

## Topics at InFL

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## Preface

A. Assmann, S. Bank, D. Georgi, T. Klein, P. Weisser & E. Zimmermann

This volume of *Linguistische Arbeits Berichte* – originally a present for Gereon Müller on his 50th birthday – brings together a number of papers addressing different topics currently being discussed and worked on at the Institute for Linguistics (InfL) in Leipzig. As a result, LAB 92 attests to the diversity of linguistic research carried out at the institute in three different ways.

First, the contributions in this volume cover a wide range of empirical phenomena in phonology, morphology and syntax. The phenomena are approached from theoretical, psycholinguistic and corpus-linguistic perspectives.

Second, this volume mirrors the diversity of the theoretical frameworks encompassed by the research in Leipzig, including Minimalism, Optimality Theory, Distributed Morphology, Nanosyntax, Generative Lexicon Framework, and Construction Grammar.

Finally, this volume also presents the results of initial research in the newly founded graduate school “Interaction of Grammatical Building Blocks” (IGRA) which investigates the interaction of different grammatical primitives (rules, constraints, constructions, operations, extralinguistic factors, etc.). The graduate programme aims to investigate these kinds of interactions from different theoretical perspectives, on the basis of detailed empirical studies of phonological, morphological, and syntactic phenomena from various languages. As becomes clear from this volume, the discussions, findings and analyses emerging from the IGRA graduate programme greatly contribute to the diversity of the institute for Linguistics in Leipzig both theoretically and empirically.



# Rule flipping and the feeding-bleeding relationship

Johannes Hein, Andrew Murphy & Joanna Zaleska\*

## Abstract

In this paper, we discuss the relationship that holds between feeding and bleeding in the interaction of rules. Whereas it is presently well understood how to change, for example, a feeding relation into one of counterfeeding (i.e. by reversing the order of application), the transformation from feeding to bleeding is still unclear. We show that there is a systematic way to go from feeding to bleeding and *vice versa* by means of ‘flipping’ rules (reversing the input and output). The ensuing discussion uncovers more about the nature of rules in general and opens up a wealth of further analytical possibilities.

## 1. Introduction

In the discussion of grammatical rules, much attention has been paid (especially in phonology) to the interaction of rules. Generally, if there is an interaction between two rules it may vary along two dimensions

1. CHRONOLOGY (with the two values *timely* vs. *tardy*) and
2. INTERFERENCE (with the two values *non-inhibitory* vs. *non-excitatory*)

whose cross-classification gives the familiar four types of rule-interaction in (1) first discussed by Kiparsky (1968).

(1) Types of rule-interaction<sup>1</sup>

		CHRONOLOGY	
		<i>timely</i>	<i>tardy</i>
INTERFERENCE	<i>non-inhibitory</i>	feeding	counterbleeding
	<i>non-excitatory</i>	bleeding	counterfeeding

\*We are indebted to the audience of the IGRA-Klausurtagung in Großbothen for a lively discussion of the general ideas of this working paper and for the encouragement to expand on them.

<sup>1</sup>We refrain from using the more common terms *transparent* for feeding and bleeding and

Rule A interacts with another rule B in a timely manner if the application of rule A affects the application of rule B. It interacts in a tardy manner if it applies too late to have an effect. This effect can be either excitatory, when application of rule A makes the application of rule B possible, or inhibitory, when it makes it impossible.

Whereas it is particularly well understood how alternations between timely and tardy interactions (e.g. feeding vs. counterfeeding) can be achieved (by reversing the order of application of two rules), little or nothing has been said about alternations between excitatory and inhibitory (feeding vs. bleeding), and non-inhibitory and non-excitatory interactions (counterbleeding vs. counterfeeding). The present paper is an attempt at bridging this gap by discussing some observations about the internal structure of rules and how it is possible to turn a feeding interaction into a bleeding interaction.

Let us begin with the following real-world example: Imagine you are standing in a lift and the doors are closing. You see a good friend approaching the lift. He is great company and you enjoy your shared lift-rides. To your right are two buttons: One opens the doors, and the other closes them. It is obvious that your friend can only enter the lift if the doors are open, so you press the *Open Doors* button, which then allows him to enter the lift. We can thus say that the *Open Doors* operation fed *Lift Entering*.

The next day, you see that annoying guy from the office next to yours approaching the lift. You find shared lift experiences with him awkward and uncomfortable. As you see him approaching the lift, the doors are still open. Cunningly, however, you see the *Close Door* button and press it. The doors close in his face and thus he cannot enter the lift. Therefore, the *Close Doors* operation bled *Lift Entering*. We now have two operations *Open Doors* and *Close Doors*, which interact with *Lift Entering*. The *Lift Entering* operation can be defined as in (2):

- (2) *Lift Entering*  
 outside-lift(X)  $\longrightarrow$  inside-lift(X) / doors = [+open]

This rule can be read as: An individual X can enter the lift (i.e. go from outside the lift to inside the lift) under the condition that the lift's doors are open. With

---

*opaque* for counterfeeding and counterbleeding here, because there is no clear-cut one-to-one correspondence between opacity and chronology. More precisely, there are feeding interactions that are opaque (see Baković 2007).

this in mind, we can define the operations *Open Doors* and *Close Doors* as follows:

- (3) *Open Doors*  
 doors[−open] → doors[+open]
- (4) *Close Doors*  
 doors[+open] → doors[−open]

What is striking about these two rules is that they have identical formats with the exception that the order of the elements on either side of the arrow is reversed. One rule maps A (doors[−open]) to B (doors[+open]) and the other B to A. This difference results in two distinct types of interaction (feeding vs. bleeding). Therefore, it seems that the alternation between feeding and bleeding can be achieved by simply reversing the order of the input and output of a rule. This is what we will call ‘(rule) flipping’ here. The abstract patterns showing this appear in the literature (e.g. Mascaró 2011), but have either not been noticed or not been explicitly discussed. In particular, there has been no attempt at systematically examining these patterns nor are there any formal accounts of them.

In what follows, we will explore some possibilities of rule internal changes and their effects on the type of interaction between two rules. Section 2 will explore this phenomenon on the basis of concrete linguistic examples from phonology and syntax. These mirror the lift example in the sense that a rule-internal change leads to a different type of interaction. In Section 3, we try to develop a formal account of the conditions on rule interactions (somewhat similar to Baković’s (2013) work on string set intersection) that elucidates why certain changes to the structural description of an earlier rule have certain effects on its interaction with a following rule. Finally, some difficulties and further issues are discussed in Section 4. As this is a working paper, there may be an abundance of open issues, so please consider the formal statements as potentially fallible and open to improvement.

## 2. Linguistic examples

The above lift-riding example – though amusing and thought-provoking – may quite arguably not have any linguistic relevance at all. However, as this section aims to demonstrate, analogous examples can be constructed using data from

natural languages, not only in the realm of phonology but also in syntax. The present section will illustrate the effect of rule flipping on three pairs of rules, all standing in a different relation: bleeding, feeding and mutual bleeding (Kiparsky 1971) for both phonology and syntax.

## 2.1. Phonology

### 2.1.1. Feeding: *i*-Epenthesis and Palatalization in Brazilian Portuguese

The Rio de Janeiro dialect of Brazilian Portuguese has a Palatalization rule (6) that changes the dento-alveolar plosives [t] and [d] into the affricates [tʃ] and [dʒ] before the front high vowel [i]:

- (5) *Palatalization in Brazilian Portuguese* (Mateus and d'Andrade 2002)
- |             |        |          |   |             |         |              |
|-------------|--------|----------|---|-------------|---------|--------------|
| <i>bato</i> | [bátu] | 'I beat' | - | <i>bate</i> | [bátʃi] | 's/he beats' |
| <i>ardo</i> | [árdu] | 'I burn' | - | <i>arde</i> | [árdʒi] | 's/he burns' |

- (6) *Palatalization*<sup>2</sup>
- $$\left[ \begin{array}{l} +\text{obstruent} \\ +\text{coronal} \\ +\text{anterior} \end{array} \right] \rightarrow \left[ \begin{array}{l} +\text{obstruent} \\ +\text{coronal} \\ -\text{anterior} \end{array} \right] / \text{ \_\_\_\_ } \left[ \begin{array}{l} -\text{consonant} \\ +\text{high} \\ -\text{back} \end{array} \right]$$

Additionally, Brazilian Portuguese has an *i*-Epenthesis rule, which repairs syllables that would otherwise violate the constraints on syllable margins active in the language (such as Sonority Sequencing Generalization, Jespersen 1904, Selkirk 1982; Minimal Sonority Distance, Vennemann 1972, Steriade 1982; Coda Condition, Itô 1988). This is evident in the nativisation of borrowings:

- (7) *i*-Epenthesis in Brazilian Portuguese (Mateus and d'Andrade 2002)
- |                   |               |              |
|-------------------|---------------|--------------|
| <i>pacto</i>      | [pákitu]      | 'pact'       |
| <i>captar</i>     | [kapitár]     | 'to capture' |
| <i>psicologia</i> | [pisikoloʒíɐ] | 'psychology' |

For the sake of simplicity, let us formulate the rule as one that splits up clusters of obstruents:

<sup>2</sup>Note that the format of this rule diverges from what is common in phonology. Typically, the arrow is only followed by the feature that is manipulated by the rule. For reasons given in Section 3.4 we use a different format.

(8) *i-Epenthesis*

$$\emptyset \rightarrow \left[ \begin{array}{l} \text{-consonant} \\ \text{+high} \\ \text{-back} \end{array} \right] / \left[ \text{+obstruent} \right] \_\_\_\_ \left[ \text{+obstruent} \right]$$

Rules (6) and (8) stand in a feeding relation. As shown in (9), if the [i] vowel is inserted after a [t] or a [d], the plosives get palatalized.

(9) *Interaction of Palatalization and i-Epenthesis in Brazilian Portuguese*

*adverso* [adʒivɛχsu] ‘adverse’  
*futebol* [futʃibów] ‘football’

If the rule of *i-Epenthesis* were flipped, it would result in the deletion of [i] vowels standing between obstruents:

(10) *i-Deletion (flipped i-Epenthesis)*

$$\left[ \begin{array}{l} \text{-consonant} \\ \text{+high} \\ \text{-back} \end{array} \right] \rightarrow \emptyset / \left[ \text{+obstruent} \right] \_\_\_\_ \left[ \text{+obstruent} \right]$$

Thus, if the Spanish word *batido* ‘smoothie’ ever made its way to Brazilian’ (identical in all respects to Brazilian Portuguese but having rule (10) rather than (8)), it would be pronounced as [bátdu], rather than [batʃídu]. Thus, the *i-Deletion* rule would bleed the application of Palatalization by removing the context in which the latter rule applies. This is exactly the effect that we have observed with the lift example. Arguably, the flipping of rule (8) leads to a quite unnatural rule. The result of *i-Deletion* is more marked than its input. The rule might be made less unnatural by changing its contextual requirements. For example, one might remodel its left-hand context to the empty set and its right-hand context to [-consonant] to the effect that this amended rule deletes [i] before another vowel. Such deletion is a natural strategy for avoiding hiatus and is common in the languages of the world. But in order for the interaction between *i-Deletion* and Palatalization to remain intact, such changes can only be made within certain limits such that the environments of the two rules do not clash. We will elucidate these limits in Section 3.4.4.

2.1.2. *Bleeding: i-Epenthesis and Voice Assimilation in Lithuanian*

In Lithuanian, homorganic plosive clusters are broken up by the vowel [i]:



dialects. In Standard German, *g*-Deletion applies first. It bleeds Final Devoicing by removing the segment that could undergo it.

(16) *Interaction of g-Deletion and Final Devoicing in Standard German*

Underlying Representation	/dɪŋg/
<i>g</i> -Deletion	dɪŋ
Final Devoicing	—
Surface form	[dɪŋ]

In Colloquial Northern German, the order of the two rules is reversed. Here, Devoicing applies first, bleeding *g*-Deletion:

(17) *Interaction of g-Deletion and Final Devoicing in Colloquial Northern German*

Underlying Representation	/dɪŋg/
Final Devoicing	dɪŋk
<i>g</i> -Deletion	—
Surface form	[dɪŋk]

Flipping the first rule of either order will feed the rule that applies as second. So, the rule of Final Voicing (flipped Final Devoicing) applied to a word such as *krank* [kʁaŋk] ‘ill’ would produce a word-final [ŋg] cluster, to which *g*-Deletion could apply. Conversely, applying *g*-Insertion (flipped *g*-Deletion) to a word ending in [n], such as *Mann* [man] ‘man’ would produce [mang], which could then undergo Final Devoicing to [mank].

## 2.2. Syntax

### 2.2.1. Feeding: Passivization & there-Insertion

A case of feeding in syntax is the interaction between passivization and *there*-Insertion (Wasow 1975). If we assume that *there*-Insertion requires the presence of an auxiliary, then this is fed by passivization (which inserts an auxiliary):

- (18) The government stationed an agent on the corner.
- a. An agent was stationed on the corner. (*Passivization*)
  - b. There was an agent stationed on the corner. (*there*-Insertion)

We can formulate the rules involved in this interaction as follows:

- (19) *Passivization*  
 $NP_{EXT} V NP_{INT} \rightarrow NP_{INT} AUX V$
- (20) *there-Insertion*  
 $NP_{INT} AUX \rightarrow there\ AUX\ NP_{INT}$

The passivization rule in (19) removes the external argument NP and moves to internal argument NP to the subject position as well as inserting an auxiliary. The *there*-Insertion rule inverts the order of  $NP_{INT}$  and *AUX* and then inserts *there* clause-initially. We can represent the feeding relation between these rules in (21), (19) feeds (20) as it adds an auxiliary allowing (20) to apply.

- (21) *Passivization feeds there-Insertion*
- |                        |   |
|------------------------|---|
|                        | The government stationed an agent on the corner |
| <i>Passivization</i>   | An agent was stationed on the corner            |
| <i>there-Insertion</i> | There was an agent stationed on the corner      |

Assuming that the observations about the effects of flipping rules are correct, then the reverse of passivization should bleed *there*-Insertion. Despite being unintuitive, it is of course a logical possibility that active clauses are derived from underlying passives. If we assume this for the sake of the argument, then the *Depassivization* rule in (22) does in fact bleed *there*-Insertion as it removes the context for it to apply (23).

- (22) *Depassivization*  
 $NP_{INT} AUX V \rightarrow NP_{EXT} V NP_{INT}$
- (23) *Depassivization bleeds there-Insertion*
- |                        |   |
|------------------------|---|
|                        | An agent was stationed on the corner            |
| <i>Depassivization</i> | The government stationed an agent on the corner |
| <i>there-Insertion</i> | —   |

### 2.2.2. *Bleeding: Extraposition & Relative Pronoun Deletion*

The next case involves bleeding of Relative Pronoun Deletion by Extraposition (Eckman 1974). In English, it is possible for relative clauses immediately adjacent to the NPs they modify to occur with or without a relative pronoun such as *which* (24). However, this process can only apply if the relative pronoun is adjacent to the modified noun (25):

- (24) a. The gun<sub>i</sub> [which<sub>i</sub> I cleaned] went off.  
 b. The gun [I cleaned] went off.
- (25) a. The gun<sub>i</sub> t<sub>j</sub> went off [which<sub>i</sub> I cleaned]<sub>j</sub>.  
 b. \*The gun t<sub>j</sub> went off [Ø I cleaned]<sub>j</sub>.

This is captured by the following rule, which states that a relative pronoun can be deleted when it is adjacent to the noun it modifies.

- (26) *Relative Pronoun Deletion*  
 REL-PRO<sub>i</sub> → Ø / NP<sub>i</sub> \_\_\_

Furthermore, constituents, including relative clauses, can be extraposed using the following general rule:

- (27) *Extraposition*  
 [S XP] → [S] XP

Since the Relative Pronoun Deletion rule can only apply to relative pronouns adjacent to modified nouns, extraposition of the relative clause will bleed application of Relative Pronoun Deletion.

- (28) *Extraposition bleeds Relative Pronoun Deletion*

	The gun <sub>i</sub> [which <sub>i</sub> I cleaned] went off
<i>Extraposition</i>	The gun <sub>i</sub> went off [which <sub>i</sub> I cleaned]
<i>Relative Pronoun Deletion</i>	*The gun <sub>i</sub> went off [I cleaned]

However, if we were to flip the bleeding rule in this case (Extraposition), we should arrive at a rule that feeds Relative Pronoun Deletion. By reversing the symbols either side of the arrow in the Extraposition rule, we obtain an Intraposition rule that moves sentence-peripheral elements inside the clause:

- (29) *Intraposition*  
 [S] XP → [S XP]

This new rule now, as expected, feeds the rule of Relative Pronoun Deletion:

- (30) *Intraposition feeds Relative Pronoun Deletion*

	The gun <sub>i</sub> went off [which <sub>i</sub> I cleaned]
<i>Intraposition</i>	The gun <sub>i</sub> [which <sub>i</sub> I cleaned] went off
<i>Relative Pronoun Deletion</i>	The gun <sub>i</sub> [I cleaned] went off

2.2.3. *Mutual bleeding: Dative shift & Theme-NP movement*

The interaction of Dative shift and Theme-NP movement in passives represents a case of mutual bleeding in syntax as discussed by den Dikken (1995). There are two main ditransitive structures in English: prepositional datives and double object constructions:

- (31) a. John sent a letter to the president.  
 b. John sent the president a letter.

It is possible to assume, as den Dikken (1995) does, that the double object construction in (31b) is derived from the prepositional dative construction. Assuming a theory-neutral representation, the Dative shift rule removes the preposition from the indirect object PP and reorders the DO and IO:

- (32) *Dative shift*  
 $V NP_{DO} [PP P NP_{IO}] \rightarrow V NP_{IO} NP_{DO}$

Furthermore, the theme NP argument of a ditransitive verb can be passivized (33). We already encountered the relevant Passivization rule in (19) (repeated in slightly modified form in (34)):

- (33) a. John sent a letter to the president.  
 b. A letter was sent to the president.

- (34) *Passivization*  
 $NP_1 V NP_2 \rightarrow NP_2 AUX V$

This rule removes the NP in initial position (the subject) and moves the closest NP to subject position. These two rules are mutually bleeding since if one of them applies to a given structure first, the other cannot apply subsequently. For instance, if Dative shift precedes Passivization, Theme-NP movement is impossible due to the fact that the Passivization rule moves the NP furthest to the left.<sup>3</sup>

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<sup>3</sup>Note that *The president was sent a letter* is grammatical. What we are trying to capture here are Minimality effects. Since capturing these in rules is not straightforward, and since we are aiming to keep this discussion as theory-neutral as possible, we are referring to a linear notion 'left-most' rather than a hierarchical one such as 'c-command'.

(35) *Dative shift bleeds Theme-NP Movement*

	John sent a letter to the president
<i>Dative shift</i>	John sent the president a letter
<i>Theme-NP Movement</i>	*A letter was sent the president

If the Passivization (Theme-NP Movement) applies first, then Dative shift can no longer apply as no reordering of verb adjacent arguments is possible:

(36) *Theme-NP Movement bleeds Dative Shift*

	John sent a letter to the president
<i>Theme-NP Movement</i>	A letter was sent to the president
<i>Dative shift</i>	*A letter was sent the president

The interesting thing about mutually bleeding rules is that the flipped version of either rule will feed the other rule. For example, the flipped version of Dative shift (37), which we call PPization, will feed rather than bleed Theme-NP movement (38):

(37) *PPization:*

$V NP_{IO} NP_{DO} \rightarrow V NP_{DO} [PP P NP_{IO}]$

(38) *PPization feeds Theme-NP Movement*

	John sent the president a letter
<i>PPization</i>	John sent a letter to the president
<i>Theme-NP Movement</i>	A letter was sent to the president

Similarly, the flipped version of Passivization (39) now feeds Dative shift:

(39) *Depassivization*

$NP_2 AUX V \rightarrow NP_1 V NP_2$

(40) *Depassivization feeds Dative Shift*

	A letter was sent to the president
<i>Depassivization</i>	John sent a letter to the president
<i>Dative shift</i>	John sent the president a letter

### 3. Abstract formulation

In order to understand why the flipping of a rule as demonstrated in the preceding sections actually turns a feeding relation into a bleeding relation, it is

useful to give an abstract formulation of the rules involved. Doing this makes it possible to clearly state the formal conditions that need to hold between different parts of the rules for there to be a relationship of one or the other kind. The underlying dependencies between rule flipping and feeding vs. bleeding will then become evident. In addition, further dependencies between counterfeeding and counterbleeding will also become clearer.

But first, let us give a formal representation of rules and the conditions for their interaction.

$$(41) \quad \text{Parts and subparts of a rule}$$

$$\begin{array}{ccc} \text{input focus} & & \text{output focus} \\ \underbrace{\text{L} \quad \overbrace{\text{I}} \quad \text{R}} & \longrightarrow & \underbrace{\text{L} \quad \overbrace{\text{O}} \quad \text{R}} \\ \text{I-SD} & & \text{O-SD} \end{array}$$

A rule such as (41) consists of two parts:

- the INPUT STRUCTURAL DESCRIPTION (I-SD), that describes the properties of strings of symbols that the rule can apply to
- the OUTPUT STRUCTURAL DESCRIPTION (O-SD), that describes the string of symbols that is the result of application of the rule

Within these parts one can further distinguish the FOCUS – the part that is actually changed by the rule – from its respective left-hand (L) and right-hand (R) context that remains unchanged by the rule. For expository purposes, we refer to the focus of the I-SD as I(nput focus) and to the focus of the O-SD as O(utput focus). The left-hand and right-hand context will be subsumed under the notion ENV(ironment) which does not refer to both contexts together but rather to each one individually ignoring the distinction between left and right. For now we will simply restrict the focus and the environment to consist of one symbol only. Furthermore, although the linguistic examples above mainly involve interactions on environment, we will only discuss rule INTERACTIONS ON FOCUS here and leave INTERACTIONS ON ENVIRONMENT (McCarthy 1999) for future research. We take the view that before delving into the intricate matter of interactions on environment one first has to have a sound grasp on the simpler cases of interactions on focus.

Bearing this in mind, consider the two rules in (42).

(42) *Abstract rules*

$$\begin{aligned} \text{Rule 1: } & L^1 I^1 R^1 \longrightarrow L^1 O^1 R^1 \\ \text{Rule 2: } & L^2 I^2 R^2 \longrightarrow L^2 O^2 R^2 \end{aligned}$$

In order for these two rules to potentially interact in an excitatory or inhibitory way certain conditions on the symbols L, I, O, and R must hold. These will be laid out in more detail for feeding, bleeding, counterfeeding and counterbleeding in the next sections.

3.1. Feeding

A preceding rule feeds a subsequent rule if the former creates a new string of symbols to which the latter then applies. Since we are only concerned with interactions on focus here, this means that the output focus of Rule 1 needs to be the same as the input focus of Rule 2 and hence:

(43) *Feeding: condition on focus*  
 $O^1 = I^2$

Additionally, it has to be the case that the environments of the two rules are compatible. That is either the environment of Rule 1 is contained in that of Rule 2 or *vice versa* or both (which is the same as equality). Since they are viewed as single simple symbols a subset relation only holds if one of them is  $\emptyset$ . Formally, this can be stated as in (44)

(44) *Feeding: condition on environment*  
 $ENV^1 \subseteq ENV^2 \vee ENV^1 \supseteq ENV^2$

If this condition were not fulfilled and for example  $L^1 = x$ ,  $R^1 = \emptyset$  and  $L^2 = y$ ,  $R^2 = \emptyset$  then the two rules would never interact even if condition (43) held.

An abstract example of feeding is given in (45) where uppercase letters represent foci and lowercase letters represent simple symbols.

(45) *Abstract feeding interaction*  
 Rule A:  $\emptyset A y \longrightarrow \emptyset \boxed{B} y$   
 Rule B:  $x \boxed{B} \emptyset \longrightarrow x C \emptyset$

Here, the output focus of Rule A is equal to the input focus of Rule B just as stated by condition (43). Additionally, the left-hand context of Rule A is a

subset of the left-hand context of Rule B. The right-hand context of Rule B is in turn a subset of that of Rule A. Thus, condition (44) is obeyed.

