks (2012) discusses.

### 4.2.3 Classifiers and number

Before I present my analysis for the different structures underlying different noun phrase configurations in MC and Cantonese, I first fill in a gap that the

previous discussion has left open. I stated earlier that CI-N phrases in both MC and Cantonese force a singular interpretation, but there are potential counter examples where the noun is accompanied by the classifier-like elements *xie* in MC and *di<sup>1</sup>* in Cantonese. In this subsection, I discuss the distribution of noun phrases containing these elements, and argue that, while Cantonese *di<sup>1</sup>* is in fact a true classifier, MC *xie* is not.

### ***Xie***

*Xie* can appear with count nouns giving an interpretation of something like ‘a few’ or ‘some’. It can optionally be preceded by *yi* ‘one’, but cannot appear with any other numerals.

- (233) a. (*yi*) *xie ren/shu*  
 one XIE person/book  
 ‘A few/some people/books’
- b. \**liang/\*san xie ren/shu*  
 two/three XIE person/book

Interestingly, (*yi*)*xie* can also appear with mass nouns.

- (234) (*yi*) *xie shui*  
 one XIE water  
 ‘Some water’

Iljic (1994) suggests that where *xie* does appear with mass nouns, it “induces discretization: *zhe xie shui* [(this XIE water)] refers either to different trickles of water, or to qualitative varieties of water” (p108). However, my informants accept *yixie shui* (*yixie* + ‘water’) as completely felicitous when referring to all of the following:

- a single (or a number of) puddle(s) at the bottom of the lake which is almost dried up.
- a discontinuous or a continuous spillage of water on a table (i.e., some splashes of water or a unified puddle).
- a little water in the bottom of a cup.

This suggests to me that there does not have to be any discretization going on: *yixie* can mean something like ‘a bit of’ when applied to mass nouns, and ‘a few’ when applied to count nouns.

At first glance, it might appear that *xie* is a plural classifier. However, Iljic (1994) points out that this cannot be the whole story, as it is also the case that *(yi)xie* can appear with a separate classifier (see also Yang 2005 and Cheng 2012). Iljic notes that the general classifier *ge* is usually preferred in these cases, but also notes that some speakers allow the classifier which is semantically associated with the head noun.<sup>10</sup>

- (235) a. *(yi) xie ge ren*  
 one XIE CL person  
 ‘A few/some people’
- b. *(yi) xie ge/ben shu*  
 one XIE CL<sub>GEN</sub>/CL<sub>BOOK</sub> book  
 ‘A few/some books’

The classifier can also appear with *xie* and a conceptually mass noun, but in this case it forces an interpretation where the mass is divided into units:

- (236) *(yi) xie ge shui*  
 one XIE CL water  
 ‘A few/some bottles/bowls (etc.) of water’ NOT ‘some water’

The expression *hao xie* (‘good’ + *xie*) can also have a similar meaning to *yixie*, but intensified (roughly ‘a good few’, (237a)). It can also appear with *ge* (237b), but cannot appear with *yi* (237c).

- (237) a. *hao xie ren/shu/shui*  
 good XIE person/book/water  
 ‘A good few people/books’, ‘a good bit of water’
- b. *hao xie ge ren/shu/shui*  
 good XIE CL person/book/water  
 ‘A good few people/books’, ‘a good few bottles of water’

---

<sup>10</sup>All of my informants accept these examples with *xie* and a classifier. There are, however, some disagreements about whether the classifier has to be the general classifier *ge* or whether it can be the usual classifier associated with the head noun. In glosses, subscript on CL indicates what type of noun that classifier usually appears with (CL<sub>BOOK</sub> is the classifier that appears with books and periodicals, and CL<sub>GEN</sub> is the general classifier which can appear with a very broad range of nouns).

c. \**yi hao xie ren/shu/shui*  
 one good XIE person/book/water

Intended: ‘a good few people/books’, ‘a good bit of water’

The fact that *xie* is **not** in complementary distribution with other classifiers, and that nothing (such as *hao*, which is typically a modifying element) can appear between *yi* and *xie*, suggests to me that *yi xie* in fact forms a single unit, and is not *yi + xie*. This is further evidence to suggest that *xie* is not a classifier, but is instead a weak quantifier of sorts.<sup>11</sup> I take *(yi/hao)xie* to appear in the specifier of a functional head which hosts numerals and certain quantifiers, where it is in complementary distribution with numerals.<sup>12</sup>

This raises the question, however, of why the classifier which can cooccur with *xie* is optional, particularly when it is generally obligatory when numerals occur. While I do not have a deep explanation for this fact, I can point out the similarity that *yixie* shares with another quantificational element in MC, namely *henduo* (‘many’). *Henduo* is also optionally followed by a classifier,

<sup>11</sup>I found some instances of *da* (‘big’) and *xiao* (‘small’) occurring between *yi* and *xie* through a Google search, but my informants all strongly judge those examples to be unacceptable, and noted that some of the examples were from ancient Chinese. It would be interesting to see if those who accept, e.g., *yi da xie ren* would also accept *yi da xie ge ren*, since if the example with the classifier *ge* were unacceptable for them, then this might suggest that for some speakers *xie* is in fact a classifier, and for others it is treated as a quantifier. Alas, I have no way of tracking down the authors of those examples found on Google, and have yet to find any speaker who accepts *yi da xie ren*.

<sup>12</sup>Li (1999) treats *xie* as a “quantity suffix”, and shows that it freely occurs with nouns that have a plural marker *-men* attached to them, whereas the *-men* suffix appears to never be able to occur with a noun phrase that includes a classifier, suggesting that *xie* is not a classifier (examples (a,b) are from Li 1999, and (c,d) are from my own informants):

- (i) a. *laoshi dui zhe-xie/na-xie xuesheng-men tebie hao*  
 teacher to this-XIE/that-XIE student-PL especially good  
 ‘The teacher is especially nice to these students’
- b. \**wo dui san-ge xuesheng-men tebie hao*  
 I to three-CL student-PL especially good  
 ‘I’m especially nice to three students’
- c. \**laoshi dui zhe/na san ge xuesheng-men tebie hao*  
 teacher to this/that three CL student-PL especially good  
 Intended: ‘The teacher is especially nice to these three students’
- d. \**laoshi dui zhe/na ge xuesheng-men tebie hao*  
 teacher to this/that CL student-PL especially good  
 Intended: ‘The teacher is especially nice to these students’

Note that there are other possible confounding factors here, and since I do not discuss the nature of *-men* in the main text, I leave it simply as suggestive evidence in support of my claim about the nature of *xie*.

without a change in meaning:

- (238) *henduo (ben) shu*  
many CL book  
'Many books'

Thus it is not unusual for a quantificational element in MC to optionally be followed by a classifier.<sup>13</sup>

### ***di*<sup>1</sup>**

Cantonese also exhibits what appears to be a 'plural' classifier, *di*. *di* can optionally appear with the numeral *jat*<sup>1</sup> 'one' (239a), and can appear with mass nouns (239b), but unlike *xie*, it cannot co-occur with a classifier (239c). It always forces a plural interpretation. Examples in this subsection are taken from Cheng (2012).

- (239) a. (*jat*<sup>1</sup>) *di*<sup>1</sup> *syu*<sup>1</sup>  
one di book  
'A few books/some books'
- b. *jat*<sup>1</sup> *di*<sup>1</sup> *seoi*<sup>2</sup>  
one di water  
'Some water'
- c. \**jat*<sup>1</sup> *di*<sup>1</sup> *go*<sup>3</sup> *jan*<sup>4</sup>  
one di CL person  
'A few people/some people'

A *di*+N phrase can have a definite interpretation, exactly as is the case with regular CL-N phrases (see also Matthews and Yip 1994, p98).

- (240) a. *go*<sup>3</sup> *hok*<sup>6</sup>*saang*<sup>1</sup> *hou*<sup>2</sup> *cung*<sup>1</sup>*ming*<sup>4</sup>  
CL student very intelligent  
'The student is very intelligent.'
- b. *di*<sup>1</sup> *hok*<sup>6</sup>*saang*<sup>1</sup> *hou*<sup>2</sup> *cung*<sup>1</sup>*ming*<sup>4</sup>  
DI student very intelligent  
'The students are very intelligent.'

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<sup>13</sup>That numerals are obligatorily followed by a classifier, while some quantifiers are not is mysterious, and I have no explanation for this fact.

Furthermore, when *di* occurs with *jat* ('one'), the noun phrase is forced to have an indefinite interpretation, again, exactly as with Numeral-Cl-N phrases:

- (241) *jat<sup>1</sup> di<sup>1</sup> hok<sup>6</sup>saang<sup>1</sup> hou<sup>2</sup> cung<sup>1</sup>ming<sup>4</sup>*  
 one DI student very intelligent  
 'Some students are very intelligent.', not 'The students...'

Finally, *di*+N can also take a bare possessor, which is true of Cl-N phrases in general:

- (242) a. *Wu<sup>4</sup>fei<sup>1</sup> gin<sup>6</sup> laang<sup>1</sup>saam<sup>1</sup>*  
 Wufei CL sweater  
 'Wufei's sweater'  
 b. *Wu<sup>4</sup>fei<sup>1</sup> di<sup>1</sup> laang<sup>1</sup>saam<sup>1</sup>*  
 Wufei DI sweater  
 'Wufei's sweaters'

These facts make it clear that *di* does in fact behave very much like a regular classifier in Cantonese, and quite differently from *xie* in Mandarin. Thus, despite the similarities in meaning and use, I am forced to conclude that *di* and *xie* cannot be treated in the same way.

This leads to the question of precisely what *di* is doing when it appears with a mass noun. There are two ways to think about this: either (i) there are in fact two homophonous morphemes, one of which is a classifier and one of which is a quantifier of mass nouns, or (ii) there is only one *di*, a classifier, and its semantics is such that it can combine with both mass nouns and count nouns and give the desired meaning (perhaps specifying something like 'one (not overly large) measure' in the case of mass nouns). Since an in depth analysis of the semantics of *di* would take us too far afield at this point, I put aside discussion of the correct route to take.

### Summary

The 'plural classifiers' thus have the following properties: MC (*yi*)*xie*:

- (243) Weak quantifier  
 a. Can co-occur with a classifier (235);  
 b. Classifier optional, exactly as with *henduo* ('many') (238);

- c. Nothing can appear between *yi* and *xie* (237);
- d. *haoxie* cannot appear with *yi* (237).
- e. Can appear with mass nouns (234).

Cantonese *di*:

(244) Classifier.

- a. Cannot co-occur with a classifier (239c);
- b. Can license definite interpretation when appearing in *di*-N configuration (240);
- c. Can take a bare possessor (242);
- d. Overt *jat* ‘one’ forces an indefinite interpretation (241);
- e. Can appear with mass nouns (239b).

#### 4.2.4 Summary

Now that we have surveyed the ways in which the different parts of nominal expressions interact, and the interpretations associated with different configurations of noun phrase internal elements, I turn to a discussion of the syntax of nominals, and show how the approach to spell-out that I adopt can account for the generalizations presented above. Recall that we have the following general picture:

(245) Noun phrase config	Definite	Indefinite	Number
Mandarin			
N	✓	✓	Neutral
CI-N	*	✓	Sg
Numeral-CI-N	*	✓	Sg/Pl
Cantonese			
N	*	✓	Neutral
CI-N	✓	✓	Sg; Pl with <i>di</i>
Numeral-CI-N	*	✓	Sg/Pl

With this summary in mind, I now show how a spanning approach to the spell-out of functional structure can further capture an interesting quirk that these languages exhibit with respect to the position of adjectives in the noun phrase.

The next section lays out the assumptions about the syntax and semantics of the extended nominal projection that I adopt, and then show how each noun phrase configuration is structured and spelled out.

### 4.3 The syntax and semantics of the extended nominal projection

I make some specific assumptions about the syntax of nominals here, and about the semantic contribution of the different heads in the extended nominal projection (extended projection in the sense of Grimshaw 2005). I take the projection to begin with an acategorial root, following work in the tradition of Distributed Morphology (Marantz 1997 and much other work following that) and also Borer (2005a) and Adger (2013).<sup>14</sup> This root then merges with a categorizing functional head: in the nominal domain, this head will be *n*, but I also assume that there are similar verbal and adjectival categorizing heads, *v* and *a* respectively. I take the head *n* to indicate that we are in the domain of individuals, not, say, events.

I take there to be a universal hierarchy of functional heads in an extended projection (Cinque 1999 et seq.; Adger 2003, 2013; Ramchand and Svenonius 2014, among many others). Following the categorization of the root by the *n* head, the functional head *Div* then merges (see Borer 2005a). The semantic function of *Div* is to impose a join complete semi-lattice structure over the property that the noun denotes, identifying the power set of all atomic individuals, and thus giving the atoms and sets of those atoms which have some property. The domain of discourse has the shape given in (246), following Link (1983) and Chierchia (1998).

$$\begin{array}{l}
 (246) \qquad \qquad \qquad \{a, b, c, d, \dots\} \\
 \\
 \qquad \qquad \qquad \{a, b, c\} \{a, b, d\} \{b, c, d\} \{a, c, d\} \dots \\
 \\
 \qquad \qquad \qquad \underline{\{a, b\} \{a, c\} \{a, d\} \{b, c\} \{b, d\} \{c, d\} \dots} \\
 \\
 \qquad \qquad \qquad a \quad b \quad c \quad d \dots \qquad = \text{Atoms}
 \end{array}$$

---

<sup>14</sup>It is important to note that different approaches differ quite sharply in what kind of content is specified in the root (phonological content (Borer 2005a), or no content at all aside from an index (Harley 2014)).

The nature of the semi-lattice means that both atoms and pluralities are included: the structure produced through the merger of Div is ‘number neutral’.

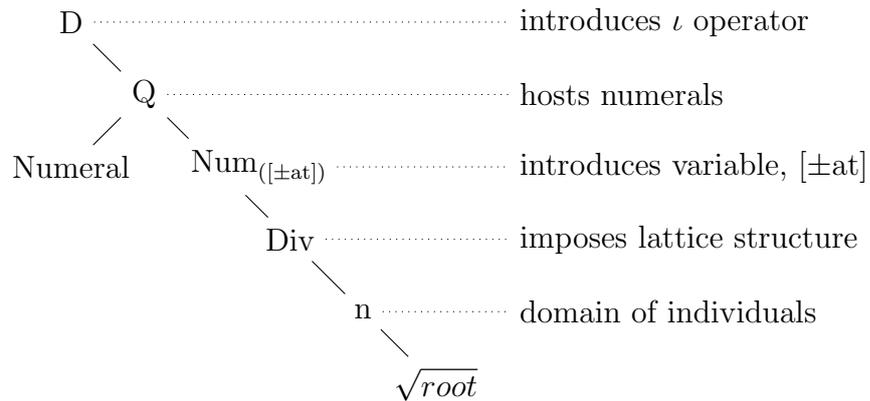
Div subsequently merges with a Num head: here I follow Harbour (2014) in taking the Num head to introduce a variable over that lattice structure, and also to impose further restrictions on the lattice through the bivalent feature  $[\pm\text{atomic}]$  ( $[\pm\text{at}]$  for short).  $[\text{+atomic}]$  identifies only the atoms in the semi-lattice, excluding non-atoms, and  $[\text{-atomic}]$  identifies all of the non-atoms, excluding the atoms. This gives us the singular/plural distinction. Thus, a structure of the type  $[\text{Num}_{[\text{+at}]}[\text{Div } [n \ \checkmark]]]$  would pick out all and only the atoms of the lattice given in (246), while the structure  $[\text{Num}_{[\text{-at}]} [\text{Div } [n \ \checkmark]]]$  would give us all of the non-atomic sets of things.

A numeral is introduced in the specifier of a functional head Q. If there is a mismatch between the feature on Num and the value given by the numeral introduced above Num, then the result is semantic incoherence (although I assume that the syntax is able to build such a structure). By this, I mean to say that it is not any fact about the syntax, or syntactic features which blocks the availability of structures such as  $[two \ Q \ [\text{Num}_{[\text{+at}]} [\text{Div } [N]]]]$ , but rather a semantic incompatibility of numerals higher than one and the meaning of the  $[\text{+at}]$  feature. If numerals are cardinality predicates, then something of cardinality of higher than one cannot apply to atomic elements, which necessarily have cardinality one.

I assume that an overt classifier signals the projection of a Num head in MC, and that the default feature value on Num is  $[\text{+at}]$ , as Cl-N phrases are obligatorily singular. In the case of bare nouns, a Num head is projected but with no  $[\pm\text{at}]$  feature; in this case Num’s only job is to introduce a variable over the structure, and we get a number neutral interpretation (again this includes the whole semi-lattice, namely all of the atoms and sets of atoms). I do include a Div head in the extended projection of even a bare noun, as it has semantic content (i.e., bare nouns can be count and denote atoms and sets composed of those atoms).

The variable introduced by Num can undergo existential closure (Heim 1984, Diesing 1992, a.o.) giving an indefinite interpretation, or it can be bound by an iota operator in the D head, giving a definite interpretation, the topic of the next subsection. Therefore, we have the following structure for the extended nominal projection (excluding modifiers):

(247)



### 4.3.1 Licensing definiteness

I take D to be the locus of definiteness; D introduces the iota operator which binds the variable which is introduced by Num. I take the iota operator to give the unique individual, or maximal plural individual, that satisfies the descriptive content of the noun in a given situation, and to be undefined if there is no such unique individual or maximal plural individual. Thus I roughly take definite noun phrases to be of the *Frege-Strawson* type, as discussed at length in Elbourne (2013).

Syntactically speaking, when D merges, the noun phrase is interpreted as definite, but only if the structure meets a licensing condition on the availability of the D head. The disjunctive licensing condition on a D head, which I take to hold cross-linguistically, is as follows:

(248) A D head is licensed iff either

- a. it is spelled out as part of a morphological word, or
- b. a phonologically overt element merges in its specifier.

The intuition behind this condition is that there has to be some kind of phonological ‘flagging’ of the D position for it to be interpreted (or for the speaker to assume that it is projected). Ideally I hope that this condition could ultimately be simplified into a more general condition on semantically contentful functional heads in general, which says that any contentful functional head must be associated with some overt material. This is an idea which has some history in the literature, and it could be thought of as fundamentally similar in nature to Longobardi’s(1994) discussion of the licensing of referentiality

through the filling of the D head.<sup>15</sup>

The way that I have worded the proposal above is potentially misleading: it appears that I am positing a morpho-phonological licensing condition on the syntactic structure, which would seem not to be in the spirit of the Y-model (and associated models) of the architecture of the grammar, in which phonological and interpretative processes are post-syntactic, and on separate branches which do not interact. I also adopt a system which separates syntax and phonology, so a clarification is necessary.

The proposal is that there are restrictions on what phonological outputs a speaker has available to her; a speaker has a list of learned phonological outputs given a specific morpho-syntactic structure, and if the speaker does not have an independent phonological output for D (i.e., an article), then the only way that a definite interpretation can be achieved is through signalling the presence of a definite D in some other way. The syntax can presumably build whatever structure it wants (so long as no **syntactic** constraints are violated), but if there is no well formed output then the result is infelicity (but not in the sense of ‘syntactically ill-formed’).

Available spell-outs of roots in the context of particular spans must simply be learned and stored in a list (see section 2.2.4). For example, in MC, we have the information in (249) stored.

(249)  $\surd$  in the context of  $\langle D, \text{Num}_\emptyset, \text{Div}, n \rangle \Leftrightarrow \{mao, shouji, zhuzi \dots\}$

Necessarily then, ‘flagging’ possibilities will be limited by the kind of input that the child gets. The reason that bare N configurations in Cantonese can never be definite is assumed to be that there was nothing in the input that would lead the learner to posit the information in (249). This way of conceptualizing the constraint requires that we assume that the structure of nominals is universal and fixed across languages: when attempting to navigate the hypothesis space of possible structural analyses for nominals, the child has access to a set of constraints which allow it to close in on the appropriate representations that match the phonology (and the meaning) of the input. Thus, the locus of cross-

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<sup>15</sup>Fukui and Sakai (2003) propose the Visibility Guideline for functional categories:

- (i) Visibility Guideline:  
A functional category has to be visible (i.e., detectable) in the primary linguistic data

Another example of a ‘visibility’ condition of the sort I propose can be seen in Aoun, Hornstein, Lightfoot, and Weinberg (1987), where a condition on lexical government of an empty category (one part of the ECP) is stated as a PF condition on that empty category.



While I agree with the general intuition of the analysis in Jenks (2012), I think that the implementation is not correct for two reasons. First, and purely theory internally, under the system of spell-out proposed in chapter 2, Chop is not a generally available operation which can have the effect of breaking up projection lines into separate spans and ordering them with respect to each other. Second, and more importantly, I believe there to be evidence in classifier languages like MC and Cantonese to suggest that the classifier is not only the contextual spell-out of a functional head, but that it is the spell-out of a functional projection which has an independent classifier root.

To understand why I think that the classifier should be considered a separate root, we have to take a closer look at the nature of the relationship between the classifier and the noun in the noun phrase, as far as meaning is concerned. Aside from portioning out ‘stuff’ (in the words of Borer 2005a) into individuals and pluralities of individuals, does the classifier contribute in any other way to the semantics of the nominal expression? It could be concluded from contrasts such as (252) and (253) that the choice of classifier is simply conditioned by the noun that it appears with, and thus that different classifiers are simply different (contextually determined) phonological outputs, given a list of vocabulary items (e.g., <Num, Div> ↔ *zhi* / \_\_n [+animal]).<sup>17</sup>

(252) *gen*: classifier for thin, slender objects

a. *yi-gen xiangjiao*

one-CL banana

‘One banana’

b. \**yi-gen gou*

one-CL dog

Intended: ‘one dog’

---

<sup>17</sup>It should be noted that not all speakers would take the examples marked with an asterisk in (252) and (253) as ungrammatical as such: I know one speaker who fully accepts *yi-zhi xiangjiao* (one+classifier-for-animals+banana), so long as it has some kind of ‘cute’ connotation. However, this view is not shared by other speakers, who completely reject it. I report what might be considered more conservative judgements here (and follow the literature); however, see the discussion which follows these examples on the role of classifiers in shifting noun interpretation.

(253) *zhi*: classifier for (certain) animals

- a. \**yi-zhi xiangjiao*  
one-CL banana  
Intended: ‘one banana’
- b. *yi-zhi gou*  
one-CL dog  
‘One dog’

However, there are also cases where the choice of classifier can force a certain interpretation on the noun, which is ambiguous otherwise. One clear example is that of *dianhua*, which means either ‘telephone’ or ‘phone call’ depending on the choice of classifier:

- (254) a. *yi-bu dianhua*  
one-CL telephone  
‘One telephone’
- b. *yi-tong dianhua*  
one-CL telephone  
‘One phone call’

It is even the case that the bare noun *dianhua* on its own, without a disambiguating classifier, can be interpreted as ‘phone call’, rather than telephone.

- (255) *wo mingtian guang dianhua jiu da-le ershi fenzhong*  
I today only telephone JIU make-PERF twenty minute  
‘Today I spent 20 minutes just making phone calls.’

There is no independent classifier which interacts with the noun *dianhua* to give rise to the meaning ‘phone call’. However, the context, and the light verb *da*, make it such that it has to mean ‘phone call’.

Furthermore, the choice of classifier can highlight a particular property of an object denoted by a noun. While the meaning of the noun is not as different as the difference between a physical telephone and a phone call, there is still a shift in interpretation. (256) illustrates.

- (256) a. *san-zhi hua*  
 three-CL flower  
 ‘Three flowers’ (long on their stalks)
- b. *san-duo hua*  
 three-CL flower  
 ‘Three flowers’ (round, with a focus on floweriness)

There are two ways that one might interpret these facts. The first is that *dianhua* (telephone) and *dianhua* (phone-call) are simply different roots which happen to be homonymous, and which are closely related in meaning, and the classifier functional head receives the correct contextual spell-out depending on which root is introduced into the structure.<sup>18</sup> The second is to take the nominal root to be related to some general conceptual information (telephone-ness, be it physical or abstract), and to take the classifier to also form part of a rooted projection separate from the noun, which carries out the function of disambiguating precisely which subpart of the concept of telephone-ness is being referred to.<sup>19</sup>

I will adopt the second position here: encyclopaedic content associated with the noun root includes both phone calls and telephones, and classifier choice serves to disambiguate precisely which subset of entities are being referred to; in a sense the classifier can be taken to fix the domain of discourse to the appropriate subset of individuals. In some cases this is not possible, as we saw with the ‘banana’ examples above. However, I do not think that this

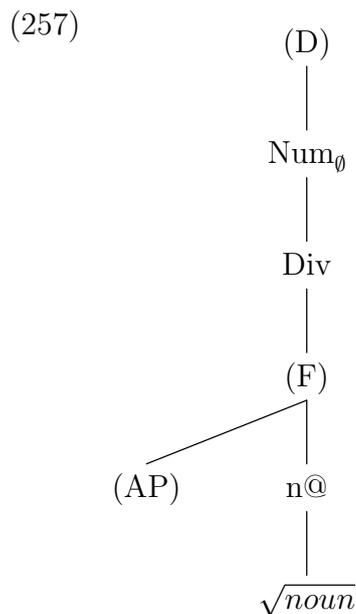
<sup>18</sup>This would also require a commitment to the idea that roots in the syntax contain some kind information outside of purely phonological information, so that the correct classifier spell-out could be chosen.

<sup>19</sup>Other classifier languages exhibit similar properties as MC and Cantonese, which further supports the idea that classifiers are rooted functional projections. Consider the following example from Japanese:

- (i) a. *ume ichi-rin*  
 plum one-CL<sub>ring</sub>  
 ‘One plum blossom’
- b. *ume i-ppon*  
 plum one-CL<sub>long+thin</sub>  
 ‘One plum tree’
- c. *ume i-kko*  
 plum one-CL<sub>small+round</sub>  
 ‘One plum (fruit)’

is a syntactico-semantic fact; instead I think that this can be put down the general conceptual difficulty that comes with placing a banana in the domain of dog-like animals. If we imagine a world in which bananas are cute pets with dog-like properties, then perhaps it becomes slightly easier to assign an interpretation to *yi-zhi xiangjiao*. As I noted in footnote 17, some speakers appear to have particularly relaxed conceptual boundaries, and allow such a construction, precisely where the banana is interpreted to have cute properties, perhaps similar to those that the speaker associates with dogs.

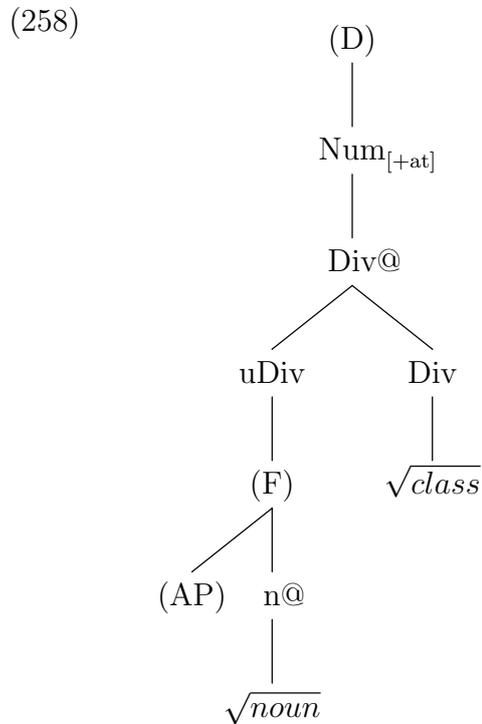
On this basis, I propose a different execution of the general idea. Bare nouns can straightforwardly receive the same kind of analysis, with a single nominal projection to Num (indefinite) or D (definite) spelling out as a noun. This is only possible if the Num head comes unspecified for  $[\pm at]$ , resulting in a number neutral reading. Mandarin and Cantonese differ in allowing and disallowing a span from n to D to spell out as a bare noun, respectively (brackets around part of the projection indicate that it is optional):



Spell-out of the nominal projection in n means that the modifier spells out to the left of the noun, even when the bare noun is interpreted as definite. This represents the major advantage of this kind of account of noun phrase spell-out over a classical head movement analysis: an apparently low head, n, can interact with a high head, but still be spelled out low, and no movement operations are required.