### 3.2. Bleeding

A preceding rule bleeds a subsequent rule if the former decreases the number of strings to which the latter could apply. In the case of bleeding on focus, this will happen when the first rule removes or modifies what would have been the input focus of the second rule. That means that the input focus of both rules has to be identical and hence

$$(46) \quad \textit{Bleeding: condition on focus} \\ I^1 = I^2$$

Two rules that obey condition (46) can only apply to the same target string, and hence interact, if the condition on environment presented in the previous section is obeyed.

$$(47) \quad \textit{Bleeding: condition on environment} \\ ENV^1 \subseteq ENV^2 \vee ENV^1 \supseteq ENV^2$$

Again, even if both rules applied to the same focus but in different environments an interaction would not be possible. (47) ensures that the contexts to the left and to the right of the foci of both rules are compatible with each other. (48) provides an abstract example of bleeding on focus.

$$(48) \quad \textit{Abstract bleeding interaction} \\ \text{Rule A: } x \boxed{A} \emptyset \longrightarrow x B \emptyset \\ \text{Rule B: } \emptyset \boxed{A} y \longrightarrow \emptyset C y$$

This time it is the input focus of Rule A which is equal to the input focus of Rule B just as stated by condition (46). The left-hand context of Rule B is a subset of the left-hand context of Rule A. The right-hand context of Rule A is in turn a subset of that of Rule B. Thus, condition (44) is obeyed.

For feeding and bleeding the conditions on environment are the same in (44) and (47). Therefore, if we want to investigate the relationship between both interactions, we need to look at their respective conditions on focus, repeated in (49) for the reader's convenience.

(49) *Flipping*

feeding: condition on focus	$\boxed{O^1} = I^2$
	↑
bleeding: condition on focus	$\boxed{I^1} = I^2$

The symbol to the right of the equal sign is the same in both conditions. More precisely, for feeding and bleeding, a part of the first rule has to be equal to the input focus of the second rule. The symbols to the left of the equal signs always refer to the first rule. They differ in the following way: For feeding it is the output focus that needs to be identical to the input focus of the second rule whereas for bleeding it is the input focus. It is now clearly visible why a feeding interaction turns into a bleeding interaction when the first of the two rules is flipped. It is precisely because flipping substitutes the input focus for the output focus and *vice versa*.

### 3.3. Tardy interactions

As is well known, one can turn a timely interaction such as feeding and/or bleeding into a tardy interaction (traditionally called ‘opaque’) such as counterfeeding or counterbleeding by reversing the order of application of two rules. Since the order of application is represented by the superscripts in (49), it should be the case that by swapping these superscripts one arrives at the conditions for counterfeeding and counterbleeding respectively. For counterfeeding, this would result in (50)

(50) *Counterfeeding: condition on focus*  
 $O^2 = I^1$

Counterfeeding is usually said to hold between two rules if one of them creates the target for the other but cannot feed it because it applies too late. This is exactly what (50) describes. Again, the condition on the environment is the same as for feeding and bleeding. An abstract example of counterfeeding is (51).

(51) *Abstract counterfeeding interaction*

Rule A:	$x \boxed{B} \emptyset \longrightarrow x C \emptyset$
Rule B:	$\emptyset A y \longrightarrow \emptyset \boxed{B} y$

The situation is a bit different for a counterbleeding interaction. By swapping the superscripts in (46) one obtains

$$(52) \quad \textit{Counterbleeding: condition on focus} \\ I^2 = I^1$$

Counterbleeding is said to hold between two rules if one of them would destroy the target of the other but does not bleed it because it applies too late. Since the condition on bleeding (46) is equal to that on counterbleeding (52) it follows that for interactions on focus every bleeding interaction is also a counterbleeding interaction; more precisely: bleeding on focus between two rules is necessarily mutual bleeding. The condition on the environment is the same as that for bleeding, feeding and counterbleeding. A change in the order of application therefore has no effect on the kind of interaction (compare the abstract counterfeeding interaction in (53) with the abstract bleeding interaction in (48)).

$$(53) \quad \textit{Abstract counterbleeding (mutual bleeding) interaction} \\ \text{Rule A: } \emptyset \boxed{A} y \longrightarrow \emptyset C y \\ \text{Rule B: } x \boxed{A} \emptyset \longrightarrow x B \emptyset$$

### 3.4. Sets of feature-value pairs

Up to now we have stated the different conditions for feeding and bleeding using simple symbols that do not have any internal structure. But as we can see from the phonological examples in Section 2, rules manipulate features rather than whole segments. In this section we will therefore reformulate the conditions on focus and environment such that they become statements on sets of feature-value pairs.

In order to arrive at a comprehensible formulation from which the relations between types of interaction are immediately obvious (as was the case with the statements on simple symbols), we make the following assumptions:

1. Feature-value pairs are regarded as primitives. There is no relation whatsoever between  $+F_1$  and  $-F_1$ . They are different elements and it is impossible to state that they both include the same feature  $F_1$ .
2. Rules do not apply vacuously. Commonly, phonological rules are often given as  $[+obstr]\# \rightarrow [-voice]\#$ , where the rule would vacuously apply

to voiceless obstruents. We formulate them in such a way that both input and output focus are identical except for the features manipulated by the rule, i.e. [+obstr,+voice] → [+obstr,-voice].

Without these assumptions a more complicated formulation of the conditions would be required. For feeding this would probably have to be  $\exists F(F \in I^1 \wedge F \in O^1 \wedge F \in I^2 \wedge v(F, I^1) \neq v(F, O^1) = v(F, I^2))$  where  $F$  is a feature and  $v(F, X)$  is its value in set  $X$ . Formulated like this, the relations between interactions become more difficult to grasp. Also, we do not yet fully understand their implications. For these reasons we will adhere to the assumptions above.

### 3.4.1. Feeding

Let us imagine a universe where segments are composed of four binary features  $F_1, F_2, F_3$  and  $F_4$ . The rules in (42) might then be reformulated in featural terms as in (54), where we additionally formulate three more versions of Rule 2 in order to exemplify the various possibilities of interaction. For better readability we only give the focus in feature notation. The left-hand and right-hand context are understood to be a set of feature-value pairs as well. For the sake of concreteness, we assume  $L^1$  and  $L^2$  to be  $\{+F_1, +F_2, -F_3\}$  and  $R^1$  and  $R^2$  to be  $\{-F_1, -F_2\}$  for the time being such that the condition on environment is fulfilled.

(54) *Abstract rules operating on sets of feature-value pairs (feeding)*

$$\begin{array}{l}
 \text{Rule 1: } L^1 \begin{bmatrix} +F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^1 \longrightarrow L^1 \begin{bmatrix} -F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^1 \\
 \hline
 \text{Rule 2: } L^2 \begin{bmatrix} -F_1 \\ +F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ -F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \quad O^1 \subseteq I^2 \\
 \text{Rule 2': } L^2 \begin{bmatrix} -F_1 \\ +F_2 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ -F_2 \end{bmatrix} R^2 \quad O^1 \supseteq I^2
 \end{array}$$

$$\begin{array}{l} \text{Rule } 2'': L^2 \begin{bmatrix} -F_1 \\ \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ \\ -F_4 \end{bmatrix} R^2 \quad O^1 \cap I^2 \neq \emptyset \\ \\ \text{Rule } 2''': L^2 \begin{bmatrix} +F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \quad O^1 \cap I^2 \neq \emptyset \end{array}$$

In (54), Rule 1 feeds Rules 2, 2' and 2'', where the input focus of Rule 2 is a superset and that of Rule 2' a subset of the output focus of Rule 1. The input foci of Rule 2'' and Rule 2''' both have a non-empty intersection with the output focus of Rule 1. The interaction between Rule 1 and 2'' is a classical feeding relation: Rule 1, by changing +F<sub>1</sub> to -F<sub>1</sub>, creates the input for Rule 2'', which otherwise could not apply to the given target. The interaction between Rule 1 and 2''' however is not feeding: Although Rule 2''' could apply to the output of Rule 1 (given a respective target {+F<sub>1</sub>, +F<sub>2</sub>, +F<sub>3</sub>, +F<sub>4</sub>}) it could also apply to the target itself. There exists no target such that Rule 2''' can only apply after Rule 1 has changed the target accordingly.

The question then is, what are the conditions that have to hold between sets of feature-value pairs in order to establish a feeding interaction? Or in other words, what distinguishes Rule 2''' from the other Rules 2, 2' and 2''?

The crucial difference is that the intersection of I<sup>2</sup> and O<sup>1</sup> for the latter Rules contains the feature whose value has been changed by Rule 1 whereas the intersection of I<sup>2</sup> and O<sup>1</sup> for Rule 2''' does not. Regarding feature-value pairs as primitives, this is set-theoretically expressible as:

- (55) *Feeding: condition on focus for feature-value sets*  
 $(O^1 \cap I^2) \not\subseteq I^1$

### 3.4.2. *Bleeding*

In order for a bleeding relation to hold between two rules one of them has to be able to apply to a subset of the targets that the other one applies to. In addition, the rule that applies first needs to alter the target in such a way that it does not fit the I-SD of the subsequent rule any more. The first requirement is fulfilled if  $I^1 \cap I^2 \neq \emptyset$ , the second one if this intersection is no subset of the

output focus of the first rule, i.e. the feature that is changed by the first rule has to be an element of the intersection. Since the empty set is a subset of every set by definition, the second requirement entails the first one, which hence does not need to be explicitly stated.

(56) *Bleeding: condition on focus for feature-value sets*  
 $(I^1 \cap I^2) \not\subseteq O^1$

Here again, as with the simpler formulations above, a flipping of the first rule substitutes its input focus for its output focus and *vice versa*. This mirrors the different positions of these elements within the set-theoretic conditions for feeding (55) and bleeding (56).

(57) *Link between feeding and bleeding*

feeding:	$\boxed{O^1} \cap I^2 \not\subseteq \boxed{I^1}$
bleeding:	$\boxed{I^1} \cap I^2 \not\subseteq \boxed{O^1}$

Thus, in (58) (which is the same as (54) but with Rule 1 flipped) Rule 1 bleeds Rules 2, 2' and 2'' but does not bleed Rule 2'''. The intersection of the input focus of Rule 1 with each of the input foci of Rules 2, 2' and 2'' is not a subset of the output focus of Rule 1. This is exactly what condition (56) requires for a bleeding interaction. The relevant intersection of Rule 1 with Rule 2''' however is a subset of the output focus of Rule 1. Conforming to (56) there is no bleeding interaction between these two rules in (58).

(58) *Abstract rules operating on sets of feature-value pairs (bleeding)*

$$\begin{array}{l}
 \text{Rule 1: } L^1 \begin{bmatrix} -F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^1 \longrightarrow L^1 \begin{bmatrix} +F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^1 \\
 \hline
 \text{Rule 2: } L^2 \begin{bmatrix} -F_1 \\ +F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ -F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \quad (I^1 \cap I^2) \not\subseteq O^1
 \end{array}$$

$$\text{Rule } 2': L^2 \begin{bmatrix} -F_1 \\ +F_2 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ -F_2 \end{bmatrix} R^2 \quad (I^1 \cap I^2) \not\subseteq O^1$$

$$\text{Rule } 2'': L^2 \begin{bmatrix} -F_1 \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_1 \\ -F_4 \end{bmatrix} R^2 \quad (I^1 \cap I^2) \not\subseteq O^1$$

$$\text{Rule } 2''': L^2 \begin{bmatrix} +F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} -F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^2 \quad (I^1 \cap I^2) \subseteq O^1$$

### 3.4.3. *Tardy interactions*

As was the case with the formalisations for simple symbols in the preceding sections a swapping of superscripts, i.e. reversal of the order of application, should give us the conditions for counterfeeding and counterbleeding. The formulation for counterfeeding is

$$(59) \quad \text{Counterfeeding: condition on focus for feature-value sets} \\ (O^2 \cap I^1) \not\subseteq I^2$$

As can be checked by reversing the order of application in (54), this condition holds for all the rules (2, 2' and 2'') that counter-feed Rule 1. It also correctly excludes Rule 2''' from the counterfeeding relation.

For counterbleeding the condition is

$$(60) \quad \text{Counterbleeding: condition on focus for feature-value sets} \\ (I^2 \cap I^1) \not\subseteq O^2$$

Unlike before, the two conditions (60) (counterbleeding) and (56) (bleeding) are not equal to each other. In the former the intersection of  $I^2$  and  $I^1$  must not be a subset of  $O^2$  while in the latter it must not be a subset of  $O^1$ . This means that a rule can actually bleed another rule but not counter-bleed it at the same time and *vice versa*. A simple example illustrates this.

(61) *Bleeding ≠ counterbleeding for feature-value sets*

$$\begin{array}{l}
 \text{Rule 1: } L^1 \begin{bmatrix} +F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^1 \longrightarrow L^1 \begin{bmatrix} -F_2 \\ +F_3 \\ +F_4 \end{bmatrix} R^1 \quad (I^1 \cap I^2) \begin{array}{l} \not\subseteq O^1 \\ \subseteq O^2 \end{array} \\
 \\
 \text{Rule 1': } L^1 \begin{bmatrix} -F_1 \\ \\ +F_4 \end{bmatrix} R^1 \longrightarrow L^1 \begin{bmatrix} -F_1 \\ \\ -F_4 \end{bmatrix} R^1 \quad (I^1 \cap I^2) \begin{array}{l} \subseteq O^1 \\ \not\subseteq O^2 \end{array} \\
 \hline
 \text{Rule 2: } L^2 \begin{bmatrix} -F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^2 \longrightarrow L^2 \begin{bmatrix} +F_1 \\ +F_2 \\ +F_3 \end{bmatrix} R^2
 \end{array}$$

In (61), the intersection of the input foci of Rule 1 and 2 ( $\{+F_2, +F_3\}$ ) is not a subset of the output focus of Rule 1 but of that of Rule 2. Hence, Rule 1 bleeds Rule 2 (by condition (56)) but does not counter-bleed it (by condition (60)). On the other hand, the intersection of the input foci of Rule 1' and 2 ( $\{-F_1\}$ ) is a subset of the output focus of Rule 1' but not of that of Rule 2. Hence, Rule 1' does not bleed Rule 2 (by condition (56)) but counter-bleeds it (by condition (60)).

#### 3.4.4. *Conditions on environment*

In the previous sections the context of the flipped rule was kept constant. However, as noted in Section 2.1.1, swapping the input and the output of a phonological rule will most likely make the resulting rule unnatural. This is because phonological rules usually apply in order to repair marked structures. Reversing the process makes the output structure more marked. However, it is possible to change the context of the flipped rule to make it more plausible. There are various possibilities to do that, but not all of them preserve the interaction between the flipped rule and the subsequent rule.

Consider the following environments of two rules that show interaction on focus. ENV<sup>1-5</sup> are variations of the environment of a preceding rule and ENV<sup>6</sup> is the unaltered environment of a subsequent rule 6.

(62) *Relations between environments*

ENV <sup>1</sup>	ENV <sup>2</sup>	ENV <sup>3</sup>	ENV <sup>4</sup>	ENV <sup>5</sup>
$\begin{bmatrix} +F_1 \\ \\ \\ \end{bmatrix}$	$\begin{bmatrix} +F_1 \\ +F_2 \\ +F_3 \\ \end{bmatrix}$	$\begin{bmatrix} \\ \\ +F_4 \\ \end{bmatrix}$	$\begin{bmatrix} +F_1 \\ \\ -F_3 \\ \end{bmatrix}$	$\begin{bmatrix} +F_1 \\ -F_2 \\ \end{bmatrix}$
ENV <sup>6</sup>				
$\begin{bmatrix} +F_1 \\ +F_2 \\ \end{bmatrix}$				

Environment 1 is a subset, environment 2 a superset of environment 6. For these two environments the interaction on focus between the respective two rules remains intact. They obey the condition on environment for simple symbols repeated in (63).

(63) *Condition on environment (for simple symbols)*

$$\text{ENV}^1 \subseteq \text{ENV}^2 \vee \text{ENV}^1 \supseteq \text{ENV}^2$$

However, if one changes the environment of the preceding rule to ENV<sup>3</sup> with the effect that condition (63) is not obeyed anymore, the interaction still pertains. Since the intersection of ENV<sup>3</sup> and ENV<sup>6</sup> is empty one might amend condition (63) to alternatively require an empty intersection of environments in cases where none of the environments is a subset of the other. But this is still not sufficient as is shown by environments 4 and 5. Both of them are neither a subset nor a superset of ENV<sup>6</sup> and their respective intersections with ENV<sup>6</sup> are not empty. Nevertheless, if the environment of the preceding rule were changed to ENV<sup>4</sup> the interaction between this preceding rule and the subsequent rule would remain intact whereas if the environment were altered to ENV<sup>5</sup> the interaction would be lost. The relevant difference between ENV<sup>4</sup> and ENV<sup>5</sup> is that the latter contains a feature that is also present in ENV<sup>6</sup> but has a contradicting value, i.e.  $-F_2$  in ENV<sup>5</sup> vs.  $+F_2$  in ENV<sup>6</sup>. As it stands, there is no way to formulate this while retaining assumption 1 made in Section 3.4 that feature-value pairs are primitives. By allowing feature-value pairs to be split up into a feature  $F$  and a value  $v$  one were able to formulate the condition on environment as (64).

- (64) *Condition on environment (without assumption 1)*  
 $\forall F((F \in \text{ENV}^1 \wedge F \in \text{ENV}^2 \Rightarrow v(F, \text{ENV}^1) = v(F, \text{ENV}^2))$

Here,  $\text{ENV}^1$  is the environment of the preceding rule while  $\text{ENV}^2$  is that of the subsequent rule. Condition (64) states that if there is an instance of the feature  $F$  in the environment of rule 1 and in that of rule 2 both instances have to bear the same value in order for an interaction between the two rules to hold.

From the above we can conclude that assumption 1 makes the formal description of rule interaction devised in the preceding sections too restrictive. Although it has been useful in the sense that it kept the system simple and easily comprehensible it will eventually have to be abandoned in favour of a more complicated system that is able to refer to features and their values separately and thus to correctly describe the dependencies between two interacting rules.

#### 4. Applications to syntax

The conditions on interactions in phonology and in terms of abstract features may, intuitively, not seem compatible with syntax. However, if these interactions such as feeding and bleeding actually exist in syntax, then there should be no reason why these conditions should not hold there too. In this section, we will discuss interactions and flipping in syntax in more detail and explore the extent to which the set-theoretic formulation of the conditions on interactions developed in the previous sections can be applied to syntax. We will see that one of the main problems that arises is that the objects that phonological rules apply to are features organized into sets, which are by definition unordered. On the other hand, the objects manipulated by syntax are linearly ordered. Thus, it is necessary to view the set-theoretic conditions on simple symbols as conditions on sets of ordered elements (denoting linear precedence relations). The final section will discuss some implications of the notion of flipping for cases of analytical ambiguity.

##### 4.1. Set-theoretic approaches to syntax

In order to see the problem syntactic rules pose for set-theoretic definitions of feeding and bleeding, consider the interaction between VP Topicalization and *do*-support. In English, VP Topicalization is only grammatical with *do*-support:

- (65) John wrote a book.  
 a. [<sub>VP</sub> write a book] John did t<sub>VP</sub>.  
 b. \* [<sub>VP</sub> write a book] John t<sub>VP</sub>.

Thus, we can say that VP Topicalization feeds *do*-support. We can describe the rules involved in this interaction as follows (where # stands for a sentence boundary):

- (66) *VP Topicalization*  
 NP VP → VP NP / \_\_\_#
- (67) *do-support*  
 Ø → do / NP<sub>SUB</sub> \_\_\_#

(66) moves a sentence-final VP to the front of the clause and (67) inserts *do* before a sentence-final (subject) NP. In order to check whether the condition on feeding holds, we will represent the rules using the following notation:

- (68) *Feeding order*  
*VP Topicalization*: NP VP # → VP NP #  
*do-support*: VP NP # → VP NP do #

Recall, that the basic condition that holds between two rules in a feeding relation is  $O^1 = I^2$ . This is indeed the case for these two rules since both  $O^1$  and  $I^2$  are *VP NP* indicated by the box below:

- (69) *Feeding order*  
*VP Topicalization*: NP VP<sub>I<sup>1</sup></sub> # → VP NP<sub>O<sup>1</sup></sub> #  
*do-support*: VP NP<sub>I<sup>2</sup></sub> # → VP NP do #

Furthermore, recall that feeding was also defined in set-theoretic terms for sets of feature-value pairs. The exact condition on feeding was the following:

- (70) *Feeding: condition on focus*  
 $(O^1 \cap I^2) \not\subseteq I^1$

If we compare this to the example in (69), we see that it does not seem to hold if we simply look at the symbols. The set intersection of  $O^1$  and  $I^2$  (marked with a box) is {VP, NP}. According to the condition in (70), this should not

constitute a subset of  $I^1$  (marked with a [dashed] box). However,  $I^1$  corresponds to the set {NP, VP}. Since sets are unordered by nature, these sets – or the symbols contained in them – stand in a subset relation. Does this mean that the set-theoretic conditions cannot be applied to syntax? Perhaps not. The problem here seems to be that syntax manipulates linear order.<sup>4</sup> Thus, in the present example, the fact that the VP appears in a different position in the string creates the necessary environment for *do*-support to apply. If we simply treat syntactic strings as simple sets of the symbols contained in them, then it seems we miss this insight.

Instead, we can view syntax as sets of ordered pairs. If we want to capture the fact that NP precedes VP in an example such as (68), we can view the set corresponding to this string not as {NP, VP} but in fact as {<NP, VP>}, where this notation stands for a linearization statement that NP precedes VP. As a result, we can translate (68) into sets of ordered pairs as follows (cf. Adger 2013):

- (71) *Feeding order:*  
*VP Topicalization:*  $\{\langle \text{NP}, \text{VP} \rangle\}_{I^1} \rightarrow \{\langle \text{VP}, \text{NP} \rangle\}_{O^1}$   
*do-support:*  $\{\langle \text{VP}, \text{NP} \rangle\}_{I^2} \rightarrow \{\langle \text{VP}, \text{NP} \rangle, \langle \text{VP}, \text{do} \rangle, \langle \text{NP}, \text{do} \rangle\}$

Now, it becomes clear that conditions on feeding in fact do hold. Furthermore, under this view we can see that the conditions on other interaction types also hold. If we reverse the order of application, then the condition on counterfeeding in (72) should also hold. (73) shows that this is the case.

- (72) *Counterfeeding: condition on focus*  
 $(O^2 \cap I^1) \not\subseteq I^2$
- (73) *Counterfeeding order:*  
*do-support:*  $\{\langle \text{VP}, \text{NP} \rangle\}_{I^1} \rightarrow \{\langle \text{VP}, \text{NP} \rangle, \langle \text{VP}, \text{do} \rangle, \langle \text{NP}, \text{do} \rangle\}$   
*VP Topicalization:*  $\{\langle \text{NP}, \text{VP} \rangle\}_{I^2} \rightarrow \{\langle \text{VP}, \text{NP} \rangle\}_{O^2}$

Furthermore, we can now test whether the flipped version of VP Topicalization confirms to the conditions on bleeding. The flipped version of VP Topicalization

<sup>4</sup>The same problem would arise if we tried to account for metathesis in a similar way. The approach developed in the present section could potentially provide a solution, however, a unified treatment of all types of phonological operations requires further research.

would be a rule that moves a sentence-initial VP to final position and is given in (74):

- (74) *VP Lowering*  
 VP NP → NP VP / \_\_\_#

If we have this rule precede the unchanged *do*-support, it becomes clear that the condition on bleeding ( $I^1 \cap I^2 \notin O^1$ ) also holds.

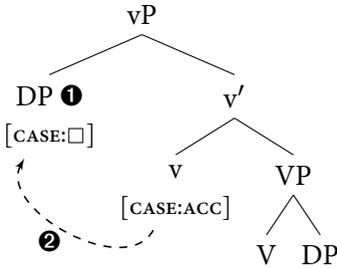
- (75) *Bleeding order (flipped rule)*
- |                      |  |       |   |  |       |
|----------------------|--|-------|---|--|-------|
| <i>VP Lowering</i> : | $\{ \langle \text{VP}, \text{NP} \rangle \}$ | $I^1$ | → | $\{ \langle \text{NP}, \text{VP} \rangle \}$   | $O^1$ |
| <i>do-support</i> :  | $\{ \langle \text{VP}, \text{NP} \rangle \}$ | $I^2$ | → | $\{ \langle \text{VP}, \text{NP} \rangle, \langle \text{VP}, \text{do} \rangle, \langle \text{NP}, \text{do} \rangle \}$ |       |

If we were not dealing with sets of ordered pairs, we would have the same problem as before, namely that the subset relation would in fact hold between the foci of the respective rules since we would have unordered sets of symbols. This example should serve to illustrate an important difference between the nature of interactions in phonology, which operates on sets of unordered features/feature-value pairs, and syntax, which operates on linear strings. If we take this consideration into account, it becomes clear that the conditions that hold for phonology and for abstract examples are also upheld in syntax.

#### 4.2. Analytical ambiguity

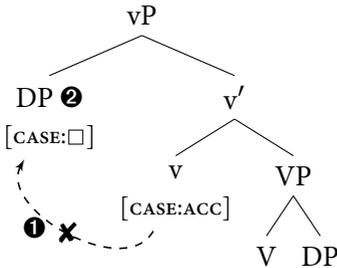
One implication of the discovery of feeding/bleeding alternations by means of flipping is that it opens up new analytical possibilities in syntax. A number of syntactic phenomena can be analyzed as tardy interactions, whereby one rule applies too late to have an effect. An example of this is counterfeeding of Spec-Head Agree. If a head *v* can carry out Agree for assignment of, say, accusative case with either its complement or its specifier (with a preference for Spec-Head Agree; cf. *Spec-Head bias*), then External Merge – an operation, which introduces a specifier of *v* – will feed Spec-Head Agree if it applies first (76).

(76) *Feeding of Spec-Head Agree*



This is the analysis that is proposed for argument encoding in Müller (2009). Following Murasugi (1992), he assumes that *v* assigns an ‘internal case’ corresponding to accusative or ergative. Whereas ergative is marked on the external argument in ergative-absolutive languages, external arguments are not marked with accusative in nominative-accusative languages. This is puzzling since we know that the external argument is in a Spec-Head configuration at some point in the derivation – this begs the question as to why it is not assigned accusative case in this position. The solution proposed by Müller (2009) is that Merge comes too late to feed Spec-Agree (i.e. it counterfeeds it):

(77) *Counterfeeding of Spec-Head Agree*



This becomes relevant for the discussion of flipping in the following way: If Merge feeds Spec-Head Agree, then the flipped version of Merge should bleed Spec-Head Agree. The question arises as to what the flipped version of Merge would look like. If we conceive of Merge as an operation that moves a syntactic object from the workspace (where it is assembled) into the tree, we can represent the movement involved as follows:

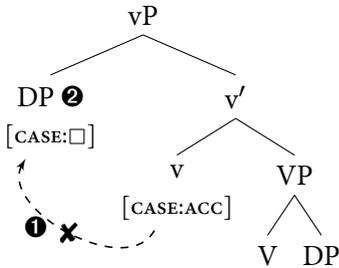
- (78) *External Merge*  
 XP(workspace) → XP(tree)

We know that – in the most basic sense – flipping a rule involves reversing its input and output. Applying this change to (78) yields the following:

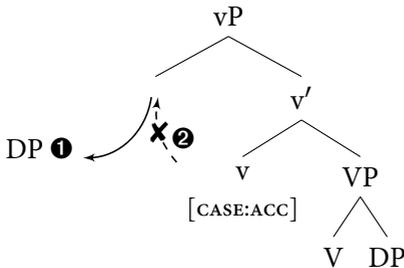
- (79) *Reversed Merge (Sideward Movement)*  
 XP(tree) → XP(workspace)

The operation in (79) moves syntactic objects from the tree into the workspace. Interestingly, this kind of operation actually exists and is commonly referred to as *Sideward Movement* (Nunes 2004). This means that we now actually have two operations that can explain the fact that Spec-Head Agree does not apply in nom-acc languages such as English: (i) Merge applies after Agree (counterfeeding) (80), (ii) the context for Spec-Head Agree to apply is destroyed by timely application of Sideward Movement (bleeding) (81):

- (80) *Counterfeeding of Spec-Head Agree*



- (81) *Bleeding of Spec-Head Agree*



Both of these are viable options in order to analyze the non-application of a particular process. If we assume that movement (Internal Merge) can actually

be decomposed into Sideward Movement & External Merge, then there is really no obvious reason to favour one analysis over the other. Thus, we have a case of genuine analytical ambiguity. There may be other reasons to favour one analysis over the other, but both exist as logical possibilities. The implication for analyses proposing ‘opaque’ interactions such as counterfeeding of counterbleeding is that there will – at least in theory – always be a ‘transparent’ alternative to an ‘opaque’ analysis. In this case, it is possible to reanalyze counterfeeding of Spec-Head Agree as bleeding of Spec-Head Agree by the flipped version of the original feeding rule. Thus, we arrive at a systematic way of generating alternative syntactic analyses. If we start from a tardy interaction (counterfeeding/counterbleeding), reverse the order of application and then apply flipping to the first rule, we will generate the corresponding timely interaction (bleeding/feeding). Although this may not always offer a plausible alternative, it means that there is always a transparent, or *timely*, alternative to every opaque interaction that should at least be considered. Uncovering the nature of flipped rules and feeding/bleeding alternations provides a systematic way of arriving at these alternatives.

## 5. Summary

In this paper, we explored the effect of ‘flipping’ rules. In the typology of grammatical interactions, the relationship between feeding and counterfeeding on the one hand, and bleeding and counterbleeding on the other is well understood. We know that if we want to turn feeding into counterfeeding, for example, we only need to reverse the order of application. What is less clear is what kind of relationship, if any, holds between feeding and bleeding, and counterfeeding and counterbleeding. We have shown that there is an active alternation between the two kinds of interaction that can be achieved in practice by inverting (or ‘flipping’) the input and output of the feeding or bleeding rule. It was shown that this is a transformation that can be readily applied to examples from both phonology and syntax. In order to better understand why feeding and bleeding stand in this relation, we sought a formal definition of the exact conditions on feeding and bleeding. We found that there exist certain conditions on each interaction type which can be partially stated in set-theoretic terms and that flipping is in fact just exchanging symbols in these set-theoretic statements in a systematic way. The main focus of the paper was placed on

intertactions on focus. The conditions on interactions on environment seem much more complex and require further research. Furthermore, it was shown that the formulation of the various conditions on symbols and feature-value pairs can in fact be extended to syntax if we view syntax as operating on sets of ordered pairs corresponding to linearization statements. One of the main achievements of this article is that it provides a systematic way to turn feeding into bleeding and *vice versa*. Furthermore, we have reached a better understanding of the exact conditions that hold on the four familiar interaction types.

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# Opacity in Lardil: stratal vs. serial derivations in OT

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## Abstract

This paper presents a derivational OT account of the word-final deletion and augmentation alternations in Lardil. It presents two arguments in favor of the stratal view of derivations where the grammar is different at different stages (Bermúdez-Otero forthcoming, Kiparsky forthcoming), and against the serial view where the ranking is the same at all steps, and each step constitutes a minimal change (McCarthy 2006, 2007 et seq.). First, Lardil consonant deletion and vowel deletion cannot both be harmonically improving with respect to the same OT ranking (Kavitskaya and Staroverov 2010, McCarthy 2006). Second, the patterns of minimal word augmentation require some amount of derivational lookahead in a theory where each derivational step may only involve a minimal change.

## 1. Introduction

The Australian language Lardil has been the focus of attention of phonologists since Hale's (1973) seminal description (Blevins 1997, Bye 2006, Goldsmith 1993, Horwood 2001, Itô 1986, Kiparsky forthcoming, Kurisu 2001, Lakoff 1993, McCarthy 2003, 2006, Prince and Smolensky 2004, Wilkinson 1988). Nevertheless, there is still considerable disagreement in the literature as to what exactly the generalizations are and how they should be analyzed. The facts of Lardil remain 'hard, unpleasant facts of phonological life' as Goldsmith (1993: 256) characterizes them.

This paper argues that word-final deletion and insertion alternations in Lardil are problematic for standard OT with just markedness and faithfulness

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\*This paper grew out of my joint work with Darya Kavitskaya and I am grateful to her for all her comments and guidance. A lot of inspiration for this paper also came from discussion with my qualifying paper committee members at Rutgers: Akinbiyi Akinlabyi, Alan Prince and especially Paul de Lacy. Paul de Lacy also guided me in digitizing the Lardil dictionary and even helped by programming. For valuable comments on various versions of this work I am grateful to Norvin Richards, Erich Round, Bruce Tesar, Jochen Trommer, and Eva Zimmermann. I am responsible for all errors and imprecisions herein.

constraints. Instead Lardil is analyzed as a case of phonological opacity. The interactions between Lardil alternations present some interesting arguments in favor of a stratal approach to opacity which crucially involves different grammars at different derivational stages (Bermúdez-Otero forthcoming, Kiparsky forthcoming). On the other hand, a serial approach which involves gradual harmonic improvement with regard to just one hierarchy (McCarthy 2007) faces two challenges. First, Lardil consonant deletion and vowel deletion arguably cannot both be harmonically improving with respect to the same OT ranking (Kavitskaya and Staroverov 2010, McCarthy 2006). Second, the patterns of minimal word augmentation require some amount of derivational lookahead in a theory where each derivational step may only involve a minimal change.

In sum, the paper argues that the facts of Lardil are better analyzed with stratal rather than with serial derivations in OT. In addition, it takes into consideration the data from the Lardil dictionary (Leman 1997), which is also analyzed by Round (2011). The dictionary will be referred to as ‘NKL’ in what follows.

The paper is structured as follows. Section 2 presents an ordering-based analysis of the interaction between apocope and consonant deletion in Lardil, and argues that this interaction cannot be captured with just one hierarchy of constraints. Section 3 considers subminimal word augmentation and argues that the choice of an augment presents a challenge for gradual derivations, but not for a stratal analysis. Section 4 discusses alternative approaches to Lardil apocope and section 5 concludes.

## **2. Apocope and consonant deletion: a challenge for harmonic improvement**

This section describes and analyzes the interaction between apocope and consonant deletion in Lardil. In order to present this famous interaction, the section considers exclusively the words and forms which are longer than two moras, and which do not run the risk of violating the word minimality requirements of Lardil. Section 3 is in turn devoted to shorter words. The key data is presented in section 2.1 followed by a Stratal OT analysis in section 2.2. Section 2.3 argues that Lardil data present a challenge for Serial OT: both

apocope and consonant deletion cannot be harmonically improving in the same language.

### 2.1. Key alternations and relevant constraints

Lardil distinguishes four vowel qualities: [a], [æ], [i] and [u]. Each vowel can be long or short. The consonant inventory of Lardil is presented in (1). The transcription conventions adopted here adhere to the IPA which is only a slight deviation from the generally adopted Lardil transcription.

#### (1) Lardil consonantal inventory

	bilabial	lamino dental	laminal palato- alveolar	apico- alveolar	apical post- alveolar	dorso- velar
stops	p	t̪	c	t	t̺	k
nasals	m	n̪	ɲ	ɳ	ɳ̺	ŋ
laterals			(ʎ) <sup>1</sup>	l	l̺	
flap				ɾ		
glides	w		j		ɹ̺	

Words longer than two moras undergo deletion of a final short vowel, as in (2). This process will be referred to as *apocope*.

(2)	Stem	Nom	Gloss	cf. Acc <sup>2</sup>
	/jilijili/	jilijil	‘oyster sp’	jilijili-n
	/majara/	majar	‘rainbow’	majara-n
	/wiwala/	wiwal	‘bush mango’	wiwala-n

I will assume here that apocope is an active phonological process of Lardil (although, as we shall see, the process is active only at a relatively early stratum). A number of challenges to the productive status of apocope have been raised in the literature. For one thing, the process reportedly only applies to nouns in the nominative (Prince and Smolensky 2004, Bye 2006, Horwood 2001, Kurisu 2001, Trommer and Zimmermann 2014, Zimmermann 2014). However, in section 4.1 I will present some data suggesting that apocope also applies to

<sup>1</sup>ʎ only occurs in a very small number of words such as *paʎatɪŋ* ‘subsection name’

<sup>2</sup>I use the following abbreviations: ACC = (non-future) accusative, ACT = actuality, COM = comitative, FUT = future, NOM = nominative, NFUT = nonfuture, PERF = perfective, VOC = vocative.

vocatives, contrasting in this regard with another process of vowel lowering. Section 4.1 will also discuss some possible exceptions to apocope, and argue that these exceptions do not change the overall picture. Additional evidence that apocope is productive is presented in Round (2011).

Some of the examples of apocope given in this article appear to be the result of reduplication, e.g. the first form in (2). Although reduplication probably happened in these forms historically, for all we know reduplication is not productive at the relevant stage of Lardil. The base of the reduplication can only rarely be located in the dictionary, for example there is no word /jili/ from which /jilijili/ could plausibly be derived. In the cases where there is a possible base, the semantic relation between base and reduplicant is often idiosyncratic, e.g. /karwakarwa/ ‘tree sp.’ presumably from /karwa/ ‘hard’.

The other process of interest is related to Lardil consonant phonotactics and syllable structure. Lardil requires syllables to have onsets and allows at most one consonant in the margins, i.e. CV(C). The dictionary lists only 5 exceptions that have complex codas (3). In all of these exceptions, the second part of the coda is also part of a homorganic NC cluster.

- (3)
- |         |   |
|---------|---|
| pilŋka  | ‘tree sp., black mangrove’  |
| pulmpa  | ‘grasshopper’   |
| ʈatŋka  | ‘fish sp., barracuda’   |
| kalŋkur | ‘bird sp., seagull’   |
| kæŋka   | ‘grass sp., grass used for making string for bullroarer,<br>for plaited grass belt and for armband’ |

The consonants appearing as codas are limited. Apicals are possible codas – this set is shaded in (1). Labials and dorsals are impossible codas, except for nasals [m ŋ] sharing place of articulation with a following consonant. Laminodental [t̪] does not occur in the coda, and laminodental [ɲ] only occurs in 14 entries in the dictionary, occurring word-finally in one example: /paŋapaŋa/ [paŋapaŋ] ‘flower’. Finally, the situation is most complicated for lamino-palatals [c ɲ] – the patterning of these consonants will be discussed at the end of this section.

The coda restrictions are exceptionless and surface true, apart from alternative pronunciations [wukwa] pro [wukuwa] ‘to work’ and [wukwan] pro [wukuwan] ‘work’.

Complex syllable margins are simplified via deletion, as illustrated in (4).

(4)	Stem	Nom	Gloss	cf. Acc
	/waŋalk/	waŋal	'boomerang'	waŋalk-in
	/maɭkant/	maɭkan	'deceased person'	maɭkant-i <sup>3</sup>

Similarly impossible codas are deleted word-finally (5).

(5)	Stem	Nom	Gloss	cf. Acc
	/t̪u.ɽaraŋ/	t̪u.ɽara	'shark'	t̪u.ɽaraŋ-in
	/wuŋkunuŋ/	wuŋkunu	'queenfish'	wuŋkunuŋ-in

I assume (with the existing accounts) that cluster simplification in (4) and impossible coda deletion in (5) are active phonological processes of Lardil. As we shall see, the interaction between these processes and apocope (2) presents a challenge for the theories of opacity.

Both vowel deletion and consonant deletion create an environment for the other process. As illustrated in (6), impossible codas and consonant clusters that become word-final as a result of vowel deletion in turn undergo deletion. In other words, apocope feeds both cluster simplification and impossible coda deletion.

(6)	Stem	Nom	Gloss	cf. Acc
	/karwakarwa/	karwakar	'tree sp., wattle'	karwakarwa-n
	/jukarpa/	jukar	'husband'	jukarpa-n
	/t̪ipit̪ipi/	t̪ipit̪i	'rock cod'	t̪ipit̪ipi-n
	/murkunima/	murkuni	'nulla-nulla'	murkunima-n
	/muŋkumuŋku/	muŋkumu	'wooden axe'	muŋkumuŋku-n

On the other hand, the opposite feeding relation does not hold: a vowel that becomes word-final as a result of consonant deletion never deletes, as seen in (5). In rule terms the derivations of the examples above can be recast as in (7).

<sup>3</sup>This form, as well as other examples later in the paper, exhibit the optional process of final apical consonant deletion – accusative is marked by [i] instead of [in]. The process, as described in Klokeid (1976: chapter 7), NKL and Richards 2001 applies optionally and probably is morphologically conditioned. Most frequently the final consonant of case endings and enclitics is dropped, but a few stems exhibit the process as well. I will not attempt to analyze this process here, but it is worth noting that all sources classify it as a separate pattern, independent of impossible coda deletion in (5).

## (7) Rule-based derivations of three crucial examples

Input	wajalk	jilijili	murkunima
Apocope	n/a	jilijil	murkunim
C-deletion	wajal	n/a	murkuni
Output	wajal	jilijil	murkuni

The generalization that words do not end in a vowel is not surface-true in Lardil. Thus on the one hand apocope and consonant deletion interact opaquely. On the other hand, the two processes are also in a transparent feeding relation. This interaction is of the kind that Kavitskaya and Staroverov (2010) call *fed counterfeeding*: the two processes are both in a feeding relation and in a counterfeeding relation.

Before we proceed to the analysis, restrictions on codas in Lardil have to be considered in greater detail. As we have seen, the consonants which are possible codas word-medially (alveolar and post-alveolar apicals) are also allowed wordfinally. Conversely, labials, dorsals, and laminodentals do not occur in coda word-medially and are deleted word-finally (except for homorganic NC clusters and the word [paŋapaŋ] ‘flower’ discussed above).<sup>4</sup>

For laminal palato-alveolar consonants, most notably [c] and [ɲ], the situation is much more complicated. [c] and [ɲ] are possible codas word-medially, (although they only occur before labials). Yet, the fate of these consonants in word-final position is different for different items (see also Round 2011). Alongside the words ending in [c ɲ] (8a) we find others which delete their final /c ɲ/ (8b) as well as examples where stem-final /c/ undergoes apicalization (8c). In (8) the underlying forms are given based on the NKL dictionary and evidence for underlying forms is given whenever available.

## (8) Variable behavior of laminal palato-alveolar word-final consonants

- a. [c ɲ] allowed word-finally
- |                    |        |                                    |
|--------------------|--------|------------------------------------|
| /kulkica, kulkici/ | kulkic | ‘shark sp.’                        |
| /pala:ɲa/          | pala:ɲ | ‘fish sp.’; cf. [pala:ɲaɪ] FUT.ACC |
| /piŋtaɲi/          | piŋtaɲ | ‘rainbow type’; cf. [piŋtaɲi] ACC  |

<sup>4</sup>Round (2011: fn. 7) suggests an analysis where stems do not end in a lamino-dental /t/ underlyingly, and where all relevant stems end in /c/. Within OT, restrictions on underlying forms have no direct translation. It is assumed here that stem-final /t/ undergoes deletion, and this may in fact explain some examples that Round (2011) describes as /c/-deletion.

## b. [c ɲ] deleted word-finally

/ɲɯɲiɲɯɲi/	ɲɯɲiɲɯ	‘message stick’; cf. [ɲɯɲiɲɯɲi] ACC
/kakuci/	kaku	‘uncle’; cf. [kakuciwuɽ] FUT.ACC
/wuɽalci/	wuɽal	‘meat, muscle, flesh’; cf. [wuɽalcin] ACC
/paŋcipaŋci/	paŋcipaŋ	‘hat’
/caɽuncaɽɯɲa/	caɽuncaɽɯ	‘term for subincision initiate used by older male members of opposite patrimoiety’

## c. [c] changes to [t] word-finally

/ɲawic/	ɲawit	‘stomach’; cf. [ɲawiciɲun] COM
/jaɽpuc/	jaɽput	‘animal’; cf. [jaɽpuciɲun] COM

The data on these stems is somewhat limited, and therefore it is not clear which of the strategies in (8) are the general phonological processes. In what follows I will not address the behavior of the stems ending in laminal palato-alveolars since these are likely to be subject to a more complicated set of restrictions than other stems.

Finally, the glide [j] is classified in the same place class as [c ɲ], but its behavior is more regular. [j] is an impossible coda word-medially, and it does not occur word-finally except for the exclamative [maj] and for the word [mimaj] ‘mother-in-law’.

To summarize, I have introduced two processes in Lardil, and argued that both of these are productive. The first one – apocope – deletes a word-final vowel, and operates only at a relatively early stratum. The second one – consonant deletion – is surface-true and exceptionless. Both of these processes create an environment for each other, and they stand in a fed counterfeeding relation.

## 2.2. Stratal analysis

In this section, I present a derivational analysis of Lardil within Stratal OT. My analysis (first hinted at by Goldsmith 1993) extends that of Kiparsky forthcoming. Section 2.2.1 introduces the basic assumptions and relevant constraints. Section 2.2.2 analyzes the interaction between apocope and consonant deletion. Section 2.2.3 concludes.

### 2.2.1. *Constraints and general assumptions*

In Stratal OT (Kiparsky forthcoming, Bermúdez-Otero forthcoming) it is assumed that phonology and morphology operate in cycles (strata). Each stratum involves attachment of certain morphemes and application of certain phonological processes. For the phonological computation this means that at each stratum a regular Classic OT evaluation occurs (Prince and Smolensky 2004, McCarthy and Prince 1993). Crucially, the phonological grammar can be different at different strata. Opacity is captured by differences in rankings between strata.

The exact set of morphophonological strata is subject to some debate, and here I adopt the version of the theory that distinguishes between three strata: stem level comprising stems and derivational morphology, lexical level forming inflected words, and postlexical level where words are combined into phrases.

Stratal approach to opacity is not antagonistic to the Classic OT view of phonology. Rather Stratal OT derives the opacity effects via an independent mechanism of strata while leaving the essentials of a Classical OT evaluation unchanged (see also McCarthy and Prince 1993). In order to introduce a stratal grammar of Lardil, it is first necessary to formulate the relevant constraints, which include three markedness constraints motivating apocope, consonant cluster restrictions, and coda conditions, as well as two faithfulness constraints.

I assume a general constraint against word-final vowels – FINAL-C in (9) – to be responsible for Lardil apocope (Gafos 1998, McCarthy and Prince 1993, 1994). As mentioned above, this is a general phonological restriction, and not a morphological statement. For additional discussion of this point see section 4.1.

(9) FINAL-C: assign a violation mark for every PWord which ends in a vowel

We have also seen that Lardil disallows sequences of consonants in syllable margins, an effect of the constraint \*COMPLEX in (10) (Prince and Smolensky 2004).

(10) \*COMPLEX: assign a violation mark for every vowel at a PWord edge

Finally, Lardil codas are restricted to either apicals or nasals homorganic with a following stop (with some complications involving laminals, as discussed above). After Itô (1986), the interpretation of these restrictions has been that there is a general constraint on coda place – CODACOND (11) which penalizes

marked C-Place in coda unless the C-Place features of a given consonant are also linked to the following onset (as in word-medial homorganic NC clusters).

- (11) CODACOND: assign a violation mark for every coda consonant which is not apical and is not assimilated in place to the following onset consonant

The markedness constraints in (9)-(11) are opposed by faithfulness constraints that protect the properties of the input (McCarthy and Prince 1995, 1999). In particular, the two faithfulness constraints MAX and DEP will be relevant in what follows. MAX prohibits deletion while DEP militates against insertion.

### 2.2.2. *Analysis of the interaction between apocope and word-final consonant deletion*

The interaction between apocope and word-final consonant deletion in Lardil is problematic for many single-level versions of OT. The constraint responsible for the mapping like /murkunima/ → [murkuni] ‘nulla-nulla’ is not easy to formulate: both words end in a vowel and truncation has no obvious templatic target. Furthermore since both final vowel and illicit codas delete, it is not clear why /murkunima/ is not truncated all the way to \*[murkun] that would have a licit coda.