In the case of a Cl-N phrase, however, the situation is slightly different. Since the classifier is to be treated as a separate rooted projection, I take the

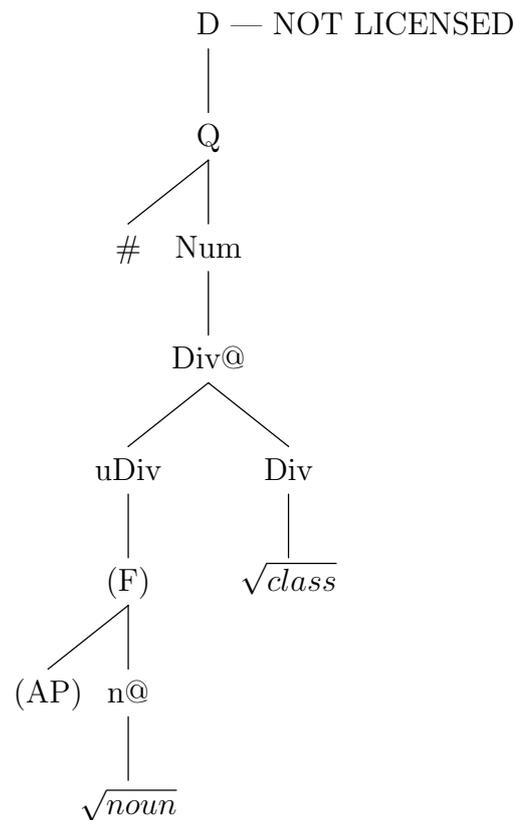
nominal root to project up to an uninterpretable Div head, which forms the specifier of an interpretable Div head that forms part of the projection of the classifier root, as illustrated in (258):



This structure, with a projection to D, results in a Cl-N phrase with a definite interpretation; if D does not project then it has an indefinite interpretation. Again, the difference between Cantonese and MC here is a difference in how high up the classifier projection a span which spells out as a classifier can reach. In MC, the classifier only spans as far as Num, and in Cantonese it can span to D. In both cases, the span includes a Num<sub>[+at]</sub> head, as the Cl-N phrase always receives a singular interpretation. The account is very close to Jenks's proposal, but treats the classifier as a separate projection.

The difference between MC and Cantonese disappears, however, when a numeral is present. Both languages exhibit obligatorily indefinite Numeral-Cl-N phrases. Therefore, it seems that, even in Cantonese, there is no way for the classifier to spell out a span up to D past the Q head which introduces the numeral in its specifier. The relevant structure is presented in (259).

(259)



For some reason, D cannot be licensed in this configuration, and the classifier projection cannot span to D. The result is that a Numeral-Cl-N phrase is always interpreted as indefinite. For the time being, I put this down to a general constraint on spans in the noun phrase, which I call Q-block.

(260) Q-block:

No spell-out of a rooted classifier projection may span past Q.

This is a purely stipulative constraint, and is merely a place holder here for a more explanatory account to be developed in chapter 5. I leave it as a pure stipulation for the purposes of the discussion in this chapter, but direct the reader to 5.2 for a full discussion of the nature of this effect.

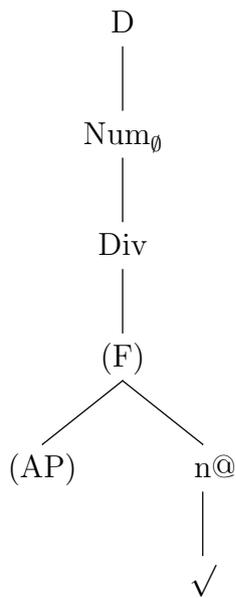
### 4.3.3 Structures

By way of summary, in this subsection I run through each of the structures associated with different noun phrase configurations, their different interpretive properties, and the spans which are targets for spell-out. I begin with MC, before moving on to Cantonese. Recall that the facts that we are attempting to account for are those presented in (245), repeated here:

(245)	Noun phrase config	Definite	Indefinite	Number
Mandarin				
	N	✓	✓	Neutral
	CI-N	*	✓	Sg
	Numeral-CI-N	*	✓	Sg/Pl
Cantonese				
	N	*	✓	Neutral
	CI-N	✓	✓	Sg; Pl with <i>di</i>
	Numeral-CI-N	*	✓	Sg/Pl

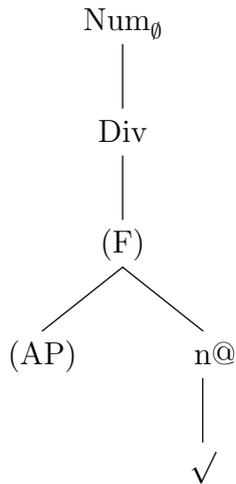
### Mandarin

(261) Definite Bare Noun (number neutral)



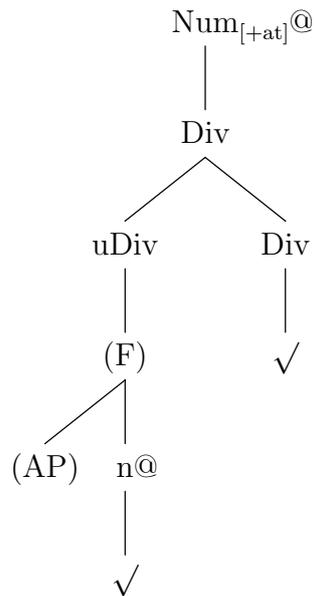
The root in the context of the *n* to *D* span spells out as a noun, with a *Num* head unspecified for  $[\pm at]$  feature, giving rise to a number neutral interpretation. If *Num* is specified with  $[\pm at]$ , then no span up to *D* is available. The projection line of the noun spells out in *n*, meaning that an adjective merged in *Spec F* will precede the noun.

(262) Indefinite Bare Noun



In this case  $n$  spans to  $\text{Num}_\emptyset$ , but  $D$  does not project, with an indefinite interpretation resulting.

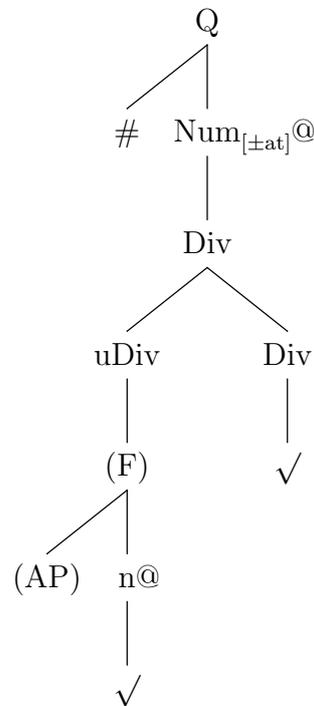
(263) Indefinite Cl-N phrase



In the case of a Cl-N phrase, there are two separate rooted projections: one for the noun and one for the classifier. The classifier root in the context of a span from the  $\text{Div}$  up to  $\text{Num}$  specified with a  $[+at]$  feature spells out as some member of the set of classifiers. This word is linearized in  $\text{Num}$ , meaning that the (adjective+)noun follows the classifier. The morphological word comprising the projection of the nominal root to  $\text{uDiv}$  spells out in  $n$  as some member of the set of nouns, again linearizing in  $n$ , meaning that the

noun follows adjectives. In Mandarin there is no span from Div to D, and so we never see a definite Cl-N phrase.

(264) Indefinite Numeral-Cl-N phrase

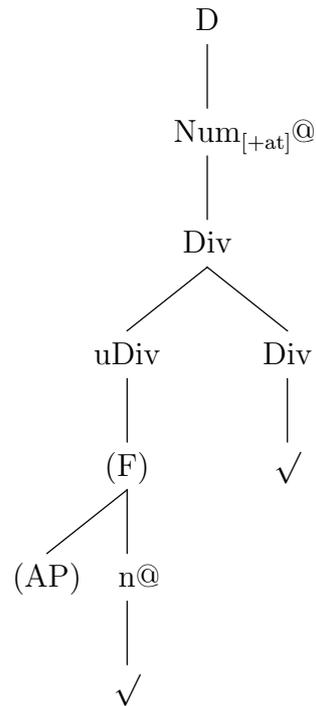


A numeral is introduced by the Q head as a specifier, and the remainder of the structure is spelled out in the same way as the Cl-N phrase. Presumably the number feature on Num must be compatible with the meaning of the numeral that merges with Q, so any numeral higher than ‘one’ is incompatible with a Num head that carries [+at], and the numeral ‘one’ is incompatible with [-at].

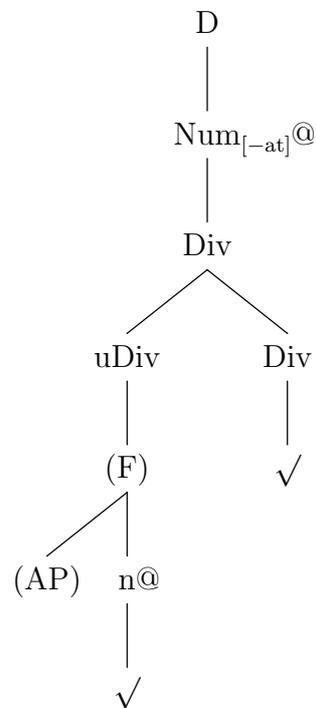
### Cantonese

Cantonese employs the same structure and makes use of the same spans for indefinite noun phrases, including indefinite bare nouns (262), indefinite Cl-N phrases (263), and indefinite Numeral-Cl-N phrases (264). The main difference is that in Cantonese, a classifier root in the context of a span from Div to D can be spelled out as a classifier (265), and when the feature on Num is [-at], the only possible spell-out is the morpheme *di* (266).

(265) Definite Cl-N phrase (singular)



(266) Definite Cl-N phrase (plural)



In both languages, Q blocks the interaction of D and Div, and Numeral-Cl-N phrases are always indefinite. The structure in (264) therefore applies to Cantonese Numeral-Cl-N phrases in the same way.

### 4.3.4 Summary

Ultimately the system that I have set up in this section can be boiled down to a few simple contrasts between the nature of the spans that are available in the two languages. Spans starting in *n* can extend up to a certain point, and the same goes for spans starting in *Div*. Differences in how high up the structure the spans can extend gives rise to a parametric difference that we have observed in MC and Cantonese. I summarise these differences in (267).<sup>20</sup>

(267)		Up to Num <sub>∅</sub>	Up to Num <sub>[+at]</sub>	Up to D
	Span from <i>n</i>	Both	Neither	MC only
	Span from <i>Div</i>	Neither	Both	Cantonese only

There is a missing piece of the puzzle however; so far I have been assuming that the presence of a numeral forces an indefinite interpretation on the noun phrase, but this is not entirely true, as will be discussed in the next section.

## 4.4 Modifier position and interpretation

The main purpose of this section is to discuss an interesting phenomenon related to the position of phrasal modifiers which are accompanied by the general modifier particle *de* relative to other elements in the noun phrase. However, before discussing this phenomenon, and my account of it, it is first necessary to motivate certain assumptions that I make about the position of different modifiers in the extended projection of the noun. Thus, in the following subsection I discuss the difference between bare modifiers and modifiers accompanied by *de* in MC.

### 4.4.1 Two classes of modifier

What Sproat and Shih (1991) refer to as ‘direct modifiers’, that is, adjectival elements which appear bare (without *de*), and immediately adjacent to the noun, I suggest are actually composed with the root below the introduction of functional structure (i.e., before *n* is merged), in a compound-like structure. I give a summary of the distribution of ‘direct modifiers’ in MC here, and

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<sup>20</sup>The cells in the table occupied by ‘neither’ raise the interesting question of whether there are languages which make use of those options. A span from *n* to Num<sub>[+at]</sub> would result in bare singular nouns, which have been claimed to exist in Modern Greek (cf. Alexopoulou and Folli 2011, and Lazaridou-Chatzigoga and Alexandropoulou 2013). A span from *Div* to Num<sub>∅</sub> would result in number neutral classifiers, which appear not to be attested.

through this motivate the claim that they are not like ‘indirect modifiers’ at all.

Sproat and Shih discuss two types of adjectival modifier that occur in MC: bare modifiers which occur without *de*, and modifiers which occur with *de* (*de*-modifiers). They note that both types of modifier have a different distribution, as shown in (268) and (269).

(268) Bare modifiers:

- a. are (usually) monosyllabic;
- b. exhibit adjective ordering constraints observed in other languages;
- c. must occur immediately to the left of the noun (or another bare modifier where two stack)<sup>21</sup>, and also consequently must occur to the right of *de*-modifiers, should they co-occur;
- d. can be non-predicative.

(269) Modifiers with *de*:

- a. can be bisyllabic;
- b. do not exhibit ordering restrictions;
- c. can appear to the left of bare modifiers, and also to the left of numerals and demonstratives;
- d. cannot be non-predicative.

We can add to the *de*-modifier list the fact that they can undergo degree modification by *hen* (‘very’).

The claim that there is a fixed order of bare modifiers when they stack has been argued against in Yang (2005). Yang argues convincingly that the facts are not quite so straightforward, that there is inter-speaker variation, strong variation according to dialect, and also that the ordering of the ‘modifiers’ varies depending on which modifier you use, i.e., there is not always a clear ordering of **classes** of modifiers as such, just that some modifiers seem to be more comfortable ordered in a certain way, or just resist stacking in general.<sup>22</sup> Speakers of the Taiwanese variety of Mandarin reported in Yang (2005) systematically reject any stacking of bare modifiers. My informants give mixed

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<sup>21</sup>They actually note that these modifiers must ‘occur within the scope of specifier material’ (p571) which includes things such as quantifiers and demonstratives.

<sup>22</sup>Judgements from my MC speaking informants corroborate this.

judgements, but generally it seems that they find stacking of up to two bare modifiers acceptable, except in certain cases for individual speakers, and in all cases it was slightly degraded compared to alternative stacking methods. My informants' judgements did clearly corroborate a claim which Yang makes: where stacking is required, the preferred method is to have a sequence with a *de*-modifier followed by a bare modifier followed by the noun (270). This option is preferred over both stacking of two bare modifiers and two *de*-modifiers, both of which are degraded ((271) and (272)). In fact, stacking of *de*-modifiers seems to give the impression that one is listing off attributes, and perhaps more closely matches the 'parallel modification' structure that Sproat and Shih also discuss.

(270) Preferred stacking option

- a. Adj-*de* > Adj<sub>bare</sub> > N
- b. *xiao-de lu huaping*  
small-DE green vase  
'Small green vase'

(271) Dispreferred stacking option 1

- a. Adj<sub>bare</sub> > Adj<sub>bare</sub> > N
- b. ?*xiao lu huaping*  
small green vase  
'Small green vase'

(272) Dispreferred stacking option 2

- a. Adj-*de* > Adj-*de* > N
- b. ?*xiao-de lu-de huaping*  
small-DE green-DE vase  
'Small green vase'

There is also a claim in Sproat and Shih (1991) to the effect that *de*-modifiers have to be predicative, and that they are relative clauses. However, as shown by Paul (2010), there are certain adjectives which (must) appear with *de*, and which are non-predicative, including *yuanlai* 'original' and *gongtong* 'common'. If we accept that (reduced) relative clause indirect modifiers have

to be predicative (e.g., Cinque 2010), then it cannot be the case that modifiers with *de* are necessarily relative clauses.

A clear demonstration of the idiosyncratic behaviour of the bare modifiers can be seen in the examples (273) to (276). Yang points out that there are certain apparent Adj+N combinations which seem to only have an idiomatic meaning, and which do not have a truly compositional reading available to them, even though the kind of semantic contribution that you would expect the bare modifier to have in a compositional case is attested in combinations with other nouns (examples (273) and (274) from Yang 2005, citing Duanmu 1998, Zhu 1980, and Krifka 1995 (edited slightly here); examples (275) and (276) from my informants).<sup>23</sup>

- (273) a. *lao pengyou*  
old friend  
'Long-time friend' NOT 'aged friend'
- b. *lao xiong*  
old bear  
'Old (aged) bear' NOT 'long-time bear'

- (274) a. *huaji dianying*  
funny film  
'A funny film/comedy'
- b. \**huaji ren*  
funny person  
Intended: 'a funny person'

- (275) a. *bai zhi*  
white paper  
'White paper' (literal)
- b. \**bai shou*  
white hand  
Intended 'white hand' (e.g., if you painted one hand white)

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<sup>23</sup>In the remainder of this subsection I use the terms '(non-)compositional', 'blocking' and 'competition' in a loose, informal sense.

- (276) a. *da ren*  
           big person  
           ‘Adult’ NOT ‘big person’
- b. *da pingguo*  
           big apple  
           ‘A big apple’

Thus we have what appears to be a wildly unsystematic set of constraints on what can mean what and when. With *de*, on the other hand, modifiers are forced into their ‘compositional’ meaning, and we do not get the above contrasts between different adjective-noun pairings.

The example in (276) illustrates an interesting pattern that it is worth discussing further: although *da* can compose with a noun-like element in an apparently normal compositional fashion (276b), the sequence *da ren* does not allow this, and it can only mean ‘adult’. So it appears that the availability of an idiomatic meaning is ‘blocking’ the normal ‘compositional’ meaning. The question is: how do we block a compositional reading where there is a non-compositional reading? We can state it as a markedness constraint, but to build a theory of the grammar that would actually not allow a compositional meaning where the bare modifier does compose in a roughly intersective fashion elsewhere would be incredibly difficult at best.

One approach<sup>24</sup> would be to take it to be the case that in examples such as (276), it is in fact possible for the grammar to generate a ‘compositional’ meaning for *da ren*, resulting in a meaning roughly equivalent to ‘big person’. Speakers reject this meaning not because it is in principle not generable, but instead because there is an alternative unambiguous way to produce the intended meaning, i.e., using a *de*-modifier. The high frequency of an idiomatic meaning associated with a certain form might strengthen this effect, and ultimately mean that a ‘compositional’ interpretation is deemed unavailable.

If this is the case, then we might expect less entrenched idioms which are examples of combinations of a bare adjective and a noun to exhibit this effect less strongly. There are in fact cases that some speakers accept under both the ‘compositional’ and ‘non-compositional’ interpretations, such as (277):

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<sup>24</sup>I thank Hagit Borer for suggesting this to me, and for discussion about the facts presented here.

(277) *huang du*

yellow poison

‘Pornographic books’ OR ?‘yellow poison’

The fact that both are available could be related to the fact that the ‘pornography’ reading is quite high (!) register (apparently used in newspapers to avoid having to use more vulgar terminology), and so does not readily block the ‘compositional’ reading (use of *da ren* to mean ‘adult’, on the other hand, is incredibly common).

A similar ‘blocking’ effect can be observed in compound cases in English, where, although the effects and generalizations are not entirely clear, I think there is at least an illustrative contrast. For me at least, the following noun-noun compounds are ‘unavailable’ if the intended meaning is ‘person of nationality x’, x the first noun:

(278) a.?? *China person*

b.?? *England person*

c.?? *Vietnam person*

The examples are all acceptable if they mean something like Sinophile, Anglophile or Vietnamophile (if there is such a word). The unavailability of the intended reading of the N-N compound seems to be related to the fact that there is an independently available adjective in each of these cases, which could be thought of as ‘blocking’ the N-N alternative in the same way that an unambiguous Adj-*de*-N sequence in MC ‘blocks’ the bare mod-N alternative.<sup>25</sup>

(279) a. Chinese person

b. English person

c. Vietnamese person

When there is no adjectival form independently available, the N-N compounds are improved (although still not entirely felicitous, presumably because there is often a nominal non-compound alternative, e.g., Beijinger, Londoner):

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<sup>25</sup>Of course there is the alternative *Chinaman*, but I take the fact that this has other (derogatory) meaning associated with it enough to suggest that *Chinese person* would not ‘compete’ with it.

- (280) a. ?Beijing person  
b. ?London person

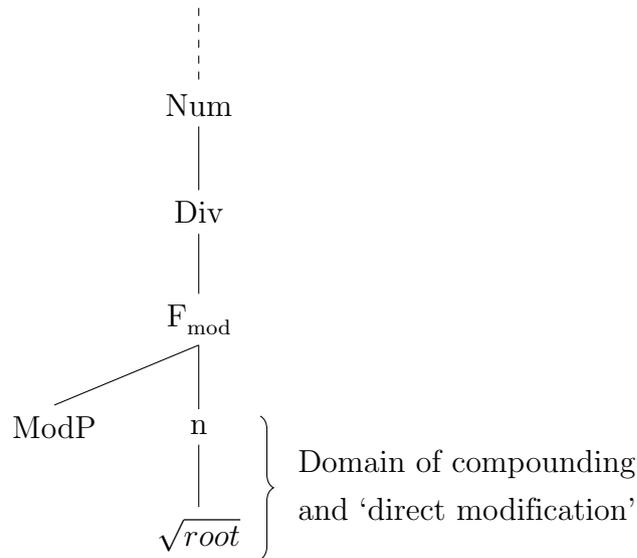
Another contrast:

- (281) a. London boy/girl  
b. ??England boy/girl

The same seems to go for nationality too: where there is no adjectival alternative, the N-N compound seems to improve. Thus *New Zealand person* is comparatively better than *China person* (although *New Zealander/Kiwi* is best). This all seems to suggest that N-N compounds are dispreferred for some reason, and that the availability of a noun with a derivational suffix or a noun with an adjectival modifier makes the compound sound much worse. Potentially this could be the result of the fact that N-N compounds have the widest range of possible meanings available, and are thus less acceptable than the more constrained N-*er* or Adj-N combinations.

The purpose of this discussion of bare and *de*-adjectives is intended to motivate the claim that bare modifiers should be taken to be merged as a compound element very low in the tree, and not in the specifier of a functional head, nor adjoined to some functional projection. *De*-modifiers are in an entirely different domain: either they are merged in the specifier of some functional head F (following Cinque 1994, et seq.), or adjoin to n, the categorizing head. As I can see little that would distinguish the two alternatives, I will adopt the assumption that they merge in the specifier of a functional head above F without further argument. We therefore have the following structure for noun phrases which include a phrasal modifier:

(282)



The phrasal *de*-modifiers form part of an extended projection which can include a Deg head, allowing the modifiers themselves to be modified (by, e.g., *hen* ‘very’). With this picture of the noun phrase in mind, we now move on to consider the complex interplay of modifier position and noun phrase interpretation.

#### 4.4.2 Canonical and non-canonical modifier positioning

In the unmarked case, modifiers of nouns generally appear immediately to the left of the noun, in the configurations given in (283). Recall that I am focusing my discussion here on modifiers which are accompanied by a ‘linking morpheme’ *de* in MC, and its counterpart *ge* in Cantonese, and put aside discussion of bare adjectival modifiers, which I take to enter into a compound with the noun that they accompany (see the immediately preceding section).

- (283) a. Adj>N  
      b. Cl>Adj>N  
      c. Numeral>Cl>Adj>N

Modifiers never appear to the right of the noun, nor do they appear immediately to the left of a classifier.

- (284) a. \*N>Adj  
      b. \*Adj>Cl>N

The interpretations available for the noun phrases which include a modifier in its canonical position are the same as if the modifier were not present. This is summarized in the table below.

(285)	Noun phrase config	Definite	Indefinite
	Mandarin		
	Adj-N	Yes	Yes
	Cl-Adj-N	No	Yes
	Numeral-Cl-Adj-N	No	Yes
	Cantonese		
	Adj-N	No	Yes
	Cl-Adj-N	Yes	Yes
	Numeral-Cl-Adj-N	No	Yes

The analysis of DP structure and interpretation in MC and Cantonese that I have provided so far has skipped over an important phenomenon related to the position of modifiers which requires explanation. In both MC and Cantonese, noun modifiers appear to be able to surface in three different positions in the noun phrase: to the left of the noun, to the left of the numeral, or to the left of the demonstrative.<sup>26</sup> All possible orders are shown in (286).

- (286) a. Numeral > Cl > Adj > N  
 b. Adj > Numeral > Cl > N  
 c. Dem > Numeral > Cl > Adj > N  
 d. Adj > Dem > Numeral > Cl > N

For the time being I focus on the configurations in (286a) and (286b), which I will refer to as Low Modifier Nominals (LMNs) and High Modifier Nominal (HMNs) respectively (I return to the configuration in (286d) in section 4.4.8).<sup>27</sup> Examples of noun phrases of both types in MC are given here:<sup>28</sup>

<sup>26</sup>It has been claimed (e.g., in Cheung 2012) that the modifier can also appear between the demonstrative and the numeral when they are both present, but my informants all strongly judge such examples as unacceptable. Given that the majority of the literature on variable modifier position only reports the positions that I give, (e.g., Sio 2006, Zhang 2015, a.o.) I do not consider the position between the numeral and the demonstrative to be possible.

<sup>27</sup>These terms are adapted from the terms Outer Modifier Nominal and Inner Modifier Nominal, from Zhang (2015).

<sup>28</sup>Although it has been claimed that adjectives with *de* are underlyingly relative clauses and predicative (e.g., Simpson 2001), it is the case that adjectives behave differently to relative clauses in certain respects (see Paul 2005 and Paul 2010 for in depth discussion), and so in order to avoid any potential complications, I focus only on what I call ‘adjectives’

(287) Low Modifier Nominal (LMN): Num-Cl-Adj-*de*-N

*liang-zhi huangse de gou*  
two-CL yellow DE dog  
'Two yellow dogs'

(288) High Modifier Nominal (HMN): Adj-*de*-Numeral-Cl-N

*huangse de liang-zhi gou*  
yellow DE two-CL dog  
'Two yellow dogs'

The two different noun phrase configurations (HMNs and LMNs) come with an interesting difference in distribution. I will discuss the differences in the next subsection, but summarise here so that we can clearly see the direction that we are heading in.<sup>29</sup>

- (289) a. \*HMN in postverbal subject position (Zhang 2015);  
b. \*HMN in *you* existentials (Huang 1982, Lu 1998);  
c. \*HMN after non-referential *ta* (Lin and Zhang 2006);  
d.<sup>ok</sup>HMN in preverbal Subject position and Topic position (my informants);<sup>30</sup>  
e. \*Extraction of N from HMNs (Zhang 2015);  
f. A class of adjectives which are obligatorily definite only appear in HMNs (Hsieh 2005, Zhang 2006);  
g. HMN exhibits forced 'wide-scope' reading with respect to quantifiers (my informants);

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here, and will not be discussing relative clauses in the two different positions relative to the numeral. See also the discussion in the preceding subsection.

<sup>29</sup>Huang (1982) discusses the claim that the difference between relative clauses that appear in the high and low position is that they are respectively restrictive and non-restrictive, citing Chao (1968) and Hashimoto (1971). However, Teng (1981), Tsai (1994), Lin (2003) and Del Gobbo (2003) argue convincingly that these claims are not correct.

<sup>30</sup>My informants all self-identify as native speakers of 'Northern Dialects' or 'Mandarin'. When asked if there was a more specific dialect that they spoke other than Mandarin, two said they spoke the sub dialect of Central Plains Mandarin (Zhongyuan Mandarin), and another said that she spoke a sub-dialect of Zhongyuan Mandarin, which she classified as Henan dialect. One other self identified as a Jin speaker (but also as a native Mandarin speaker).

- h. HMN exhibits uniqueness/inclusiveness presupposition (my informants).

Characteristics (289a) to (289d) show that HMNs pattern with definite and strongly quantified noun phrases. Characteristic (289e) shows that HMNs exhibit the kind of resistance to N extraction that definite DPs have been argued to exhibit Diesing (1992). Property (289g) shows that HMNs do not behave like indefinites in MC with respect to their scope relative to other quantificational elements (see Huang 1982), and (289h) shows that they exhibit the same kind of uniqueness/inclusiveness presupposition that definite descriptions do (see, e.g., Lyons 1999, Elbourne 2012). Each of these properties is the opposite of what holds for low modifier nominal (LMNs), which are obligatorily interpreted as being indefinite.

These facts are intended to highlight a significant contrast in MC noun phrase interpretation: Numeral-Cl-N phrases are obligatorily indefinite, and remain so when a modifier is introduced in the canonical low position, but HMNs are obligatorily definite. In fact, the only way that a Numeral-Cl-N sequence can ever be interpreted as definite (at least without the introduction of a demonstrative) is for a modifier to be merged in a position to the left of the numeral.

Properties (289a) to (289e) are discussed in the literature, and quite extensively in some cases, so I will give only a brief set of examples to show that the generalizations hold (section 4.4.3). Property (289f) has not received extensive discussion, and properties (289g) and (289h) are novel observations, and thus deserve some closer attention (sections 4.4.4 to 4.4.6).

### 4.4.3 Properties previously discussed in the literature

#### HMN barred in postverbal subject position

Li (1990, pp145-146) shows that post-verbal subject position exhibits a ‘definiteness effect’; only indefinites are acceptable in this position.