On the Stratal OT approach this interaction is not surprising (see also Kiparsky forthcoming: 38-42). The ranking responsible for deleting the final vowel is different from that responsible for deleting the final consonant. The two rankings apply at the lexical and postlexical level respectively. Thus, while complex syllable margins are prohibited at all strata, all words end in consonants at the lexical stratum and apocope applies to enforce this generalization. On the other hand, labial and dorsal codas are tolerated lexically so that words may end in non-apical consonants. Lexical stratum involves attachment of case morphology. Postlexically the picture is different: word-final vowels are tolerated, but illicit codas are no longer allowed. Postlexical morphology involves attachment of clitics, such as the actuality clitic /-kun/.

Let us examine the lexical level first. The tableau in (12) shows the effect of the lexical level phonology on the input /murkunima/ ‘nulla-nulla’: vowel deletion applies, but consonant deletion does not. Like all tableaux in this article, this tableau uses the comparative format of Prince (1999) while also noting the violation counts with subscripted numbers.

At the lexical level no word may end in a vowel because FINAL-C is ranked above MAX (12b). On the other hand, any consonant can occur in the coda, hence MAX  $\gg$  CODA COND (12a,d). Finally, word-final vowels are deleted, rather than protected by an inserted consonant because DEP dominates MAX (12c).

## (12) Lexical level: vowel deletion but no consonant deletion

	/murkunima/	DEP	FINAL-C	MAX	CODA COND
☞ a.	murkunim			1	1
b.	murkunima		W <sub>1</sub>	L	L
c.	murkunimaC	W <sub>1</sub>		L	L
d.	murkun			W <sub>3</sub>	L

Complex codas are not allowed in Lardil. The constraint \*COMPLEX is ranked above MAX both lexically and postlexically, thus triggering deletion. The analysis of lexical level alternations of the input /jukarpa/ ‘husband’ in (13) illustrates this ranking.

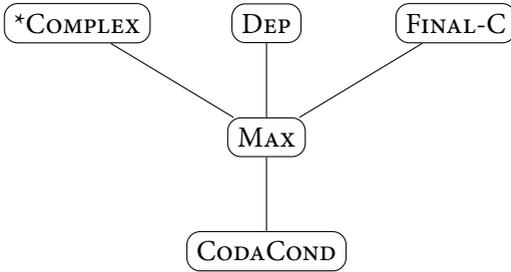
## (13) Lexical level: complex cluster simplification

	/jukarpa/	*COMPLEX	DEP	FINAL-C	MAX	CODA COND
☞ a.	jukar				2	
b.	jukarp	W <sub>1</sub>			L <sub>1</sub>	W <sub>1</sub>
c.	jukarpa			W <sub>1</sub>	L	
d.	jukarpaC		W <sub>1</sub>		L	

Word-final consonant clusters could in principle be simplified by deleting any of the consonants. The fact that the final consonant is always deleted is presumably due to contiguity (Kenstowicz 1994).

A summary of Lardil lexical level ranking is given in (14) below. This ranking allows the application of apocope, even at the expense of violating CODA COND.

(14) Lexical level ranking: apocope applies, all codas allowed



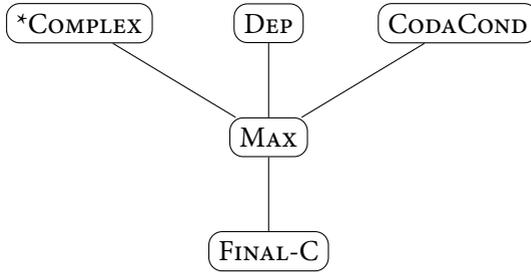
Postlexically word-final impossible codas are deleted, but apocope no longer takes place. Therefore the vowels exposed to word-final position by consonant deletion survive. The ranking of MAX, CODA COND, and FINAL-C is changed accordingly to CODA COND >> MAX >> FINAL-C. The tableau (15) illustrates the application of the postlexical hierarchy to the word ‘nulla-nulla’ whose lexical level evaluation is in (12). The input to postlexical phonology is the output of lexical phonology, i.e. the winner in (12) /murkunim/. The ultimate output (15a) ends in a vowel in violation of FINAL-C. This is allowed since post-lexically FINAL-C is demoted below MAX (15c).

(15) Postlexical level: consonant deletion but no vowel deletion

	/murkunim/	DEP	CODA COND	MAX	FINAL-C
☞ a.	murkuni			1	1
b.	murkunim		W <sub>1</sub>	L	L
c.	murkun			W <sub>2</sub>	L

On this analysis lexical level and post-lexical level impose very different requirements on word-final segments. While lexically words may end in any consonant, but not in a vowel, post-lexically words may end in a vowel, but only in apical consonants. The requirements which were active at an earlier, lexical, level thus become opaque postlexically. The postlexical ranking for Lardil is summarized in (16).

- (16) Postlexical level ranking: codas are restricted, apocope does not apply



### 2.2.3. Summary

In this section we have seen that Stratal OT can account for the interaction between apocope and consonant deletion in Lardil. Both of these processes create an environment for each other, and they are ordered derivationally, hence they stand both in a feeding relation (apocope feeds consonant deletion), and in a counterfeeding relation at the same time (consonant deletion counterfeeds apocope). On the other hand, the following section shows that in serial theories of opacity, such as OT-CC, this situation is inherently problematic, because both apocope and consonant deletion have to improve harmony relative to the same hierarchy.

### 2.3. Fed counterfeeding presents a challenge to serial harmonic improvement

The Serial OT approach incorporates derivations in a way which is fundamentally different from Stratal OT. The two crucial properties of Serial OT are *gradualness*, and *harmonic improvement* with respect to one language-specific hierarchy. The argumentation here applies to all versions of Serial OT, i.e. both to OT-CC (McCarthy 2007) designed to deal with opacity and to Harmonic Serialism (Prince and Smolensky 2004, McCarthy 2006 et seq.) which does not aim at capturing the full range of opaque interactions (cf. Elfner 2009). For concreteness, I will mainly focus on OT-CC here.

In this theory the output is reached from the input via a series of steps (a *candidate chain*). At each step the output of the previous step is fed to Gen and Eval. Each step's Gen performs only one minimal operation. More formally, the requirement of one operation per step (*gradualness*) boils down to introducing only one violation of only one basic faithfulness constraint at a time, where basic faithfulness includes at least MAX, DEP, and IDENT.

In OT-CC the faithfulness constraints compare each form in the chain to the original input. The first step is assumed to be the most harmonic faithful parse of the input. Each subsequent step must introduce unfaithfulness, that is, fully faithful steps are assumed to be prohibited (McCarthy 2007: 61-62). Additionally, each step must improve harmony (*harmonic improvement*) and provide an optimal way of violating the given basic faithfulness constraint (*best violation*). Both of these requirements are evaluated against the same language-specific constraint hierarchy.

There is no requirement that each step's output is the most harmonic form. Thus, if a given marked configuration can be repaired by violating either MAX or DEP, both repairs would represent valid ways of producing the next form as long as they improve harmony. Out of the candidates that violate one basic faithfulness constraint, only one is selected.

All possible chains for the same input are then fed to an evaluation by the so-called PREC constraints which may enforce opacity through assessing the order of steps in a chain. Importantly, PREC constraints are irrelevant for chain formation in that they do not count for the evaluation of harmonic improvement. The argumentation below will focus on chain formation (hence exclude PREC), since for every output there must be a harmonically improving candidate chain leading to it.

The interaction of apocope and consonant deletion in Lardil cannot be derived in such a system, because both processes cannot improve harmony relative to the same ranking (see also Kavitskaya and Staroverov 2010, McCarthy 2006). As we have seen, both apocope and consonant deletion create the structures which are subject to the other process, and hence any one hierarchy will prefer either one or the other, but not both. This problem is dubbed *paradox of fed counterfeeding* by Kavitskaya and Staroverov (2010).

In more technical terms the two relevant processes impose contradictory ranking requirements. Satisfying FINAL-C by vowel deletion introduces violations of CODACOND. The opposite is also true: satisfying CODACOND by consonant deletion introduces violations of FINAL-C. Since the two markedness constraints trigger violations of each other, the V-deleting mappings will require FINAL-C  $\gg$  CODACOND while the C-deleting mappings necessitate CODACOND  $\gg$  FINAL-C. This ranking paradox is illustrated by two steps from the derivation of the input /murkunima/ 'nulla-nulla' below.

The tableau in (17) illustrates the vowel deletion step. This tableau represents one step in an OT-CC derivation. The output of the previous step (or the

most harmonic faithful parse of the input) is listed in the top left corner since this is where the derivation proceeds from. The candidates are the forms that violate the same basic faithfulness constraint – in our case, MAX. The opacity constraints are irrelevant in (17) since PREC constraints do not participate in the evaluation until the chains are formed.

The candidate (17a) is the actual continuation of the chain, since it leads to the ultimately correct output. For this candidate to win over the faithful (17b), FINAL-C should dominate CODA COND and MAX.

- (17) Lardil: vowel deletion step requires FINAL-C  $\gg$  CODA COND

Input: /murkunima/

	Prev. step output: murkunima	FINAL-C	CODA COND	MAX
☞ a.	murkunim		1	1
b.	murkunima	W <sub>1</sub>	L	L

(18) illustrates the next step. In order for the actual output (18a) to be a possible chain continuation, CODA COND should dominate FINAL-C and MAX.

- (18) Lardil: consonant deletion step requires CODA COND  $\gg$  FINAL-C

Input: /murkunima/

	Prev. step output: murkunim	CODA COND	FINAL-C	MAX
☞ a.	murkuni		1	1
b.	murkunim	W <sub>1</sub>	L	L

The ranking requirements of (17) and (18) contradict each other. Therefore, the chain <murkunima, murkunim, murkuni> that would be required to derive [murkuni] ‘nulla-nulla’ cannot be formed.

To summarize, I have argued that Lardil has two phonological processes, apocope and consonant deletion, which stand in a fed counterfeeding relation. The interaction between these processes can be analyzed with two different rankings in a Stratal OT derivation, but this interaction cannot be captured with one and the same ranking, as in Serial OT. Lardil thus presents a potential problem to any model that has gradualness and harmonic improvement. Circumventing this problem requires a fair amount of technical machinery, such as the new kinds of derivational constraints proposed by Kavitskaya and Staroverov (2010).

### 3. Subminimal word augmentation: a challenge for gradualness

This section illustrates the pattern of subminimal word augmentation in Lardil. This pattern presents a challenge for Serial OT's gradual derivations because it has to involve some derivational lookahead. At a certain step in the derivation, the grammar must correctly pick either a V or a CV augment, but this choice is based on whether place spreading from a root-final consonant can affect the inserted C, and place spreading has to happen at a later step. In section 3.1 I introduce the subminimal word augmentation and propose a Stratal OT analysis. Section 3.2 discusses the challenge that Lardil augmentation presents for gradual derivations.

#### 3.1. Subminimal word augmentation and stratal analysis

##### 3.1.1. *Bimoraic and shorter stems: data and relevant constraints*

In Lardil, words shorter than two moras are categorically disallowed (no exceptions found in the dictionary). This minimality requirement has several consequences. First, apocope is blocked in bimoraic words (19). If the final vowel was to be deleted here, the word would be shorter than the minimum.

(19)	/pækæ/	pækæ	‘white pigeon’
	/jilæ/	jilæ	‘shell sp.’
	/wiʔæ/	wiʔæ	‘inside, interior’; cf. ACC wiʔæn
	/mupa/	mupa	‘dorsal fin of fish’; cf. FUT.ACC mupaɿ
	/mica/	mica	‘bird sp.’
	/mæla/	mæla	‘sea, sea water; grog’ cf. ACC mælan

Second, the words that are underlyingly shorter than two moras undergo augmentation, as illustrated in (20).<sup>5</sup> The content of the augment is determined by the final segment of the stem.

(20)	Stem	Nom	Acc	Gloss
a.	ɿil	ɿilta	ɿilin	‘throat’
	wun	wunta	wunin	‘rain’
	kaŋ	kaŋta	kaŋin	‘grass’

<sup>5</sup>In fact, the patterns in (20) apply in nouns. Augmentation in verbs will be discussed in section 4.1.

	kaŋ	kaŋka	kaŋin	‘speech’
	caŋ	caŋka	caŋin	‘some’
	ma.ɹ	maɹtʃa	ma.ɹin	‘hand’
b.	jak	jaka	jakin	‘fish’
	ɹælk	ɹæлка	ɹælkɪn	‘head’
c.	pit	pita	picin	‘odour’
	pat	pata	pacin	‘west’
	juɾ, jir	jura	jiɾin	‘body’
d.	ca	ca:	cajin	‘foot’
	la	la:	lajin	‘that (south)’
	lu	luwa	lujin	‘fat’
	cu, ci	cuwa	ci:n	‘axe-handle’

Subminimal words ending in a sonorant consonant (20a) augment with a Ca sequence. The inserted consonant is velar or labial after velar and labial nasals respectively and it is [t] otherwise (i. e. after /l/, /n/, /ŋ/, /ɹ/). The retroflexion of inserted /t/ and lateralization of stem-final /ɹ/ in /ma.ɹ/ → [maɹtʃa] ‘hand’ follow from the general alternations of Lardil.

The subminimals ending in /k/ (20b) augment with just the vowel [a]. The same pattern applies to the short words ending in /t/ and /ɾ/ (20c). Finally the number of subminimal vowel-final nouns is rather small, (20d) lists all available examples. These data indicate that the augment /a/ is also attached to vowel-finals, after which identical vowel sequences are resolved by lengthening, while nonidentical VV sequences trigger glide insertion. I will not focus on these alternations in what follows, but an analysis of these is fully compatible with my proposal.

Since Prince and Smolensky (2004), the alternations in (19) and (20a-b) have been analyzed as an interaction of the constraints requiring word-minimality with the constraints on syllable structure and morphology-to-prosody alignment. I will assume a cover constraint BINMIN (21) that enforces the bimoraic word minimum (see Prince and Smolensky 2004 on deriving the minimum word requirement from foot binarity).

- (21) BINMIN: assign a violation for every output prosodic word that is shorter than two moras

BINMIN is responded to by epenthesis of a vowel in monomoraic inputs. However, as we have seen in (20), in many cases the augment also contains a consonant. This consonant epenthesis is triggered by the alignment constraint in (22), to which I will refer as ALIGN (after Prince and Smolensky 2004).

- (22) ALIGN(MWd,R, $\sigma$ ,R): the correspondent of the rightmost segment in the morphological word should be present in the output and be at the right boundary of a syllable.

Adding just a vowel to an input like / $\text{ɰil}$ / ‘throat’ would create a form where the last segment of the MWord is not at the right syllable boundary: [ $\text{ɰi.l|a}$ ] (dots signify syllable boundaries and the vertical line symbol “|” shows the MWord boundary).<sup>6</sup> Consonant epenthesis repairs the violation of ALIGN by putting the consonant which corresponds to the rightmost segment of the stem at the right edge of a syllable: [ $\text{ɰil|ta}$ ]. However, consonant epenthesis is only possible if it creates licit codas.

The data in (20c) present a potential challenge to the ALIGN-based analysis. [t] and [ɾ] are possible codas word-medially, and yet the words ending in [t ɾ] are augmented with [a], not [ta]. I will hypothesize that Prince & Smolensky’s analysis is essentially on the right track but that there are additional constraints that prohibit C-epenthesis after /t/ and /ɾ/. I will only briefly speculate as to what these additional constraints may be – a full investigation would have to involve typological comparisons and thus has to be left for further research.

Observe that all the codas created by subminimal word augmentation are sonorant. It could be argued that [t] and [ɾ] are of lower sonority than liquids and nasals, and hence they are expected to be disfavored as codas (Zec 1995). We thus may analyze the augmentation of words in [t] and [ɾ] with just a V instead of CV as an instance of interaction of Alignment with sonority scale. I leave the full exploration of this analysis for future research, while noting that there may be complications. Ideally we would need independent evidence that Lardil [ɾ] is less sonorous than say [ɰ] as well as perhaps some evidence that codas are moraic in Lardil since sonorous segments are only better as moraic codas (Zec 1995). For the time being I will continue working with the simplified version of ALIGN in (22).

<sup>6</sup>This way of representing the boundaries does not necessarily imply that morphological boundaries are present in the output. In conformity with the definition in (22), we could put a “|” symbol after the *correspondent* of the rightmost segment in the input MWord.

3.1.2. *Stratal OT analysis of subminimal word augmentation*

The minimality requirements of BINMIN hold in all strata of Lardil phonology. Thus BINMIN blocks the lexical-level apocope alternation and interacts non-trivially with CODACOND which is active postlexically.

The fate of disyllabic words at the lexical level is illustrated in (23) for the word /jilæ/ ‘shell species’. As shown in this tableau, the constraint FINAL-C has to be outranked by both BINMIN and DEP in order for the input to surface faithfully avoiding consonant insertion (23b) or apocope (23c). In this and the following tableaux the capital “C” in the candidates symbolizes an epenthetic consonant.

## (23) Disyllabic words do not undergo lexical apocope

	/jilæ/	BINMIN	DEP	FINAL-C	MAX
☞ a.	jilæ			1	
b.	jilæC		W <sub>1</sub>	L	
c.	jil	W <sub>1</sub>		L	W <sub>1</sub>

Since BINMIN is active already at the lexical level, I assume that vowel epenthesis in subminimal words also happens at this level. On the other hand, consonant epenthesis in subminimal words is constrained by what kind of codas the process creates (i.e. by CODACOND). Since CODACOND only comes to be high-ranked postlexically, consonant epenthesis has to happen postlexically as well.<sup>7</sup>

To summarize, at the lexical level all subminimals augment with a vowel. This is illustrated in (24) for the input /.jil/ ‘throat’. Crucially, the output at the lexical level violates ALIGN and DEP, hence both of these constraints must be dominated by BINMIN lexically (24b). On the other hand, consonant epenthesis does not happen at this stage, because DEP dominates ALIGN (24c).

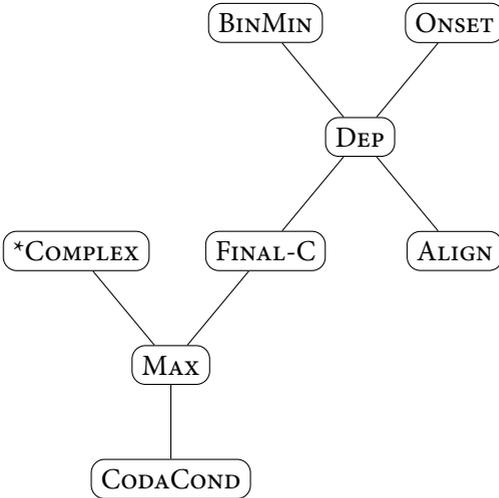
<sup>7</sup> Alternatively, one might try to entertain a Duke-of-York style analysis where all subminimals are augmented with CV lexically with the relevant consonant deleted postlexically if the cluster becomes illicit due to newly high-ranked CODACOND (e.g. yak → yakCa → yaka). This analysis is hard to maintain for Lardil since we expect the final consonant of the root, not the inserted consonant to delete in response to CODACOND. Thus, the final consonant of the stem is deleted in nouns when combined with the privative suffix /wæri/ (NKL 49). The illicit clusters are thus resolved by deleting the first consonant, in accordance with a general typological tendency (Wilson 2000, McCarthy 2008).

(24) Lexical level: subminimals augment with a vowel

	/tʃil/	BINMIN	ONSET	DEP	FINAL-C	ALIGN
a.	tʃi.l a			1	1	1
b.	tʃil	W <sub>1</sub>		L	L	L
c.	tʃil.ta			W <sub>2</sub>	1	L
d.	tʃil.a		W <sub>1</sub>	1	1	L

Finally, the candidate (24d) solves the alignment problem via syllabification rather than consonant insertion. This is not allowed in Lardil because of the high ranked ONSET constraint (Prince and Smolensky 2004). The ranking conditions which necessarily hold of the lexical level are given in (25).

(25) Lexical level ranking conditions



Unlike the lexical level, postlexical level allows consonant epenthesis, and hence both CODA COND and ALIGN must be ranked above DEP here (in addition to demotion of FINAL-C below MAX which was discussed in section 2.2.2).

Postlexical consonant epenthesis in [tʃilta] ‘throat’ is illustrated in (26). BINMIN and ONSET are undominated here, just as they were lexically, and therefore deletion or coda syllabification is prohibited (26c-d). On the other hand, ALIGN is now ranked above DEP thus triggering consonant insertion.

(26) Postlexical level: consonant epenthesis is possible

		BINMIN	ONSET	ALIGN	DEP	MAX	FINAL-C
	/ɟi.l a/						
☞ a.	ɟil.ta				1		1
b.	ɟi.l a			W <sub>1</sub>	L		L
c.	ɟil	W <sub>1</sub>			L	W <sub>1</sub>	L
d.	ɟil.a		W <sub>1</sub>		L		1

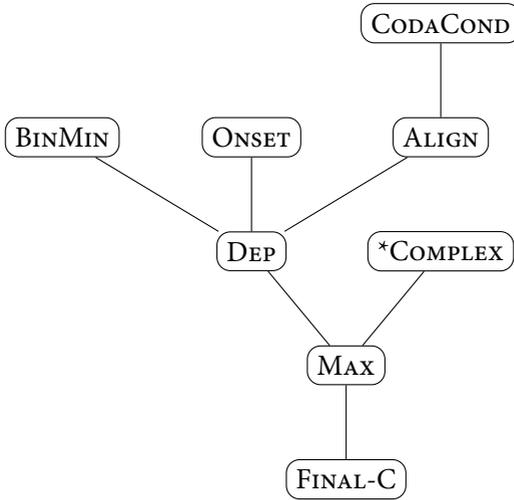
There is an additional reason for the result in (26): all candidates in this tableau satisfy CODACOND. For an input like /jak/ ‘fish’ that runs the risk of violating CODACOND, misaligned candidate is the winner. This is illustrated in (27) which adds an additional ranking requirement: CODACOND must dominate ALIGN. The lexical level evaluation of /jak/ is analogous to (24).

(27) Postlexical level: consonant epenthesis constrained by CODACOND

		BINMIN	ONSET	CODACOND	ALIGN	DEP	MAX	FINAL-C
	/ja.k a/							
☞ a.	ja.k a				1			1
b.	jak.ta			W <sub>1</sub>	L	W <sub>1</sub>		1
c.	jak	W <sub>1</sub>			L		W <sub>1</sub>	L
d.	jak.a		W <sub>1</sub>	W <sub>1</sub>	L			1

The overall postlexical ranking conditions are given in (28). This completes the stratal analysis of truncation and augmentation in Lardil.

## (28) Postlexical level ranking conditions

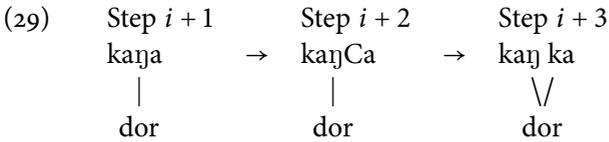


## 3.2. Minimal word augmentation as a challenge to gradualness

One of the core properties of OT-CC and Serial OT in general is that the output must be reachable from the input via a series of small changes (gradual steps) each of which improves harmony. The way in which CODACOND restricts Lardil subminimal word augmentation presents a challenge to gradualness.

To illustrate, consider two different augmentation patterns: /jak/ → [jaka] ‘fish’ and /kaŋ/ → [kaŋka] ‘speech’. In a Serial OT analysis, both of these mappings would involve a vowel insertion step *i* (or steps, as in Moore-Cantwell 2013). At this step the two words would behave the same: /jak/<sub>*i*</sub> → [jaka]<sub>*i+1*</sub>; /kaŋ/<sub>*i*</sub> → [kaŋa]<sub>*i+1*</sub>. However, at the step *i* + 1, these two words behave differently: the input /jaka/<sub>*i+1*</sub> is the ultimate output, hence it has to be mapped to itself. On the other hand, the input /kaŋa/<sub>*i+1*</sub> triggers insertion of an additional consonant.

Upon a closer look, it turns out that this consonant insertion step in fact involves two basic operations rather than one. The first operation inserts a consonantal root node, and the second spreads the place features from root-final /ŋ/ onto a newly inserted root node. In other words, the derivation of /kaŋ/ after the step *i* has to proceed as in (29).



Evidence for a two-step derivation in (29) is both typological and theoretical. Typologically, there are languages where other operations happen between the insertion and place linking steps of (29). Thus in Ponapean (Rehg and Sohl 1981) morpheme-internal geminates are tolerated because they are doubly-linked (Itô 1986) while geminates that come about through morpheme concatenation are resolved via epenthesis or nasal substitution. It would be impossible to analyze Ponapean if we assumed that whenever a language requires coda consonants to be place-linked to the following onset, such place-linking automatically happens when the two consonants come together. On the other hand, a two-step analysis is readily available in a Serial OT framework such as Wolf (2008): place linking simply happens before the morphemes are put together to create ‘new’ geminates. Additional evidence for the derivation in (29) comes from the fact that place deletion (McCarthy 2008), place insertion (Moore-Cantwell 2013), and place spreading (McCarthy 2011) have all been independently argued to be single-step operations in Serial OT.<sup>8</sup>

The problem with (29) is that the step  $i + 1$  creates a violation of CODA COND. Indeed, the output of this step has an illicit coda, namely [ŋ] which is not (yet) linked to a following onset. However, if violations of CODA COND are allowed in a step /kaŋa/ <sub>$i+1$</sub>   $\rightarrow$  [kaŋCa] <sub>$i+2$</sub> , then the theory predicts that they should also be allowed for /jaka/ <sub>$i+1$</sub>   $\rightarrow$  [jakCa] <sub>$i+2$</sub> . The availability of a doubly-linking step cannot be predicted when the consonant is inserted, at least not based on CODA COND. Thus the global benefit of achieving a doubly-linked NC cluster is available for only one of these inputs, but the ability to see this global benefit is precisely what Serial OT gets rid of, compared to Classical OT.

It is possible that there are some additional constraints which would differentiate between /kaŋa/ <sub>$i+1$</sub>   $\rightarrow$  [kaŋCa] <sub>$i+2$</sub>  and /jaka/ <sub>$i+1$</sub>   $\rightarrow$  [jakCa] <sub>$i+2$</sub> . However, it is clear that Serial OT, and OT-CC requires additional machinery here, and this machinery has to be motivated independently.

<sup>8</sup>McCarthy (2006) on the other hand adopts a one-step derivation, although the two-step option is not discussed.

### 3.3. Interim summary

To summarize, we have seen that Stratal OT can account for both deletion and augmentation in Lardil. On the other hand, Lardil data present two challenges for OTCC (and Serial OT in general). First, both apocope and consonant deletion cannot be harmonically improving given the same ranking – they both create structures that would trigger the other process. Second, subminimal word augmentation is too gradual in order for it to be controlled by CODACOND, as it is in Lardil.

## 4. Alternative approaches to Lardil apocope

The argument in section 2 relied on the assumption that Lardil apocope is a general phonological process driven by the dispreference for word-final vowels. This section considers the alternative approaches to Lardil apocope and presents some arguments against these approaches.

First, the morphological account states that Lardil apocope is essentially a sort of nominative marking (Bye 2006, Horwood 2001, Kurisu 2001, Trommer and Zimmermann 2014, Zimmermann 2014). However, in section 4.1 I argue that apocope also applies in the vocative, and that non-application of apocope (Round 2011) in many cases is due to the presence of an underlying final consonant.

Section 4.2 considers the existing phonological accounts which claim that apocope is a productive phonological process, but a process which deletes only one final vowel (Prince and Smolensky 2004, McCarthy 2003). It is argued that all of these approaches involve nontrivial extensions of OT and thus require further motivation (see also Kaplan 2008 on non-iterativity in general).

### 4.1. Apocope as a morphological marker

According to the morphological account, apocope is essentially a morpheme that distinguishes the nominative from other forms (Bye 2006, Horwood 2001, Kurisu 2001, Trommer and Zimmermann 2014, Zimmermann 2014). Apocope deletes only the stem-final vowel, because the morphological requirements only apply to the specific segment at an edge. For example, in the mapping /murkunima/ → [murkuni] ‘nullanulla’ the final vowel of the stem is deleted

due to morphological requirements, which do not apply to the final [i] of the output.

Section 4.1.1 identifies a challenge for the morphological account coming from the fact that apocope applies in the vocative, contrasting in that respect with a true nominative-only process of vowel lowering. Section 4.1.2 analyzes the nonapplication of apocope in other non-nominative contexts.

#### 4.1.1. *Vocative morphophonology*

In fact apocope does apply in morphological contexts other than the nominative, most notably in the vocative. The examples in (30) are vocatives that undergo deletion of the final vowel and of the non-apical consonant preceding it.

(30)	/jakuku/ <sup>9</sup>	jaku	‘older sister-voc’
	/jukarpa/	jukar	husband-voc’
	/tapuci/	tapu <sup>10</sup>	‘man’s older brother-voc’
	/kakuji/	kaku	‘uncle-voc’

Certain other kinship terms in the dictionary ([paŋtaru] ‘cousin of spouse’, [kaŋarpa] ‘kin pair, WiBr and his child’, [ŋamalaɟura] ‘kin pair of elder Br + MoMoBr’) seem to occur in a non-truncated form in a vocative context. However the data we have on these latter forms is rather scarce (Norvin Richards, p.c.) and these forms could be instances of a later diachronic process whereby new Lardil gradually loses apocope (Richards 2001). The only clear exception seems to be /ɟæriwarpa/ ‘pair of people one of whom is ɟæɾæ to the other’ appearing untruncated, i.e. as [ɟæriwarpa] in the vocative.

Overall this evidence suggests that vocatives are subject to apocope. This is a problem for the morphological account of apocope, because otherwise nominative and vocative are not identical, they contrast in the applicability of another alternation, namely vowel lowering.

Vowel lowering changes a word-final short /u/ to [a], while a final /i/ changes to [a] after lamino-alveolars (most notably after [j] and [ç]) and to [æ] otherwise. Lowering only visibly applies in disyllabic words (31a), whereas the stem-final

<sup>9</sup>Klokeid 1976 lists the underlying form of ‘older sister’ as /jakuci/ although NKL has /jakuku/. This could be a typographical error or an instance of variation.

<sup>10</sup>I am grateful to Norvin Richards (p.c.) for this example from his fieldwork on Lardil. Note that NKL (170: see *kuŋta*) also records a vocative form without apocope which apparently belongs to new Lardil where apocope got gradually lost.

vowel in longer words is deleted anyway. The vowels rendered final by consonant deletion do not lower (31b).

(31)	Input	Nom	Acc	Gloss
	a. /paŋka/	paŋka	paŋkan	‘stone’
	/kaʈu/	kaʈa	kaʈun	‘child’
	/ŋuku/	ŋuka	ŋukun	‘water’
	/kæŋti/	kæŋtæ	kæŋtin	‘wife’
	/ŋiŋi/	ŋiŋæ	ŋiŋin	‘skin’
	/pulci/	pulca	pulcin	‘heart’
	/paji/	paja	pajin	‘anger’
	b. /ʈipitipi/	ʈipiti	ʈipitipin	‘rock cod’
	/muŋkumuŋku/	muŋkumu	muŋkumuŋkun	‘wooden axe’

Lowering is clearly restricted to just nouns. There are 15 examples of adjectives, pronouns or demonstratives which end in an [i] or [u] in the dictionary. In addition, I could locate 6 nouns which are apparent exceptions to lowering.

Crucially, unlike apocope, vowel lowering does not apply in the vocative. This is illustrated in (32).

(32)	Input	Nom	Voc	Gloss
	/kæŋti/	kæŋtæ	kæŋti	‘wife’
	/tunci/	ʈunca	ʈunci	‘brother-in-law’
	/kaʈu/	kaʈa	kaʈu	‘child (of a woman)’
	/papi/	papæ	papi	‘paternal grandmother’

The contrast between lowering and apocope can be derived within the stratal account if we assume that the former, but not the latter, is only applicable in the nominative. Since lowering is then essentially a case marker it will attach lexically (just like other case morphemes) and this would correctly predict that consonant deletion counterfeeds lowering.

On the other hand, the contrast between lowering and apocope presents a genuine puzzle for the existing morphological accounts of apocope where it is assumed that apocope marks the nominative.

4.1.2. *Non-application of apocope*

The nominative-marker analysis of Lardil apocope capitalizes on the fact that the process does not apply in several environments where it would be expected. However, in many of these cases there is evidence that a surface final vowel arises because the word underlyingly ends in a consonant which later gets deleted.

For example, verbal stems apparently do not exhibit apocope on the surface. Nevertheless there is evidence (Klokeid 1976) that the final vowel in verbs is protected by a consonantal morpheme /t̪/. Since [t̪] is not a licit coda, it gets deleted when it happens to be the last morpheme of the word, but it is present at the lexical level thus protecting the preceding vowel from apocope. When the /t̪/ morpheme is not final, it behaves quite as expected – we find it before vowel-initial tense suffixes as well as its alternants in other cases. Additionally, monosyllabic vowel-final verb stems augment with [t̪a] as shown in (33) while the monosyllabic vowel-final nouns show vowel lengthening (although recall that there is just a handful of such nouns).

- (33) Augmentation in vowel-final verbs vs. nouns
- |      |          |        |          |       |         |
|------|----------|--------|----------|-------|---------|
| /ca/ | [ca̠t̪a] | ‘nter’ | cf. /ca/ | [ca:] | ‘foot’  |
| /ma/ | [ma̠t̪a] | ‘get’  | cf. /ɬa/ | [ɬa:] | ‘south’ |
| /na/ | [na̠t̪a] | ‘hit’  |          |       |         |
| /ti/ | [t̪ita]  | ‘sit’  |          |       |         |

The contrast in (33) is readily explained on Klokeid’s analysis since the [t̪] part of the verbal augment is the verbal morpheme. Finally, the verbal [t̪] morpheme also makes an appearance in verbal reduplication. For example, the verb [pæri] ‘crawl’ reduplicates as [pæricpæri] ‘to crawl around’ where [c] is a regular alternant of [t̪] (Wilkinson 1988, Round 2011). To summarize, verbal stems are not expected to undergo apocope because their surface final vowel is underlyingly followed by a consonant.

Another commonly cited exception to apocope occurs in the locative case which is [ɲæ] after consonants and mora after vowels (Klokeid 1976, Round 2011). However, so far as I could see locative always occurs word-finally, and hence it is possible that its synchronic underlying form is /ɲæC/ with a consonant protecting the final vowel. It is also possible that the element (perhaps a mora) protecting the final vowel of the locative is actually the same one that imposes lengthening on vowel-final stems. A similar kind of

exception comes from the verbal negative suffix [cari]. The data on this affix are somewhat contradictory however since NKL (pages 21, 28) and Round (2011) give examples with the suffix [cari] but Klokeid (1976: 89) reports that the same morpheme is [car].

Finally, a number of nouns in the nominative nevertheless do not undergo apocope (Round (2011)). These have to be treated as exceptions on any analysis. In a detailed discussion of these forms Round (2011) reports that many of these are borrowings or come historically from locatives. Some of these exceptions may also reflect a decay of apocope happening in the so-called new Lardil (Richards 2001). Importantly however, many of the apparent exceptions do not present positive evidence of lack of apocope (see also Round (2011) who reports on a study of Hale's field notes).

#### 4.2. IO-Antifaithfulness and Comparative Markedness

In this section, I will consider the alternative phonological analyses where apocope is assumed to apply only once (Prince and Smolensky 2004, McCarthy 2003). In each case the special non-iterativity mechanisms involve a significant amount of additional machinery.

Prince and Smolensky make use of a constraint FREEV that requires the last vowel of the word to be unparsed. The relevant constraint can be restated in accordance with correspondence theory of McCarthy and Prince (1995).<sup>11</sup> The revised version of FREEV will then be formulated as in (34).

- (34) FREEV: the final vowel of the input must not have a correspondent in the output

Because the constraint looks at the final vowels in the input, it does not assign a violation to all vowel-final outputs. The outputs in which the vowel gets exposed to word-final position by consonant deletion (e.g. the final vowel of [murkuni] from /murkunima/) will satisfy FREEV. Thus appealing to FREEV is a way of formulating an input-related generalization about Lardil which is true of all the relevant items. The generalization crucially involves a requirement to be unfaithful to the input.

Substantiating such an analysis would require a full-fledged theory of IO antifaithfulness (cf. Alderete 2001 on *output-output* antifaithfulness). It is not

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<sup>11</sup>I am grateful to Alan Prince (p.c.) for pointing this out to me.

impossible to develop such a theory, but that theory would no longer have some of the fundamental mathematical properties of OT (Moreton 2004, Tesar 2013).

A more recent take on the status of Lardil apocope is offered by the theory of Comparative Markedness (McCarthy 2003). On this theory, the markedness violations of every candidate are compared to those of the fully faithful candidate (FFC), and the new vs. old markedness constraints (i.e. penalizing the marked structures shared vs. non-shared with the FFC) are distinguished.

The Lardil generalization is recast as “only the vowels which are final in the fully faithful candidate are penalized”. The analysis is akin to that of Prince and Smolensky except that the fully faithful candidate is used as a ‘surrogate’ of the input.

Comparative markedness, unlike Stratal or Serial OT, cannot be extended to other opaque interactions and therefore it would need to combine with some mechanism for capturing opacity (Kavitskaya and Staroverov 2008). Stratal OT is one of such mechanisms, but as we have seen, employing Stratal OT renders it unnecessary to assume comparative markedness in Lardil.

It is instructive to compare the Stratal OT approach to the ones just discussed. Unlike the theories of IO-antifaithfulness and comparative markedness, Stratal OT requires no modification to the core mechanisms of Classic OT. Opacity effects are achieved by assuming that instead of one Classic OT computation there are several which come in order. In this sense Stratal OT treats opacity as something external to OT computation. On the other hand, IO-antifaithfulness and comparative markedness introduce nontrivial modifications to the OT computation itself.

### 4.3. Summary

This section has considered a number of alternative approaches to Lardil apocope, most of which revolve around the idea that there is a reason (phonological or morphological) for apocope to apply only once. In conclusion it should be pointed out that the exact analysis of apocope is only relevant to its particular interaction with CODACOND which presents a potential challenge to Serial OT’s harmonic improvement. However Lardil subminimal word augmentation considered in section 3 is relatively uncontroversial, and its status with regard to gradualness does not depend on the analysis of apocope.

## 5. Conclusion

This paper proposed an analysis of Lardil alternations which crucially involves several derivational steps but which at the same time preserves some key insights of Prince and Smolensky (2004). I have argued that Lardil phonology employs two levels which crucially differ in their restrictions on word-final consonants, and that this level difference can be encoded as constraint reranking within the Stratal OT model (Bermúdez-Otero forthcoming, Kiparsky forthcoming). On the other hand, the different derivational steps involved in Lardil phonology have to differ in the phonological grammar – hence they present a challenge for Serial OT where all derivational steps have the same ranking.

The patterns of subminimal word augmentation also present an argument for OT's global evaluation where all output candidates are evaluated together. The restriction to single-change candidates in Serial OT makes it difficult to select a correct augment (CV vs. V) since it depends on the ways in which this augment may be later integrated in the word.

To summarize, Lardil phonology can be analyzed as involving an opaque derivation, and it presents some interesting arguments in favor of the stratal view of derivations and against the serial view.

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# As alive as ever: the geminate debate under Containment

Nina Topintzi & Eva Zimmermann\*

## Abstract

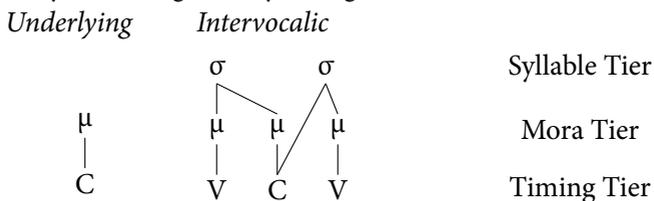
After decades of research, opinions are still split as to whether geminates should be represented as long or as heavy. In this paper, we attempt to resolve this riddle by entertaining a model that basically rests on the principle that while all geminates are underlyingly moraic, they might not emerge as such on the surface. This intuition – due to Davis (2011) – is formalized neatly through an extension of Containment Theory within OT (Prince and Smolensky 1993/2004) along the lines of Zimmermann (2014). We discuss the main typology of gemination (medially, initially, finally), briefly explore some predictions the system makes and illustrate how distinct patterns of gemination within the same language, e.g. weightful medial and final geminates, vs. weightless initial ones, as in Swiss German, can be generated. Importantly, in all cases investigated, we show how our model consistently manages to maintain a representational contrast between singletons and geminates.

## 1. Introduction

A recurring, and yet unresolved, debate in the literature concerns the representation of geminates. Using the terminology of Ringen and Vago (2011) and Davis (2011), the two main competing theories are the syllabic weight analysis (1a) and the segmental length analysis (1b) of geminates.

(1) *Geminate representations* (Ringen and Vago 2011: 156)

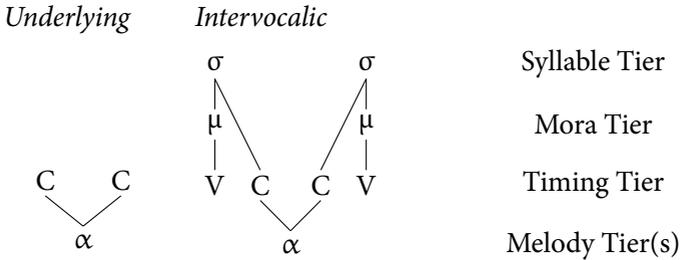
a. The syllabic weight analysis of geminates



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\*We would like to thank Peter Staroverov for helpful comments on a previous version of this paper.

## b. The segmental length analysis of geminates



In the syllabic weight analysis (Hayes 1989, Davis 1994, 1999*a*, 2003, Topintzi 2008, 2010), a geminate is underlyingly moraic. The moraic consonant is associated to the coda of one syllable and also to the onset of the next one. This second link ensures that the structure avoids an onsetless syllable. The fact then that the geminate typically straddles syllable boundaries intervocalically, producing what is known as a ‘flopped’ structure, is actually a product of syllabification considerations (Ham 2001). The splitting of the geminate also serves well to reflect the fact that geminates are typically longer, in fact up to three times longer (Ladefoged and Maddieson 1996: 91+92), than singletons. This property of geminates is what Ringen and Vago (2011) strive to capture in (1b). For them, weight – as in the intervocalic case here in (1b) – may emerge on the surface because of the constraint WEIGHTBYPOSITION, but does not have to. To sum up, under (1a) geminates are underlyingly heavy; under (1b), they are underlyingly long. For convenience, we will refer to those as the ‘weight’ vs. ‘length’ theories.

The two theories make very different predictions, many of which are thoroughly examined in Davis (2011). We will mention the major ones briefly here. In the ‘length’ theory, geminates project two C elements on the timing tier, therefore they should pattern like a string of two consonants when it comes to processes that refer to the C/V-tier. This is not the case for the ‘weight’ approach. Ringen and Vago (2011) claim that this prediction is borne out in Hungarian, a language that bans strings of 3 Cs and resolves such cases through epenthesis, thus CCC→CCεC. As anticipated in their framework, geminates produce the same effect, thus: /fygg-s/→[fygges] ‘depend-2sg’. But geminates don’t behave uniformly like that. In Hadhrami Arabic for example (Davis 2011), word-final clusters are split through epenthesis, e.g. /gird/→[gird] ‘a monkey’, word-final

geminate are not, e.g. [rabb] ‘Lord’. This asymmetry is not anticipated under (1b).

A strong argument in favor of the ‘weight’ theory is the following. Given that under (1b), weight – if applicable – is a derived property of geminates, it seems that geminates in coda position<sup>1</sup> should always pattern uniformly alongside the singleton codas in the language in either being both moraic or not (but not a mixture of the two). This is what Tranel (1991) originally called the Principle of Equal Weight for Codas. Such Principle predicts the patterns in (2I+II), but not those in (2III+IV). The ‘weight’ approach predicts instead (2II+III).

(2) *Weight for singleton (C) and geminate (G) codas*

	CVC	CVG
I.	light	light
II.	heavy	heavy
III.	light	heavy
IV.	heavy	light

There are arguments in the literature that all these possibilities are in fact attested. (2I) is represented by Selkup, Malayalam, Tübatulabal (Tranel 1991) or Chuvash (Davis 2011). Davis (2003, 2011: 890) however claims that possible re-analyses of the facts are available in order to maintain the ‘weight’ approach of geminates. (2II) is uncontroversial. Prime examples are Latin and Lake Miwok (Tranel 1991). Where things get to be really interesting are the cases in (2III-IV). In a number of papers, Davis (see 2011 and references therein), has convincingly argued for the existence of type (2III) languages. Among them are to be found: West Swedish, Koya, Seto, Fula, Cahuilla or Hausa. To our knowledge, these data have not been reanalyzed by the proponents of the ‘length’ approach. Finally, (2IV) is arguably illustrated by Ngalakgan. According to Baker (1998, 2008), codas in heterorganic clusters act as moraic for stress purposes, but codas in homorganic contexts, i.e. geminates or NC clusters, do not. We argue below that this pattern can fall out as well in a containment-based OT system where all geminates are underlyingly moraic.

The aim of this short survey has been to demonstrate that the discussion on geminate representation remains as alive as ever. While it has been generally claimed that most cases reported as evidence for the ‘length’ approach are

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<sup>1</sup>Meaning consonants that are doubly linked to a coda and onset position. We term these ‘coda geminate’ in the following and abbreviate them with ‘G’.

subject to reanalysis couched within the ‘weight’ approach, there is admittedly at least a handful of cases that are more straightforwardly captured under (1b), e.g. Hungarian epenthesis or Selkup and Ngalakgan stress.

Davis (2011) himself acknowledges this issue too and suggests various solutions, among which is the possibility that geminates may exhibit distinct representations on a language specific basis. However a more interesting solution is one that both Davis (2011: 893) and Ringen and Vago (2011: 166) foster, namely a unique representation of all geminates. Having considered a wealth of data, Davis envisages that such goal could be accomplished either through enrichment of representations – so that both a segmental and prosodic tiers are included, e.g. the Composite Model of Curtis (2003) – or by maintaining the underlying-mora approach of geminates with the added proviso that on the surface the structure may be altered.

In the present paper, we maintain the hypothesis that geminates are underlyingly moraic, but also entertain a proposal that blends these two suggestions in a novel way. To this end, we employ a version of containment in OT (Prince and Smolensky 1993/2004) as revitalized and further developed in Zimmermann (2014) (cf. also Trommer (2011) or Trommer and Zimmermann (to appear)). Our account provides further support for Zimmermann’s account that was originally proposed to capture morphologically-triggered phonological length alternations. Conversely, from the viewpoint of gemination-theory, we will now be able to capture Davis’ intuition – in relation to Ngalakgan – that “while geminates may be underlyingly moraic, they do not surface as moraic” (2011: 892) using extant and independently motivated machinery.

The remainder of the paper is structured as follows: In section 2, we present our theoretical background assumptions of containment-based OT and show how our system predicts four types of languages differing in whether coda singletons and geminates contribute to syllable weight. In section 3, we discuss the issue of edge geminates and their representation in our model. Brief case studies of initial geminates in Thurgovian Swiss and final geminates in Hungarian further illustrate the representational contrasts between singletons and geminates possible in a containment-based model. The factorial typology of the constraint system we adopt is briefly discussed in section 4. Relying on the software OT-Help, we argue that only attested grammars are predicted by our theory that differ in which types of geminates exist in a language, whether they contribute to syllable weight, and whether singletons contribute to syllable weight. We conclude in section 5.

## 2. The theory

### 2.1. Background assumptions: containment-based OT

Crucial to our present purpose is the assumption of containment that was already present in the discussion of OT in Prince and Smolensky (1993/2004) but was rejected in favor of a correspondence-theoretic OT (McCarthy and Prince 1995). Its original formulation given in (3) demands that the input is *contained* in the output and hence no literal deletion of structure is possible. Elements can only lack a phonetic interpretation if they are not integrated under the highest prosodic node and are consequently phonetically ‘invisible’.

(3) *Containment* (Prince and Smolensky 1993/2004)

Every element of the phonological input representation is contained in the output.