- (290) a. *Lai le yi-ge ren*  
 come PRF one-CL person  
 ‘A person came.’
- b. \**Lai le tamen*  
 come PRF they  
 ‘They came.’

- c. *Tamen lai le*  
 they come PRF  
 ‘They came.’
- (291) a. *Xia yu le*  
 fall rain PRF  
 ‘It rained.’
- b. \**Xia-wan le zhei chang yu*  
 fall-finish PRF this CL rain  
 ‘This rain has finished falling.’
- c. *zhei chang yu xia-wan le*  
 this CL rain fall-finish PRF  
 ‘This rain has finished falling.’

HMNs exhibit the same behaviour as definite noun phrases in post-verbal subject position, while LMNs are completely acceptable in that position (see also Zhang (2015) for discussion).

- (292) a. *Lai le san-zhi huangse de gou*  
 come PRF three-CL yellow DE dog  
 ‘Three yellow dogs came.’
- b. \**Lai le huangse de san-zhi gou*  
 come PRF yellow DE three CL

### HMN barred in *you* existentials

It is a well known phenomenon that definite and strongly quantified noun phrases are barred in existential sentences (Milsark 1974). This is exemplified with English in (293).

- (293) a. \*There is the/that/every/John’s dog in that room.
- b. There is/are a/some/a few/many/several/one/two dog(s) in that room.

Existential sentences in MC which involve *you* ‘have/exist’ exhibit a similar pattern (example (294a) from Huang, Li, and Li 2009, p217, (294b) and (294c)

are my own). Bare nouns are acceptable in existential sentences, but must have an indefinite interpretation (294c).

- (294) a. \**you mei-ge ren/ na-ge ren/ ta zai zher*  
 have every-CL person that-CL person him at here  
 ‘#There is every person/that person/him here’
- b. *you san-ge ren/ ji-ge ren/ henduo-ge ren zai zher*  
 have three-CL person several-CL person many-CL person at here  
 here  
 ‘There are three/several/many people here.’
- c. *you ren zai zher*  
 have person at here  
 ‘There is/are a person/people here.’

Lu (1998, p109) points out that HMNs are infelicitous in existential sentences, while LMNs are fully acceptable.

- (295) a. *Zhuozi shang you san-ben hong de shu*  
 table on have three-CL red DE book  
 ‘There are three red books on the table.’
- b. \**Zhuozi shang you hong de san-ben shu*  
 table on have red DE three-CL book  
 ‘There are three red books on the table.’

### HMN barred after non-referential *ta*

Lin and Zhang (2006) discuss what they refer to as non-referential *ta*. This is a morpheme which is identical to the third person singular pronoun, which appears between a verb and a noun phrase, and which makes the sentence ‘more lively’ (Chao 1968), or has a connotation of ‘no matter what’ or ‘regardless of’ (Iljic 1987). Indefinite noun phrases and weakly quantified noun phrases can appear with *ta* (296), but definite noun phrases cannot (297).

- (296) a. *Wo mashang he ta yi-bei*  
 I immediately drink it one-CL(cup)  
 ‘I’ll have a glass right away.’
- b. *Da-si ta ji-ge wangbadan*  
 hit-die it several-CL bastard  
 ‘Beat several bastards to death!’
- c. *Zheli keyi zuo ta san-ge ren*  
 here can sit it three-CL person  
 ‘Three people can sit here.’
- d. *Wo zhen xiwang xia ta yi-chang da yu*  
 I really hope fall it one-CL big rain  
 ‘I really hope it rains heavily.’
- (297) a. \**Du ta Hongloumeng*  
 read it Hongloumeng (book title)
- b. \**Du ta na ben shu*  
 read it that CL book
- c. \**Kan ta ni-men*  
 look it you-pl
- d. \**Du ta mei-yi-ben/dabufen-de/suoyou-de wuxia xiashuo*  
 read it every-on-CL/most-DE/all-DE chivalry novel

HMNs cannot appear with non-referential *ta*, but LMNs can.

- (298) a. *Zanmen haohao de he ta liang-bei gang mai de pijiu ba!*  
 we good DE drink it two-CL just buy DE beer PRT  
 ‘Let’s have a good drink of two glasses of beer that was just bought.’
- b. \**Zanmen haohao de he ta gang mai de liang-bei pijiu ba!*  
 we good DE drink it just buy DE two-CL beer PRT  
 ‘Let’s have a good drink of two glasses of beer that was just bought.’

#### 4.4.4 Scope interactions

It has been argued that Mandarin Chinese does not allow for variable scope in multiply quantified sentences, and that the language has a ‘surface only’

scope mapping (Huang 1982, Aoun and Li 1989; see Scontras, Tsai, Mai, and Polinsky 2014 for supporting experimental evidence). What this means is that the sentence in (299) only allows for a  $\forall > \exists$  reading, because *mei-tiao shayu* ‘every shark’ precedes *yi-ge nüren* ‘a woman’.

(299) *mei*-Cl N ... *yi*-Cl N

- a. *mei-tiao shayu dou gongji le yi ge nüren*  
 every-CL shark all attack PRF one CL woman  
 ‘Every shark attacked a woman.’
- b.  $\checkmark \forall > \exists$
- c.  $* \exists > \forall$

When we introduce a modifier, we find some very interesting differences. First, introducing a modifier in a low position seems to have the effect that the wide scope reading for the existential becomes marginally available (300). This could possibly be related to a ‘descriptive richness’ effect (Fodor and Sag 1982), whereby a noun phrase which includes more descriptive content (allowing one to more easily identify the referent) seems to produce a preference for a ‘strong indefinite’ reading, with a specific referent. However, there is still a preference for a narrow scope reading.

(300) *mei*-Cl N ... *yi*-Cl Mod-*de* N

- a. *mei-tiao shayu dou gongji le yi ge youqian de nüren*  
 every-CL shark all attack PRF one CL rich DE woman  
 ‘Every shark attacked a rich woman.’
- b.  $\checkmark \forall > \exists$
- c.  $? \exists > \forall$
- d. Note on (c): Where ‘wide’ scope is available for the existential, it is weakly available.

When the modifier is in the high position, left of the numeral, the noun phrase with *yi* ‘one’ can only have a wide scope reading and the weak, narrow scope reading is ruled out.

(301)  $\forall x \dots$  Mod-*de* *yi*-cl N

- a. *mei-tiao shayu dou gongji le youqian de yi ge nüren*  
 every-CL shark all attack PRF rich DE one CL woman  
 ‘Every shark attacked a rich woman.’
- b. \*  $\forall > \exists$
- c. ✓  $\exists > \forall$

This suggests that HMNs do not behave like weakly quantified noun phrases: in fact, they behave very much like definite descriptions, in that they have a forced widest scope interpretation.

#### 4.4.5 Uniqueness/inclusiveness presupposition

I assume that definiteness is ultimately the result of the merger of an element that introduces the iota operator  $\iota$ , which has the effect of binding a variable and giving an expression of type e. I take definite expressions to come with a presupposition that there is a unique individual (in the case of a singular term) or a presupposition that “reference is to the totality of objects in the context which satisfy the description” (Lyons 1999, p11) in the case of a plural (a presupposition of inclusiveness, in Hawkins’s 1978’s terms). This means that terms such as *the dog* in English are only felicitous in a context where there is only one dog, and a term such as *the three dogs* is only felicitous in a context where there are no more than three dogs; i.e., the description applies to the totality of individuals in a domain which satisfy the description *dog*.

On this assumption, if HMNs are interpreted as definite, then we expect that they should also come with the same kind of presupposition. In (302a) and (302b), I show a contrast in interpretation between HMNs and LMNs which shows that this is in fact the case. The situation is one in which there are a number of dogs in a room, and they are of a variety of colours.

- (302) a. *suoyou (na xie) gou li, liang-zhi huangse de gou*  
 all (that CL.pl) dog here, two-CL yellow DE dog  
*piqi zui hao*  
 temperament most good  
 ‘Of all the dogs here, two yellow dogs have the best temperament.’  
 Post-num Mod ( $\geq 2$  yellow dogs)

- b. *suoyou (na xie) gou li, huangse de liang-zhi gou*  
 all (that CL.pl) dog here, yellow DE two-CL dog  
*piqi zui hao*  
 temperament most good  
 ‘Of all the dogs here, the two yellow dogs have the best tempera-  
 ment.’ Pre-num Mod (= 2 yellow dogs)

In (302a), where we use an LMN *liang zhi huangse de gou* to describe the dogs, it is possible that there are more than two dogs in the room which have the property of being yellow, but it is true that two dogs which are yellow are the best behaved. In (302b), however, there must be no more than two yellow dogs; this is paralleled in the English translations, which have the same constraint where the definite article is present. This offers a further piece of evidence to suggest that HMNs are obligatorily definite.

#### 4.4.6 Restrictions on modifier class in HMNs

It is noted in Hsieh (2005), picking up on an observation in Zhang (2006) that there is a small set of modifiers in MC that *always* occupy the higher position and are unacceptable in an IMN configuration. Two examples from this group of modifiers are *qiyu* ‘remaining’ and *yishang* ‘above/aforementioned’:

- (303) a. *Akiu yaoqing-le qiyu de liang-ge laoshi*  
 Akiu invite-PRF remaining DE two-CL teachers  
 ‘Akiu invited the remaining two teachers.’  
 b. \**Akiu yaoqing-le liang-ge qiyu de laoshi*  
 Akiu invite-PRF two-CL remaining DE teachers  
 ‘Akiu invited the remaining two teachers.’

The existence of this group of modifiers is taken to be evidence that a movement analysis of HMNs is untenable; if there is movement then it should either be obligatory in all similar cases or it should be optional in all similar cases (Hsieh 2005). The obligatory high position of this class of modifier in MC can be explained under the analysis proposed below for HMNs in general (see section 4.4.7).

Note that in the example above, the direct object of the verb has a definite interpretation. I propose that this is always the case with modifiers in this class (Niina Zhang in fact reaches the same conclusion in Zhang 2015). The

semantics of *yishang* and *qiyu* forces the modified noun to have a definite interpretation. These modifiers are also acceptable with bare nouns, which are also interpreted as definite.

- (304) a. *qiyu de shu*  
 remaining DE book  
 ‘The remaining book(s)’  
 b. *yishang de ci*  
 above DE word  
 ‘The above word(s)’

Interestingly, a definite interpretation is also generally forced for related modifiers in English:

- (305) a. John wrote the above example.  
 b. John wrote the above two examples.  
 c.?? John wrote some/an above example.  
 d.?? John wrote some/two above examples.  
 e. John wrote two of the above examples.
- (306) a. John wrote the remaining example.  
 b. John wrote the remaining two examples.  
 c.?? John wrote a remaining example.  
 d.?? John wrote two remaining examples.  
 e. John wrote two of the remaining examples.

Examples (305c,d) and (306c,d) may be marginally acceptable, but this can be put down to the fact that a partitive reading seems to be forced (like that given in (305e) and (306e)), so that ultimately there is something like a covert definite involved.

If it is the case that generally these modifiers require the DP to be definite, or that they are infelicitous under an indefinite reading (for some conceptual reason related to ‘remainingness’, for example), then it is no surprise that they should always appear in the high position in MC (i.e., in HMNs). This is forced by the requirement that D be licensed by some overt element in its specifier when a span is blocked, which I discuss below.

#### 4.4.7 The structure of HMNs

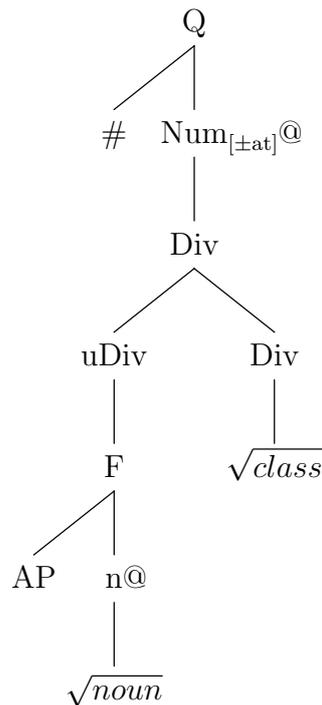
These properties of HMNs and LMNs (given in (289), repeated below) lead me to conclude that HMNs are obligatorily definite, while LMNs are obligatorily indefinite.

- (289)
- a. \*HMN in postverbal subject position (Zhang 2015);
  - b. \*HMN in *you* existentials (Huang 1982, Lu 1998);
  - c. \*HMN after non-referential *ta* (Lin and Zhang 2006);
  - d. <sup>ok</sup>HMN in preverbal Subject position and Topic position (my informants);
  - e. \*Extraction of N from HMNs (Zhang 2015);
  - f. A class of adjectives which are obligatorily definite only appear in HMNs (Hsieh 2005, Zhang 2006);
  - g. HMN exhibits forced ‘wide-scope’ reading with respect to quantifiers (my informants);
  - h. HMN exhibits uniqueness/inclusiveness presupposition (my informants).

That the position of the modifier should give rise to such an effect may seem mysterious, but receives a neat explanation under the theory of D licensing adopted above. I turn now to an explanation of how this is implemented.

The discussion of different noun phrase configurations in section 4.3.3 showed how the adjective is ordered relative to other elements in the noun phrase. Recall that there is a separated rooted projection for classifiers, and in modified Cl-N phrases, and Numeral-Cl-N phrases, we have the following structure:

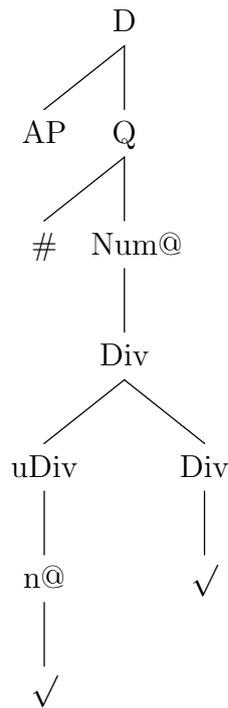
(307)



The classifier projection spells out in Num, meaning that it precedes the projection of the noun root. The adjective is linearized to the left of the noun. This means that the A+N constituent follows the classifier, and the adjective precedes the noun, giving the order Classifier>Adjective>Noun. The numeral precedes all of this because it is a high specifier, above the spell-out position of the classifier, giving the order Numeral>Classifier>Adjective>Noun.

Finally we consider the case of HMNs. Recall that the conditions in (248) mean that D cannot be present unless it spells out as part of morphological word, or has overt material in its specifier. Given that there is no span which goes past Q to D (by stipulation) the only way to get a definite interpretation (aside from the merger of demonstratives, which I discuss in the next subsection) is to have some element merge in in Spec D. In MC and Cantonese, this element can be an adjective, as shown in (308).

(308)



Where we have a high modifier in Spec D, the order is Adj>Numeral>Cl>N. An indefinite interpretation cannot be achieved, because there is no high position available for the adjective other than the specifier of D.

We can also see why *qiuyu* and *yishang*, which are only felicitous in a definite noun phrase, are forced to appear in a high position when a numeral is present: there is simply no other way to get the right interpretation.

Thus, given the assumptions put forward in chapter 2 regarding the nature of the syntax-phonology mapping, and the underlying structure of the extended nominal projection, we have derived each of the appropriate noun phrase configurations in MC and Cantonese, with their associated meanings.

#### 4.4.8 Demonstratives and high modifiers

So far I have left out discussion of the role that demonstratives play in the noun phrase in MC and Cantonese. This piece of the puzzle is particularly important because noun phrases with a demonstrative are often treated as a species of definite noun phrase (Roberts 2002, Elbourne 2008). Furthermore, as was noted in section 4.4.2, high modifiers in MC and Cantonese are acceptable in a pre-demonstrative position too, so the question immediately arises: if the high modifier is in its high position to license definite D, then what job is it doing if a demonstrative is already present?

Demonstratives appear before numerals, or immediately preceding a classifier if no numeral is present.

(309) Dem>(Numeral>)Cl>N

There are some important facts to note about the meaning of noun phrases with a demonstrative (henceforth Dem-NPs) and the meaning of definite noun phrases which do not include a demonstrative in MC and Cantonese. First, note that in English, Dem-NPs are generally unacceptable in a context like that in (310) where one intends to refer back to a referent introduced in a previous sentence.

(310) Situation: A man and a woman walk into a bar.

a. The man was already drunk.

b.?? That<sup>unstressed</sup> / \*That<sup>stressed</sup> man was already drunk.

Sybesma and Sio (2008, p468) claim that a similar contrast is visible to a certain extent in MC and Cantonese. They state that a stressed demonstrative in a Dem-Cl-N phrase in MC leads to unacceptability, and that a bare noun should be used instead. However, there is no preference between the bare noun case and an unstressed demonstrative in Dem-Cl-N:

(311) Situation:

*yi-ge nanren he yi-ge nüren zoujin-le jiuba*  
 one-CL man and one-CL woman enter-PRF bar  
 ‘A man and a woman enter a bar.’

(312) Continuation

a. *nanren yijing hezui-le*  
 man already drunk-SFP  
 ‘The man was already drunk.’

b. *nei-ge<sup>unstressed</sup>/\*<sup>stressed</sup> nanren yijing hezui-le*  
 that-CL man already drunk-SFP  
 ‘The man was already drunk.’

Sybesma and Sio then show that if the antecedent is *yi-dui fufu* ‘a couple’, then only the bare noun is acceptable (313). In English, only a definite article is acceptable here (314).<sup>31</sup>

- (313) *yi-dui fufu zoujin-le jiuba. nanren/\*na-ge nanren yijing*  
 one-CL couple enter-PRF bar. man/dem-CL man already  
*hezui-le*  
 drunk  
 ‘A couple enter a bar. The man is already drunk’

- (314) A couple walked in. The/??that man was already drunk.

In Cantonese, the contrast is sharper. Use of a definite Cl-N phrase is strongly preferred, and a Dem-Cl-N phrase is very degraded:

- (315) a. *go<sup>3</sup> naam<sup>4</sup>jan<sup>4</sup>...* ... was already drunk.  
 CL man  
 b.?? *go<sup>2</sup> go<sup>3</sup> naam<sup>4</sup>jan<sup>4</sup>...*  
 that CL man

Another way in which a demonstrative noun phrase and a definite description are known to differ is in the domain restriction that accompanies them. Singular definite descriptions under the assumptions that I adopt about them here come with a presupposition of existence and of uniqueness. However, one can completely felicitously utter the example in (316) without intending to mean that there is in fact only one table in the entire universe. Rather, it is the case that there is some implicit domain restriction which means that we are attempting to point out the unique table in a particular salient context, e.g., in this room (example from Elbourne forthcoming).

- (316) The table is covered with books.

There is a clear contrast in domain restriction between demonstrative noun phrases and definite descriptions. Imagine one finds oneself at a park, and one sees a dog next to a large oak tree, and another dog next to a fountain.

<sup>31</sup>My MC informants partly disagree with the judgements presented in S& S. One finds the examples with a demonstrative acceptable in referring back to the male member of a couple, whereas others prefer the bare noun, and find the Dem-Cl-N phrase degraded but not completely unacceptable.

One could felicitously point to each dog in turn and utter (317a), but not (317b) (where subscript indicates a pointing towards the location given in the subscript).

- (317) a. That dog<sub>tree</sub> is cute and that dog<sub>fountain</sub> is cute.  
 b. #The dog<sub>tree</sub> is cute and the dog<sub>fountain</sub> is cute.

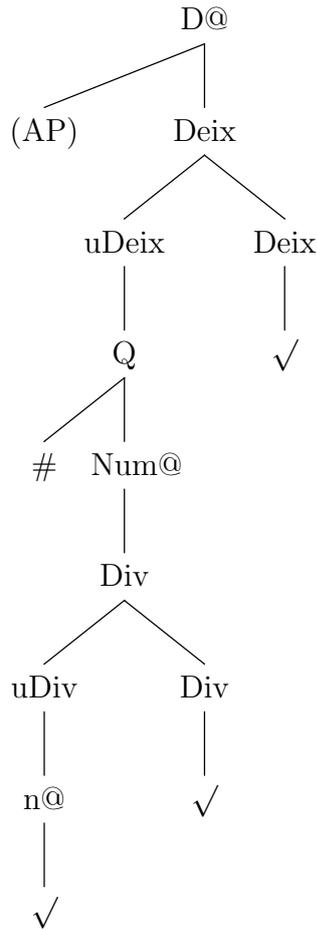
Interestingly, it has been pointed out in Williams (1998) that a similar contrast exists in MC between demonstrative noun phrases that have a low modifier, and those that have a high modifier. The example relies on the same ‘park’ situation as above.

- (318) a. *nei<sub>tree</sub>-zhi huangse de gou he nei<sub>fountain</sub>-zhi huangse de gou*  
 that-CL yellow DE dog and that-CL yellow DE dog  
*dou tai keai le*  
 both very cute SFP  
 ‘That yellow dog and that yellow dog are so cute!’
- b. \**huangse de nei-zhi<sub>tree</sub> gou he huangse de nei-zhi<sub>fountain</sub> gou*  
 yellow DE that-CL dog and yellow DE that-CL dog  
*dou tai keai le*  
 both very cute SFP  
 ‘#That yellow dog and that yellow dog are so cute!’

Where a demonstrative is present, but the modifier is low (318a), the domain is restricted to a specific location (‘over there’ for distal demonstrative, ‘over here’ for the proximal). With a high modifier (318b), the domain restriction is stricter, and the sentence is only felicitous where there is a unique referent in the context which has the properties of being a dog and being yellow.

Given these facts, I propose that demonstratives are rooted projections which project from a deictic head Deix, as illustrated in (319).

(319)



The demonstrative projection spells out in D, meaning that the demonstrative precedes the numeral, adjective and noun in the canonical case. If a modifier merges high, then it will precede the demonstrative.

The demonstrative licenses the D head, and so a high modifier is not required for a definite interpretation (i.e., a phrase composed of a demonstrative, numeral, classifier and noun, in that order, can still be definite). However, if an adjective merges in Spec D in MC, then the domain restriction becomes whatever property the adjective denotes (in the example above, yellow things). In the LMN case, the domain restriction is ‘things here’ and ‘things there’ which means that we cannot exclude the other dog (because it is in a different ‘there’, indicated through the pointing action). However in the HMN case, the domain restriction is ‘yellow things’, and both dogs are yellow things, regardless of where they are, giving rise to a violation of the uniqueness presupposition. That is, in (318a), there is a unique over-there<sub>tree</sub> yellow dog, and also a unique over-there<sub>fountain</sub> yellow dog. However in (318b), there is not a unique yellow dog. I further discuss the nature of demonstratives in classifier languages in the next chapter, in section 5.3.3.

#### 4.4.9 Summary

As summarized in section 4.3.3, we have seen the system that I have set up in this chapter takes the contrasts between MC and Cantonese to be the result of a simple difference in the nature of the spans that are available in the two languages, as shown in the table in (267), reproduced here.

(267)		Up to Num <sub>∅</sub>	Up to Num <sub>[+at]</sub>	Up to D
	Span from n	Both	Neither	MC only
	Span from Div	Neither	Both	Cantonese only

This, coupled with a condition on the licensing of the D head, gives us the full range of facts presented above. Where D is not spelled out in a span with other elements, then it can only be licensed through the merger of some overt element in its specifier position. In MC and Cantonese a modifier in a high position is able to take on this role. The high modifier also has the effect of introducing a very constrained domain restriction. As noted above, the facts that I have been discussing in this chapter are by no means novel; while I have introduced new empirical evidence to sharpen the distinction between certain interpretations, and to clarify the role that certain functional elements play, the core empirical phenomena have been the subject of a number of papers over the past 15 years or so, beginning with the comparative analysis of the differences between Cantonese and Mandarin undertaken in Cheng and Sybesma (1999). The analysis of the facts is, however, novel. Therefore, it is necessary to show how this approach is an improvement over previous analyses: in the next section I discuss Cheng and Sybesma's discussion of MC and Cantonese noun phrases, and show that in general, any analysis based on head movement suffers from a drawback that the direct linearization story avoids. This is a good sign, since I am adopting the position that head movement does not in fact exist as a syntactic operation.

### 4.5 Alternatives

In this section I consider some alternative analyses that have appeared in the literature which take head movement to be the driving force behind the licensing of a definite interpretation. I then attempt to develop an account that takes movement of a phrasal element including N to Spec DP to license definiteness, and show that it too is inadequate.

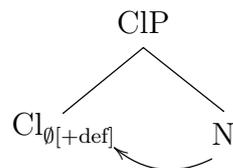
While I generally agree with a number of the assumptions that motivate a head movement account, and agree with some of the conclusions, I ultimately conclude that both alternatives are inferior to the account proposed above, in that they have worse empirical coverage.

#### 4.5.1 A head movement account and its limitations

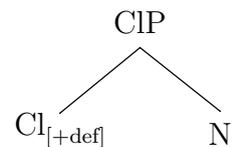
Simpson (2005) and Wu and Bodomo (2009) propose a head movement account for the variety of interpretive restrictions on different noun phrase configurations in Cantonese, generally following the insights of Longobardi (1994). Cheng and Sybesma (1999) also include head movement as part of their explanation for the differences between Mandarin and Cantonese. The proposals differ in their assumptions about the locus of definiteness, and about universals of syntactic structure. However, one fact about each head movement analysis is that it makes the prediction that a definite bare noun which is modified by an adjective should precede that adjective, which is contrary to what we actually see in Mandarin.

Cheng and Sybesma argue that the Cl head in Mandarin and Cantonese plays the (semantic) role that D does in English, that of introducing an iota operator. They state that there is a condition on interpreting Cl as an iota operator, and that this condition is simply that the Cl position be filled.<sup>32</sup> In Cantonese, the classifier is overt, and thus the Cl head is filled. In Mandarin, N moves to the Cl projection in the case of a definite bare noun.

(320) Mandarin



(321) Cantonese



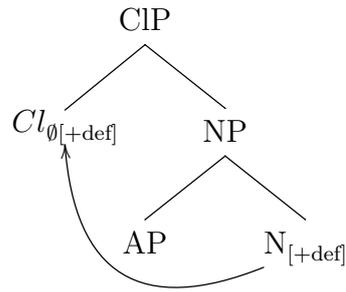
Simply put then, the difference between Mandarin and Cantonese lies in how the definiteness feature encoded in the Cl head is licensed.

Cheng and Sybesma accept that this movement would result in an illicit ordering of the adjective and noun, if the adjective merges lower than Cl, and the noun moves up to Cl.

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<sup>32</sup>On this point my analysis is close in spirit to Cheng and Sybesma's, in that I also have an 'overtness' requirement on the functional head responsible for introducing a definite interpretation.

(322)



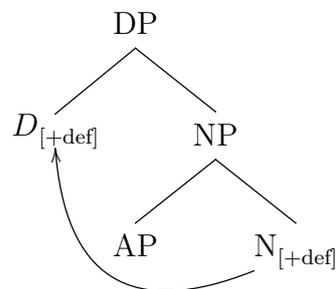
Predicted order: N > Adj

They therefore claim that the movement has to be covert. Note, however, that this conclusion is problematic: if the licensing condition on the  $\iota$ -operator is that the Cl head be filled by some overt material (the classifier can do this job in Cantonese, but not in Mandarin), then covert movement will not get us the desired effect. Therefore the word order problem still stands.

Wu and Bodomo (2009) (following work in Simpson 2005) posit a D projection as the locus of definiteness, and take it to be Cl moving to D that gives rise to a definite interpretation in Cantonese. They claim that argument nominals always project a D layer, and that a definite feature in D can be licensed through movement of Cl to that position. Where a Cl-N phrase is indefinite, D is taken to be empty.

They do not discuss Mandarin, but one could imagine extending this analysis by arguing that in Mandarin, N moves to D for a definite interpretation (in a similar way that it moves to Cl in Cheng and Sybesma's story). In that case, we have the same problem that Cheng and Sybesma's account faces, namely that the wrong order is predicted when a definite bare noun is modified by an adjective.

(323)

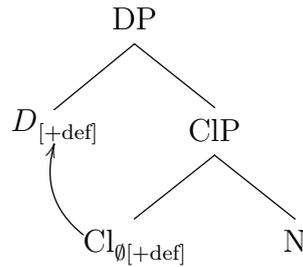


Predicted order: N > Adj

An alternative would be to claim that it is the Cl head which moves to D even in Mandarin, and that Cl is null in the case of bare nouns. However, this would make it necessary to make some quite unusual stipulations about

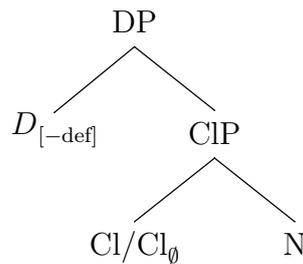
the phonological content of Cl in different contexts. As summarized in (324) and (325), one would have to claim that in Mandarin, a definite interpretation (with movement of Cl) would force the Cl to be phonologically null (only bare nouns are definite), and an indefinite interpretation (with no movement of Cl) would mean that Cl could be either null or overt (bare nouns and Cl-N phrases can both be indefinite).

(324)



In the case of a definite bare N, Cl **must be phonologically null** (overt Cl-N phrases are never definite).

(325)

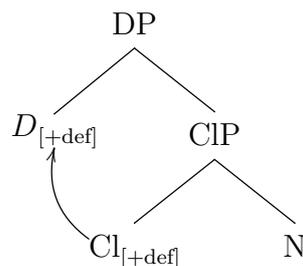


Where D is  $[-def]$ , the Cl can be **either overt or covert** (Bare N is  $[\pm def]$ , Cl-N is  $[-def]$ ).

A null head moving to a null head to license a particular feature on the higher head seems unsatisfying as a solution to the problem, particularly given that there is no evidence for the movement outside of the fact that it is simply required to get the interpretation right.

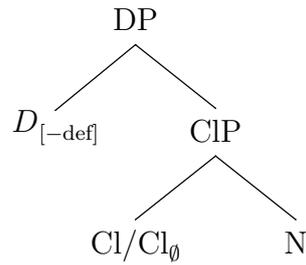
The same kind of complication holds for the Cantonese data too. We are lead to the conclusion that in Cantonese, a definite D head would force the classifier to be phonologically overt (326), whereas an empty D/indefinite D would allow for either an overt or covert classifier (327).

(326)



In the case of a  $Cl-N_{[+def]}$ , Cl **must be phonologically overt** (Bare Ns are never definite).

(327)



Where D is [-def], Cl can be **either overt or covert** (Bare N is [-def], Cl-N is [ $\pm$ def]).

Ultimately any head movement account either gets the word order wrong when adjectives are taken into consideration, or has to make some very unwelcome stipulations about what kind of phonological content is spelled out in the Cl head. Otherwise, one must stipulate that the movement must be covert, but without any independent evidence that a movement has taken place, and given that head movement arguably has no interpretive effects (see chapter 3), this is not an attractive option. The general conceptual issue with the head movement account of noun phrase interpretation is that it involves an ‘overt-ness’ condition on the licensing of definiteness, but at the same time appeals to a covert operation to fulfil that condition. Given that we do not see overt evidence that anything has moved to fill Cl/D (i.e., there is no rearrangement of the classifier and the adjective), we cannot appeal to that overt-ness condition. The alternative is to allow that condition to be mediated through the concept of an extended projection, where lower functional elements can enter into a relation with higher functional elements without moving. That is what I have proposed.

Fundamentally, I entirely agree with the spirit of the analyses that Cheng and Sybesma (1999), Simpson (2005) and Wu and Bodomo (2009) present: they all attempt to derive the interpretative facts about different noun phrase configurations from an underlying similarity across Mandarin and Cantonese, and all attempt to tie a definiteness affect to interaction between D and other parts of the functional structure. I too take D to be the head which is responsible for definiteness. Where we differ is in the machinery that is employed to license certain functional heads, and in the machinery that takes the functional structure and maps it to the phonology. I have shown that the machinery that I have employed gets us results that are unachievable under the alternative, at least so long as we do not introduce *ad hoc* stipulations.

### 4.5.2 A ‘Cartographic’ account and its limitations

My main goal in the previous section was to show that a head movement account of the distributional facts in MC and Cantonese faces a problem, and that an approach which embraces spans as a target of spell-out achieves better empirical coverage without facing that problem.

However, to show that the spanning account is the right account to adopt, I further have to show that other alternatives lead to less parsimonious accounts of the data. Thus, in this subsection I lay out what a cartographic story of the facts might look like; ‘cartographic’ meaning ‘making use of phrasal movement with pied-piping’, and roughly following Cinque’s (1994, et seq.) theory of the underlying structure of the extended nominal projection. I must be clear that this kind of analysis of the data has never been put forward by anyone working in the cartographic tradition, but it is a reasonable approach worth considering (and ideally ruling out).

The main difference between a ‘cartographic’ analysis and that relying on head movement is that I will assume that phrasal movement of some portion of the extended nominal projection to Spec D licenses a definite interpretation, rather than N-to-D (or Cl-to-D, or N-to-Cl) movement. In entertaining this analysis, the hope is that pied-piping part of the structure above N, including the adjective, will preserve the hierarchical ordering of the adjective and the noun, thus making the correct predictions about word order (given a linearization algorithm something like the LCA).

I consider two ways of thinking about the position of classifiers in the extended nominal projection, and discuss the consequences of adopting each analysis. The first involves a phonologically null functional projection Div which hosts a classifier in its Spec, while the second takes classifiers to be the head of a functional projection which has an empty abstract specifier position. In both cases I take numerals to merge in the specifier of a functional projection which I have labelled Q, and take number features to be introduced in the Num<sup>0</sup> head. These assumptions about number features and the merge position of numerals are in line with the assumptions that I have been making throughout my discussion of the noun phrase.<sup>33</sup>

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<sup>33</sup>The assumptions are likewise in line with the shape of the extended noun phrase that Cinque outlines in Cinque (2013).

## Part 1 (Classifier as Spec DivP)

In order to properly lay out a phrasal movement analysis, I adopt the assumptions given in (328), with cross-linguistic variation resulting from the differences presented in (329).

(328) Assumptions:

- a. Classifiers are in Spec DivP (Div<sup>0</sup> is a phonologically null functional head);
- b. Numerals are in the specifier of a functional projection Q;
- c. Adjectives merge in the specifier of a functional head, F (Cinque 1994 et seq.);
- d. FP always projects even if there is no adjective;
- e. Movement of a constituent containing N must proceed through all intermediate Spec positions between base position and Spec DP (roughly following Cinque 2005).<sup>34</sup>

(329) Parametric variation:

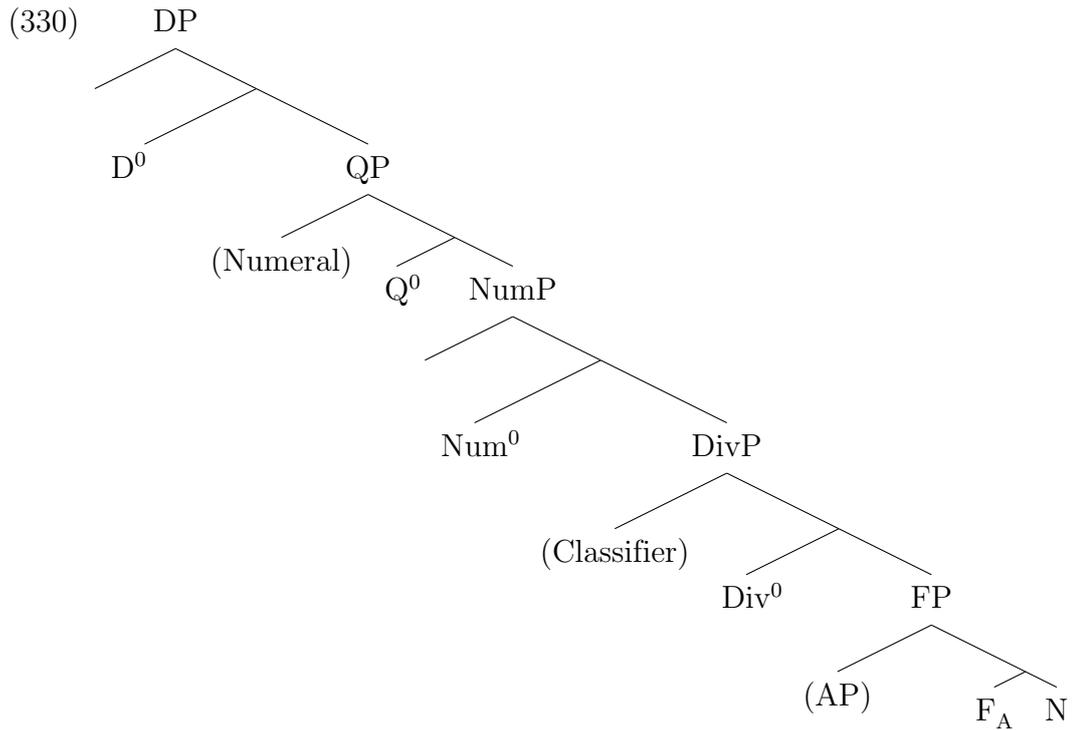
- a. Mandarin: FP moves to Spec DP to license [+def]; nothing smaller than FP can move.
- b. Cantonese: DivP moves to Spec DP to license [+def]; nothing smaller than DivP can move.

This gives us the following partial map of the xNP, where brackets around an element indicate optionality.<sup>35</sup>

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<sup>34</sup>There is the question of why the moved phrase should have to stop off at each Spec position, but I leave this aside here, simply adopting the same kind of cyclic restrictions on movement operations that are generally assumed in the cartographic literature. Whether we think of it as movement through each intermediate Spec or not, we have to account for minimality effects (i.e., blocking by an intervening XP in a specifier position) somehow.

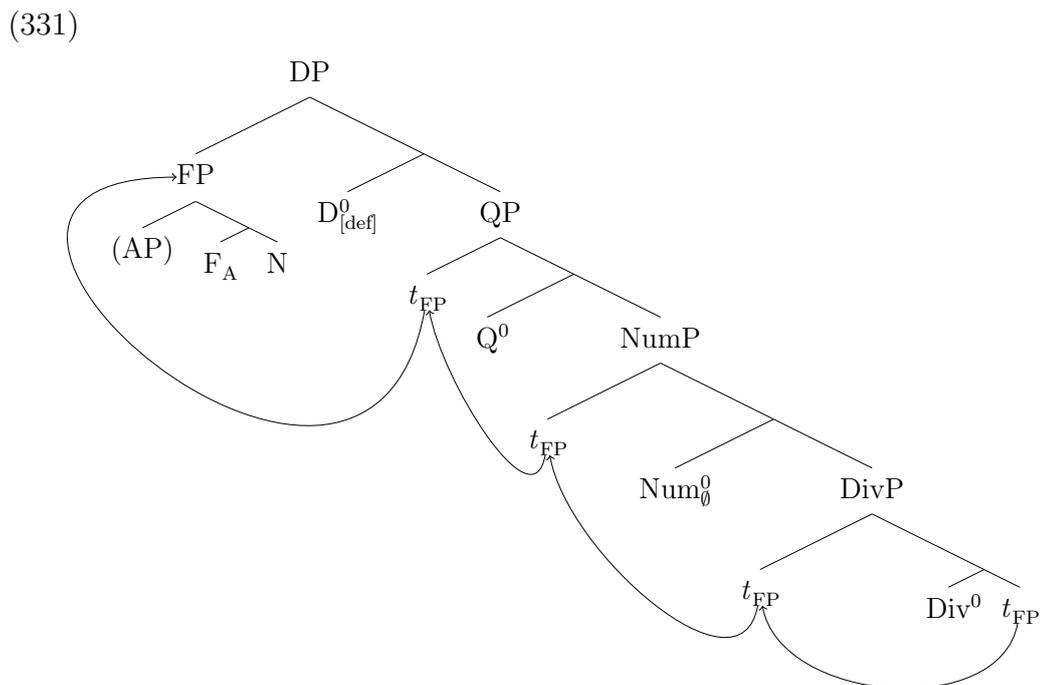
<sup>35</sup>According to lecture notes from ACTL summerschool 2014 at University College London, Cinque has sortal classifiers above Number<sup>0</sup> and below cardinals (Cinque 2014b). I assume that this is not the correct hierarchical order for semantic (and word order) reasons, and adopt the structural hierarchy given in (330). Note that in Cinque (2005), he has Cl between Num and A (the same as assumed here).



Given these assumptions, I will now attempt to derive each of the interpretive facts discussed above. I start with MC.

### Mandarin

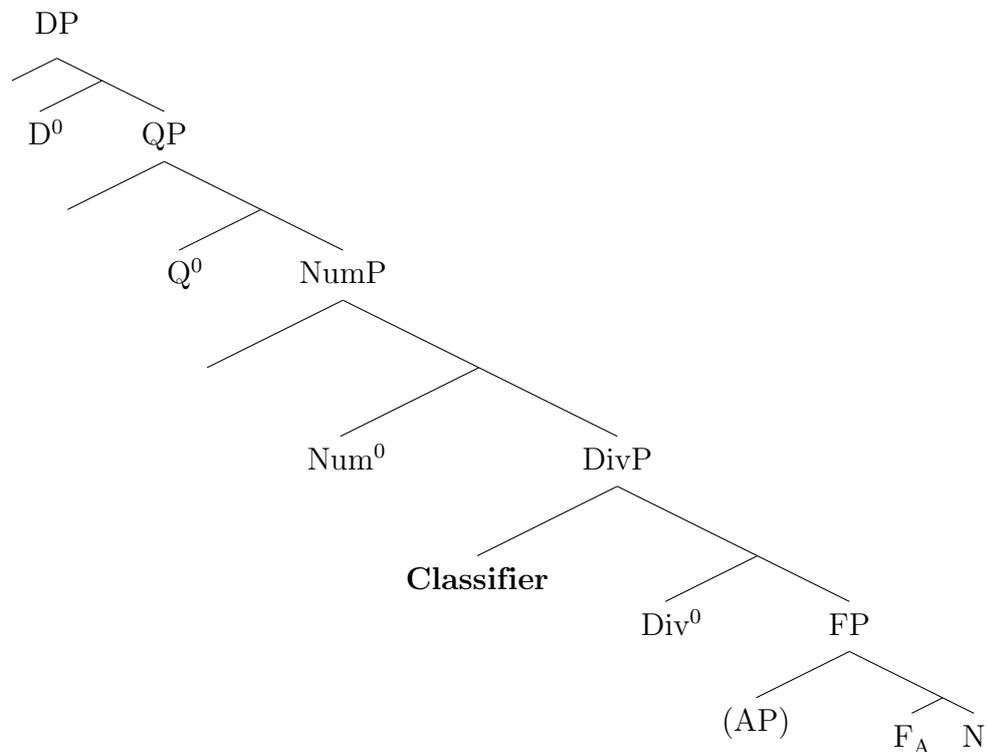
A definite bare noun has the following structure:



Here, FP containing the noun moves to Spec DP, through each intermediate specifier, driven by the definiteness feature on D. This derivation predicts the correct A>N order if the AP is present. In the case of an indefinite bare noun, it could be assumed that an empty D head projects, and the lack of a definite feature means that there is no driving force behind the movement. Alternatively we could take the D head to not be present, and thus there is nothing to drive the movement and no landing site available.

When a classifier is introduced in the specifier of Div, no phrasal movement of FP up to Spec DP is possible, given that movement has to proceed through each specifier on its way up to D (328e). Simply put, the classifier blocks movement of FP. This is shown in (332).

(332)

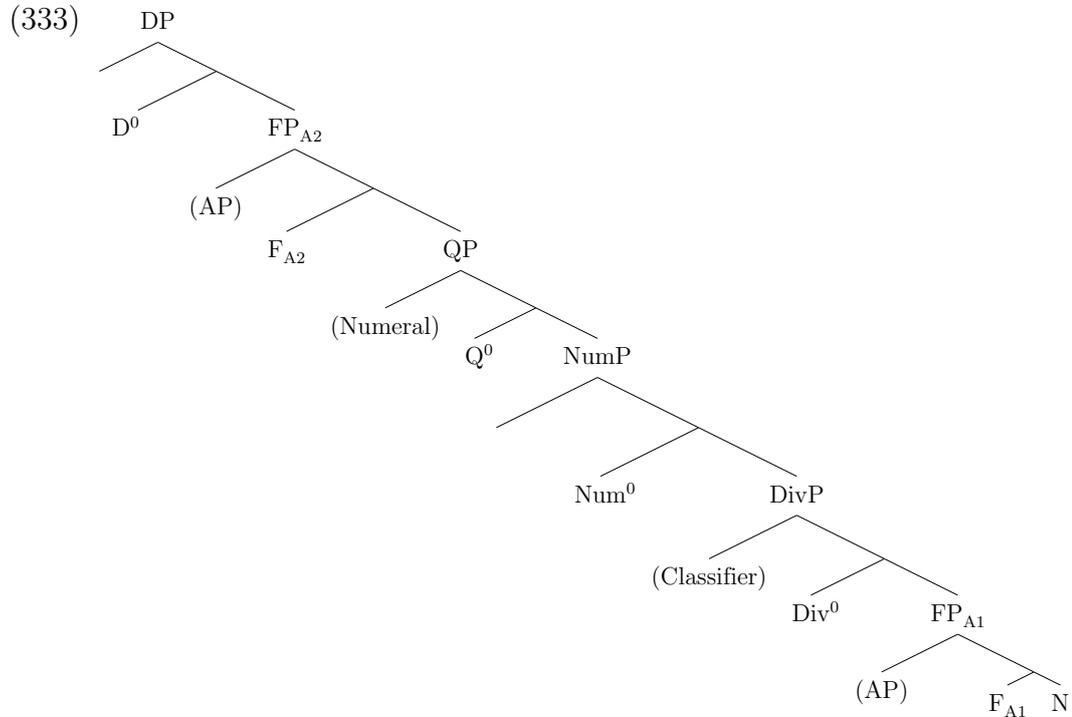


Thus we derive the obligatorily indefinite character of Cl-N phrases in MC. This analysis also gets the correct Cl>Adj>N order, and further accounts for the fact that Numeral-Cl-N phrases are obligatorily indefinite, since there would be two intervening elements between FP and Spec DP.

### Problems

Under this analysis, the Adj>Numeral>Cl>N order becomes problematic. If we take the adjective to move up to the high position from a low merge site

(Spec FP), we would expect that intermediate filled specifiers would block the movement. A potential solution is to posit an additional high merge position for the adjective, as in (333):



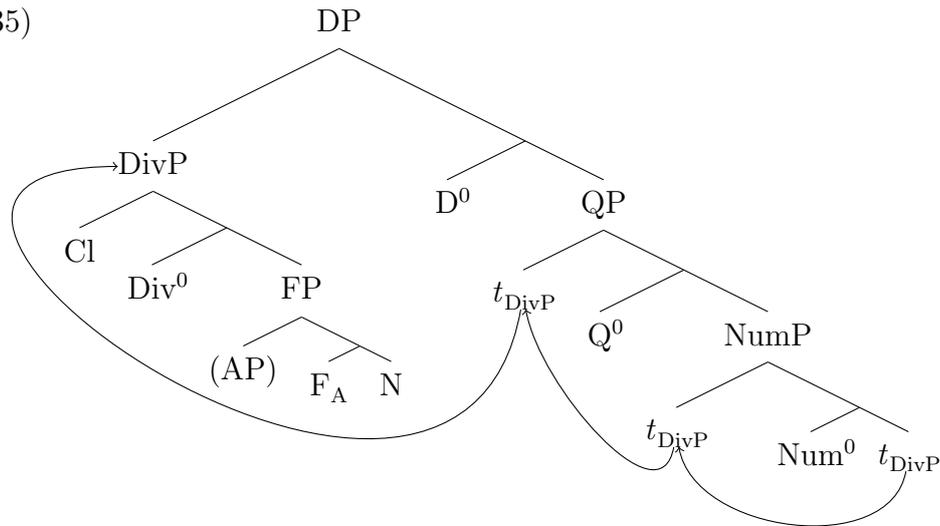
This would lead us to the prediction that the order Adj>Cl>(Adj >) N should be available, but adjectives immediately preceding classifiers are never acceptable:

- (334) \**huangse-de zhi gou*  
 yellow-DE CL dog  
 Intended: ‘(a/the) yellow dog’

## Cantonese

Moving on to Cantonese, we can use a similar movement analysis to capture the fact that Cl-N phrases can have a definite interpretation, if we allow for a larger chunk of the xNP (up to DivP) to be pied-piped when the noun moves up:

(335)



The whole of DivP, including the classifier and any adjectives (if they are present) moves up to Spec DP through intermediate specs. This gets the correct Cl>Adj>N order. Again, either an empty D, or no D projection will mean that the DivP stays in its base generated position, and an indefinite interpretation results. A Numeral-Cl-N phrase will involve a filled Spec QP, and so movement of DivP to license the definite D head is blocked, giving rise to an obligatory indefinite reading.

### Problems

We encounter a problem when considering the possible interpretations for bare nouns in Cantonese: presumably DivP should be able to move to Spec DP in the case of a bare noun, because all intermediate specs are empty (there is no numeral to block movement). Therefore there is thus no way to block a definite interpretation for bare nouns in Cantonese.

### Summary of part 1

The table in (336) summarises the successes and failures of this analysis. As stated at the beginning of this subsection, an advantage of a phrasal-movement approach over a head movement approach is that the order of the adjective and noun in a definite noun phrase can be easily captured. However, we trade this off with two other effects, and ultimately end up with a less successful analysis.

(336)	Effect	Captured?	Problems
	Bare N interp (MC)	Yes	
	Bare N interp (C)	No	Cannot block definite interpretation
	A>N (def) order (MC)	Yes	
	Cl-N interp (MC)	Yes	
	Cl-N interp (C)	Yes	
	Numeral-Cl-N interp (both)	Yes	
	High adjective interp	No	Movement should be blocked; high base position makes incorrect predictions

## Part 2 (Classifier as Cl head with abstract Spec)

Given that the set of assumptions explored in the previous subsection lead to some problems related to word order and interpretive possibilities, let us explore a different set of assumptions to see if we can make any headway. I adopt the same assumptions as in (328), except that I treat the classifier as being a realization of the functional head, Cl, and parametric variation results from the assumptions in (338).

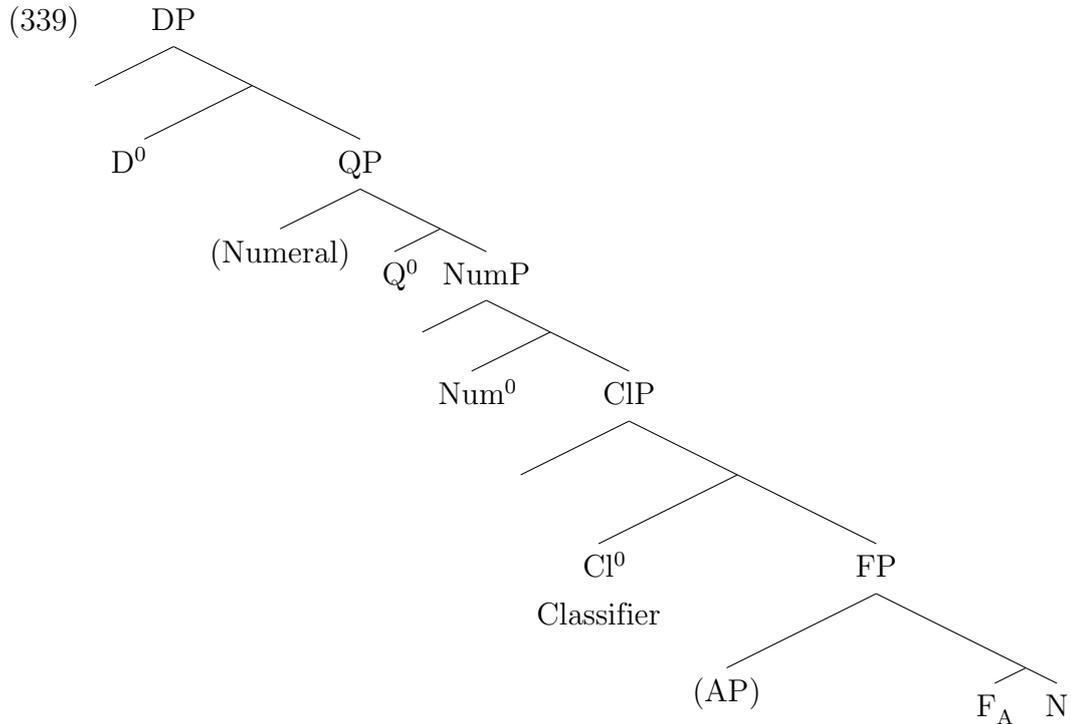
### (337) Assumptions

- a. Classifiers are the realisation of the head  $Cl^0$ ;
- b. Numerals are in the specifier of a functional projection Q;
- c. Adjectives merge in the specifier of a functional head, F (Cinque 1994 et seq.);
- d. FP always projects even if there is no adjective;
- e. Movement of constituent containing N must proceed through all intermediate Spec positions between base position and Spec DP.

### (338) Parametric variation:

- a. Mandarin: FP moves to Spec DP to license [+def]; nothing smaller than FP can move.
- b. Cantonese: ClP moves to Spec DP to license [+def]; nothing smaller than ClP can move.

A partial map of the xNP is given in (339).



### Mandarin

Bare nouns in Mandarin can be analysed in the same way as before, with FP moving to Spec DP freely, given that nothing blocks the movement. An indefinite interpretation results from an empty D, or the head not projecting at all. As above, the correct ordering is predicted between adjectives and nouns.

When considering Cl-N phrases, however, we encounter a problem. Since there is nothing in the specifier of Cl, there seems to be nothing to stop FP from moving up to license a definite interpretation, and giving the order (Adj>)N>Cl, which is not possible. When a numeral is present, exactly the correct prediction is made, i.e., an indefinite interpretation is forced. However, without the numeral blocking the movement, there is no way to rule out a definite interpretation for N-Cl sequences (an ordering which is never possible).

### Cantonese

Cl-N phrases in Cantonese can also be analysed in the same way as above, with ClP moving up for a definite interpretation, or staying low (with an empty D)

for an indefinite interpretation. A numeral in Spec QP blocks movement and forces an indefinite interpretation.

In Cantonese, again, it is the bare nouns that represent a problem; there is no way to stop CIP from moving up and licensing a definite interpretation, since no other XP intervenes.

The table in (340) summarises the successes and failures of this analysis. Again, we gain better descriptive accuracy with respect to noun/adjective word order at the price of a failure to capture word order effects elsewhere, and interpretive effects.

(340)	Effect	Captured?	Problems
	Bare N interp (MC)	Yes	
	Bare N interp (C)	No	Cannot block definite interpretation
	A>N (def) order (MC)	Yes	
	Cl-N interp (MC)	No	Predict N>Cl (def) order
	Cl-N interp (C)	Yes	
	Numeral-Cl-N interp (both)	Yes	
	High adjective interp	No	Movement should be blocked; high base position makes incorrect predictions

### 4.5.3 Summary

We have seen that both a head movement and a phrasal-movement approach to licensing definite interpretations runs into a number of problems, both related to word order, and also to capturing the possible (and impossible) interpretations available for each noun phrase configuration in both languages. Movement produces effects on word order, which lead to predictions which are not borne out. When one wants to rule out movement, something has to be able to block that movement, otherwise the alternative is simply to stipulate a block, and all one achieves in the end is a restatement of the facts. The approach that I have proposed above allows us to capture the word order facts, the available interpretations, and avoids the problems faced when positing a movement as the driving force behind differences in interpretation.

The main criticism against a head movement account is that head movement in these cases has to be covert for it to make sense at all, but then to capture the differences between MC and Cantonese, some kind of overttness condition has to be imposed on the licensing of a definite D (Wu and Bodomo 2009) or Cl head (Cheng and Sybesma 1999). An overttness condition coupled with covert movement is nonsensical, but if movement is overt, the word order is not captured.

## 4.6 Conclusion

In chapter 3, I reviewed some attempts to show that instances of head movement which rearrange the order of syntactic objects have semantic effects. I argued that in fact there are no semantic effects of head movement, and that thus the reordering effects that have been analysed as head movement in the past should be reanalysed. In this chapter, I have looked at a related but different problem. The distribution of particular interpretations associated with different noun phrase configurations in Mandarin Chinese and Cantonese has been argued in previous literature to arise from head movement. Those analyses are cases of arguments for a semantically active head movement which has no effect on word order. I have shown in this chapter that a direct linearization theory which does not employ head movement captures that facts better in this case too.

The two types of claim that I have attempted to make in chapters 3 and 4 are summarized in (341).

- (341) a. Head displacement with a semantic effect (SAHM examples): does not exist.
- b. No head displacement, but a visible semantic effect (MC and Cantonese): problematic under movement approach, better accounted for with Direct Linearization Theory.