Containment as we assume it here goes even further and demands that the input must be reconstructable from the output at any time. Consequently, not only elements like segments or features are subject to containment but association lines are as well and can never be deleted, only remain phonetically ‘invisible’ if they are marked as uninterpretable for the phonetics (Goldrick 2000, van Oostendorp 2006, Revithiadou 2007, Trommer 2011, Zimmermann 2014, Trommer and Zimmermann to appear). Consequently, there are four possible types of association lines, given in (4). Association lines can be underlyingly present and phonetically visible in the output (4a) (=notated as straight lines), they can be underlyingly present and marked as phonetically invisible (4b) (=notated as lines that are crossed out), they can be epenthetic and phonetically visible (4c) (=notated as dotted lines), or they can be epenthetic and phonetically invisible (4d) (=notated as dotted lines that are crossed out).<sup>2</sup>

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<sup>2</sup>This typology of association lines is highly reminiscent of the system proposed in Turbidity Theory (Goldrick 2000, van Oostendorp 2006, Revithiadou 2007) where association lines are replaced with the two relations of projection and pronunciation. In Goldrick’s original proposal of Turbidity Theory, the former denotes an abstract relationship between two elements and the latter denotes the output relations that are visible for the phonetics (Goldrick 2000).

(4) *Marking conventions for different types of association lines*

Morphological association lines		Epenthetic association lines	
phonetically visible:	phonetically invisible:	phonetically visible:	phonetically invisible:
a.	b. †	c. ⋮	d. ‡

Under our containment model, phonological elements like segments, prosodic nodes, features, or tones are taken to be phonetically invisible if they are not properly integrated under the highest prosodic word node (Prince and Smolensky 1993/2004: 25). Since association lines can be marked as phonetically invisible, it is clear that a ‘properly integrated’ element that is visible for the phonetics implies that it is integrated under the highest prosodic node via phonetically visible association lines. Association lines, on the other hand, can only be phonetically visible if they associate a lower element to a phonetically visible higher one. This principle of phonetic visibility is summarized through the two statements in (5).

(5) *Principles of phonetic (in)visibility* (Zimmermann 2014: 49)

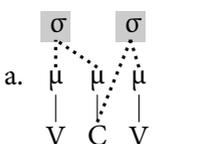
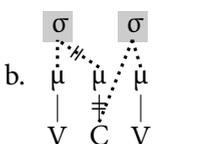
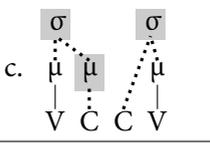
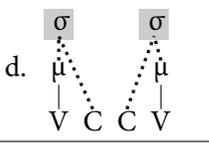
- a. Every association line linking a phonetically invisible element to a lower element is *phonetically invisible*.
- b. Every element is *phonetically invisible* iff it is not associated with a higher prosodic node by a phonetically visible association line.

A central assumption in this containment-based model is that constraints exist in at least two versions: one referring only to phonetically visible structure and another referring to *all* kinds of structure, including phonetically invisible one. This is explicitly formulated as the ‘cloning hypothesis’ in Trommer (2011). Another assumption that is necessary in containment is the often implicit assumption that morphological affiliation is detectable. In van Oostendorp (2006) and Revithiadou (2007), this theoretical assumption is made explicit as the assumption of morphological colours: every morpheme has its own index (= ‘colour’) and all elements that are part of the underlyingly representation of this morpheme bear this index. This allows to distinguish whether two elements belong to the same morpheme or not and whether an element is

epenthetic (hence colourless). Epenthetic elements are marked with a grey background in all following depictions.

These background assumptions now allow to predict all the attested types of languages in (2) while maintaining that geminates are distinguished from non-geminates by being underlyingly moraic. In languages where geminates do not contribute to syllable weight, the underlying association to the  $\mu$  is simply marked as uninterpreted. It remains, however, in the structure and constraints sensitive to phonetically invisible structure can always refer to this structural difference between geminates and non-geminate consonants. Geminates and singletons can hence both be predicted to contribute to syllable weight (=phonetically associated to a  $\mu$ ) or to be irrelevant for syllable weight (=not phonetically associated to a  $\mu$ ). This is briefly summarized in (6): the underlying association of a consonant to its  $\mu$  can be phonetically visible (6a) or not (6b) and an underlyingly  $\mu$ -less consonant might remain  $\mu$ -less (6d) or might project an epenthetic  $\mu$  (6c). Crucially, as we show in detail in section 2.2, for this choice of being moraic or not, different constraints are relevant for singletons and geminates. Hence, the (non)moraicity of geminates is not bound to the (non)moraicity of singleton codas in our model – in contrast to the prediction of the principle of ‘Equal Weight for Codas’ (Tranel 1991).

(6) *Underlyingly (non)moraic consonants and syllable weight*

	... can contribute to syllable weight	... can be irrelevant for syllable weight
<b>Geminate:</b> $\mu$ C	a. 	b. 
<b>Non-geminate:</b> C	c. 	d. 

Of special interest here is the representation we assume in (6b), namely the representation of a geminate that does not contribute to syllable weight. This results from the fact that the association of the consonant- $\mu$  to the syllable is marked as phonetically invisible and is hence not interpreted by the phonetics.

In containment theory, however, this underlying  $\mu$  remains in the structure and ensures that the consonant is still doubly linked to two syllables – the structural difference that distinguishes it from a non-geminate consonant.<sup>3</sup>

## 2.2. Predicting the four language types

In the following subsection, we illustrate how the four types of languages (7) (repeated from (2)) that differ in the question of whether singleton and/or geminate codas contribute to syllable weight fall out in our containment-based system assuming that all geminates are underlyingly moraic.

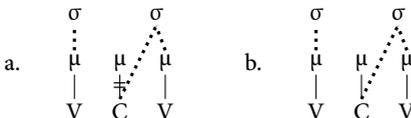
### (7) *Weight for singleton (C) and geminate (G) codas*

	CVC	CVG	example
I.	light	light	<i>Selkup</i>
II.	heavy	heavy	<i>Latin</i>
III.	light	heavy	<i>Hausa</i>
IV.	heavy	light	<i>Ngalakgan</i>

The relevant constraints are given in (8).  $\text{ONS}$ ,  $\text{WBP}$ , and  $\ast\text{C}^\mu$  are standard markedness constraints on syllable structure, discussed in, for example, Prince and Smolensky (1993/2004) or Sherer (1994).  $\ast_\sigma[\text{C}^\mu]$  is a specific version of  $\ast\text{C}^\mu$  that bans moraic onsets – a necessary markedness constraint given the assumption that moraic onsets are highly marked but possible (Topintzi 2008, 2010). The existence of  $\text{MAX}(\mu\text{—S})$  is a necessary consequence of the containment-based system we adopt: it penalizes association lines that are

<sup>3</sup>There are other imaginable structures that are in principle possible in a containment-based system for such a non-weight bearing geminate that we cannot discuss in detail for reasons of space. That the phonetically invisible  $\mu$  of a geminate is still integrated under a syllable node follows from a high-ranked demand that every  $\mu$  must be integrated under a syllable. However, in principle, a structure (ia) is also possible. (ib) is generally excluded in our system that assumes the principles (5) since a phonetically invisible  $\mu$  dominates a C in a phonetically visible way. However, we leave it open for future research whether those structures might receive independent support from other patterns of weight distribution.

### (i) *Other non-weight contributing geminates*



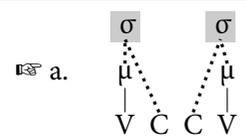
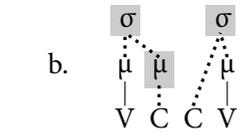
marked as invisible and hence mirrors roughly the effect of a faithfulness constraint demanding the preservation of underlying prosodic structure.

- (8) a. ONSET (=ONS)  
Assign a violation mark for every syllable without an onset consonant.
- b. WEIGHTBYPOSITION (=WBP)  
Assign a violation mark for every coda consonant that is not phonetically dominated by a  $\mu$ .
- c.  $*C^\mu$   
Assign a violation mark for every consonant that is phonetically dominated by a  $\mu$ .
- d.  $*_\sigma[C^\mu]$   
Assign a violation mark for every onset consonant that is phonetically dominated by a  $\mu$ .
- e. MAX( $\mu$ —S)  
Assign a violation mark for every phonetically invisible association line between a  $\mu$  and a segment.

In a first possible ranking of these constraints, high-ranked  $*C^\mu$  ensures that no consonant is associated to a  $\mu$  in a phonetically visible way. Coda consonants hence never become moraic (9i) and the underlying association line from a geminate consonant to its  $\mu$  is marked as phonetically invisible (9ii). The non-moraic singleton coda in candidate (9i-a) induces a violation of WBP but since  $*C^\mu$  is high-ranked, this candidate becomes optimal. The non-realization of an underlyingly present  $\mu$  dominating a consonant (9ii-b), on the other hand, induces a violation of MAX( $\mu$ —S) but since this constraint is dominated by  $*C^\mu$  as well, this candidate wins the competition. It does not violate WBP since the consonant is not phonetically visibly linked to a coda position and is hence irrelevant for calculating violations of WBP. Note that a candidate that leaves the invisible  $\mu$  unintegrated under a syllable node is not listed in (9ii). Such a structure would not make any different prediction with respect to the phonetic interpretation and we assume that such a candidate is excluded by a high-ranked constraint ensuring that every  $\mu$  must be dominated by a syllable (cf. our discussion in footnote 3). The sub-optimal candidates (9ii-a), (9ii-c), and (9ii-d) show different strategies to integrate the underlying consonant  $\mu$  in a phonetically visible way: the consonant can be integrated under two syllables

(9ii-a), it can be integrated only as coda additionally violating ONS (9ii-c), or it can be integrated as moraic onset additionally violating  $*_{\sigma}[C^{\mu}]$  (9ii-d). For WBP and  $*_{\sigma}[C^{\mu}]$ , only phonetically visible associations of consonants to the syllable positions coda or onset are relevant. (9ii-a) hence does not violate  $*_{\sigma}[C^{\mu}]$  although the consonant is syllabified as onset and is indeed moraic – however, the link to the onset position is direct and does not include a  $\mu$ . Recall that epenthetic elements are marked with a grey background.

- (9) Type I: *Selkup*
  - i. CVC=light

$\mu$   V C C V $\mu$   V C C V	$*C^{\mu}$	$*_{\sigma}[C^{\mu}]$	MAX $\mu-S$	WBP	ONS
a. 				*	
b. 	*!				

ii. CVG=light

$\begin{array}{ccc} \mu & \mu & \mu \\   &   &   \\ V & C & V \end{array}$	$*C^\mu$	$*_{\sigma}[C^\mu$	MAX $\mu-S$	WBP	ONS
a.	*!				
b.			*		
c.	*!				*
d.	*!	*			

This ranking predicts the type I language we discussed in (7), exemplified by, for example, Selkup. The second type of language that can be predicted is a language where all codas contribute to syllable weight, irrespective of whether they are singleton consonants or the first part of a geminate (type II in (7)). That geminate consonants always contribute to syllable weight follows if MAX( $\mu-S$ ) is ranked above  $*C^\mu$  and hence the underlying  $\mu$  of a geminate consonant is always phonetically realized, even if this implies a violation of  $*C^\mu$ . And if WBP outranks  $*C^\mu$  as well, every singleton coda will project an epenthetic  $\mu$ . This ranking and its outcome is summarized in (10). Note that in the following tableaux, we abbreviate the full autosegmental structures we gave in (9) and notate a segment that is associated with a  $\mu$  in a phonetically visible way with  $X^\mu$  and a segment that is associated to a  $\mu$  through an underlying but phonetically invisible association line by  $X^{(\mu)}$ . For ease of exposition, we give the same candidates as in (9) in the same order in all the following tableaux.

(10) *Type II: Latin*

	WBP	MAX <sub>μ-S</sub>	*C <sup>μ</sup>	* <sub>σ</sub> [C <sup>μ</sup> ]	ONS
V <sup>μ</sup> CCV <sup>μ</sup>	i. CVC=heavy				
a. V <sup>μ</sup> CCV <sup>μ</sup>	*!				
☞ b. V <sup>μ</sup> C <sup>μ</sup> CV <sup>μ</sup>			*		
V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>	ii. CVG=heavy				
☞ a. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>			*		
b. V <sup>μ</sup> C <sup>(μ)</sup> V <sup>μ</sup>		*!			
c. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>			*		*!
d. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>			*	*!	

If now MAX(μ-S) is ranked above \*C<sup>μ</sup> but WBP is ranked below \*C<sup>μ</sup>, we expect a pattern where only underlyingly moraic consonants surface as moraic but no epenthetic μ is inserted for an underlyingly μ-less coda. The effect of this ranking is shown in tableaux (11) that predict the type III language we listed in (7). This is the first pattern that does not follow the Equal Coda Weight Principle but is, as we mentioned above, attested in, for example, Hausa.

(11) *Type III: Hausa*

	* <sub>σ</sub> [C <sup>μ</sup> ]	MAX <sub>μ-S</sub>	ONS	*C <sup>μ</sup>	WBP
V <sup>μ</sup> CCV <sup>μ</sup>	i. CVC=light				
☞ a. V <sup>μ</sup> C CV <sup>μ</sup>					*
b. V <sup>μ</sup> C <sup>μ</sup> CV <sup>μ</sup>				*!	
V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>	ii. CVG=heavy				
☞ a. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>				*	
b. V <sup>μ</sup> C <sup>(μ)</sup> V <sup>μ</sup>		*!			
c. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>			*!	*	
d. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>	*!			*	

And finally, if WBP dominates \*C<sup>μ</sup> that in turn dominates MAX(μ-S), we expect a pattern where singleton codas contribute to syllable weight but underlyingly moraic intervocalic consonants do not. This ranking given in (12) predicts a type IV language that is exemplified with Ngalakgan (7). Undominated

WBP demands insertion of epenthetic  $\mu$ 's for coda consonants (12i) but the underlying  $\mu$  of a geminate remains phonetically unrealized (12ii). This follows since the underlyingly moraic consonant can be realized as a mora-less onset: a violation of  $*C^\mu$  can be avoided without inducing a new violation of WBP.  $MAX(\mu-S)$  demanding preservation of the underlying  $\mu$  is too low-ranked to have an effect.

(12) *Type IV: Ngalakgan*

	WBP	ONS	$*_{\sigma}[C^\mu$	$*C^\mu$	$MAX_{\mu-S}$
$V^\mu C C V^\mu$	i. CVC=heavy				
a. $V^\mu C C V^\mu$	*!				
$V^\mu C^\mu C V^\mu$				*	
$V^\mu C^\mu V^\mu$	ii. CVG=light				
a. $V^\mu C^\mu V^\mu$				*!	
$V^\mu C^\mu V^\mu$					*
c. $V^\mu C^\mu V^\mu$		*!		*	
d. $V^\mu C^\mu V^\mu$			*!	*	

This concludes our illustration how the general language types in (2) follow in a containment-based OT model under the assumption that geminates are underlyingly moraic. All four patterns differing in whether geminates and codas contribute to syllable weight can be predicted in the model we propose.

### 3. Edge geminates

Generally, it is uncontested that intervocalic geminates are by far the most common crosslinguistically while geminates at word edges are far less frequent (Thurgood 1993, Muller 2001, Davis 2011, Dimitrieva 2012). Still, such geminates exist as well and in this section we discuss their representation in our model in some more detail. It will be shown that the typology in (7) was a simplification and there are languages where the question of whether geminates contribute to syllable weight depends on their position in the word. For reasons of space we cannot look into this question thoroughly but will focus on some interesting asymmetries found for initial geminates in subsection 3.1 and the general question of final geminates in subsection 3.2.

## 3.1. Initial geminates

In the ranking in (11) for the type III language Hausa,  $*_{\sigma}[C^H]$  dominates all faithfulness constraints, especially  $MAX(\mu-S)$ . It is hence predicted that no moraic onset ever surfaces in this language and all underlying association lines between  $\mu$ 's and consonants that are syllabified as onsets are marked as phonetically invisible. There are, however, some examples of initial weight-bearing geminates. One language of this type is Trukese, an Austronesian language spoken in the Truk state of Micronesia (Hart 1991, Davis and Torretta 1998, Davis 1999*b*). All consonants in Trukese except the glides may surface as geminates and geminates are possible initially and medially. One piece of evidence for the surprising fact that initial geminates indeed contribute to weight comes from empirical facts on word minimality restrictions. Nouns must be C:V, CV:, or bisyllabic, but CV or CVC nouns are generally impossible. Trukese hence is a pattern III language where initial and medial geminates contributing to syllable weight. Such a pattern is predicted from a grammar that differs only slightly from the ranking we gave for Hausa in (11): if  $MAX(\mu-S)$  and  $*_{\sigma}[C^H]$  reverse their position in the ranking, it is predicted that initial geminates surface as long and weight-contributing. This can be seen in the additional context of an initial moraic consonant in (13iii). In Hausa, on the other hand, such an input would be neutralized to a non-moraic initial onset as can be seen in (14).

(13) Type III: Trukese

	MAX μ-S	* <sub>σ</sub> [C <sup>μ</sup>	ONS	*C <sup>μ</sup>	WBP
V <sup>μ</sup> CCV <sup>μ</sup>	i. CVC=light				
☞ a. V <sup>μ</sup> C CV <sup>μ</sup>					*
b. V <sup>μ</sup> C <sup>μ</sup> CV <sup>μ</sup>				*!	
V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>	ii. CVG=heavy				
☞ a. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>				*	
b. V <sup>μ</sup> C <sup>(μ)</sup> V <sup>μ</sup>		*!			
c. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>			*!	*	
d. V <sup>μ</sup> C <sup>μ</sup> V <sup>μ</sup>	*!			*	
C <sup>μ</sup> V	iii. GV=heavy				
☞ a. C <sup>μ</sup> V		*			*
b. C <sup>(μ)</sup> V	*!			*	

(14) Type III: Hausa, contd. from (11)

	* <sub>σ</sub> [C <sup>μ</sup>	MAX μ-S	ONS	*C <sup>μ</sup>	WBP
C <sup>μ</sup> V	iii. GV=light				
a. C <sup>μ</sup> V	*!			*	
☞ b. C <sup>(μ)</sup> V		*			

Thurgovian Swiss, a Swiss dialect spoken in the canton Thurgau (Muller 2001, Kraehenmann 2001, 2003), now shows an alternating behaviour of geminates with respect to their weight contribution. The language has a length contrast for vowels and consonants and geminates surface in all positions. Examples for medial (15a), final (15b), and initial (15c) geminates are given below, contrasted with singleton (near) minimal pairs.

(15) *Geminates in Thurgovian Swiss* (Kraehenmann 2003: 42+43)

	Geminates		Singletons	
a.	mat:tə	'mat'	matə	'maggot'
	jak:tə	'jacket'	jakə	'to hunt'
b.	hilf:t	'help'	ʃilf	'reed'
	ru:tʃ:	'inebriation'	ru:tʃ	'rouge'
c.	p:u:təR	'powder'	pu:tə	'hut'
	t:ɑŋk:	'tank'	tɑŋk:	'thank'

There are no CV or CVC words in Thurgovian Swiss. Instead words of the shape CVCC or CVG are allowed. This distributional fact easily follows under the assumption that a word minimality condition demands that words are minimally bimoraic in the language and codas are moraic but final consonants are extrametrical (Muller 2001). CVC words then undergo vowel lengthening in order to conform to this bimoraicity requirement, cf. the contrast in (16a). Words ending in a final geminate (16b) are not subject to vowel lengthening, implying that the geminate contributes a  $\mu$  to syllable weight.<sup>4</sup> Interestingly now, words with an initial geminate do undergo vowel lengthening as well (16c) and no word GV(C) ever surfaces. One can hence conclude that medial and final geminates are weight-contributing in Thurgovian Swiss, initial ones are not.

(16) *Word minimality in Thurgovian Swiss* (Muller 2001: 101)<sup>5</sup>

	ROOT	SINGULAR	PLURAL	
a.	/has/	ha:s	hase	'hare'
b.	/fɛt:/	fɛt:	fɛt:e	'fat'
c.	/t:ak/	t:ak	t:ake	'day'

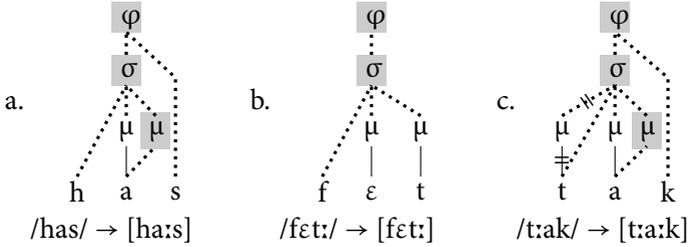
(17) lists the structures in our containment-based model that derive this asymmetric behaviour of geminates. (17a) shows a simple CVC stem: since the final C is extrametrical, an additional  $\mu$  resulting in vowel lengthening is required to conform to the word minimality requirement. Medial and final geminates (17b) remain phonetically associated to the  $\mu$  they were underlyingly associated with and no additional vowel lengthening to ensure bimoraicity is required.

<sup>4</sup>Underlyingly moraic consonants are exempt from the final extrametricality. This is easily derivable if  $\mu$ 's prefer not to be associated directly to a foot node (=DEPAL $_{\mu-\varphi}$ ).

<sup>5</sup>Note that Muller (2001) does not provide the data in consistent IPA notation.

Initial geminates (17d), however, cannot remain phonetically associated to their  $\mu$  due to high-ranked  $^*_\sigma[C^H]$  and additional vowel lengthening is hence required.

(17) *Word minimality and vowel lengthening in Thurgovian Swiss*



Initial geminates in Thurgovian Swiss are hence not phonetically dominated by a  $\mu$  but since the underlying  $\mu$  always remains in the structure in containment, the geminate remains structurally different from a singleton onset: it is doubly linked to a syllable (even though one of the association paths is phonetically invisible). And this double linking is then interpreted as length. Note that the consonant would remain phonetically unrealized if it were only integrated via the phonetically invisible association path to the  $\mu$ ; the additional epenthetic association line is hence demanded by high-ranked MAX-S ensuring that no segment is deleted.

To summarize this very brief typology: Hausa has no initial geminates but medial ones that contribute to syllable weight, Trukese has medial and initial geminates that both contribute to syllable weight, and Thurgovian Swiss has medial and initial geminates but only the former contribute to syllable weight. The representational contrast between Trukese and Thurgovian Swiss, we argue, is that the underlying  $\mu$  of an initial consonant is phonetically visibly integrated in the former (18a) but not in the latter (18b). Interestingly, given the assumption of Richness of the Base in OT, languages like Hausa without initial geminates must still deal with a possible underlying representation of a moraic initial consonant. We assume that in such a language, the representation in (18c) predicts that the initial consonant neither contributes to syllable weight nor is realized as long – the  $\mu$  is not integrated into the syllable structure and the consonant not doubly linked; not even through a phonetically invisible association line.

(18) *Initial moraic consonants*

	TRUKESE	T. SWISS	HAUSA
phonetics:	[C:V]	[C:V]	[CV]
contributes to syllable weight:	yes	no	no

## 3.2. Final geminates

An apparent conundrum for the moraic approach to geminates are languages where geminates and codas are moraic and where final geminates exist. In Ringen and Vago (2006), it has been argued that Hungarian is such a language and contrasts as in (19) for final singletons and geminates exist. There is a word minimality restriction active in the language that excludes CV words. This follows if words are minimally bimoraic in Hungarian and both codas and geminates contribute to syllable weight.