In general, this chapter is an attempt to show that the kind of empirical domain in which head movement explanations are typically applied is precisely the kind of domain in which DLTs should be applied instead as explanations. Not only do these kinds of theories cover just as much empirical ground, but they also do so more elegantly, and without the conceptual problems that come along with head movement. In the next chapter, I attempt to tackle the more daunting task of applying the same kind of reasoning to a larger set of languages, and

show that conditions on the licensing of definite classifiers can be extended to other languages.

One element of the analysis of Mandarin Chinese and Cantonese remains problematic: the unavailability of a definite interpretation of a Numeral-Cl-N phrase in Cantonese is put down to a stipulation that a Q head somehow interrupts the relationship between the classifier and D, meaning that only a modifier merging in spec D can force a definite interpretation. In the next chapter I argue that the Q-block phenomenon can be explained without recourse to a stipulation like the one proposed in this chapter, and that a number of interesting morphological and interpretive facts about classifier languages follow from the explanation.

# Chapter 5

## Classifier languages, interpretation, and word order variation: Cross-linguistic considerations

### 5.1 Introduction

In the previous chapter, the discussion of noun phrase interpretation and its relation to the morpho-phonological licensing of the D head resulted in the introduction of an undesirable stipulation, Q-block. While the stipulation allows us to capture a generalization about the unavailability of a definite reading being associated with a classifier in the presence of a numeral, it remains little more than a restatement of the generalization: when a numeral (and thus Q) is present, the classifier cannot be definite.

In this chapter, I show that the generalization can in fact be explained without having to stipulate a constraint like Q-block, under a particular analysis of the underlying structure of noun phrases with and without numerals in classifier languages. I propose that the classifier is the spell-out of a rooted projection which is associated with the Div head, and that the numeral merges as a specifier of that head. When the Div head forms part of a morphological word (in a Spear structure) with D, then a definite interpretation is licensed. When a numeral is present, and merges as a specifier of Div, then Div is not in a morphological word with D, and thus a definite interpretation is not licensed. I show that two languages which encode definiteness morphologically on the classifier in a bare Cl-N phrase do not do so when a numeral is present, which

is expected under the proposal. I then consider a broader typology of classifier languages, and show that the proposed noun phrase structure and spell-out system can capture the attested word orders for those languages which exhibit definite classifiers. Finally, I show that the proposed analysis of noun phrase structure also allows us to capture the structure of definite noun phrases in non-classifier languages, focusing on Icelandic.

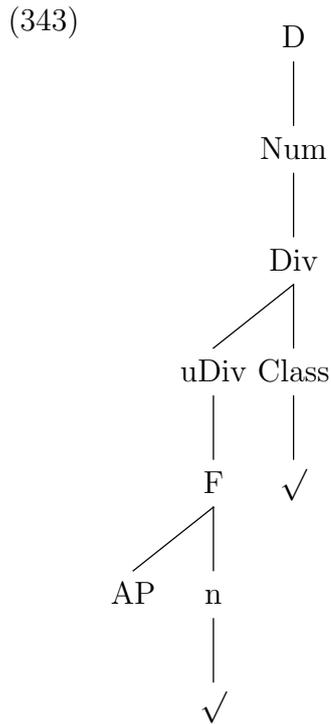
## 5.2 Two classifier structures

The proposal is that noun phrases in classifier languages always project the same functional categories, but that the way in which extended projections combine in Numeral-Cl-N phrases and bare Cl-N phrases is fundamentally different. Recall that the condition on the licensing of D in chapter 4, example (248) says that D must be spelled-out in a morphological word, or it must have an overt specifier:

- (342) A D head is licensed iff either
- a. it is spelled out as part of a morphological word, or
  - b. a phonologically overt element merges in its specifier.

I will claim in this chapter that this condition still stands, but that the licensing of a definite interpretation associated with a classifier is even more stringent. That is, a classifier can only be associated with a definite interpretation if it roots a projection of the head Div, which forms a morphological word with D. In a sense, this is a claim that the classifier is able to behave somewhat like an article, in that it roots a projection which licenses the D head (see section 5.5.3 for discussion of English articles). That means that fundamentally the proposal is very similar to that of Cheng and Sybesma (1999) in spirit, in that classifiers behave like articles in a sense, but the proposal is very different in execution, and does not involve movement.

A bare Cl-N phrase, which can have a definite interpretation in Cantonese, for example, has the following structure:



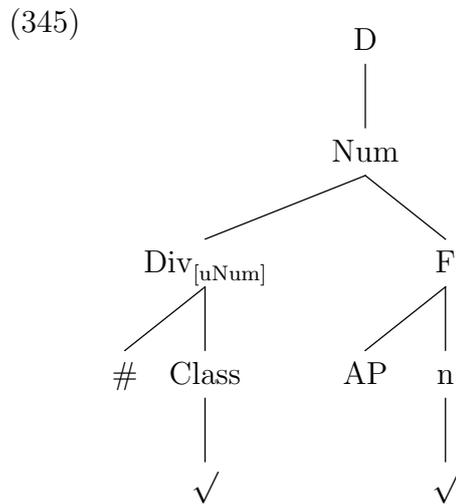
The rooted nominal projection merges as a left daughter of the Div head. The classifier is also a rooted projection, which starts with a Class label. This label comes with a semantics which identifies the class of things that the content of the noun root must fall into. The possible set of classes varies quite widely across languages, and indeed for languages such as Cantonese, the set of classifiers is very large. The Div head merges above Class, and is in a morphological word with D, allowing the bare classifier to give rise to a definite interpretation. Taking the example of Cantonese, the classifier projection would spell out in a position above Div, meaning that the classifier precedes the adjective and noun.

- (344) *bun<sup>2</sup> hung<sup>4</sup> sik<sup>1</sup> ge<sup>3</sup> syu<sup>1</sup>*  
 CL red GE book  
 ‘A/the book’

The same structure without D gives rise to the indefinite interpretation of Cl-N.

Numerals are introduced lower in the structure than claimed in chapter 4. Numerals merge as a specifier of the Div head, and act as cardinality predicates (introducing the cardinality operator | |). Numerals combine directly with the Div head which is part of the rooted Class projection, and then this

entire constituent combines with the rooted nominal projection, as illustrated in (345).<sup>1</sup>



The numeral and the classifier form a constituent, which combines with the nominal projection.<sup>2</sup> Since the Div head never forms a morphological word with D, the D head is not licensed, and therefore a Numeral-Cl-N phrase never has a definite interpretation.

Why are numerals never merged with a classifier projection which forms a morphological word with D? As the tree in (343) shows, a numeral could not merge as the specifier of Div, because the nominal projection fills that specifier position. Therefore, whenever the classifier gives rise to a definite interpretation, we expect that a numeral will not be present. Conversely,

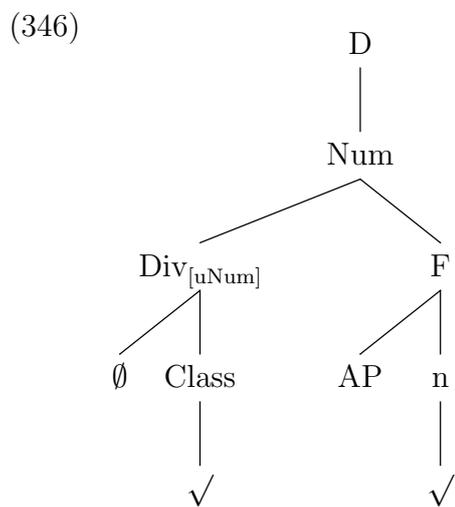
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<sup>1</sup>For the semantics of this structure to work, the meaning of the Num head has to compose with the specifier first, and then the nominal projection after, because the nominal projection at this point is merely a undivided mass. Under Adger (2013)’s approach to the compositional semantics, it is the right daughter which composes with the label (head) first (as would be the case with non-telescoped structures), which is problematic here. To get this to work, I assume that the order of composition of the label and its daughters is type-driven (Heim and Kratzer 1998).

<sup>2</sup>There is some debate in the Chinese and Japanese literature over whether the classifier and numeral form a constituent ((Tang 1990), Fukui and Sakai 2000, Saito, Lin, and Murasugi 2008, 2010). Most of the arguments attempt to show that the classifier behaves as a functional head, and therefore that it cannot be part of a single functional unit with the numeral. This does not, however, suggest that the two cannot be a constituent. The only serious argument claiming that the two could not be a constituent, at least in Chinese is proposed by Saito, Lin, and Murasugi 2008. They show that the numeral and classifier can float to the left in Japanese (where they posit an adjunction structure for the numeral and classifier, which form a constituent), but that the same does not hold in Mandarin. They conclude that the lack of availability of movement of the numeral and classifier in Mandarin means that the numeral and classifier are not a constituent. This is quite a weak argument, as the lack of movement could just be an independent fact about the language. This, coupled with the typological facts reviewed in section 5.4, means that I maintain the position that the two form a constituent.

whenever a numeral is present, it could only have merged as the specifier of Div, and thus Div does not form a morphological word with D, and a definite interpretation is ruled out.

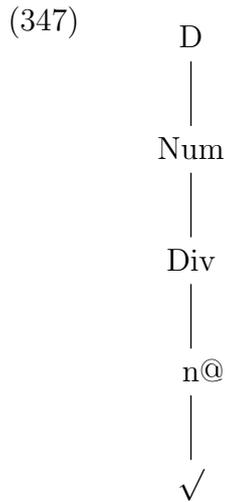
There are two questions which arise from this discussion, related to the interpretation of bare nouns and Cl-N phrases in Mandarin Chinese and Cantonese. First, why can Cl-N phrases never be definite in Mandarin? Second, why can bare nouns be definite in Mandarin? To answer the first, I propose that Mandarin always has the structure in (345) when on the surface there is a Cl-N phrase. This means that either the numeral in this case is a phonologically reduced or null *yi* ‘one’, or that the Div head takes no specifier.



Div is never in the relevant relationship with D to license a definite interpretation, but the classifier may still appear bare. In a sense, classifiers in Mandarin are always affected by the ‘Q-block’ phenomenon.<sup>3</sup>

To answer the second question, I note that the analysis remains the same as for bare nouns proposed in chapter 4. The D head forms a morphological word with the nominal root, and therefore D is licensed.

<sup>3</sup>Since it must be the case that the alternative structure for Cl-N phrases (343) is one that speakers of a language like Cantonese would (and do) posit as the correct structural description of Cl-N, it might be imagined that there is simply not enough evidence (for the Mandarin learner) in the primary linguistic data to suggest that Div interacts with D when a classifier is present.



The original claim that Cantonese speakers simply never posit a morphological word from n to D rules out the possibility of definite bare nouns in Cantonese (but a morphological word from n to Num is well-formed).<sup>4</sup>

Having laid out the proposal that Cl-N phrases and Numeral-Cl-N phrases have distinct structures, in the remainder of the chapter I discuss some empirical consequences. First, I lay out some interesting empirical facts from two classifier languages which express definiteness overtly on the morphology of the classifier. The interaction of numerals and definiteness with the morphological shape of the classifier can be explained quite straightforwardly under the split approach to noun phrase structure in classifier languages presented here.

### 5.3 Numerals block definite classifiers: Empirical evidence

The blocking effect of numerals is a general effect that can be seen in other classifier languages. Cantonese classifiers are able to signal definiteness without any difference in the morphological shape of the classifier. That is to say, a Cl-N sequence is interpreted as either definite or indefinite depending on context, rather than the shape of the classifier which accompanies the noun. This is also

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<sup>4</sup>This still remains a somewhat stipulative explanation. An alternative might be to suggest that the Div head is always implicated in the licensing of D in these two languages, and that there is no Div head in the structure of a bare noun in Cantonese. However, I do not think that this is the correct path to follow, as indefinite bare count nouns in Cantonese still denote individuals, and not unindividuated properties.

true of other classifier languages, including Vietnamese and Nung.<sup>5,6</sup> However, there are two classifier languages spoken in China which exhibit ‘inflecting’ classifiers; that is, classifiers whose morphology encodes different interpretive features of the noun phrase. The striking fact about those languages is that, even though definiteness can be overtly marked on the classifier, the presence of a numeral always prevents the definite classifier from being used. I give a description of the classifier morphology of those two languages in the following subsections, and show that these languages also appear to exhibit the same blocking effect as Cantonese.

### 5.3.1 Wenzhou Wu

The southern Wu variety spoken in Wenzhou is a local dialect of one of the seven major varieties of spoken Chinese, Wu. Cheng and Sybesma (2005) discusses the different interpretive possibilities for different noun phrase configurations in four varieties of Chinese, including Wenzhou Wu (WW). They note that WW bare nouns have the same distribution as Mandarin bare nouns, in that they can be either definite or indefinite in object position, and can only be interpreted as definite in subject position.

Cl-N phrases, however, differ from both Mandarin and Cantonese. While WW is similar to Cantonese in allowing a definite interpretation for Cl-N phrases, it differs from Cantonese in that a definite interpretation for a Cl-N phrase also comes along with a shift in the tone of the classifier. As Cheng and Sybesma (2005) discuss in detail, the 8 lexical tones of the language can be divided into 4 subgroups (A, B, C, and D), each subgroup containing two register subclasses, hi and lo. I reproduce a table presenting the tone values

---

<sup>5</sup>Vietnamese does allow a pluralizing element *những* to precede a classifier and still give rise to a definite interpretation. However, it appears to give rise to a partitive reading:

- (i) a. *Bà tôi nuôi nhiều mèo. Những con mèo đen bắt chuột rất giỏi*  
 grandma I raise a lot cat NHUNG CL cat black catch mouse very good  
 ‘My grandma has a lot of cats. **Some of the black cats** are very good at catching mice.’  
 Nguyen (2004, p37)
- b. *Những cái đèn*  
 NHUNG CL light  
 ‘Some of the lights’  
 Thompson (1987, p180)

<sup>6</sup>Li and Bisang (2011) suggest that a bare Cl-N phrase in Hmong is always interpreted as definite, although there is no data for Numeral-Cl-N phrases. Since I do not have access to speakers of the language, I leave the availability of definite readings for Numeral-Cl-N phrases in Hmong to future research.

for each lexical tone here (contour values taken from Norman 1988):

(348)

1: hi-A	2: lo-A	3: hi-B	4: lo-B	5: hi-C	6: lo-C	7: hi-D	8: lo-D
44	31	45 (abrupt)	24 (abrupt)	42	11	23	12

In an indefinite noun phrase containing a classifier, the classifier carries its underlying, lexically specified tone. However, when a Cl-N phrase is interpreted as definite, the tone of the classifier shifts to a D tone, no matter what the underlying lexical tone of that particular classifier is. Thus, hi-A (tone 1), hi-B (tone 3), hi-C (tone 5) all shift to hi-D (tone 7), and hi-D (tone 8) also surfaces as hi-D. Lo-A (tone 2), lo-B (tone 4), lo-C (tone 6) and lo-D (tone 8) all surface as lo-D.

Therefore, Cl-N phrases in subject position with an underlying ‘indefinite’ classifier tone (i.e., any non-D tone) are unacceptable, because of a ban on indefinite preverbal subjects (similar to that of Mandarin and Cantonese):

- (349) \* *ɗxu<sup>2</sup> kau<sup>8</sup> i<sup>5</sup> tsau<sup>3</sup>-ku<sup>5</sup> ka<sup>1</sup>lɔy<sup>6</sup>*  
 CL dog want walk-cross street  
 Intended ‘a dog wants to cross the street’

A D-tone alternative would be well formed, but with a definite interpretation.

A minimal pair can be shown for a Cl-N phrase in object position (350), where a Cl-N phrase is acceptable under both a definite and an indefinite reading, the difference in meaning being indicated only by tone.

- (350) a. *ɨ<sup>4</sup> ɕi<sup>3</sup> ma<sup>4</sup> paŋ<sup>3</sup> si<sup>1</sup>*  
 I want buy CL<sub>B-tone</sub> book  
 ‘I want to buy **a** book’  
 b. *ɨ<sup>4</sup> ɕi<sup>3</sup> ma<sup>4</sup> paŋ<sup>7</sup> si<sup>1</sup>*  
 I want buy CL<sub>D-tone</sub> book  
 ‘I want to buy **the** book’

Thus, a change in the shape of the classifier gives rise to a change in interpretation.

What about when numerals are combined with Cl-N phrases? Cheng and Sybesma point out that classifiers preceded by numerals keep their underlying

tone, and Numeral-Cl-N phrases are necessarily interpreted as indefinite. That is, definite morphology on the classifier is blocked when a numeral merges, and a Numeral-Cl-N phrase cannot have a definite interpretation.

- (351)  $\eta^4$   $\epsilon i^3$   $ma^4$   $\eta^4$  ***paŋ***<sup>3</sup>  $si^1$   $le^2$   $tshi^5$   
 I want buy four CL<sub>B-tone</sub> book come read  
 ‘I want to buy four books to read’

This is another example of a case where the ability of a classifier to encode definiteness is blocked by a numeral, which is expected if the numeral and the classifier are in a constituent which merges as a specifier, meaning that Div cannot interact with D.

### 5.3.2 Weining Ahmao

A second example of ‘inflecting’ classifiers is the fascinating case of Weining Ahmao (Gerner and Bisang 2008, 2010). A Miao-Yao language spoken in western Guizhou province, Weining Ahmao (WA) encodes not only definiteness, but also number and ‘size’ (diminutive, medial and augmentative) on the classifier. Furthermore, the function of the ‘size’ inflection goes beyond encoding literal size; it mainly carries a socio-pragmatic function whereby the particular choice of classifier form indexes the gender and age of the speaker.<sup>7</sup> Male speakers typically use augmentative forms of the classifier, female speakers the medial form, and children the diminutive form. Although this third aspect of classifiers in the language is particularly rare and interesting, I put aside discussion of the socio-pragmatic facts here, and concentrate instead on number and definiteness; I direct the reader to Gerner and Bisang (2008, 2010) for an in depth discussion of the socio-pragmatic nuances of classifier use in the language.

<sup>7</sup>The only other vaguely similar socio-pragmatic classifier function that I am aware of is exhibited in Assamese, where there are four separate classifiers for humans, but which differ with respect to the status of the human that is being referred to (Aikhenvald 2000, pp102-103):

(i)

Human males of normal rank (respectful)	Female human (disrespectful)	animals; females	High-status humans of any sex	Humans of either sex (respectful)
<i>zɔn</i>	<i>zɔni</i>		<i>zɔna</i>	<i>gɔraki</i>

I summarize the forms of classifiers in Weining Ahmao in the following table (taken from Gerner and Bisang 2008, p.721):

(352)	Gender/Age	Size	Singular		Plural	
			Definite	Indefinite	Definite	Indefinite
	Male	Augmentative	CVT	C*VT	ti <sup>55</sup> a <sup>11</sup> CVT'	di <sup>31</sup> a <sup>11</sup> C*VT'
	Female	Medial	Cai <sup>55</sup>	C*ai <sup>213</sup>	tiai <sup>55</sup> a <sup>11</sup> CVT'	diai <sup>213</sup> a <sup>11</sup> C*VT'
	Children	Diminutive	Ca <sup>53</sup>	C*a <sup>35</sup>	tia <sup>55</sup> a <sup>11</sup> CVT'	dia <sup>55</sup> a <sup>11</sup> C*VT'

Taking the augmentative (male) form to be the base form, C means simple, double or affricated consonant, V means simple or double vowel, T means tone, and the superscript numbers represent relative pitch on a scale from 1 (lowest) to 5 (highest). T' indicates an altered tone from T, and \* indicates a suprasegmental change in the consonant, such as aspiration or devoicing, although there is also sometimes an absence of sound changes. To illustrate the application of this abstract schema with a concrete example from the language, we take the classifier for animacy, *tu*<sup>44</sup> (op. cit. p.722):

(353)	Gender/Age	Size	Singular		Plural	
			Definite	Indefinite	Definite	Indefinite
	Male	Augmentative	tu <sup>44</sup>	du <sup>31</sup>	ti <sup>55</sup> a <sup>11</sup> tu <sup>44</sup>	di <sup>31</sup> a <sup>11</sup> tu <sup>44</sup>
	Female	Medial	tai <sup>44</sup>	dai <sup>213</sup>	tiai <sup>55</sup> a <sup>11</sup> tu <sup>44</sup>	diai <sup>213</sup> a <sup>11</sup> tu <sup>44</sup>
	Children	Diminutive	ta <sup>44</sup>	da <sup>35</sup>	tia <sup>55</sup> a <sup>11</sup> tu <sup>44</sup>	dia <sup>55</sup> a <sup>11</sup> tu <sup>44</sup>

As an example, (354) shows the four ways a male (adult) speaker can refer to oxen, with differences in number and definiteness being encoded solely on the classifier:

- (354) a. *tu*<sup>44</sup>                      *ɲɦu*<sup>35</sup>  
 CL.AUG.SG.DEF ox  
 'The ox'
- b. *du*<sup>31</sup>                              *ɲɦu*<sup>35</sup>  
 CL.AUG.SG.INDEF ox  
 'An ox'
- c. *ti*<sup>55</sup>*a*<sup>11</sup>*tu*<sup>44</sup>                      *ɲɦu*<sup>35</sup>  
 CL.AUG.PL.DEF ox  
 'The oxen'
- d. *di*<sup>31</sup>*a*<sup>11</sup>*tu*<sup>44</sup>                      *ɲɦu*<sup>35</sup>  
 CL.AUG.PL.INDEF ox  
 '(Some) oxen'

Interestingly, constructions involving numerals are always interpreted as indefinite, and when a numeral (including numerals greater than ‘one’) is present, both definite forms and plural forms of the classifier are ungrammatical. A numeral therefore must occur only with an indefinite singular classifier (regardless of ‘size’): all other combinations are ungrammatical (Gerner and Bisang 2010, p588).

- (355) a. \* $i^{55}$   $tai^{44}$   $ɲfiu^{35}$   
 one CL.MED.SG.DEF ox  
 Intended: ‘the one (sole) ox’
- b.  $i^{55}$   $dai^{213}$   $ɲfiu^{35}$   
 one CL.MED.SG.INDEF ox  
 ‘one ox’

- (356) a. \* $tsi^{55}$   $la^{53}$   $tau^{55}$   
 three CL.DIM.SG.DEF hill  
 Intended: ‘the three hills’
- b.  $tsi^{55}$   $la^{35}$   $tau^{55}$   
 three CL.DIM.SG.INDEF hill  
 ‘three hills’

- (357) a. \* $tsi^{55}$   $ti^{55}a^{11}lu^{55}$   $ɕey^{55}$   
 three CL.AUG.PL.DEF valley  
 Intended: ‘the three valleys’
- b. \* $tsi^{55}$   $diai^{213}a^{11}lu^{55}$   $ɕey^{55}$   
 three CL.MED.PL.INDEF valley  
 Intended: ‘three valleys’

The same is true for the quantifier  $pi^{55}dzau^{53}$  ‘several’: it can only occur with a singular indefinite classifier:

- (358) a. \* $pi^{55}dzau^{53}$   $dzai^{53}$   $tɕi^{55}$   
 several CL.MED.SG.DEF road  
 Intended: ‘the several roads’

- b.  $pi^{55} dzau^{53} dzfiai^{213}$                        $te^{55}$   
      several       CL.MED.SG.INDEF road  
      ‘several roads’

Noun phrases with a demonstrative and a Cl-N constituent, on the other hand, always take a definite classifier.

- (359) a.  $lu^{55}$                        $a^{55} v\theta^{55} vfi^{35}$   
          CL.AUG.SG.DEF stone    DEM:MED  
          ‘that stone (at medial distance from me)’
- b.  $*lu^{33}$                        $a^{55} v\theta^{55} vfi^{35}$   
          CL.AUG.SG.INDEF stone    DEM:MED  
          Intended: ‘that stone (at medial distance from me)’

This is another classifier language where the coding of definiteness on the classifier is blocked by the presence of a numeral. I now turn immediately to how the facts from these two languages can be derived.

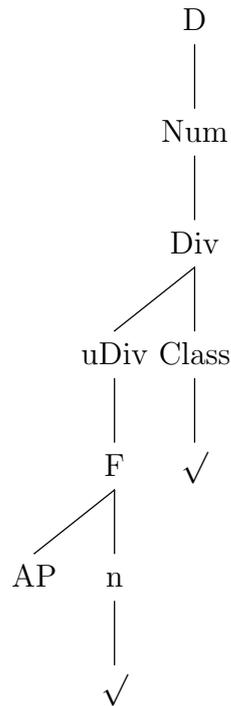
### 5.3.3 Accounting for the facts

Aside from the fact that a classifier obligatorily takes its indefinite form when it appears with a numeral (in both WW and WA), there are also two facts about WA that are relevant here that must be explained:

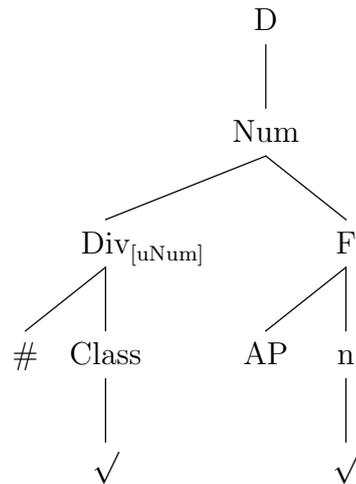
- (360) a. Classifiers are singular in form when a numeral is present;  
      b. Classifiers take definite inflection when a demonstrative is present.

First, we can straightforwardly account for the lack of a definite classifier in the presence of a numeral with the proposal in section 5.2. I repeat the relevant structures here:

(343)



(345)



When a numeral is present, it is a specifier of the Div head of a rooted classifier projection (345). The classifier cannot interact with the D head (it does not form a morphological word with D), and so the classifier spells out in its default indefinite form. When there is no numeral present, the classifier is a rooted projection, and Div forms a morphological word with D (343), meaning that a definite interpretation, and definite inflection, is possible.

Accounting for the other properties of WA requires a more complicated set of assumptions; nonetheless I will show that both facts can be accounted for in the account of noun phrase structure presented above.

### Numerals occur with singular classifiers

First, I consider the fact that classifiers are always singular in form when appearing with numerals, whereas bare classifiers can appear in both singular and plural forms. I propose that plural bare classifiers are classifiers which have a Num<sub>[-at]</sub> exponent affixed to them. Under the structure in (343), the classifier forms a morphological word with Num, and so the Num head spells out as an affix to the classifier root. However, the general classifier schema presented in the table in (352) suggests that the plural form is a prefix to the classifier root (*ti<sup>55</sup>a<sup>11</sup>*- in the definite and *di<sup>31</sup>a<sup>11</sup>*- in the indefinite form of the augmentative), and under Mirror we would expect it to be a suffix. Here

I adopt the claim from Bye and Svenonius (2012) that prefixes are actually suffixes which are displaced to the left edge of a prosodic word in the phonology. As I discussed in footnote 16, chapter 2, the claim is that lexical items can be specified as ‘Antitropical’, which means that they do not align with the right edge of a prosodic word. Such a suffix has the general structure in (361a), where  $x$  is a lexical item, the symbol  $\bullet$  is read as ‘does not align with’, and  $]_{\omega}$  represents a prosodic word boundary. This is followed by a concrete example from Weining Ahmao in (361b).

- (361) a.  $x \bullet ]_{\omega} \Leftrightarrow \langle Y \rangle$   
 b.  $di^{31}a^{11} \bullet ]_{\omega} \Leftrightarrow \langle \text{Num}_{[-at]} \rangle$

Definiteness, on the other hand, does not appear to straightforwardly behave as an affix, particularly since the phonological processes which mark definiteness are not entirely predictable. Generally in the plural, the initial consonant of the plural prefix is devoiced, and the initial syllable undergoes a shift in tone in the definite form. However, in the singular there are a wide variety of processes which affect the shape of the stem, summarized in (362).

- (362)  $[-\text{def}, +\text{at}] \rightarrow [+ \text{def}, +\text{at}]$
- a. aspiration
  - b. deaspiration
  - c. voicing
  - d. devoicing
  - e. tone shift (up)
  - f. tone shift (down)
  - g. no phonological change

The wide variety of processes, and the fact that opposite processes achieve the same result in some cases, means that it would be wrong to suggest that D acts as an affix of any sort. I suggest instead that the root receives a contextual spell-out in the presence of a singular Num head and a definite D head which is simply stored in the lexicon. This is a case of root allomorphy conditioned by a span of more than one functional head, something which has been proposed to exist in the Greek voice and aspect system (Merchant 2015), and which generally would be predicted to exist under a spell-out system which allows the locality conditions on allomorphy to be determined by spans.

In the presence of a plural Num head, however, it seems that the root receives its default spell-out, and a span of the Num head and D head spell-out as a single unit, which is displaced to the left edge of the word that it forms with the classifier. Where the classifier root does not form a morphological word with Num or D, however, it spells out in its default form: this is the case whenever a numeral is present.

### Demonstratives occur with definite classifiers

Recall that when a demonstrative occurs with a bare Cl-N phrase in Weining Ahmao, the classifier must appear in its definite form:<sup>8</sup>

- (363) a. *lu*<sup>55</sup>                      *a*<sup>55</sup>*və*<sup>55</sup> *vfi**ai*<sup>35</sup>  
           CL.AUG.SG.DEF stone    DEM:MED  
           ‘that stone (at medial distance from me)’
- b. \**lu*<sup>33</sup>                      *a*<sup>55</sup>*və*<sup>55</sup> *vfi**ai*<sup>35</sup>  
           CL.AUG.SG.INDEF stone    DEM:MED  
           Intended: ‘that stone (at medial distance from me)’

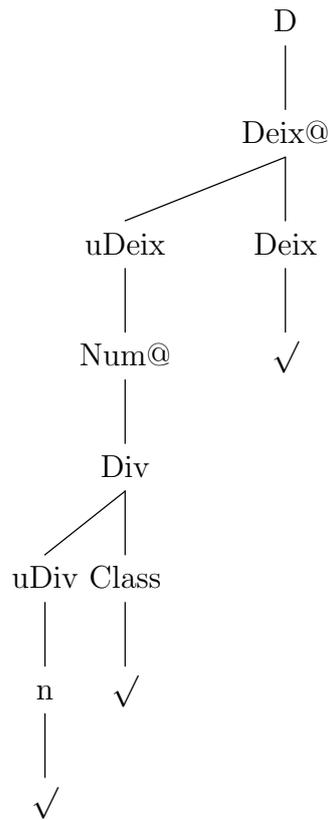
To achieve a rightward demonstrative, I propose that a Wiggle structure attaches a uDeix head at the top of the projection of the classifier to a Deix head which forms part of a projection to D, as in Mandarin and Cantonese (see chapter 4, section 4.4.8). This projection is rooted by some kind of locative or directional root; Weining Ahmao exhibits a six way demonstrative system which takes into account distance and altitude relative to the speaker (see Gerner 2009a, p63).<sup>9</sup>

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<sup>8</sup>The classifier is obligatory when there is a demonstrative in the noun phrase.

<sup>9</sup>I propose in section 5.5 that a similar structure is implicated in definite articles and demonstratives in English.

(364)



The correct order Classifier > Noun > Demonstrative is achieved with a spell-out position for the classifier projection above Div, and a spell-out position for the demonstrative projection in any position other than D (@ diacritics on the tree represent only one possible way to achieve the correct order).

There is a problem here, however. D is no longer part of a morphological word with Div, yet the classifier still appears with definite morphology. The D head is licensed straightforwardly by being in a morphological word with Deix, but we predict that the classifier should not be morphologically definite. I suggest here that the morphological definiteness on the classifier here results from an agreement relation between D and the uDeix head which forms the highest label in the classifier projection. A definiteness feature on the interpretable Deix head, valued by D, is copied onto the uDeix head, giving rise to a ‘concord’ effect. However, if such a relation between the D head and the Deix head is possible here, then we would expect that Num could agree with uNum in the structure in (345) above, and so there would no longer be a way to block a plural classifier when a numeral is present. I propose that the inability for the classifier to take a plural form is the result of the fact that plurality is indicated through an affix in WA. Affixal morphology is the result of a head being in a morphological word with the root that it attaches to, but

the classifier does not form a morphological word with the Num head when a numeral is present. The realization of definiteness, on the other hand, is not affixal in WA. Rather, definiteness appears as a phonological adjustment to the root, which I suggest can be the result of the uDeix head carrying an agreement feature uDef.

I therefore make the prediction that non-suffixal plural Agree should be possible in some classifier language which expresses plurality on classifiers. This prediction is borne out. Northern Kam, a Kam-Tai language spoken in Guizhou, China, expresses number on its classifiers, and plural classifiers appear with numerals higher than one (examples from Gerner 2009b):

- (365) a. *i<sup>45</sup> jiu<sup>22</sup> ɲa<sup>45</sup>*  
           one CL.SG river  
           ‘one river’
- b. *ham<sup>11</sup> tɿu<sup>22</sup> ɲa<sup>45</sup>*  
           three CL.PL river  
           ‘three rivers’

The number morphology is represented as a shift in the first consonant of the classifier, and is not affixal (see Gerner (2009b, p171) for a full list of phonological changes that underlie the singular/plural distinction in classifiers in Northern Kam).

This of course makes the much broader typological prediction that there should be no classifier language which marks plurality as an affix on classifiers, and where a plural classifier appears with a numeral higher than one. Some classifier languages appear to have a general plural classifier (e.g., Bangla, Dayal 2014; Canotnese, chapter 4 of this thesis), and others have classifiers and obligatory number marking on the noun (Yuki, Nootka, Tlingit, Dravidian languages, and Ejagham, Aikhenvald 2000), but independent number marking on the classifier appears to be a rarity in world languages, and as far as I know the generalization is correct. I leave a more in depth study of number marking on classifiers to future research.

So, we have seen now that the proposal of two different structures for Cl-N phrases and Numeral-Cl-N phrases, and the proposal that the numeral and the classifier form a constituent to the exclusion of the noun, means that we capture Q-block phenomena without stipulation, and can also account for the co-occurrence of definite classifiers and demonstratives, and singular classifiers

with numerals higher than one in Weining Ahmao. The account ties together interpretive and morphological facts about classifier languages, without appealing to movement.

## 5.4 Word order in classifier languages

In this section I will look at the typological consequences of my analysis of noun phrase structure in classifier languages. I discuss attested and unattested orders of noun phrase internal elements across classifier languages, and then discuss the predictions that my system makes, and how well those predictions are borne out by the facts. In section 5.4.3 I then show what an alternative that makes use of XP-movement to derive word order variation might look like, ultimately concluding that my DLT account of word order variation has better empirical coverage than the alternative. Therefore, the system presented in this thesis represents an improvement on previous accounts of variation, in both conceptual and empirical terms.

### 5.4.1 Gaps in the typology

Greenberg (1972) discusses the possible orders of the numeral, classifier and noun, and claims that no language exhibits an order where the numeral and the classifier are separated from each other by the noun. Furthermore, he points out that of the four remaining orders, two are quite common and the other two are exceedingly rare, each being instantiated by only one language:<sup>10</sup>

(366) Order of Numeral, classifier and noun:

- a. Numeral>Classifier>Noun: very common (Mandarin, Vietnamese, Cantonese, ... )
- b. Noun>Numeral>Classifier: very common (Thai, Khmer, Loni, ... )
- c. Classifier>Numeral>Noun: very rare (Ibibio only)
- d. Noun>Classifier>Numeral: very rare (Bodo only)

---

<sup>10</sup>Simpson (2005) points out that order (366e) is possible in Nung, but only with the numeral ‘one’. A special position for the numeral ‘one’ is not entirely unusual cross-linguistically: Thai has ‘one’ in a non-canonical right peripheral position (N>Cl>‘one’; usual order (366b), Piriawiboon 2010), and Loni has ‘one’ in a non-canonical left peripheral position (‘one’>Cl>N; usual order (366b), Hamel 1994). I discount these orders from the typology below, and assume that there must be some other explanation for the unusual position of ‘one’.

- e. Classifier>Noun>Numeral: Not attested
- f. Numeral>Noun>Classifier: Not attested

Aikhenvald (2000) suggests that the order in (366e) is in fact attested in Ejagham, a Niger-Congo language of the Cross River basin in Nigeria, but confirms that (366f) is unattested. However, a closer inspection of Ejagham classifiers suggests that it would be reasonable to discount the language as a true example of the order Classifier>Noun>Numeral. First of all, classifiers are generally not required for most nouns, and are only obligatory when enumerating seeds, fruits, grains, plants and vegetables. An example from Watters (1981, p310) illustrates:

- (367) *à-mə̀gè*                      \                      *í-č̀kú̀d*                      *á-bá'é*  
 NCL1/6-CL<sub>small.round</sub> GEN NCL19/3-orange.seed NCL1/6-two  
 'two orange seeds'

This example shows that classifiers combine with the noun through a genitive floating tone, and furthermore that the numeral agrees with the classifier and not the noun in its noun class prefix. Therefore, it appears that these examples can be treated as on par with pseudopartitives in English, with a meaning something like 'two pieces of orange seed'. The classifier in this case appears to behave more like a nominal element.<sup>11</sup>

If we accept this analysis, and therefore rule out separating the numeral and the classifier, then 4 language types remain. The rarity of type (366c) and (366d) also warrants a closer look at the two languages which exhibit the patterns. First, with respect to Ibibio, a descriptive grammar, Essien (1990), shows no evidence that there are classifier like elements at all in the language. Numerals combine directly with nouns, in the order Noun>Numeral:

- (368) *éniìn*      *itìòn*  
 elephant five  
 'five elephants'

There is no change in the morphology of the numeral from its citation form, and there is no separate classifier like element. The example that Greenberg (1972, p.23) cites is from Kaufman (1972), and appears to be a pseudopartitive:

<sup>11</sup>Under an analysis which treats the numeral and classifier as two heads/phrases which form distinct projections not in constituency (e.g., Li 1999, Cheng and Sybesma 1999, Borer 2005a), the rarity, or rather non-existence, of languages which exhibit an order where the numeral and the classifier are separated becomes entirely surprising.

- (369) *ákpó ífià kèèt*  
 stalk firewood one  
 ‘a piece of firewood’

Since nouns do not normally combine with classifiers, and since the only classifier like elements in the language could be analysed as pseudopartitives, I conclude that Ibibio does not constitute a language with the order Classifier>Numeral>Noun (indeed, it does not appear to be a classifier language at all).

Bodo, on the other hand, deserves a closer inspection, as it does truly appear to be a classifier language. In the next subsection I show that the nature of the numeral and classifier in Bodo is more complicated than it appears on the surface, and thus that the Classifier>Numeral order does not provide a counterexample to the generalization that numerals precede classifiers cross-linguistically.

### Bodo

The Tibeto-Burman language Bodo (or Boro) is claimed to exhibit the order Noun>Classifier>Numeral (Bhattacharya 1977, Moral 1997):<sup>12</sup>

- (370) N Cl-Numeral
- a. *<sup>2</sup>man<sup>1</sup>si <sup>2</sup>sa-<sup>1</sup>noy*  
 man CL-two
- b. *<sup>2</sup>məy<sup>1</sup>der <sup>2</sup>ma-<sup>1</sup>se*  
 elephant CL-one

Bhattacharya (1977) points out that both the classifier and the numeral appear to be bound morphemes, and as such I suggest that the numeral appears as an affix to the classifier root, and it is this that gives rise to the unusual Cl-Numeral order. As evidence for this perspective, it is illustrative to look at the forms that numerals take, and particularly those numerals which are higher than ten. Classifiers appearing with numerals from one to ten all have the form Cl-Numeral, as shown in (371), with the classifier for inanimate things *<sup>2</sup>mon*:

<sup>12</sup>I follow Bhattacharya’s orthography in all following examples, but replace his *ō* with *ə*.

(371)	<sup>2</sup> mon <sub>CL</sub>	- <sup>2</sup> se	1
		- <sup>1</sup> nəy	2
		- <sup>2</sup> tham	3
		- <sup>2</sup> brəy	4
		- <sup>1</sup> ba	5
		- <sup>2</sup> do	6
		- <sup>1</sup> sni	7
		- <sup>1</sup> zad	8
		- <sup>2</sup> si <sup>1</sup> kho	9
		- <sup>1</sup> zi	10

Interestingly, the number ten also has an separate free form, <sup>2</sup>khaw<sup>1</sup>se (which can be decomposed to <sup>2</sup>khaw-<sup>1</sup>se, ‘ten one’), which does not appear with a prefixed classifier (the form -<sup>1</sup>zi attaches to a classifier instead). When counting with classifiers above ten, we have the following configuration:<sup>13</sup>

- (372) a. <sup>2</sup>khaw<sup>1</sup>se <sup>2</sup>mon-<sup>1</sup>se  
ten CL-one  
‘eleven (things)’
- b. <sup>2</sup>khaw<sup>1</sup>se <sup>2</sup>mon-<sup>1</sup>noy  
ten CL-two  
‘twelve (things)’

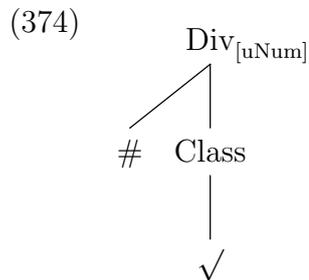
The pattern is the same up to nineteen, and the free morpheme twenty is formed in a similar way as that of ten, taking the form <sup>2</sup>khaw<sup>1</sup>noy (‘ten two’). Thus, twenty-eight (things) is expressed as in (373).

- (373) <sup>2</sup>khaw<sup>1</sup>noy <sup>2</sup>mon-<sup>1</sup>zad  
twenty CL-eight  
‘twenty-eight (things)’

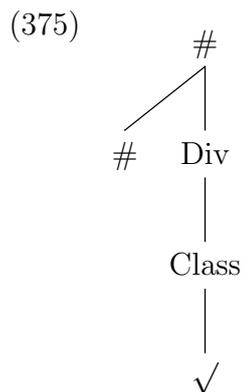
All of these facts immediately make sense if we take the numerals one to ten to be affixes to the classifier, and then complex numerals including the free form of ten, twenty and so on to be specifiers. Assuming that the classifier and numeral form a constituent of the form proposed in section 5.2, one could take # to be phonologically null in Bodo for numbers less than 10, and the spell-out of the Div head to be the appropriate number suffix. I repeat here

<sup>13</sup>There is a tone sandhi effect which shifts the tone of -se from 2 to 1.

the structure of the numeral and classifier, ignoring the remainder of the noun phrase:



When the numeral is higher than ten, # spells out as e.g., <sup>2</sup>*khaw<sup>1</sup>noy*, ‘twenty’, and the Div head spells out the suffix between ‘one’ and ‘nine’, which attaches to the right of the classifier. Another possibility is that, in Bodo, an extra head projects above Div, and the numeral merges in its specifier instead. I annotate that head #:



In this case Div does its usual semantic job, but the # head provides a site for the numeral affix to spell out. This head also has a specifier position to host multiples of 10. Although it is possible in this way to capture the ordering facts, and the affix-like nature of the numerals which combine with a classifier in Bodo, it is still unclear why this kind of classifier and numeral system should be so incredibly rare, and I am not aware of any other language that has such a system. Regardless of the particular execution of the analysis, the fact that the only language which exhibits the order in (366) has such an unusual numeral system, with an unusual morphology, is enough to suggest that we should consider the order Noun>Classifier>Numeral unattested.

## Summary

The preceding discussion of the order of the classifier and the numeral lead me to conclude that a more accurate typological picture is the following, where we take numerals to be non-affixal:

- (376) a. [Numeral>Classifier]>Noun: very common  
b. Noun>[Numeral>Classifier]: very common  
c. [Classifier>Numeral]>Noun: Not attested  
d. Noun>[Classifier>Numeral]: Not attested  
e. Classifier>Noun>Numeral: Not attested  
f. Numeral>Noun>Classifier: Not attested

This provides us with more evidence that the numeral and classifier form a constituent: they are never separated by other elements in the noun phrase, which would not be expected if they were not taken to be a separate constituent. This is not to say that there is not some alternative explanation for the typological facts; rather I intend to say that the typological facts are quite easily understood if we adopt the assumptions about numeral classifiers that I laid out in section 5.2.

### 5.4.2 Generating variation

The above discussion of classifier language typology established that proposal that the numeral and classifier are a constituent (section 5.2) makes the correct predictions with respect to the relative order of the numeral, classifier and noun across languages: numeral and classifier are never separated by the noun, and the classifier appears to the right of the numeral in all cases. I now move on to a discussion of possible word orders when we also consider the position of the demonstrative and adjectives.

A cross-linguistic survey of Southeast Asian languages in Jones (1970), together with data from Greenberg (1972), Aikhenvald (2000), and Simpson (2005) gives the following set of attested orders for classifier languages:<sup>14</sup>

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<sup>14</sup>This is of course putting aside those orders that I have claimed are spurious in previous sections.

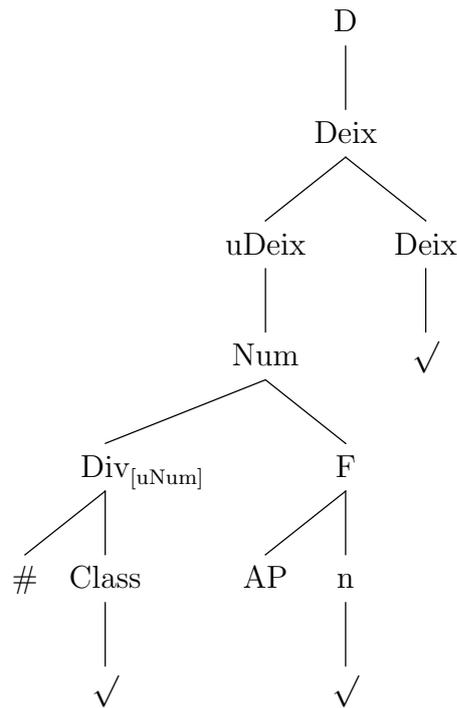
(377)	Word order	Example Languages
	# > Class > N > A > Dem	Vietnamese, Nung, Malay
	N > A > # > Class > Dem	Thai, Khmer, Javanese
	Dem > N > A > # > Class	Burmese, Maru
	Dem > # > Class > A > N	Mandarin, Cantonese
	Dem > # > Class > N > A	Yao

Three more attested orders can be added to the set of classifier languages. Coast Tsimshian, or Sm'álg yax, spoken in British Columbia, exhibits the order # > Class > A > N > Dem (Dunn 1995). Newari, or Kathmandu Newar, a Tibeto-Burman language spoken in Nepal, and Dulong, a Tibeto-Burman language spoken in Yunnan, China, both exhibit the order Dem > A > N > # > Class (see Hargreaves 2003 for Newari, and LaPolla 2003 for Dulong). The Loloish languages Nuosu Yi (Northern Loloish), Lisu (Central Loloish) and Akha (Southern Loloish) exhibit the order N > A > Dem > # > Class (See Gerner 2013 for Nuosu Yi, Jones 1970 for Lisu and Hansson 2003 for Akha.). This gives us the complete summary in (378).

(378)	Word order	Example Languages
1.	# > Class > N > A > Dem	Vietnamese, Nung, Malay
2.	N > A > # > Class > Dem	Thai, Khmer, Javanese
3.	Dem > N > A > # > Class	Burmese, Maru
4.	Dem > # > Class > A > N	Mandarin, Cantonese
5.	Dem > # > Class > N > A	Yao
6.	# > Class > A > N > Dem	Coast Tsimshian
7.	Dem > A > N > # > Class	Newari, Dulong
8.	N > A > Dem > # > Class	Nuosu Yi, Lahu, Akha

Following the discussion in section 5.3.3, I take the demonstrative to involve a wiggle structure to a rooted projection through a deixis head, Deix, which projects to D. The underlying structure of the noun phrase is given in (379).

(379)



This structure as it is, with different positions of spell-out for the *n* and *Deix* projections, generates the orders in (380).

(380)	@ in D (leftward Dem)	@ in Deix (rightward Dem)
@ in Num	Dem > # - Cl > N > A (Yao)	# - Cl > N > A > Dem (Nung)
@ below Num	Dem > # - Cl > A > N (Cantonese)	# - Cl > A > N > Dem (Coast Tsimshian)
@ in uDeix	Dem > N > # - Cl > A (Unattested?)	N > # - Cl > A > Dem (Unattested?)

Out of the seven attested orders presented in (378), only four are generated from the structure in (379), and we also generate two unattested orders, where the nominal projection spells out high, in the *uDeix* head. As it stands, there is no way to account for the orders in which the numeral and classifier follow the noun and adjective. So how do we account for the Thai (line 2), Burmese (line 3), Newari (line 7) and Loloish (Line 8) orders?

One possible approach is to take the noun to spell out high in these languages, and to assume that the adjective obligatorily merges as a high reduced relative clause (cf. Cinque 2010). There is some suggestive evidence from Nuosu Yi that this is indeed the correct way to treat adjectives in the language.

### Adjectives in Nuosu Yi

At a glance, there seems to be little evidence that simple adjectival modification in Nuosu Yi involves reduced relative clauses. Consider the following examples, taken from Gerner (2013):

- (381) a. *bbox bu ax hmu ma*  
 mountain high CL  
 ‘a high mountain’
- b. *co sur ggat bbu*  
 person rich CL  
 ‘a rich household’

The adjectives can be followed by a classifier, and bear no specific marking which identifies them as being in a relative clause. However, this is also the case for full relative clauses; they can also appear bare, so long as they are followed by a classifier:

- (382) *nyop mu co zza yy cop vup gox sha ggex-su ix go bbo ox*  
 peasant cereals 3.PL sell send CL-DEF home go SFP  
 ‘The peasants who sold cereals at the market have gone home’

Gerner (2013), a comprehensive descriptive grammar of Nuosu Yi, points out that the distribution of adjectives and relative clauses in the noun phrase follows the following general pattern:<sup>15</sup>

- |       |   |                |     |
|-------|---|----------------|-----|
| (383) | N | Adj            | CI' |
|       | N | Adj- <i>su</i> | –   |
|       | N | RC             | CI' |
|       | N | RC- <i>su</i>  | –   |

CI' indicates a sequence of the numeral, classifier and a final particle *su* which operates as either a nominalizer or as a definiteness marker. The table in (383) shows that both adjectives and relative clauses either have to be followed by a nominalizer *su* and nothing else, or that they must be followed by some part of the CI' sequence when they appear without *su*. That is to say, relative clauses and adjectives exhibit precisely the same distribution. Stacking of adjectives and relatives is possible with a repetition of the MOD-*su* configuration, but the final classifier sequence prevents any further stacking.

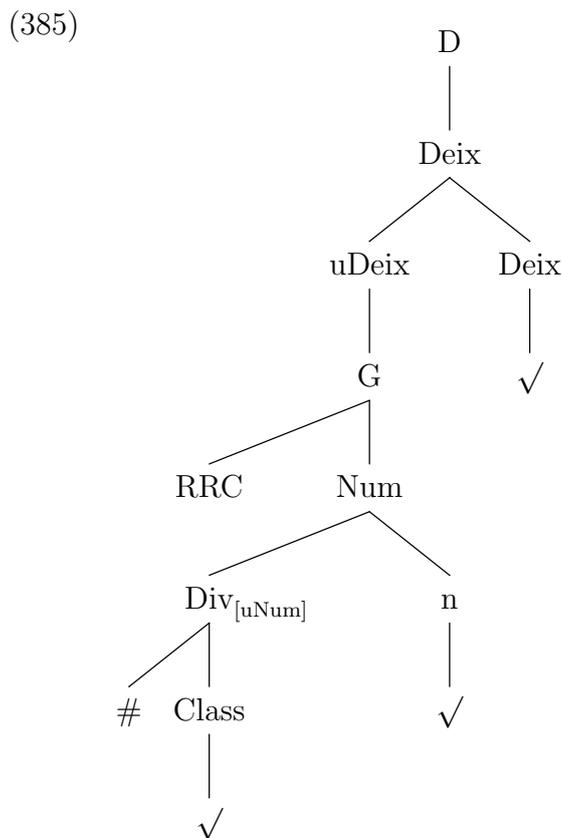
<sup>15</sup>I focus here on postnominal adjectives. There is in fact a prenominal position for adjectives which is quite clearly a relative clause position, and which only has an appositive reading associated with it, but I will leave aside discussion of this position. See Gerner (2013), particularly section 5.1.

- (384) a. *ngat i dix a vut su ap ndi hxix vy six la su*  
 1SG.POSS garment green NOM yesterday buy RES come NOM  
 ‘my green shirts that I bought yesterday’
- b. *ngat i dix a vut su ap ndi hxix vy six la suo*  
 1SG.POSS garment green NOM yesterday buy RES come three  
*ggux su*  
 CL<sub>plural</sub> DET  
 ‘my three green shirts that I bought yesterday’

This means that adjectives are indistinguishable from relative clauses.

### Returning to the post-nominal numeral orders

We can imagine, then, that some classifier languages which exhibit a post-nominal numeral have high adjectives which merge as reduced relative clauses. This would result in the following structure for those languages:

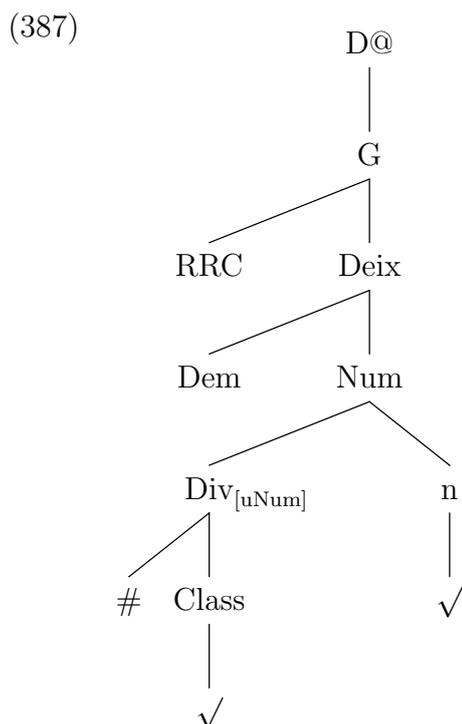


The orders in lines 2, 3 and 7 can then be generated as shown in (386), and an additional unattested order is generated.

(386)	Spell-out position	Order
	@ in uDeix and Deix	N > A > # > Class > Dem (line 2)
	@ in uDeix and D	Dem > N > A > # > Class (line 3)
	@ in G and D	Dem > A > N > # > Class (line 7)
	@ in G and Deix	A > N > # > Class > Dem (unattested)

Capturing these orders requires making quite a stipulative claim about the nature of adjectives in these languages. Allowing adjectives to merge as reduced relative clauses means that the constraints on possible word orders become much more loose, and one could potentially posit a number of other positions for RRCs in the structure, meaning that our system potentially allows too much freedom. This is a general problem which is also faced by movement accounts of word order variation in the DP. If we adopt the position from Cinque (2010) that adjectives can merge as RRCs somewhere high up in the extended projection the noun, then the analysis of word order variation in Cinque (2005) loses much of its explanatory power too, since a number of ungenerable (and unattested) orders would become possible.

Furthermore, the Loloish order is not generated by this structure, because the demonstrative immediately follows the adjective in those languages. For these languages, one could propose that the demonstrative merges as a specifier of the Deix head, rather than through a wiggle structure, the RRC merges above the Deix head, and the noun spells out high in D. (387) illustrates.



Allowing demonstratives to merge as specifiers also means that we generate two more unattested orders even when adjectives merge in their usual low structural position. For this reason, I do not adopt the position that the demonstrative can merge as a specifier, and instead accept that the system does not generate the Loloish order. I leave this as an open question for future research.

To summarize, the system can capture the orders in (388), including three unattested orders, on the assumption that post-nominal numeral languages introduce adjectives as reduced relative clauses. It cannot, however, capture the Loloish order,  $N \succ A \succ Dem \succ \# \succ Class$ .

(388)	Word order	Example Languages
1.	$\# \succ Class \succ N \succ A \succ Dem$	Vietnamese, Nung, Malay
2.	$N \succ A \succ \# \succ Class \succ Dem$	Thai, Khmer, Javanese
3.	$Dem \succ N \succ A \succ \# \succ Class$	Burmese, Maru
4.	$Dem \succ \# \succ Class \succ A \succ N$	Mandarin, Cantonese
5.	$Dem \succ \# \succ Class \succ N \succ A$	Yao
6.	$\# \succ Class \succ A \succ N \succ Dem$	Coast Tsimshian
7.	$Dem \succ A \succ N \succ \# \succ Class$	Newari, Dulong
8.	$Dem \succ N \succ \# \text{-Cl} \succ A$	Unattested
9.	$N \succ \# \text{-Cl} \succ A \succ Dem$	Unattested
10.	$A \succ N \succ \# \succ Class \succ Dem$	Unattested

In the next section, I show what an XP-movement analysis of word order variation in the DP might look like, starting with a discussion of one such account from Simpson (2005), and extending that account based on a similar approach to word order variation from Cinque (2005). I then compare the results of the XP-movement account with those of the DLT account presented above.