(19) *Final singletons vs. geminates* (Ringen and Vago 2006: 14)

	singleton		geminate		
a.	sok	'many'	b.	sok:	'shock'
	hal	'fish'		hal:	'hear(s)'
	tol	'push(es)'		tol:	'pen'

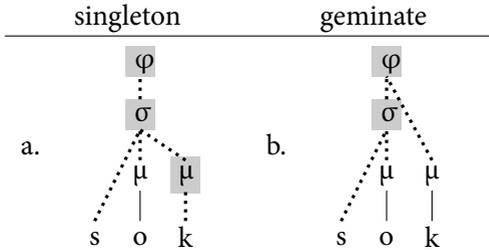
For a moraic approach, this is problematic at first sight: what distinguishes the singletons in (19a) from the geminates in (19b), the latter being underlyingly moraic, the former receiving a  $\mu$  due to WBP? Notice, however, that other interpretations of the empirical facts are available, such as the non-weight-contributing role of singleton codas (cf., for example, Grimes 2010). But even if the Hungarian facts are as described in Ringen and Vago (2011), our approach straightforwardly offers a solution since the distinction into underlying and inserted structure is always detectable in containment. Recall the assumption we introduced in section 2.1 that the morphological affiliation of every phonological element is visible and epenthetic elements can be identified since they are

lack any morphological colour. The underlying  $\mu$ 's in (19b) can hence be distinguished from the  $\mu$ 's in (19a) since the former bear a morphological colour, the latter do not. Because constraints such as DEP<sub>AL</sub> can be sensitive to this distinction, it is predicted that colourless and morphologically coloured  $\mu$ 's can be syllabified differently. More concretely, the constraint in (20) demanding that no association line between an underlying  $\mu$  and a syllable should be inserted, prohibits an integration of an underlying  $\mu$  into a syllable.

- (20) DEP<sub>AL $\sigma$ - $\mu$</sub>   
 Assign a violation mark for every colourless association line between a  $\sigma$  and a morphologically coloured  $\mu$ .

If (20) is high-ranked, a structure as in (21b) is predicted where an underlying  $\mu$  is extrasyllabic and directly attached to a foot node. An epenthetic  $\mu$ , on the other hand, can easily be integrated under a syllable node (21a).<sup>6</sup>

- (21) *Final singletons and geminates: different syllabification structure*



#### 4. A full typology: geminates and syllable weight

A remaining question is whether the phonological structures we assume together with the constraint system we employ predict any unattested combinations of (non)weight contributing geminates and singletons. In this section we discuss the factorial typology based on the OT-Help software and argue that all grammars predicted are indeed attested. For reasons of space, we limit our discussion to four relevant contexts (singleton codas, medial geminates, initial geminates, and final geminates) and only include the most relevant candidates

<sup>6</sup>Cf. Trommer and Zimmermann (to appear) for a more detailed discussion of this implementation of DEP<sub>AL</sub> in containment in the domain of morphological  $\mu$  affixation.

and constraints.<sup>7</sup> Tableaux (22) to (25) give the set of relevant candidates and list their constraint violations. The constraints are the same we introduced in (8) and are not ranked with respect to each other. Tableaux (24) and (25) are especially interesting since they summarize the structures discussed in section 3 for edge geminates.

(22) *Non-moraic medial consonant*

$\mu$   V C C V $\mu$	$*C^\mu$	$*_\sigma[C^\mu]$	MAX $\mu-S$	WBP	ONS
a. 				*	
b. 	*				

(23) *Medial geminate*

$\mu$ $\mu$ $\mu$       V C V	$*C^\mu$	$*_\sigma[C^\mu]$	MAX $\mu-S$	WBP	ONS
a. 	*				
b. 			*		
c. 	*				*

<sup>7</sup>An example for an issue that we need to exclude in the following is the distinction between medial and final singleton codas and hence the effect of NONFINALITY (Hyde 2011).

(24) *Initial geminate*

	$\mu$ C	$\mu$ V	$*C^\mu$	$*_\sigma[C^\mu]$	MAX $\mu-S$	WBP	ONS
a.	$\mu$ C	$\mu$ V	*	*			
b.	$\mu$ C	$\mu$ V			*		

(25) *Final geminate*

	$\mu$ V	$\mu$ C	$*C^\mu$	$*_\sigma[C^\mu]$	MAX $\mu-S$	WBP	ONS
a.	$\mu$ V	$\mu$ C	*				
b.	$\mu$ V	$\mu$ C			*	*	

We fed these 4 tableaux with a total of 9 candidates into the software OT-Help (Staub's et al. 2010) that automatically calculated the possible grammars. OT-Help found 6 possible parallel OT-grammars, listed below in (26). For all of the 4 relevant contexts (22) to (25), we abbreviate the winning candidates for every predicted language. For non-moraic medial consonants (22), either the non-moraic consonant (a.) or the consonant dominated by an epenthetic  $\mu$  (b.) wins; for medial moraic consonants, either the structure with a consonant that is phonetically visibly double-linked to two syllables (a.) or the structure where this double association is phonetically invisible (b) becomes optimal; and for initial (24) and final (25) moraic consonants, either a phonetically visible integration of the moraic consonant (a.) or a phonetically invisible double

integration (b.) wins. All optimal candidates where a  $\mu$  is phonetically visibly integrated are marked with a grey background to ease readability.

(26) *Predicted typology: 6 grammars*

INPUT:	Non-moraic C	Moraic C		
	medial (22)	medial (23)	initial (24)	final (25)
LG1	non-moraic	vis.doubl	moraic	moraic
LG2	moraic	vis.doubl	moraic	moraic
LG3	non-moraic	vis.doubl	inv.doubl	moraic
LG4	moraic	vis.doubl	inv.doubl	moraic
LG5	moraic	inv.doubl	inv.doubl	moraic
LG6	non-moraic	inv.doubl	inv.doubl	inv.doubl

We argue now that all these predicted rankings result in attested grammars. In (27), we list an example for each of these patterns. For every winning candidate, we indicate whether the consonant is phonetically visibly associated to a  $\mu$  at the top of the cell and how this consonant is phonetically interpreted at the bottom of the cell. It became already clear in the preceding discussion in section 3 that the structures involving phonetically invisible structures can be interpreted differently. This concerns the b. candidates in (23) to (25): they are doubly associated but one of the associations is phonetically invisible. We argue that it is a language-specific choice whether such an association is interpreted as length or not. For (27-5), for example, we assume that the phonetically invisible double association of an onset to the same syllable is not interpreted as length, the phonetically invisible double association of a medial consonant to two different syllables, however, is indeed interpreted as length. This correctly predicts that there are no initial geminates in Ngalakgan but medial geminates that do not contribute to syllable weight.

Another asymmetry in the interpretation of phonological structure concerns moraic final consonants. In Latin (27-4), a final moraic consonant is simply interpreted as a singleton consonant whereas in Thurgovian Swiss (27-3), such a moraic final consonant is interpreted as geminate. Such asymmetries are simply due to different contrasts in a language: whereas Thurgovian Swiss exhibits non-moraic codas as well (=those that were underlyingly  $\mu$ -less), all codas in Latin are moraic and hence interpreted the same. A final note is in order

with respect to Marshallese that we cite as an example for language (27-1). At this point, the exclusion of some relevant constraints becomes problematic: in Marshallese, there are neither final geminates nor any moraic final consonants in general. This simply follows from the effect of well-established NONFINALITY (cf. our footnote 7). We hence notate it as a language 1’.

(27) *Attested typology: 6 grammars*

	type	N-mor.C	Moraic C			example
		(22)	(23)	(24)	(25)	
LG1’	III	¬μ C	μ C:	μ C:	¬μ C	Marshallese (Topintzi 2008)
LG2	II	μ C	μ C:	μ C:	μ C:	Tamazight Berber (Jebbour 1999, Kraehenmann 2011)
LG3	III	¬μ C	μ C:	¬μ C:	μ C:	Thurgovian Swiss (Muller 2001, Kraehenmann 2001)
LG4	II	μ C	μ C:	¬μ C	μ C	Latin (Mester 1994)
LG5	IV	μ C	¬μ C:	¬μ C	μ C	Ngalakan (Davis 2011)
LG6	I	¬μ C	¬μ C:	¬μ C	¬μ C	Selkup (Ringen and Vago 2011)

It has to be emphasized again, that this was only a preliminary typology that excluded several relevant constraints and contexts. It is hence clear that not all attested patterns of weight contribution and geminates can be captured with this set of constraints. Our aim was only to show that the constraints and structures we assumed to predict the four types of languages (7) are unproblematic from an empirical perspective and that all imaginable rankings of these constraint result in attested grammars.

## 5. Conclusion

To sum up, a core feature of our paper has been the assumption that what sets geminates apart from singletons is their underlying moraicity (Hayes 1989, Davis 1994, 1999a, 2003, Topintzi 2008, 2010). To account for geminates, however, that behave as weightless, we have further entertained Davis’ (2011) idea that such underlying moraicity may not always survive on the surface. We have then developed a Containment based model, along the lines of Zimmermann (2014) that formalizes these basic principles. Our system correctly generates

all main patterns. Importantly, we are also able to capture asymmetries with respect to geminates within a language. For example, we can produce languages such as Swiss German that exhibits geminates in all positions, but where medial and final ones are weightful whereas the initial ones are not. Moreover, we are able to always maintain a representational contrast between singletons and geminates, even when they are quite atypical, as in e.g. Ngalakgan where singletons behave moraicly, but geminates do not. Our future plans involve conducting a fuller typology and exploring further the predictions our systems makes.

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# The *se-ra* alternation in Spanish subjunctive

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## Abstract

In this paper I take a look at a classic problem in Spanish morphosyntax, namely the alternation between the forms *-se* and *-ra* in the Imperfect Subjunctive (*Imperfecto de Subjuntivo*). Research on this topic has mainly focused on sociolinguistic variation, and has been done almost exclusively with impressionistic data and speaker's intuitions. I address the problem from a usage-based perspective, using corpus linguistics methods. The main claim is that the choice between *-se* and *-ra* correlates to a certain extent with morpho-syntactic and discourse factors. Through collocation analysis I also show that there are repelled and attracted collexemes that distinguish and relate both forms.

## 1. Introduction

The morphological alternation between *-se* and *-ra* in the Spanish *imperfecto del subjuntivo* ('imperfect subjunctive') has been studied for long but it is still poorly understood, and it remains a challenging problem. We can see the alternation in (1):

- (1) a. Si yo fuera ingeniero no estaría en esta  
if I be.1SG.IMP.SBJ engineer no be.1SG.COND.PRES in this  
situación.  
situation  
'If I were an engineer, I wouldn't be in this situation.'
- b. Si yo fuese ingeniero no estaría en esta  
if I be.1SG.IMP.SBJ engineer no be.1SG.COND.PRES in this  
situación.  
situation  
'If I were an engineer, I wouldn't be in this situation.'

Both forms are, at least in principle, possible with all Spanish verbs, and there is no categorical distinction in their use. The difference between both is elusive and hard to pin down. Most research on this alternation has so far tried to characterize its sociolinguistic aspects focusing mainly on how different dialects differ in the attested proportions of use (see section 2), but very little is known regarding its distributional properties within dialects, and even less is known about how and why speakers choose one form or the other.

This paper deals exclusively with speakers' choice, that is, what factors are correlated with the use of *-se* or *-ra*, the emergent patterns present in corpora, and how predictable the alternation is from the morpho-syntactic and discourse context. I will deal exclusively with Peninsular Spanish and will ignore for now issues regarding dialectal variation.

The structure of the paper is as follows. Section 2 briefly discusses some of the previous work that has addressed the *-se/-ra* alternation, and tries to characterize the types of methods that have been used so far. Section 3 sketches a simple constructional analysis of the alternation based on work by Booij (2010a), which will be used as a starting point for the empirical investigation. Section 4 describes the materials and methodology used for this study, section 5 informs about the distribution of *-se* and *-ra* in the corpus studied. Section 6 presents a Naive Discriminative learning model that show how different morpho-syntactic and discourse properties of the context correlate with *-se* and *-ra*. Section 7 reports on a collostructional analysis for both forms, and what collexemes can tell us about the semantics of the construction. I discuss the results in section 8, and offer some final remarks in section 9.

All statistical tests, plots and models were done using R programming language (R Core Team 2014).

## 2. Previous work on the *-se/-ra* alternation

There has been extensive research into the Spanish imperfect subjunctive for the last hundred and forty years or so, but it has overwhelmingly focused on inter-speaker variation, and on dialectal differences that exists between Spanish speaking communities. In this section, I very briefly summarize some of the most prominent investigations on the matter and their overall conclusions. For a more comprehensive discussion see DeMello (1993), for example.

The form *-se* evolved from the Latin plusquamperfect subjunctive, while the

form *-ra* evolved from the Latin plusquamperfect indicative (Wilson 1983). According to Cuervo and Ahumada (1981[1874]), the form *-ra* started to be associated with an indicative mood and slowly acquired the subjunctive mood over time through analogy with the form *-se*. Today *-se* and *-ra* are seen as two near synonymous morphemes in free variation. Cuervo and Ahumada (1981[1874]) noted already in 1874 there was a significant difference in the proportion of both forms between American Spanish and Peninsular Spanish. Although they do not give numbers, they claim that Spaniards use *-se* almost exclusively, and that this form is almost absent in casual speech in America. Cuervo and Ahumada also claim that *-se* was used in Colombia mainly by writers that were trying to imitate peninsular varieties.

Wilson (1983) traces the evolution of *-se* and *-ra* in the Mexican written language, but treats both forms as having converged into a basically identical function. He claims that originally *-se* was the most common form used by the Conquistadores in Mexico, but that its use has steadily declined to a point of being almost non-existent, while the use of *-ra* has become widespread.

Gili Gaya (1983: 180-181) also observe that there are regional and personal preferences in the use of *-ra* and *-se*. He also claims that the form *-ra* is less frequent than the form *-se* in ordinary conversation in Spain, but that *-ra* is also in use in the written form and among educated speakers. He also cites Lenz (1920), who claims that when one of the two forms is predominant in use in a dialect, then the other form is seen as more formal or pertaining to literary style.

DeMello (1993) looks at the use of both forms in Bogota, Buenos Aires, Caracas, Havana, Lima, Madrid, Mexico City, San Juan (Puerto Rico), Santiago (Chile) and Seville. His research shows that there is great dialectal variation, and that the proportions of both *-se* and *-ra*, as well as their functions (subjunctive or replacing the conditional) are quite different from city to city. His work, however, only focuses on dialectal variation and does not look into intra-speaker variation. His main conclusion is that although *-se* is considerably less frequent than *-ra*, the former can still be found in Spain and America, and it is by no means dead. As for the indicative use of both forms (*el equipo que perdie-ra/se el día de ayer* 'The team that lost.IMP.SUBJ yesterday'), DeMello argues that already around 1950 its use was affected and only present in pedantic writers. The only exceptions seem to be Argentinian Spanish, where it still seems to be somewhat common, and Chilean and Cuban Spanish, where it is occasionally found.

These studies, with the exception of DeMello's, were all done with impressionistic data, and most of them relied solely on the author's intuition of what the distribution of the forms were. DeMello introduces the use of corpora to study the alternation, but he does not make use of advanced quantitative techniques, and limits himself to looking at raw frequencies.

To my knowledge, the only study of the *-se/-ra* alternation that makes use of quantitative corpus linguistic methods is Schwenter (2013), who claims to have found some effects of PERSON and NUMBER on the choice of the morpheme. Schwenter looks at a large amount of examples<sup>1</sup> from different countries in the CREA corpus (Real Academia Española 2011) and fits a mixed effect logistic regression model to the data. In his presentation Schwenter claims to have found priming effects: when a speaker uses *-se*, he is more likely to use *-se* again when producing another imperfect subjunctive form shortly after the previous one. However, Schwenter does not provide in his slides any accuracy scores or any other metric that allows evaluation of the model. This means that we do not know how his model performs and how many cases (if any) it can correctly predict. It is therefore not possible to contrast his results with those of the present study in any meaningful way.

In summary, most studies done on the *-se/-ra* alternation have been carried out without the use of quantitative corpus linguistic methods, and although it is well understood what the origins of this alternation are, we still know very little about its current usage in terms of its statistical and distributional properties.

### 3. The imperfect subjunctive construction

There are many possibilities for analyzing the *-se/-ra* alternation. One obvious possibility is to assume that *-se* is an allomorph of *-ra* which can be chosen freely by speakers. This seems to be the standard assumption, although it has never been articulated as such. Another option is to view both forms as different, near synonymous, morphemes. Both explanations are problematic. Considering *-se* and *-ra* as allomorphs does not explain their systematic differences, and considering them as different morphemes does not explain their similarities and identical grammatical function.

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<sup>1</sup>However, an important shortcoming of Schwenter's study is that he only considered 15 different verb types. This was presumably done so for practical reasons, but as we will see in the following sections the variable VERB plays the most interesting role in the *-se/-ra* alternation.

In this paper I take a constructional view, which could be seen as a middle way between the two alternatives. Following the notation proposed by Booij (Booij 2010*a,b*, 2013) I will take the construction for the imperfect subjunctive to be as in (2)<sup>2</sup>:

- (2)  $[[X_{vi}] - Y_{(se/ra)}]_v \leftrightarrow [SEM_i \text{ in imperfect tense subjunctive} + PRAG_1]$

What (2) says is basically that there is a semi-abstract imperfect subjunctive construction which instantiates a verbal lexical construction  $X_i$  with a morpheme slot  $Y$  which can be either *-se* or *-ra* (but is still not specified), and produces a conjugated verb in the imperfect subjunctive associated with some pragmatic value<sup>3</sup> not derivable from either the morpheme nor the verb. In this analysis both *-se* and *-ra* are more specific constructions that instantiate the more general abstract construction in (2) and have the forms in (3):

- (3) a.  $[[X_{vi}] - ra_j]_v \leftrightarrow [SEM_i \text{ in imperfect tense subjunctive} + PRAG_1 + PRAG_j]$   
 b.  $[[X_{vi}] - se_k]_v \leftrightarrow [SEM_i \text{ in imperfect tense subjunctive} + PRAG_1 + PRAG_k]$

What this means is that both constructions *-se* and *-ra* instantiate the same grammatical core construction in (2), retain the pragmatic value associated with it ( $PRAG_1$ ) but specify additional pragmatic information associated exclusively to the specific form in question ( $PRAG_j$  and  $PRAG_k$ ). This analysis captures well the fact that both constructions have indeed the same grammatical function, but that there seem to be important differences between both forms. The interesting issue thus is to investigate what  $PRAG_1$ ,  $PRAG_j$  and  $PRAG_k$  actually represent.

The null hypothesis that we will test is that there is no motivation for the distribution of both forms, and that the alternation is in truly free variation. The alternative hypothesis is that the choice of these forms is at least partially dependent on other variables.

<sup>2</sup>This is a simplified version. The full system would have more constructions at more abstract levels that deal independently with TAM and person and number. This representation assumes that tense, aspect and mood constructions have already been merged or instantiated.

<sup>3</sup>Here *pragmatic* is used in a very loose sense. I take it to be any meaning that is not related to the truth semantics of the construction. In addition, it includes any usage preferences, and statistical properties of the construction. It is more related to the concept of Cognitive Models in Evans (2009, 2010).

Analyzing inflectional morphology from a construction grammar perspective is, as far as I am aware, not common practice. A notable exception can be seen in Beuls (2012), who within the framework of Fluid Construction Grammar (Steels 2011), developed a full implementation of Spanish inflectional morphology (see also Schneider 2010). She does not address the issue of this particular alternation, though.

#### 4. Material

The corpus used for this study was the Corpus Oral de Referencia de la Lengua Española Contemporánea, CORLEC, (Marcos Marín et al. 1992). The CORLEC has approximately 1,100,000 words, covers a wide range of genres and was compiled with the aim of building a representative corpus of spoken standard Peninsular Spanish. I performed some semi-automatic and manual fixes of some unicode characters, formatting errors, and tagging issues, and afterwards carried out the POS tagging with the library FreeLing (Padró and Stanilovsky 2012) using its python API.

Sentence segmentation of speech data is extremely difficult, so I decided to divide the text according to single punctuation marks, namely ‘.’ or ‘:’ between two words, independently of whether lower or upper case followed. Other punctuation elements like ‘.’ or ‘.’ were ignored and not taken to be sentence (utterance) boundaries. This results in a division that is a product of what the transcriber of the corpus thought was a complete utterance by the speaker, which means that some text units can be larger than sentences. This also means that some sentences contain two cases of the imperfect subjunctive with either identical or different forms. For the collostructional analysis all sentences were considered, but for the regression models only 200 sentences for *-ra* were randomly extracted. From this set of sentences (plus all the occurrences for *-se*) some cases were removed if they were clear errors or instances of a different genre, e.g. people reading poetry. After all these fixes, the total number of *-ra* sentence was 184 and for *-se* 183.

Besides the study by Schwenter (2013), there are no proposals in the literature for any particular set of variables that could influence the *-se/-ra* alternation. Because of this, I include in this study also variables that have been found to be relevant in distinguishing other alternations, even if there seems to be no reason for including them for analyzing a morphological alternation. The

variables related to the verb that appears in the imperfect subjunctive form are the following. The variable **VERB** is simply which verb in question was used in the imperfect subjunctive, which should tell us whether there are lexical preference in the alternation. Directly related variables, and also suggested by Schwenter<sup>4</sup>, are **PERSON** and **NUMBER** of the verb in imperfect subjunctive. Also closely related to the variable **VERB** is the verb ending (often referred to in the literature as thematic vowel of the verb) *-ar*, *-er* or *-ir* (in the models coded as **TYPE**). This variable could be important for priming reasons (the vowel /a/ could prime *-ra* and /e/ could prime *-se*). Additionally, an interesting variable that could have an effect is whether the verb appearing in imperfect subjunctive has a modal meaning (coded as **MODAL**). The status of modals in Spanish is not without debate, for simplicity I took the verbs *querer* 'want', *poder* 'can', *deber* 'must', *soler* 'do often', *tener* 'have (to)' to be modals. The main reasons for including these verbs as modals is that they either mostly occur with other verbs (*quiero ir a comer* 'I want to go to eat'), or because they are grammaticalizing into periphrastic constructions (*tengo que ir* 'I have to go'). As we will see in section 7 this decision seems to be justified. Then, we have lexical variables associated with the choice of verb (**VERB**, **MODAL**, **TYPE**), and grammatical variables (number and person).

A different set of variables is recruited from elements related to the grammatical and discourse context that the verb appears in. I coded all *-se* sentences and the randomly chosen *-ra* sentences for: **ANIMACY OF THE SUBJECT** (NP, pronoun, drop, null, etc.), **DEFINITENESS OF THE SUBJECT**<sup>5</sup>, **REALIZATION OF THE SUBJECT**, **ANIMACY OF THE OBJECT**<sup>6</sup>, **DEFINITENESS OF THE OBJECT**, **REALIZATION OF THE OBJECT** (NP, PP, pronoun, null, etc.), and **TYPE OF SENTENCE**. For this final variable the following types were considered: **conditional** (expressing a condition on which something happens), **final** (expressing desire or determination that something happens), **indicative** (indicative use of the subjunctive), **temporal** (expressing temporal relations), **adversative**

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<sup>4</sup>Schwenter's proposal for considering whether there was priming between two consecutive forms is not practical for the present corpus because there are not enough consecutive cases of imperfect subjunctive. It also seems trivially true that any form will prime itself.

<sup>5</sup>The value **abstract** for definiteness is reserved for non NP subjects and objects, and is not related to the concept of abstract nouns.

<sup>6</sup>I also considered in this category adjectival and adverbial complements when there was no direct or indirect object to the verb. **OBJECT** could be seen here as the first postverbal complement of the verb.

(comparison or opposition to something), and potential (other uses where possibility or probability are conveyed by the subjunctive). Related to the type of sentence is whether the words *que* ‘that.COMPL’ and *si* ‘if’ introduced the subjunctive verb (coded as QUE and SI). The reason for including these two variables is that they are two of the most common triggers for the subjunctive, but have quite different functions, which means it is conceivable that they correlate with one or the other form. Two other contextual variables I included were CATEGORY OF THE NEXT WORD and CATEGORY OF THE PRECEDING WORD, these were extracted from the first letter in the POS tags provided by FreeLing plus a X category for cases where there was no word or punctuation mark after or before the word. Finally I included the variable LENGTH OF SENTENCE (in number of words).

## 5. Distribution of the alternation

After removing cases with incomplete information and some clear errors in the extraction, the total number of observations was 1269, with some sentences containing more than a single occurrence. In agreement with DeMello (1993) and contradicting Gili Gaya (1983) the form *-se* (191 occurrences) is considerably less frequent than the form *-ra* (1078 occurrences). Other relevant proportions are presented in Table 1.

	se	ra	total
total cases	191	1078	1269
total sentences	171	911	1081
total verbs	97	228	325

Table 1: Total number of occurrences, sentences and verbs with the forms *-se* and *-ra*

Figure 1 shows the proportions in which the alternation occurs with the variables TYPE, MODAL, NUMBER, QUE, PERSON and SI. In this figure we can see that both forms are almost identical except for the variables MODAL and TYPE<sup>7</sup>. The morpheme *-ra* seems to appear with modals and verbs ending in *-er* more

<sup>7</sup>Statistical tests will be omitted in this section because the models presented in the next section are a better way of assessing the importance of each of these variables and their correlation with the forms of the alternation.

often than the morpheme *-se*. It is, however, likely that both of these variables are correlated to some degree because all modal verbs chosen end in *-er*, but, as we will see in the collocation analysis, there are reasons to suspect that their overlap is coincidental.