### 5.4.3 An XP-movement alternative

Simpson (2005) presents an argument that word order variation in Southeast Asian classifier languages can be explained by appeal to leftward phrasal movement of subparts of the DP. Looking at the difference between Thai and Chinese, it might be tempting to analyse the two languages as simply mirror images of each other, if one takes the classifier to form a single unit with the



and is developed fully in Cinque (2005), but also has the added benefit of not overlooking the position of classifiers in deriving the orders.

So what is wrong with this story? Basically, the problem lies in the contradictory nature of two of the steps of the argument. First, we have the claim that there is such a thing as a scopal hierarchy within the DP; it is a fundamental fact about language (perhaps the result of a more general fact about the nature of human cognition) that demonstratives scope over numerals, which scope over classifiers which scope over adjectives which scope over nouns, in the unmarked case. Then, we have the claim that movement operations are required to derive the word order that we see on the surface in Thai; movement operations which fundamentally alter the scopal relations between elements in the DP. Simpson attempts to motivate these movements through a semi-functional account by claiming that they can give rise to information structure effects related to presentational focus, particularly when listing items. It is indeed true that languages like Mandarin Chinese (391a), and in a sense, English, (391b) have a marked order where the numeral and classifier (or a measure in English) follows the noun when listing off quantities:

- (391) a. *shu, liang-ben; bi, san-zhi*  
           book, two-CL; pen, three-CL  
           ‘Two books, three pens ...’ (listing what you want at a stationary shop)
- b. *Sugar, two pounds; bread, two loaves; wine, four bottles*

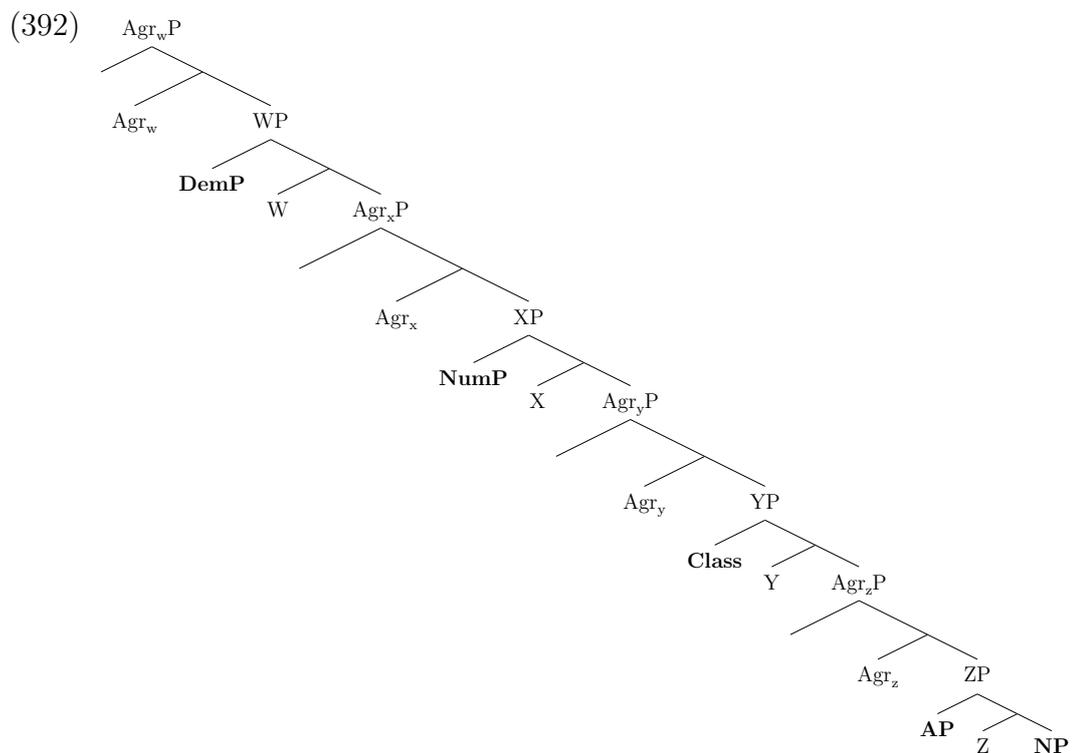
However, as Simpson concedes, the N>Num>Cl order in Thai does not come with any presentational focus; it is the unmarked order, and there is no detectable difference in meaning between *ten books* in English and *náŋsǎm sǐp lēm* in Thai. Appeals to a diachronic process of ‘re-analysis’ do not gain us any ground, as the movements are claimed to be necessary to get the word order right synchronically, and the structural configuration of the elements in the DP will be affected by such movements.

### **A movement account of classifier language word order variation**

Putting aside these problems, I want to now push Simpson’s analysis further, and see how it compares to my proposal with respect to the kind of predictions that it makes about possible orders. I assume a movement analysis of word order variation in the DP along the lines of that presented in Cinque (2005),

since the conditions on the movement of elements is concretely laid out, and meaningful predictions can be generated.<sup>19</sup>

Simpson assumes that the numeral and the classifier are functional heads, Num<sup>0</sup> and Cl<sup>0</sup> respectively, and in Cinque's story they would be specifiers of functional heads. However, this does not make a difference to the orders that can be generated, as no subpart of the nominal extended projection can move if it does not contain the noun. Therefore, for concreteness, I treat the numeral and the classifier as specifiers. This gives us the following base generated structure of the noun phrase:<sup>20</sup>



Subconstituent of the DP can move to Agr positions throughout the extended projection of the noun, giving rise to word order variation. I directly adopt the constraints on movement from Cinque (2005), given in (393).

- (393) a. Merge order: [ . . . [WP Dem . . . [XP Num . . . [YP A [NP N]]]]]
- b. Parameters of movement
- i. No movement, or
  - ii. Movement of NP plus pied-piping of the *whose picture* type (movement of [NP[XP]]), or

<sup>19</sup>See also chapter 1 for a discussion of Cinque (2005).

<sup>20</sup>Contentful elements are in boldface.

- iii. Movement of NP without pied-piping, or
- iv. Movement of NP plus pied-piping of the *picture of who* type (movement of [XP[NP]]).
- v. *Total* versus *partial* movement of the NP with or without pied-piping (either NP moves all the way up or only partially)
- vi. Neither head movement nor movement of a phrase not containing the (overt) NP is possible.

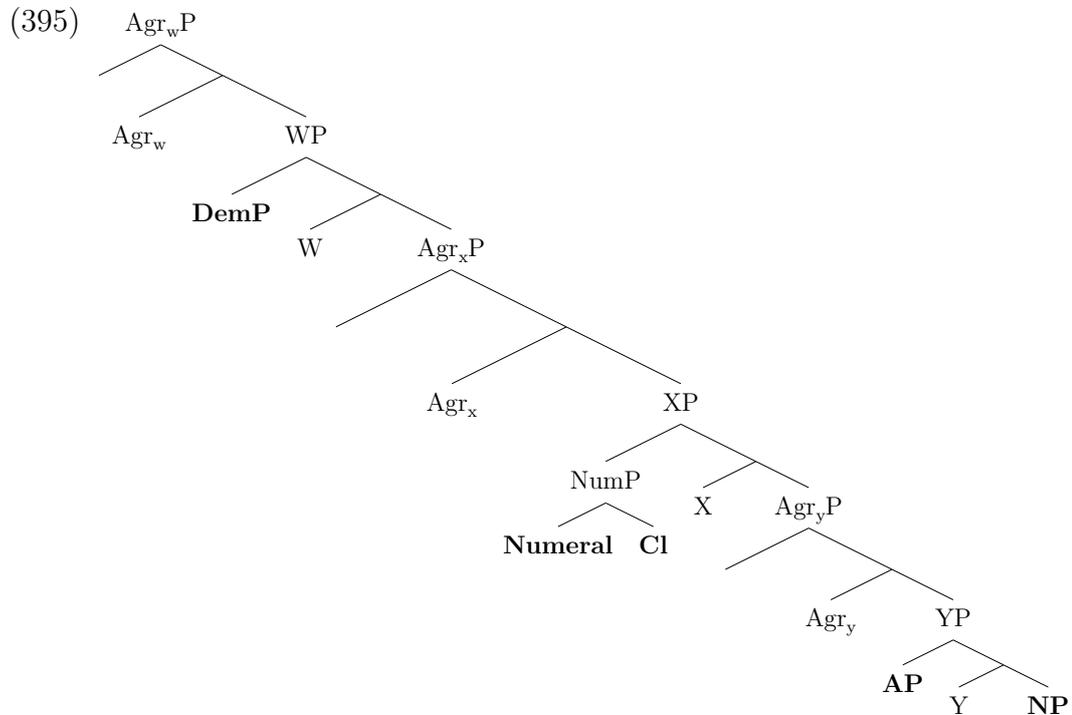
With 5 elements now in the noun phrase, there are  $5! = 120$  logically possible orderings of those elements. Given the base generated structure of the noun phrase, and the constraints on movement presented above, this number is reduced. However, the number is still very large, and it will suffice to show that a number of unattested orders can be generated. In (394) I list some of those orders, focusing on orders where the classifier and noun are separated from each other, and where the classifier is left adjacent to the numeral.

- (394) a. Dem>Num>N>Class>A  
 b. Dem>Num>A>N>Class  
 c. Dem>Class>A>N>Num  
 d. Class>A>N>Dem>Num  
 e. Dem>Num>N>A>Class  
 f. Dem>Class>N>A>Num  
 g. Class>N>A>Dem>Num  
 h. Dem>A>N>Class>Num  
 i. Dem>N>A>Class>Num  
 j. A>N>Class>Dem>Num  
 k. N>A>Class>Dem>Num  
 l. Dem>N>Num>A>Class  
 m. N>Dem>Num>A>Class  
 n. N>Dem>Class>A>Num

None of these orders are attested (although see 5.4.1 above).

To curb the power of the system so that we do not generate so many unattested languages, I will assume, as I have in my own proposal, that the numeral and the classifier form a constituent. This means that we will not be able to

generate those orders where the numeral and the classifier are separated, or where the classifier is left-adjacent to the numeral. Assume the following base generated structure:



With the same constraints on movement, 14 orders (of a possible 24) are now generable. I present all possible orders in the table (396), with example languages for those orders that are attested; a star next to an order means that that order cannot be generated by the system.<sup>21</sup>

<sup>21</sup>The list of example languages for each attested order is not exhaustive, and are intended merely as examples. I have labelled apparently unattested order with ‘Unattested?’, where the question mark is intended to suggest that the survey of classifier languages undertaken in the preparation of this thesis is by no means completely exhaustive, and there may indeed be languages which exhibit those orders. As far as I know, the orders are unattested; this is supported by other typological studies (Jones 1970, Greenberg 1972, and Aikhenvald 2000).

(396)

1.		Dem	Num+Cl	A	N	Mandarin, Cantonese
2.		Dem	Num+Cl	N	A	Yao
3.		Dem	N	Num+Cl	A	Unattested?
4.		N	Dem	Num+Cl	A	Unattested?
5.	*	Num+Cl	Dem	A	N	Unattested?
6.	*	Num+Cl	Dem	N	A	Unattested?
7.	*	Num+Cl	N	Dem	A	Unattested?
8.	*	N	Num+Cl	Dem	A	Unattested?
9.	*	A	Dem	Num+Cl	N	Unattested?
10.	*	A	Dem	N	Num+Cl	Unattested?
11.		A	N	Dem	Num+Cl	Unattested?
12.		N	A	Dem	Num+Cl	Nuosu Yi, Lisu, Akha
13.	*	Dem	A	Num+Cl	N	Unattested?
14.		Dem	A	N	Num+Cl	Newari, Dulong, Japanese
15.		Dem	N	A	Num+Cl	Burmese, Maru
16.		N	Dem	A	Num+Cl	Unattested?
17.	*	Num+Cl	A	Dem	N	Unattested?
18.		Num+Cl	A	N	Dem	Coast Tsimshian
19.		Num+Cl	N	A	Dem	Vietnamese, Nung, Malay
20.		N	Num+Cl	A	Dem	Unattested?
21.	*	A	Num+Cl	Dem	N	Unattested?
22.	*	A	Num+Cl	N	Dem	Unattested?
23.		A	N	Num+Cl	Dem	Unattested?
24.		N	A	Num+Cl	Dem	Thai, Khmer, Javanese

The XP-movement account correctly generates all 8 attested orders. As is evident from the table, the system also overgenerates. While it can correctly rule out 10 unattested orders, it generates 6 orders that are unattested.

#### 5.4.4 Summary

Recall that the DLT account of word order variation generates all but one of the attested orders, and also three unattested orders (388). An XP-movement analysis massively overgenerates if the numeral and classifier are taken to form separate elements which are not a constituent, but imposing numeral+classifier constituency means that all of the attested orders can be generated, and 6 unattested orders are generated. The DLT account is more constrained and thus rules out more orders, but the freedom of the XP-movement account means that we can capture all of the attested orders.

However, the DLT account also allows us to capture the relationship between bare classifiers and definiteness in classifier languages; this is something

that remains a mystery under the alternative. The typological facts also quite strongly support the claim that the numeral and classifier must form a constituent. If they do not, then it is evident that under an XP-movement account, a very large number of unattested orders becomes possible.

I end my discussion of classifier languages here, and move now to the realization of definiteness in a non-classifier language, specifically Icelandic. Icelandic also appears to exhibit a Q-block phenomenon, in that the presence of a numeral means that a noun cannot take a definite suffix in its base position. In these cases the noun with a definite suffix must shift to the left periphery of the noun phrase, or alternatively an independent non-suffixal article merges at the left edge. I show that ultimately this is not a case of exactly the same kind of Q-block phenomenon as above, but that the facts can be accounted for within the analysis of noun phrase structure adopted in this thesis.

## 5.5 Moving beyond classifier languages: Definiteness in Icelandic

Icelandic provides us with an interesting test case: it is not a classifier language, but noun phrases in Icelandic exhibit some very interesting behaviour with respect to the realization of definiteness, and the order of elements in the noun phrase. I will show that at first blush, Icelandic appears similar to those classifier languages discussed in the previous section which realize D at the top of an extended projection, but then conclude that in fact there are differences between the two language types. However, I will conclude that ultimately Icelandic does exhibit some characteristics which are very similar to classifier languages, but that it relies on phrasal movement of part of the nominal extended projection to D, where a definite element attaches to the noun (in most cases). In this section I run through a set of facts about Icelandic, and an analysis of them that is presented in Pfaff (2015). I take Pfaff's analysis to be along the right lines, and adopt most of the core assumptions that he argues for, and show that the system that I have adopted in this thesis can capture the same data, while also giving rise to some additional correct predictions that would be less straightforward to implement in more traditional syntactic theories.<sup>22</sup>

Let us begin with some basic facts. In Icelandic, bare nouns are interpreted

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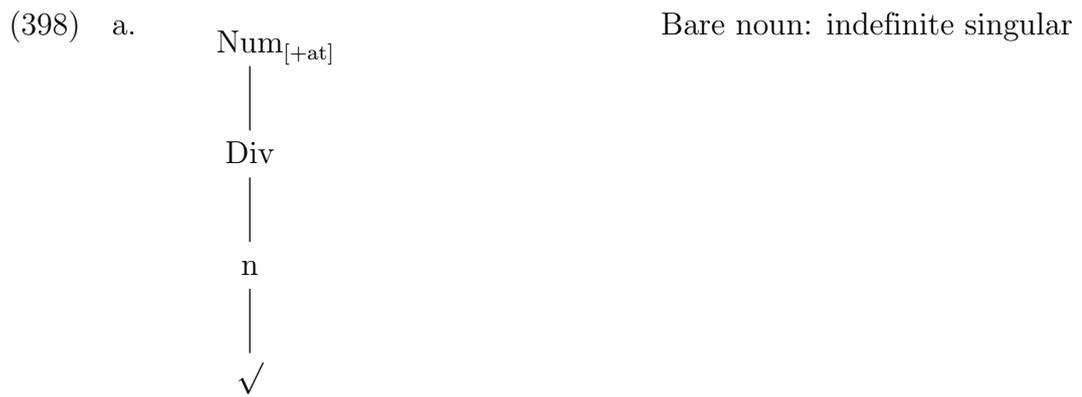
<sup>22</sup>All of the Icelandic data that I present here is from Pfaff (2015), unless indicated otherwise.

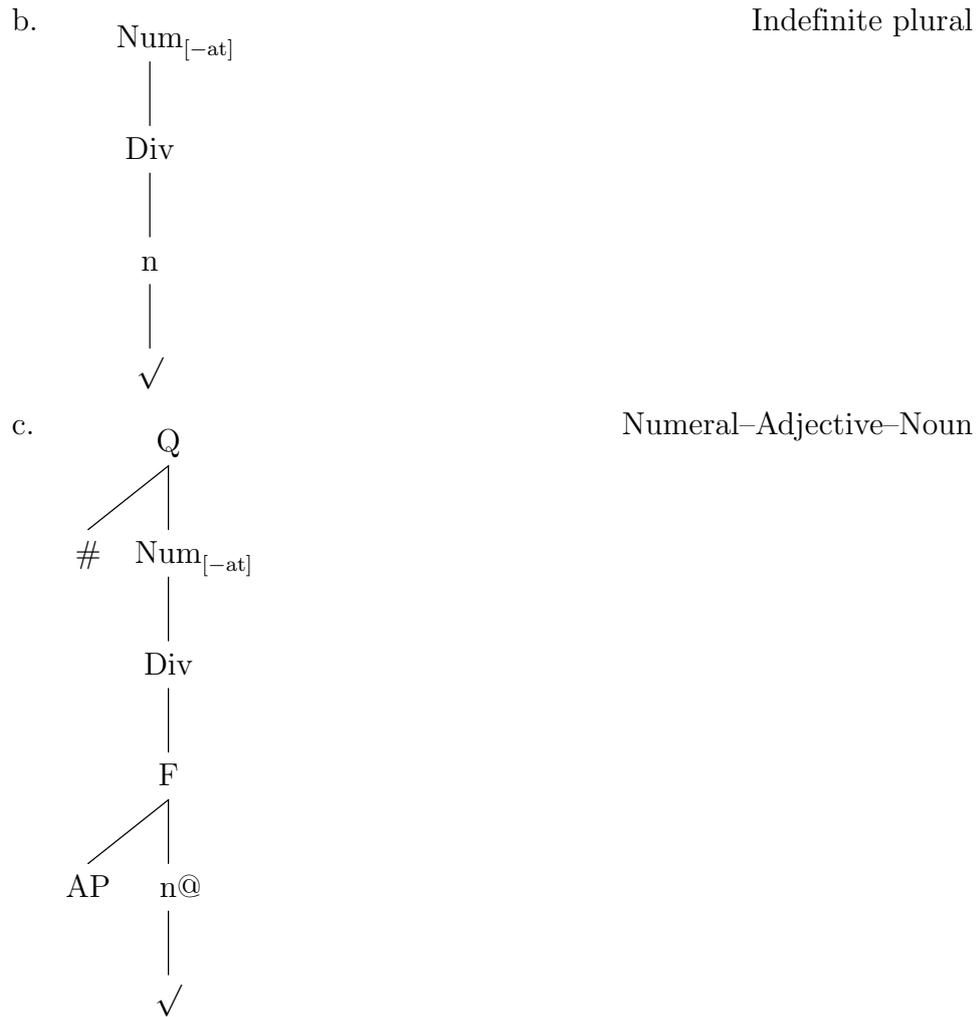
as indefinite and singular, and plural is indicated through a suffix on the noun. The numeral is pronominal, as are adjectives:

(397) Indefinite Noun Phrase

- a. *bíll*  
car  
'a car'
- b. *bíl-ar*  
car-PL  
'cars'
- c. *fimm bíl-ar*  
five car-PL  
'five cars'
- d. *fimm rauðir bíl-ar*  
five red car-PL  
'five red cars'

Following our assumptions about the structure of the noun phrase from the previous chapter, I propose that Icelandic indefinites then receive a straightforward analysis:





The bare noun indefinite is an extended projection from the noun root to Num. It could be that the whole span  $\checkmark \rightarrow \text{Num}$  spells out as a single morpheme, or that Num<sub>[+at]</sub> has a null exponent, and the heads in the extended projection spell-out separately as suffixes following Mirror. In the case of the plural, it is clear that Num<sub>[-at]</sub> spells out as a suffix. For each configuration, it is assumed that the extended nominal projection spells out in the lowest possible head, n. I further assume that the numeral spells out as a specifier of the Q head, unlike classifier languages, where it is merged lower.

In the simplest case, a definite noun appears as a noun with a suffix indicating definiteness:<sup>23</sup>

- (399) a. *bill-inn*  
 car-DEF  
 ‘the car’

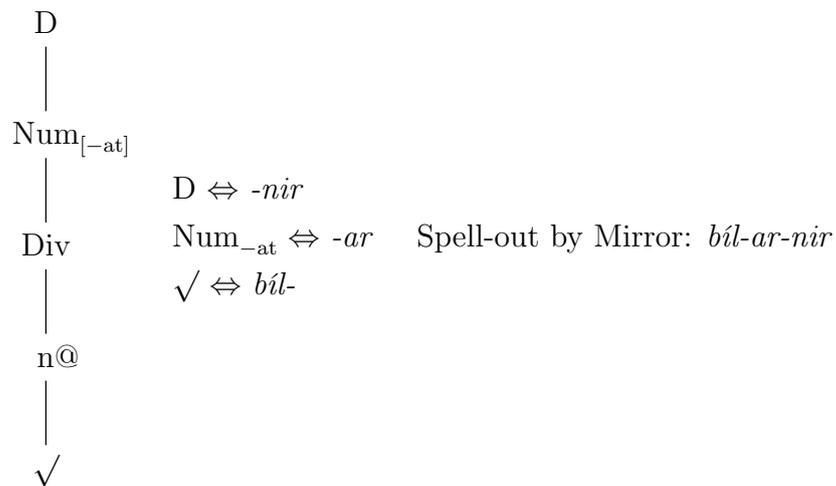
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<sup>23</sup>The suffix takes a different inflectional shape depending on the case, number and gender of the noun. See Pfaff (2015, p33) for a full paradigm of definite suffixes.

- b. *bíl-ar-nir*  
 car-PL-DEF  
 ‘the cars’

This is fully compatible with a simple structure for the noun phrase, as proposed in (398). Presumably D merges above Num, and the structure spells out following Mirror, with the root followed by the num suffix followed by the definite suffix.

(400)



This would capture a simple parametric difference between languages such as Icelandic, which morphologically realises definiteness on the noun, and languages like Weining Ahmao, where it is the classifier root that forms a morphological word with D, and therefore expresses definiteness (morphologically) on the classifier, which begins a separate rooted projection from the noun. A similarity between the two language groups is that the introduction of a numeral means that a definite suffix is blocked on the noun. Again, a demonstrative to the left of the numeral can give rise to a definite interpretation, without a definite suffix on the noun:

- (401) a. *þrjár frøegu bæk-ur*  
 three famous book-PL  
 ‘three famous books’
- b. \**þrjár frøegu bæk-ur-inn*  
 three famous book-PL-DEF  
 Intended: ‘the three famous books’

- c. *þessar þrjár frægu bæk-ur*  
 these three famous book-PL  
 ‘these three famous books’

It looks like we have a very similar situation to that presented in Weining Ahmao, except that it is the noun which roots the morphological word which is restricted by the introduction of the Q head. The structure of definite noun phrases with adjectives, however, complicates the picture somewhat. When we consider more complicated noun phrase configurations, it quickly becomes evident that the above could not be the correct analysis, and, as Pfaff (2015) argues at quite some length, ultimately a movement analysis is necessary. In what follows, I will adopt an analysis very similar to Pfaff’s, but with a crucial difference that I will clarify presently.<sup>24</sup>

With an adjective present, a definite noun phrase can take the abstract configurations in (402), with examples following in (403).<sup>25</sup>

- |       |    |   |             |
|-------|----|---|-------------|
| (402) | a. | Adjective > N-DEF   | Pattern I   |
|       | b. | Article > Adjective > N   | Pattern II  |
|       | c. | N-DEF > Adjective   | Pattern III |
|       |    |   |             |
| (403) | a. | <i>þýski heimspekingur-inn</i><br>German philosopher-DEF                                  | Pattern I   |
|       | b. | <i>hinn þýski heimspekingur</i><br>ART German philosopher                                 | Pattern II  |
|       | c. | <i>heimspekingur-inn þýski</i><br>philosopher-DEF German<br>All: ‘The German philosopher’ | Pattern III |

In pattern II, definiteness is now indicated by a free article form, *hinn*, and no suffixal definite marker is present on the noun. Patterns I and III retain the definite suffix on the noun, but the order of the noun and the adjective are reversed in pattern III relative to pattern I.

<sup>24</sup>Vangsnes (1999), Julien (2005), and Svenonius (2008) also present movement analyses of these facts.

<sup>25</sup>I leave aside the fourth form that a definite noun phrase can take, where an adjective with strong inflection precedes the noun with a definite suffix. Pfaff argues that these strong adjectives are above the layer of the noun phrase which introduces the article (between what I call DP and a case projection KP).

It has been claimed in previous literature that pattern II is virtually non-existent in casual, everyday speech, and that use of the free-form definite article is restricted to a particular formal, literary style (Sigurðsson 2006, Vangsnes 1999). However, Pfaff shows that speakers reliably judge pattern II noun phrases to be possible with a certain class of adjectives that cannot appear in a pattern I phrase, so this cannot be merely a matter of style or register.

Pfaff shows that there are a number of restrictions on the type of adjective that can appear in the three different patterns, and uses this fact to motivate the claim that there are three different zones of modification in the noun phrase. The first set of contrasts involves thematic vs. provenance readings for nationality adjectives. The noun phrase *the French president* can have two readings associated with it, depending on the interpretation of *French*. On the thematic reading of *French*, the phrase denotes ‘the president of France’: the person who holds this office could in fact be of German origin, but he or she must nonetheless be the president of the country called France. On the provenance reading of the adjective, the phrase denotes the person who is the president (of some country), and who is French in origin; i.e., the president who is French. Taking all three patterns then, we get the following noun phrases:

- |       |    |  |             |
|-------|----|--|-------------|
| (404) | a. | <i>franski forseti-nn</i><br>French president-DEF      | Pattern I   |
|       | b. | <i>hinn franski forseti-nn</i><br>DEF French president | Pattern II  |
|       | c. | <i>forseti-nn franski</i><br>president-DEF French      | Pattern III |

In each case, the provenance reading is available; each can mean ‘the president who is French’. However, the thematic reading is the most salient reading for pattern I, and is not available at all for pattern II and III.

The argument then runs as follows: the availability of the thematic reading is tied to a low merge position for the adjective, concretely Spec nP. Adjectives which are in this low merge position cannot be stranded by movement of a noun-containing constituent to Spec articleP. Thus, pattern III is ruled out. The free-form article can only merge where there is a ‘visible’ adjectival (or numeral) element above nP, and this position is too high for the adjective to have a thematic reading. Thus, only when the adjective accompanies the noun up to the higher position (pattern I) do we get that reading. The fact that

the provenance reading is also available for pattern I means that a constituent larger than nP must move up.<sup>26</sup> The lowest modifier position, Spec nP, is also shown to be the domain of non-compositional/idiomatic readings. Again, only pattern I allows such a reading (see Pfaff 2015, p114 for more examples).

- (405) a. *Hvíta hús-ið* Pattern I  
white house-DEF  
‘The White House’
- b. *Hið hvíta hús* Pattern II  
DEF white house  
‘The house which is white’; NOT ‘The White House’
- c. *Hús-ið hvíta* Pattern III  
house-DEF white  
‘The house which is white’; NOT ‘The White House’

There is another class of adjectives which can only appear in patterns I and II, but not in III, that of relational or classificatory adjectives; these are properties of kinds (Pfaff 2015, p116).

- (406) a. *hefðbundna fjölskylda-n* Pattern I  
traditional family-DEF
- b. *hin hefðbundna fjölskylda* Pattern II  
DEF traditional family

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<sup>26</sup>A bonus prediction of this analysis is that both provenance and thematic nationality adjectives should be able to co-occur, and give rise to the following patterns:

- (i) a.  $A_{\text{prov}} \succ A_{\text{theme}} \succ N\text{-DEF}$  Pattern I  
b.  $\text{DEF} \succ A_{\text{prov}} \succ A_{\text{theme}} \succ N$  Pattern II  
c.  $A_{\text{theme}} \succ N\text{-DEF} \succ A_{\text{prov}}$  Pattern I+III

This prediction is borne out:

- (ii) a. *norski íslenski seðlabankastjóri-nn*  
Norwegian Icelandic central.bank.chief-DEF
- b. *hinn norski íslenski seðlabankastjóri*  
DEF Norwegian Icelandic central.bank.chief
- c. *íslenski seðlabankastjóri-nn norskí*  
Icelandic central.bank.chief-DEF Norwegian  
All: ‘the chief of the Central Bank of Iceland who is Norwegian’

c. # *fjölskylda-n hefðbundna*  
 family-DEF traditional

Pattern III

This means that there is a class of adjectives which cannot be stranded at all. So roughly speaking, there must be a zone for modifiers above the minimal domain for modification (nP), but which also has to move up with the noun.

Numerals, conversely, **must** appear postnominally in definite noun phrases where the noun has a definite suffix. It is never the case that we have the configuration Numeral > Adjective > N-DEF. The noun can still be modified by a prenominal adjective, but this gives rise to the overall order Adjective > N-DEF > Numeral.

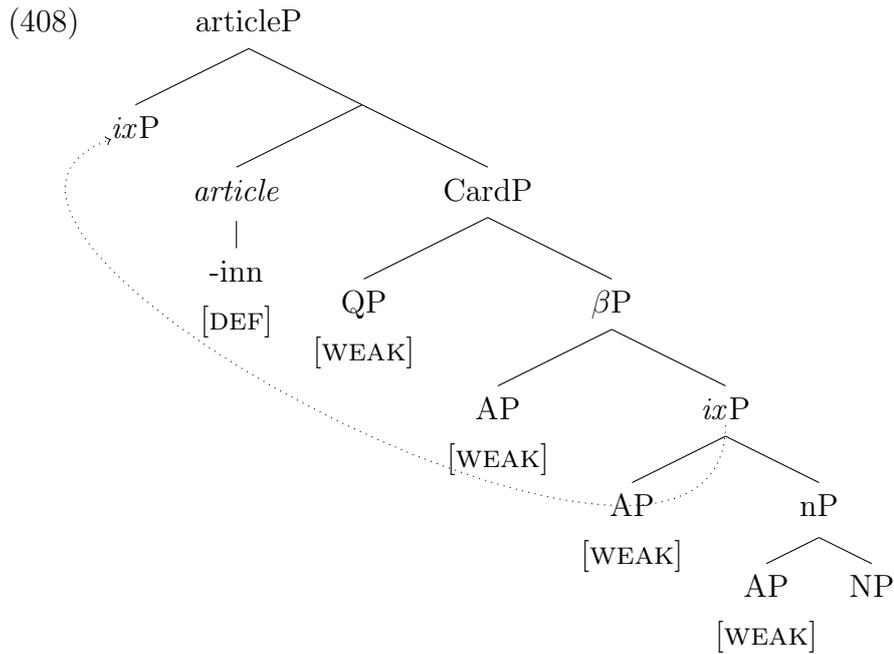
- (407) a. *höfuðsýndir-nar sjö*  
 cardinal.sins-DEF seven
- b. \**sjö höfuðsýndir-nar*  
 seven cardinal.sins-DEF  
 ‘the seven cardinal sins’
- c. *myndir-nar tvær frægu*  
 pictures-DEF two famous
- d. \**tvær frægu myndir-nar*  
 two famous pictures-DEF  
 ‘the two famous pictures’

To summarize then: some subpart of the nominal projection must move to a higher specifier position to license definiteness, in which case the DEF head attaches to the right of the noun. This subpart of the projection must include at least nP and what Pfaff labels as *ixP* (index phrase). Where this constituent moves, numerals and adjectives merged outside of this domain appear postnominally in the order Numeral > Adjective. An expletive *h-* can merge in the Spec of the DEF head, but only if there is ‘lexical material merged somewhere between nP and *article*’ (Pfaff 2015, p130); this is a general constraint on the well formedness of the independent article.

### Pfaff’s analysis, and an alternative

The general structure of the noun phrase proposed by Pfaff is given in (408).<sup>27</sup>

<sup>27</sup>[WEAK] indicates that the item has weak inflection. I do not discuss strongly inflected adjectives in this chapter; see Pfaff (2015), chapter 1 section 3.



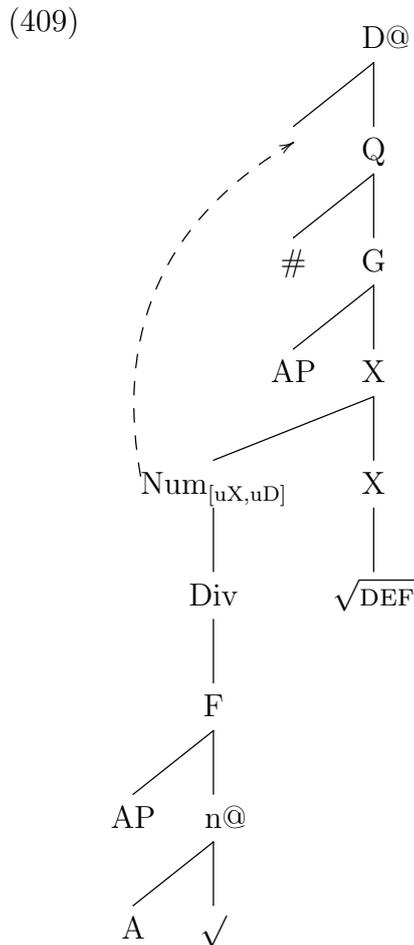
Where definiteness is realized on the noun as a suffix, the entirety of *ixP* moves up to Spec *articleP*, and the definite article is suffixed to the noun. Nothing inside *ixP* is strandable, meaning that postnominal adjectives cannot have the kind of interpretation associated with the positions Spec *nP* (idiomatic; thematic reading on nationality *As*) and Spec *ixP* (properties of kinds); they can only be in Spec  $\beta$ P. Numerals are necessarily postnominal where the noun has a definite suffix, because they merge outside of the constituent that moves up. The order of numerals and postnominal adjectives is also captured.

If the *ixP* constituent does not move, then a full article appears, which for Pfaff is an element which is spelled out as *h-* in Spec *articleP*, which takes the DEF head *-inn* as a suffix. There remains the question as to why it is that the full article cannot merge with a bare noun, and requires either a numeral, an adjective in Spec  $\beta$ P or an adjective in Spec *ixP* to be present in order to be licensed. Pfaff only offers a general licensing condition, which states that something outside of the *nP* domain has to be ‘visible’ to the article head for the expletive *h-* to merge above it.

I believe that Pfaff’s arguments for the relative structural locations of the different modifiers, and his arguments for a movement analysis of the suffixed article are compelling. However, the precise implementation is not reconcilable with the kind of phrase structure that I adopt, particularly because the movement of the bottom part of the nominal projection, the *ixP*, would be an instance of roll-up movement, which is independently ruled out by the definition of *i*-complement and the FILS principle in Adger (2013). Only specifier

to specifier movement is well-formed in this system, and so a different execution is required. In what follows, I will adopt the main conclusions that Pfaff reaches, but treat the underlying structure of the noun phrase in a crucially different way.

Taking *ixP* to be an independent domain, I claim that it in fact merges as a specifier of a separate projection. I will treat certain projections as being different from those proposed by Pfaff, so that the general structure of the noun phrase is in line with that proposed for classifier languages above. Since the definite suffix appears outside of the morphological realization of the Num head, that is, the noun in the left peripheral position has the form N-*NUM*-*DEF*, I take the highest head in the separate nominal domain to be Num, which merges as the specifier of a head that I label merely as X here, which projects to D. The root that projects to D is a *DEF* root, which spells out high in the D position. There is no single complement line projecting from the noun root all the way to D, as suggested as a possibility in (400); rather the extended nominal projection is split into two parts, one of which has to be able to move to a higher position to license definiteness. I propose the following structure:



For Num to be able to merge with D in the higher position, I assume that it also comes with a uD feature. The lower section of the rooted nominal structure is identical to that proposed for Mandarin Chinese in chapter 4. The low adjectives which Pfaff takes to merge in Spec n are those which can give rise to a non-compositional/idiomatic interpretation, precisely parallel to the ‘bare modifiers’ that we discussed for Mandarin (section 4.4.1). The only difference is that there is a higher, non-restrictive AP position which is merged in the specifier of the head labelled G: this is the adjectival position which ends up appearing postnominally when the N-root projection moves. In the normal case, the noun projection to Num moves to Spec D and licenses a definite interpretation. The projection line is spelled out in n, and the projection line from X to D spells out in D, giving the order A>N-PL>DEF>Numeral>Adjective. Following Pfaff, I also take the full independent article to be composed of an expletive *h-* in Spec D, which spells out to the left of the Num to D complement line when the nominal projection doesn’t move to spec D. Icelandic always requires some phonologically overt element to appear in spec D; either the nominal projection moves, or the expletive *h-* appears there.

There is a catch here, however. The direct linearization theory that I adopt treats suffixes as the spell-out of higher heads in a direct complement line in the usual case, but for Icelandic I am claiming that a definite suffix should be thought of as part of a separate morphological word from the noun phrase that moves to its specifier. However, there is some evidence that the ‘definite suffix’ in Icelandic should be treated as a clitic which forms part of a separate phonological word to the noun that it attaches to. I review this evidence in section 5.5.1, and conclude that there is sufficient evidence to suggest that the definite ‘suffix’ should be treated as part of a separate projection line. In the next section I argue that the definite suffix does not behave like a suffix, and instead appears to be more like a clitic, and that therefore its attachment to the right of the noun follows straightforwardly from the analysis of Icelandic noun phrase structure presented above.

### 5.5.1 On the clitic status of the definite ‘suffix’

Börjars and Harries (2008) present a comparison of the definite suffix in modern Scandinavian languages and compares them to the counterpart element in Old Norse.<sup>28</sup> They focus on an analysis of the change from Old Norse to Mod-

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<sup>28</sup>The point of the article is not to establish the status of the definite suffix, but rather to argue that diachronic shifts between cliticness and suffixhood cannot be described simply

ern Scandinavian presented in Faarlund (2007), where it is concluded on the basis of cliticness diagnostics from Zwicky and Pullum (1983) that the change was from a definite clitic in Old Norse to a definite suffix in Norwegian. Icelandic is neither Old Norse nor Norwegian, and also it is not entirely clear that the distinction between a clitic and an affix as presented in Zwicky and Pullum (1983) can have any kind of real theoretical content in a late insertion (non-lexicalist) approach (see e.g., Embick and Noyer 2001, p560). However, B&H show that the bound definite morpheme in Icelandic has a set of properties associated with it which mark it as a clitic rather than an affix:

- (410) a. There are no arbitrary changes in the host  
 b. There are no arbitrary gaps  
 c. The host of DEF can be inflected (number/case morphology)  
 d. DEF can be inflected itself  
 e. DEF can be the sole def marker, and there is no double definiteness

This can at least provide some evidence that the bound definite morpheme is in a separate morphological domain to the noun that it combines with.

Svenonius (2014) provides some further evidence for the separation of the noun and the definite suffix. He points out that in Icelandic, within a gender there is more than one declension class, meaning that the number/case suffixes which attach to the noun roots differ depending on the class that the noun is in, even if it is the same gender. What is important is that the number suffix is sensitive to the class of the noun, but the definite suffix is not. That is to say, there is an invariant form of the article for each gender/case/number complex, but the declension class of the noun has no effect on the morphological shape of the definite suffix.

- (411) a. *gest-ir-n-ir*  
 guest-M.PL.NOM-DEF-M.PL.NOM  
 ‘the guests’  
 b. *hest-ar-n-ir*  
 horse-M.PL.NOM-DEF-M.PL.NOM  
 ‘the horses’

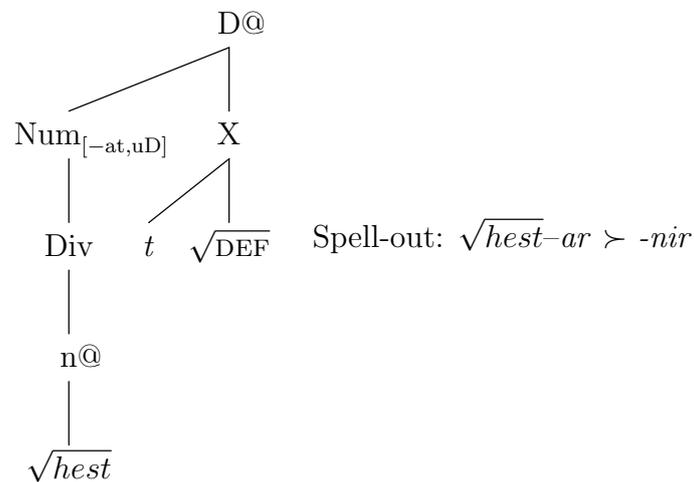
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in terms of a grammaticalization cline of the form content word > grammatical word > clitic > affix > (zero). However, their close scrutiny of the behaviour of the definite suffix/clitic in Icelandic provides useful data which is relevant to the discussion here.

The masculine noun ‘guest’ is in a declension class where the masculine plural nominative suffix takes the form *ir*, and the definite suffix has the same form. However ‘horse’, which is in a different declension class, takes the masculine plural nominative suffix *ar*, but the definite suffix remains unchanged in the *ir* form. This can be thought of as a locality constraint on the conditioning of allomorphy for suffixes, so that it is adjacency to the stem that results in sensitivity to declension class.<sup>29</sup> We can think of adjacency to the stem as ‘being part of the same rooted projection’ here, in which case the lack of sensitivity to declension class follows straightforwardly from my analysis.

With this taken into account, a definite noun phrase, such as *hestarnir* ‘the horses’ from (411) has the structure in (412).

(412)



The Num<sub>[-at]</sub> head spells out as a suffix *ar*, and the rooted DEF projection spells out as *-nir* in D, which follows the spell-out of the nominal projection.<sup>30</sup> Its clitic nature means that it attaches to the spell-out of the nominal projection. The important point is that the spell-out of the Num suffix is sensitive to the declension class of the nominal root because it forms a morphological word with it. On the other hand, the definite suffix cannot be sensitive to the declension class of the noun, because it forms a separate morphological word, and thus a separate locality domain.

<sup>29</sup>In fact, Svenonius proposes that the locality constraint is ultimately a phonological constraint, whereby declension class is a pseudophonological feature, and the lexical entry for functional feature bundles which are spelled out as suffixes includes a specification of their realization which is dependent on phonological environment.

<sup>30</sup>It is possible that the DEF root is spelled out as *n*, and the D head itself suffixes to it, giving *n-ir* in this case

### 5.5.2 Summary

One can think of the definite clitic as being similar to a definite classifier. It is the spell out of a definite root that attaches to a noun in the specifier of D. Some phonologically overt element has to appear in the specifier of D, and so the lower nominal projection moves to this position, or an expletive *h-* merges there. The blocking effect of the numeral is not the same as that seen in classifier languages, however. Instead, the numeral appears to block a definite suffix on the noun because it merges in a high position in the structure, and the nominal projection has to move around it for the definite clitic to attach to the noun. Adjectives do not ‘block’ the definite suffix because they are part of the constituent that moves to spec D, and so low adjectives retain their order relative to the noun when the noun is definite. Adjectives which merge higher in the structure, outside of the moved nominal constituent, end up in a postnominal position when the noun takes a definite suffix, but remain prenominal when the *h-* expletive merges with D, as shown in example (413).

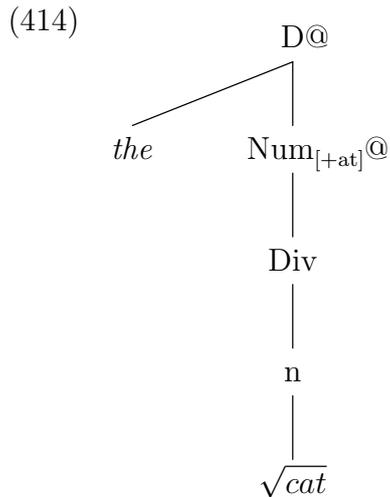
- (413) a. *hinn norskí íslenski seðlabankastjóri*  
DEF Norwegian Icelandic central.bank.chief
- b. *íslenski seðlabankastjóri-nn norskí*  
Icelandic central.bank.chief-DEF Norwegian
- Both: ‘the chief of the Central Bank of Iceland who is Norwegian’

The final part of this chapter I dedicate to a description of how this system would capture the behaviour of the definite article in English.

### 5.5.3 English

English only has independent articles and no definite suffix, and the demonstrative and the definite article are in complementary distribution. Definite articles are able to precede the numeral to give a definite interpretation. There are two ways to think about the definite article under my system, both of which I now briefly discuss.

The first possibility is that the article simply merges as a specifier of D, with the structure in (414) spelling out as *the cat*.

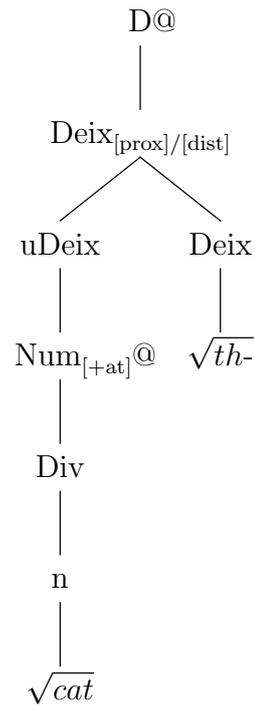


The complementary distribution of the definite determiner and demonstratives would then not be expected if the demonstrative is introduced by a wiggle structure, as D would still have an available specifier position.<sup>31</sup> A solution would be to have the demonstrative merge as a specifier of a Deix head and then moves to D. However, this is an unsatisfactory solution, and requires positing a structure for English which differs quite radically from the structure proposed above for classifier languages.

The second possibility is to assume that the article, like demonstratives in classifier languages, merges through a Wiggle structure. Following the intuition in Leu (2008), where demonstratives are decomposed into a definite marker and a deictic component, I propose that demonstratives and the definite article are introduced by a DEF root. The nature of the head which projects above the definite root (which is phonologically realized as *th* (/ð/)) determines the interpretation and the spell-out of the suffix which attaches to the definite root. A Deix head merging above the root can either be proximal or distal, in which case a (proximal or distal) demonstrative results. A distinct head, call it Def, can merge above the root instead, resulting in a definite article. The noun phrases *this cat* and *that cat* have the structure in (415).

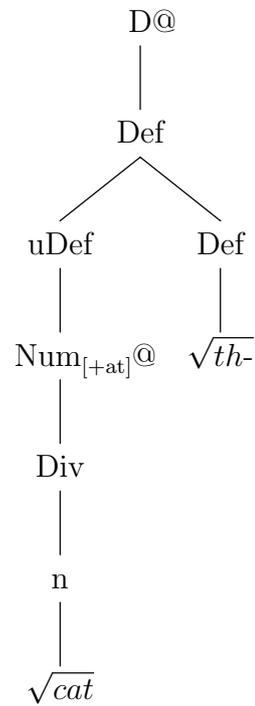
<sup>31</sup>There is a separate question of what kind of semantics the definite article is contributing if it is in the specifier of a D head which presumably is able to carry the semantic content of the definite article itself.

(415)



Deix with a proximal feature results in *this cat*, and Deix with a distal feature results in *that cat*. The phrase *the cat* has the structure in (416).

(416)

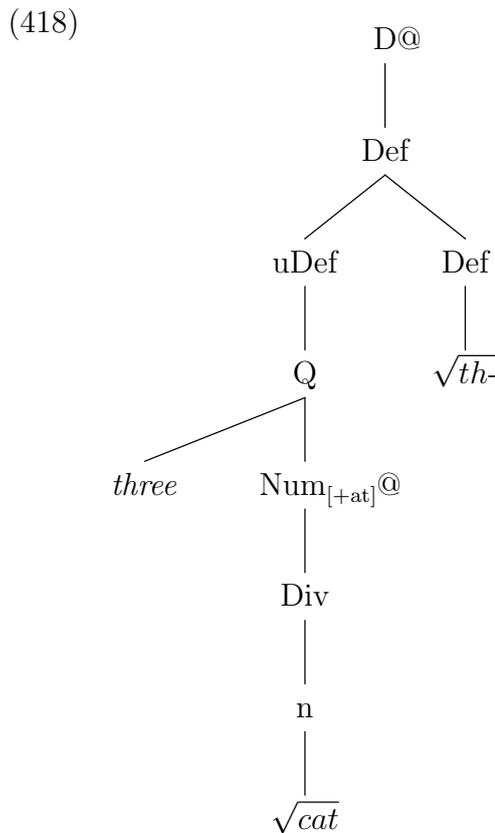


In both cases, high spell out of the Def/Deix morphological word means that it precedes the noun. To capture the morphological shape of the definite article and the demonstratives, we need the lexical items in (417).

- (417) a.  $\langle \text{Deix}_{[\text{prox}]}, D \rangle \Leftrightarrow -is$   
 b.  $\langle \text{Deix}_{[\text{dist}]}, D \rangle \Leftrightarrow -at$   
 c.  $\langle \text{Def}, D \rangle \Leftrightarrow -e$

The root *th-* is suffixed by one of the above, following Mirror.

I propose that the numeral merges in the specifier of a Q projection, like Icelandic, and unlike classifier languages. For a definite noun phrase with a numeral, such as *the three cats*, I posit the structure in (418).<sup>32</sup>



This analysis is not without drawbacks, however. Since the Deix head forms part of a separate projection from the Num head, I have to assume that demonstratives which appear with plural nouns undergo a process of concord, which gives rise to the plural forms of the demonstratives, *these* and *those*. This could be modelled as an agreement relation, where the  $[\pm at]$  feature on Num percolates to the top of the nominal projection, and then agrees with the Deix/Def head that it merges with. Ultimately any account of demonstrative morphology has to appeal to some kind of agreement or concord device which

<sup>32</sup>It is possible to go further and claim that numerals too are introduced as a rooted projection through a Wiggle structure. Since I have treated numerals as leftward specifiers above, I do the same for English here.

can produce the correct form of the demonstrative in plural environments, and while the brief account presented here is by no means adequate, I believe it could be on the right track.

## 5.6 Conclusion

In this chapter I have shown that positing two different structural accounts for Cl-N phrases and Numeral-Cl-N phrases in classifier languages means that we can capture the interaction between the classifier and definiteness, and also some quite mysterious morphological facts from Weining Ahmao and Wenzhou Wu. Furthermore, the account of definiteness licensing extends to Icelandic, which at first glance appears to exhibit similar characteristics to classifier languages.

The account of Numeral-Cl-N phrases also makes the typological prediction that numerals and classifiers should be rigidly ordered  $\# \text{>Class}$  across languages, and that they should not be separated by other noun phrase internal elements, such as adjectives, nouns or demonstratives. This prediction is borne out. Unfortunately, the account fails to capture word order facts in languages where the numeral and the classifier follow the noun, unless one makes some unwelcome stipulations about the nature of adjectives in those languages. Here I speculate on why it might be the case that post-N numeral languages do not fit neatly into the picture.

The languages that I have studied in this thesis exhibit a general pattern that I have thus far not discussed, but I believe that the pattern could very likely be implicated in a more adequate account of all of the facts. The pattern is that classifier languages with prenominal numerals tend to be able to have bare Cl-N phrases, whereas languages with postnominal numerals do not.<sup>33</sup> This suggests that the two structures proposed for the noun phrase in section 5.2 are only really relevant to languages in which the numeral precedes the noun (Mandarin, Cantonese, Nung, Hmong, Vietnamese, Weining Ahmao, Wenzhou Wu). Those languages with postnominal numerals (Thai, Burmese, Javanese, Khmer, Maru) presumably introduce numerals and classifiers in a way distinct from the prenominal numeral languages, although I do not have an account to present here, and leave the question for future research.

An XP-movement account of cross-linguistic variation can successfully gen-

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<sup>33</sup>The Loloish languages Nuosu Yi, Lisu and Akha represent the only counter example to this generalization.

erate all of the attested orders under the assumption that the numeral and the classifier are a constituent, but overgenerates (producing 6 unattested orders) and gives us no insight into the interaction between the classifier and definiteness. An XP-movement account where the numeral and classifier are not a constituent massively overgenerates, meaning that adopting an XP-movement account pretty much forces one into the position that the classifier and noun must be a constituent. Furthermore, the scopal reorganisation of noun phrase internal elements has no semantic effect, and thus the account suffers from the general conceptual problem that I have attempted to address throughout this thesis.

I think that ultimately to capture the full typology of classifier languages would require a much more subtle analysis of the structure of the noun phrase in different languages, which takes into account the generalizations that have been discussed in this chapter. While I do not have the solution here, I think the discussion in this chapter opens the way for a more nuanced account of cross-linguistic order variation in the DP, which does not rely on movement operations.

# Chapter 6

## Conclusion

A summary of this thesis would break it into two main parts. In the first part, I argued that the operation head movement, understood as an operation which generates word order variation across languages, has no semantic effects, something which is very surprising if it is a narrow syntactic operation. It is surprising because under standard minimalist assumptions, there is a near homomorphism between syntactic structure and semantic representations, in that the semantics is computed over syntactic objects. If movement alters structural relations between syntactic objects, then we expect there to be semantic effects associated with that structural reconfiguration. Indeed, other types of movement (A- and A'-movement) do robustly exhibit such effects. Given this, head movement effects are apparently not semantic. To further strengthen my position, I argued in chapter 3 that claims to the effect that there are semantic effects of head movement are unconvincing. Chapter 2 showed how a linearization theory that does not involve movement could generate the same kind of 'displacement' effects that head movement is proposed as an explanation for.

The second part of the thesis was dedicated to an empirical investigation of the structure and linearization of the noun phrase in classifier languages. It has been argued in the literature that different interpretations associated with different noun phrases in Mandarin Chinese and Cantonese can be explained through a mixture of overt and covert head movement. In chapter 4 I showed that the same results could be obtained without appeal to movement, and in fact that the non-movement approach is superior. In chapter 5, I extended the analysis of the noun phrase and licensing of definiteness to other classifier languages. I showed that the generalization that the classifier is never definite in the presence of a numeral could be explained if these languages require a classifier to be in a Spear structure with D to license definiteness. A

discussion of classifier language typology revealed that ultimately the theory of linearization that I have adopted undergenerates, but also that a theory of word order that employs XP-movement overgenerates. The difference between classifier languages that exhibit pre-nominal numerals, and those that exhibit post-nominal numerals deserves further consideration, and I hope to tackle this question in future research.

Overall I have taken an approach to the interfaces which involves a near homomorphism between syntax and semantics. Different structures are associated with different meanings, but that is not to say that similar communicative meanings cannot be produced by different structures. I have claimed that the structure involved in, e.g., *three cats* in English, and *san-zhi mao* ‘three (CL) cats’ in Mandarin Chinese is not the same. Both phrases ultimately mean (roughly) the same thing, yet the semantic contribution of the classifier means that there must be a difference, under the view of the syntax semantics interface that I adopt. The difference might not be detectable in most cases, but given that different classifiers give rise to a different interpretation of the noun (like with the ‘telephone’ example in section 4.3.2), it is clear that the difference is revealed under the right conditions. It is certainly true that similar communicative meanings are achieved through different syntactic structures across languages. Take for example Austronesian languages, where wh-questions often take the form of clefts (Aldridge 2013). The fact that wh-questions are not clefts in English does not mean that fundamentally questions in English and questions in, say, Seediq, fundamentally mean something very different from a communicative standpoint. However, the logical form of questions may be different, and expressions in the two languages will therefore have detectable syntactico-semantic differences.

I have also adopted the position that there is a near homomorphism between syntax and morphology. As far as morphology is concerned, all bound functional morphemes are the spell-out of functional heads following Mirror, in a Spear structure.<sup>1</sup> Pushing the system to its logical conclusion, one might take all free functional morphemes to be rooted projections which are introduced by a Wiggle structure, as classifiers and demonstratives have been proposed to be. I have not adopted such a strong position in this thesis (I still allow complex leftward functional specifiers), but think that it is an idea worth pursuing. Ultimately I think it is an open empirical question as to whether it is

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<sup>1</sup>An interesting question is why there should be a suffixing preference across languages (Hawkins and Gilligan 1988).

possible to analyse all free functional morphemes in this way. Treating free functional morphemes as rooted also raises a number of questions related to the lexical/functional divide; a consequence of having free functional morphemes as roots is that this divide becomes less clear (Svenonius 2014).

My main hope is that the discussion over the five chapters of this thesis is enough to suggest that word-order movements are neither necessary, nor conceptually attractive. An alternative can be stated which does not come with the same kind of conceptual problems that a movement approach faces, and we should be striving towards a theory which does away with ‘meaningless movement’.

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