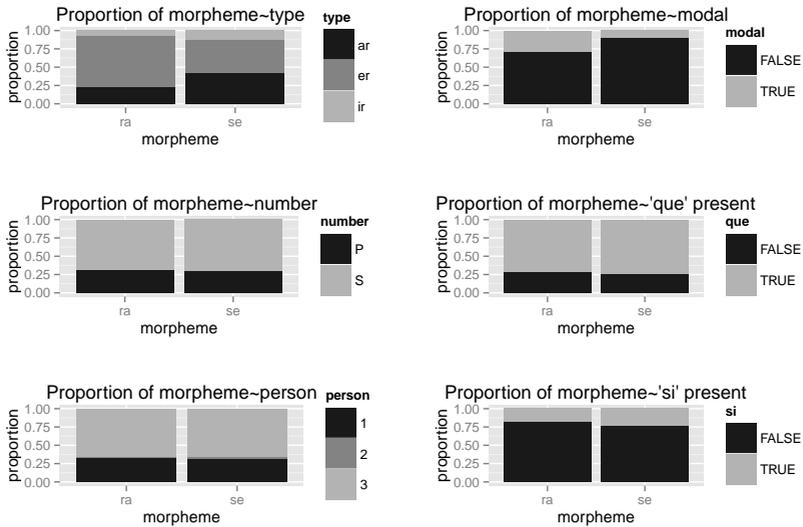
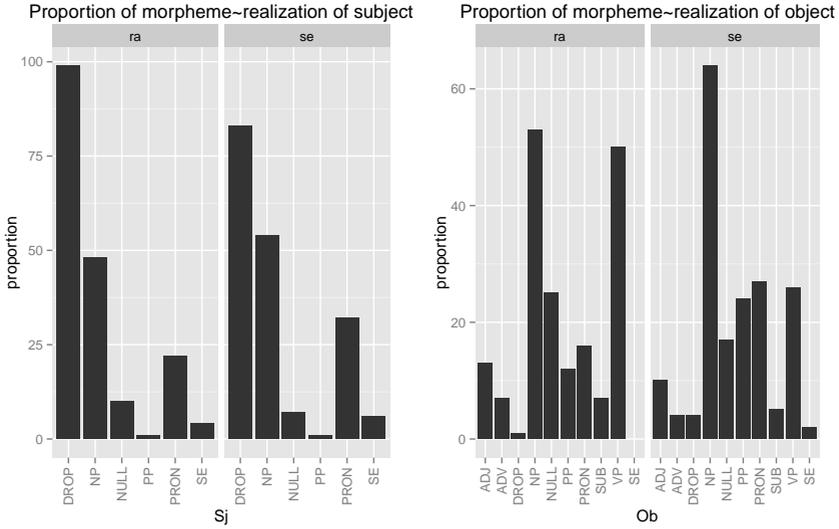


Figure 1: Proportions of the variables TYPE, PERSON, NUMBER, MODAL, QUE, SI for *-se* and *-ra*.

Figure 2 shows the proportions of realization of the subject and object. We can see that the differences in subject phrases are smaller than the difference in object phrases, but it is apparent that *-ra* appears with more sentences without overt subjects than *-se*. For objects, the differences are larger. The form *-se* prefers noun phrases, while *-ra* shows almost the same preference for noun phrases and verb phrases.

Figure 3 gives the proportions for animacy and definiteness of both subject and object (again, object here means any post verbal complement of the verb). We can notice little difference in the animacy of subject and object, but there are noticeable differences in the definiteness of subject and object. The largest differences are between abstract (i.e., non NPs or PPs), definite and indefinite objects, but some difference between definite and indefinite subjects can also be observed.



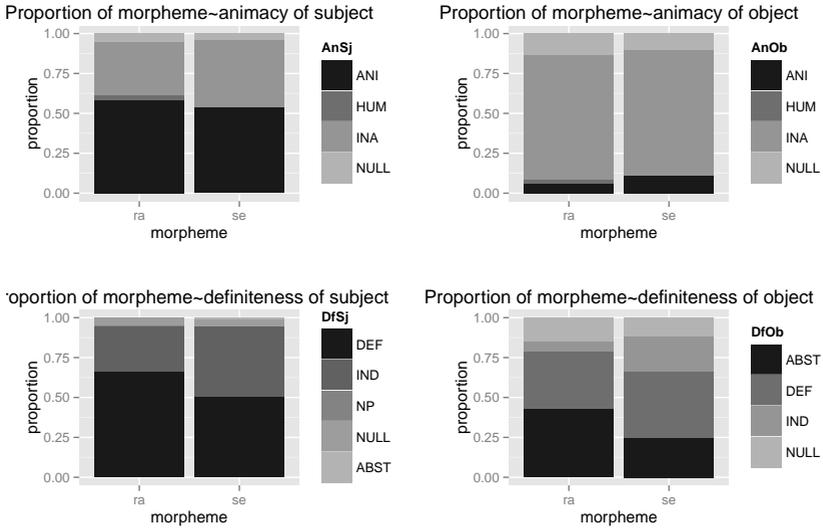
**Figure 2:** Proportions of the variables **REALIZATION OF SUBJECT** and **REALIZATION OF OBJECT** for *-se* and *-ra*. DROPP = no overt subject near the verb, NP = noun phrase (with or without determiner), NULL = impersonal uses like existential *haber*, PRON = single pronoun (also relatives, demonstratives and numerals), SE = impersonal sentences with *se*, ADJ = bare adjectives and adjective phrases, ADV adverbial phrases, PP = prepositional phrases, SUB = subordinate clauses headed by a complementizer, VP = verb phrases without complementizer.

In Figure 4 and Figure 5 we can see the distributions of the grammatical categories of the preceding and following words<sup>8</sup>.

From both figures, we can see that there does not seem to be much difference when it comes to the preceding grammatical category between both morphemes. The following grammatical category does show some differences, mainly in prepositions (S), nouns (N), determiners (D) and main verbs (V), but the effect is not large enough to draw any conclusions yet. We will come back to the effects of preceding and next grammatical category in the next section.

The next factor considered was **LENGTH OF SENTENCE**. As mentioned above,

<sup>8</sup>For a full list of what each POS tag means see <http://nlp.lsi.upc.edu/freeling/doc/tagsets/tagset-es.html>.



**Figure 3:** Proportions of the variables ANIMACY OF SUBJECT, ANIMACY OF OBJECT, DEFINITENESS OF SUBJECT, DEFINITENESS OF OBJECT for *-se* and *-ra*. NULL = no subject or object, ABST = for phrases different from NPs that work as the subject or first complement of the verb. DEF and IND are definite and indefinite subject and objects, both for NPs and NPs introduced by prepositions.

there are repeated sentences in the data for the cases where a single sentence contains more than one case of the construction. Figure 6 and 7 shows the distribution of the length of sentence for each form considering only the manually coded cases, including repeated sentences.

Finally, we can have a look at the variable VERB (considering all hits). If we examine the proportions of verbs for each form we can find that, not very surprisingly, *-ra* appears with considerably more verb types than *-se*, but, unexpectedly, *-se* also appears with some verb types that do not appear with *-ra*. The individual lists of unique verbs appearing with either *-se* or *-ra* are shown in Tables 2 and 3 respectively.

A detailed analysis of colllexemes will be presented in section 7, but both these tables already suggest that there are lexical preferences associated with both morphemes. We can see that *deber* ('must'), a modal verb, never appears

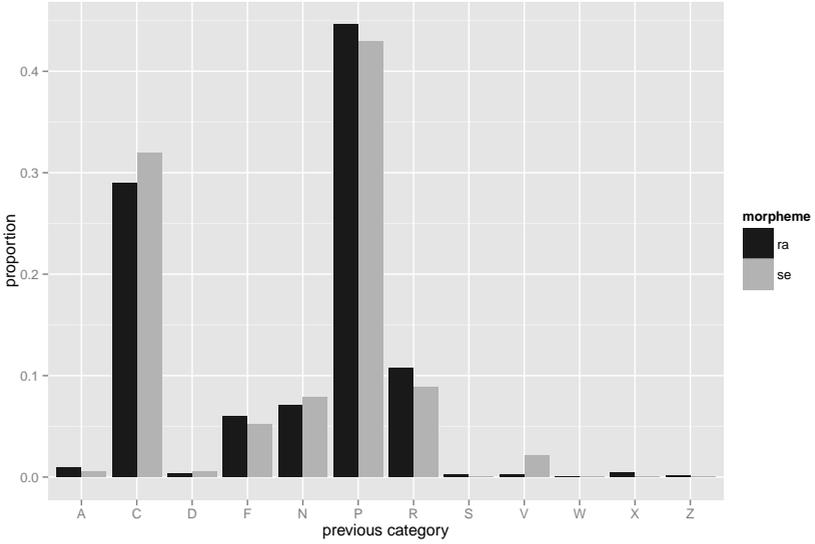


Figure 4: Proportion of preceding grammatical category present for *-se* and *-ra*.

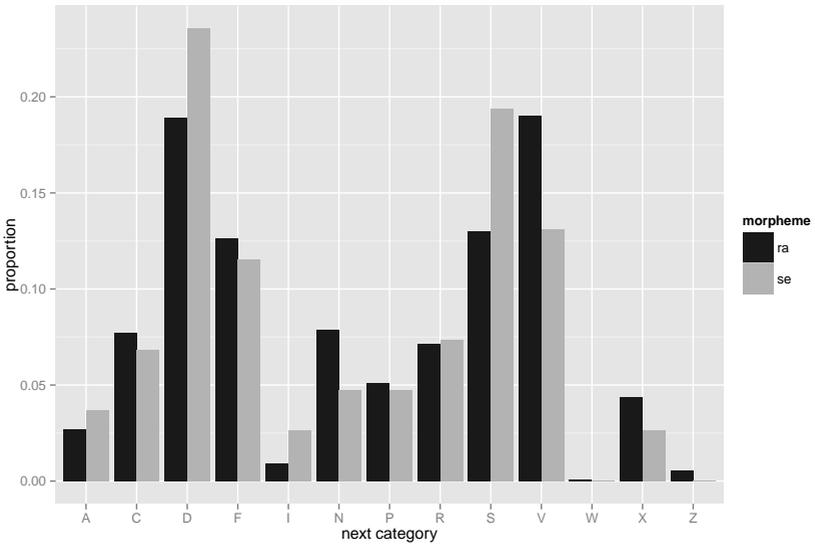


Figure 5: Proportion of next grammatical category present for *-se* and *-ra*.

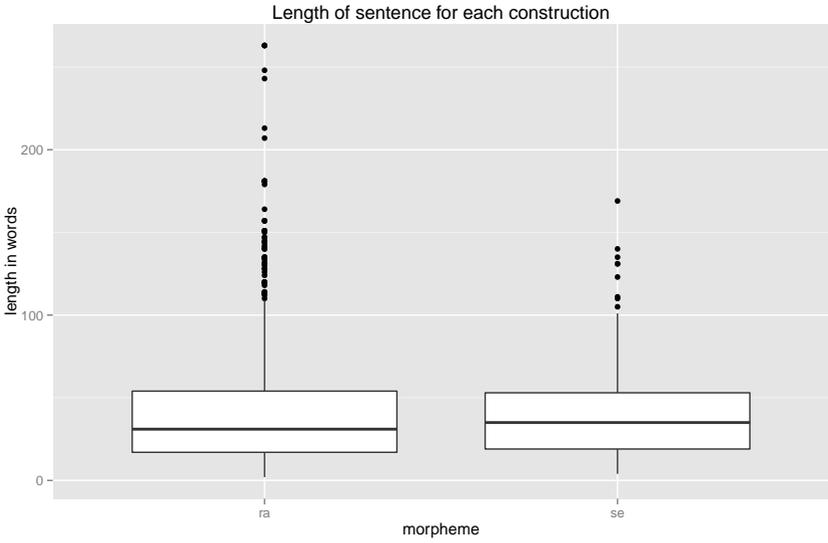


Figure 6: Length of sentence for *-se* and *-ra*.

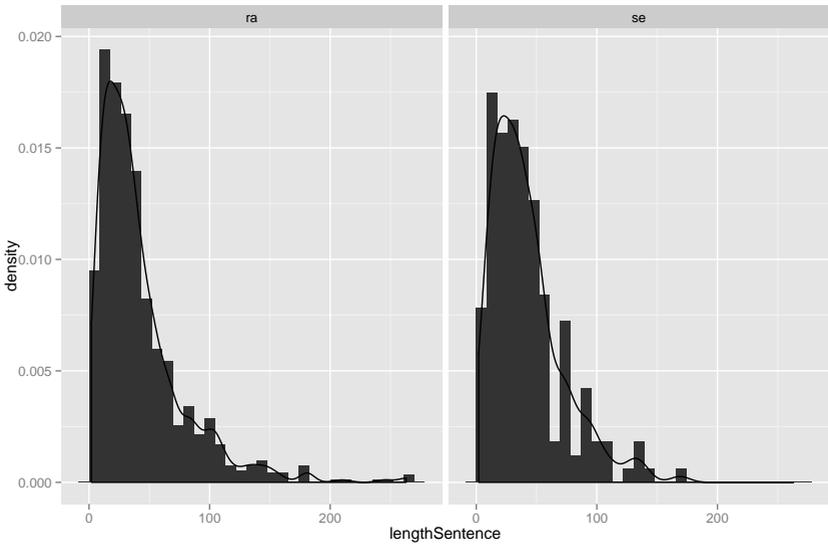


Figure 7: Histogram of length of sentence for *-se* and *-ra*.

Verb	Gloss	Frequency	Proportion
aclarar	clarify	2	0.0104712
desear	wish	2	0.0104712
equivocar	mistake	2	0.0104712
marcar	mark	2	0.0104712
actuar	act	1	0.0052356
adjudicar	adjudicate	1	0.0052356
alcanzar	reach	1	0.0052356
alejar	move away	1	0.0052356
antojar	fancy	1	0.0052356
aplicar	apply	1	0.0052356
aprender	learn	1	0.0052356
aprovechar	take advantage of	1	0.0052356
arrancar	pull out	1	0.0052356
asumir	assume	1	0.0052356
ayudar	help	1	0.0052356
calificar	clarify	1	0.0052356
cifrar	encode	1	0.0052356
compartir	share	1	0.0052356
comprobar	verify	1	0.0052356
concertar	agree on	1	0.0052356
concretar	make concrete	1	0.0052356
considerar	consider	1	0.0052356
creer	believe	1	0.0052356
derrumbar	crumble	1	0.0052356
dirigir	direct	1	0.0052356
encargar	order, ask	1	0.0052356
enfrentar	confront	1	0.0052356
fallar	fail	1	0.0052356
fijar	fix	1	0.0052356
informar	inform	1	0.0052356
jamar	eat	1	0.0052356
lanzar	throw	1	0.0052356
merecer	deserve	1	0.0052356
moderar	moderate	1	0.0052356
molestar	tease, bother	1	0.0052356
penetrar	penetrate	1	0.0052356
precisar	make precise	1	0.0052356
profundizar	go in depth	1	0.0052356
reabrir	reopen	1	0.0052356
realizar	make	1	0.0052356
relajar	relax	1	0.0052356
resolver	resolve	1	0.0052356
retomar	retake	1	0.0052356
sentir	sense	1	0.0052356
suministrar	provide	1	0.0052356
valorar	value	1	0.0052356

**Table 2:** Verbs that appear with *-se* but not with *-ra*

Verb	Gloss	Frequency	Proportion
deber	must	23	0.02133581
conocer	know	7	0.00649351
ocurrir	happen	6	0.00556586
quitar	take away	6	0.00556586
acudir	go to	5	0.00463822
cambiar	change	5	0.00463822
contestar	answer	5	0.00463822
fallecer	die	4	0.00371058
seguir	follow	4	0.00371058
aparecer	appear	3	0.00278293
coger	take, grab	3	0.00278293
comprar	buy	3	0.00278293
dedicar	dedicate	3	0.00278293
desaparecer	disappear	3	0.00278293
explicar	explain	3	0.00278293
funcionar	function	3	0.00278293
jugar	play	3	0.00278293
mover	move	3	0.00278293
pedir	ask for	3	0.00278293
preguntar	ask	3	0.00278293
presentar	present	3	0.00278293
reconocer	recognize	3	0.00278293
usar	use	3	0.00278293
vender	sell	3	0.00278293
abrir	open	2	0.00185529
acercar	move closer	2	0.00185529
arreglar	repair	2	0.00185529
atender	help	2	0.00185529
caber	fit	2	0.00185529
caer	fall	2	0.00185529
comentar	comment	2	0.00185529
comenzar	begin	2	0.00185529
constituir	constitute	2	0.00185529
cuidar	take care of	2	0.00185529
esperar	wait	2	0.00185529
establecer	establish	2	0.00185529
estudiar	study	2	0.00185529
existir	exist	2	0.00185529
financiar	finance	2	0.00185529
leer	read	2	0.00185529
mandar	order, send	2	0.00185529
morir	die	2	0.00185529
nacer	be born	2	0.00185529
notar	notice	2	0.00185529
ofrecer	offer	2	0.00185529
olvidar	forget	2	0.00185529

**Table 3:** Most frequent verbs that appear with *-ra* but not with *-se*

with *-se*, suggesting that modality of the verb might play a role in distinguishing both forms. This is consistent with the proportions of modals we saw before, but the results must be tested for significance.

Just looking at raw frequencies is not enough to determine whether there are significant correlations between these variables and the *-se/-ra* alternation. Statistical testing of each individual variable would also be of little help because this method cannot take into account interactions between the variables, and

multiple testing reduces the reliability of each individual test. To address this problem we now turn to multifactorial methods.

## 6. Multifactorial interactions

The use of multifactorial methods and machine learning algorithms for predicting alternations is a relatively recent development in corpus linguistics that started with studies by Gries (2003) and Bresnan et al. (2007), and these methods are becoming increasingly popular in the field of Cognitive Linguistics and Corpus Linguistics (Janda 2013). In most approaches, researchers try to find the best fit by the backwards elimination of factors based on p-values or AIC scores. Here I take a slightly different approach. The main reason is that the algorithm that I will be using, Naive Discriminative Learning (NDL) does not allow for backward elimination of factors based on p-values or AIC scores, instead of using these method I will focus mostly on the C score of the model for model selection.

### 6.1. Initial considerations

The first issue to be considered regarding regression models is which factors should be included in the initial model. The natural choice are the factors already discussed in the previous section: VERB, PERSON, NUMBER, LENGTH OF SENTENCE, , MODAL, SI, QUE, PRECEDING CATEGORY, NEXT CATEGORY, animacy of the subject (ANSJ) and object (ANOB), definiteness of the subject (DFSJ) and object (DFOB), and the realization of subject (SJ) and object (OB).

The second issue that requires consideration is which kind of model should be fitted to the data. The most widely used machine learning algorithm for the purpose of linguistic data analysis is logistic regression (with and without random effects). Other popular methods include partition trees and random forest. Finally, a new model that has shown very promising results is Naive Discriminative Learning (Baayen 2010, Baayen, Milin, Đurđević, Hendrix and Marelli 2011, Baayen 2011, Baayen, Hendrix and Ramscar 2011, Baayen et al. 2013). The main advantage of the latter model is that it is not based on abstract equations (like logistic regression) or a black box (like Random Forest), but on work on classical conditioning and discriminative learning (Rescorla et al. 1972), which has proven to be an excellent model for animal and human

learning (Miller et al. 1995). In what follows I will use Naive Discriminative Learning for most of the models.

Naive Discriminative Learning is based on the Rescorla-Wagner equations. The basic idea behind this model is that animals learn in a cue-outcome fashion. If a cue is present when an outcome is seen, then the value of that cue (the association between the outcome and the cue) increases; when a cue is absent when an outcome is seen, then the value of that cue decreases. The Rescorla-Wagner equations describe how the association between outcome and cues changes by each observation. The equations that describe the model are as follows:

$$\begin{aligned}\Delta V_x^{n+1} &= \alpha_x \beta (\lambda - V_{tot}) \\ V_{tot} &= V_x^n + \Delta V_x^{n+1}\end{aligned}$$

Where  $\Delta V_x^{n+1}$  is the change in association of X.  $\alpha$  and  $\beta$  are fixed parameters bounded between 0 and 1, usually set at 0.1.  $\lambda$  is a fixed value denoting the maximum association strength for the unconditioned stimulus, usually set at 1.  $V_{tot}$  is the total sum of all association strengths, and  $V_x$  is the current association strength (for a more detailed explanation of how the model works see Baayen 2011).

For model assessment I will mainly use the Area Under the Roc Curve value (C). The C score can go from 0 to 1, with 1 being a perfect model fit, and 0 a perfectly wrong model fit. Models with values from 0.5 to 0.6 are considered to be bad models (they perform no better than chance), those from 0.6 to 0.75 are considered to be decent models, those from 0.75 to 0.9 are considered to be good models, those from 0.9 to 0.97 are considered to be very good models, and those from 0.97 to 1.0 are considered to be excellent models.

## 6.2. Morpho-syntactic and discourse factors

The smallest model that best fits the data has the following formula: morpheme  $\sim$  modal + DfSj + Df0b + sentenceType + lengthSentence + verb (Model A). This formula means that we are taking morpheme as the dependent variable, and the variables after the  $\sim$  as predictors. Other predictors, especially number and person were not significant for the model (i.e. they did not significantly improve the overall C score of the model). The confusion matrix for this model is shown in Table 4. We can see that the model fits the data very well, with very few errors.

Confusion Matrix			
	Prediction		
Reference	ra	se	
ra	160	24	
se	32	151	
Accuracy: 0.8474%			
C score: 0.9174			

Table 4: Confusion Matrix for Model A.

By far, the strongest predictor was VERB, which suggests very strong lexical preferences in the construction. Since section 7 will deal exclusively with the issue of lexical effects, I will not go into a detailed discussion of this predictor here. The best individual predictors for *-ra* and *-se* are given in Figures 8 and 9:

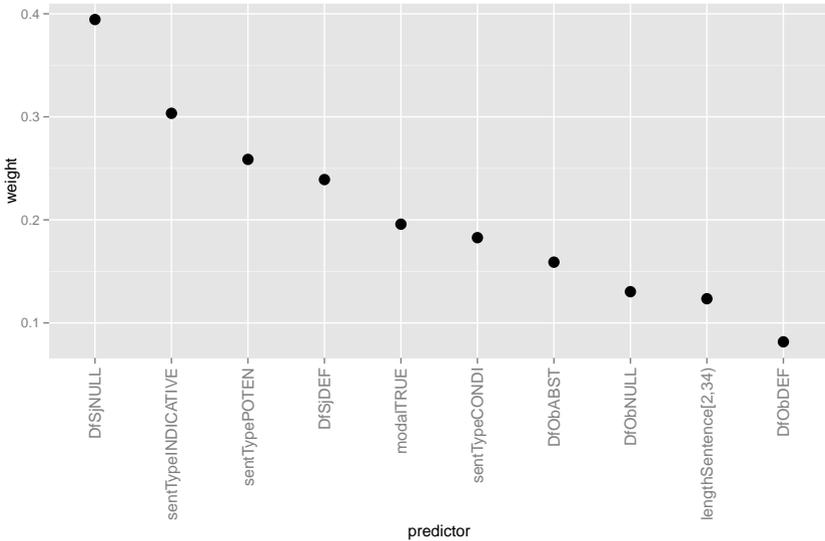


Figure 8: Best 10 predictors for *-ra*

From these figures we can see that most predictors other than VERB are, for the most part, relatively weak. The strongest predictor for both *-se* and *-ra* was DEFINITENESS OF THE SUBJECT, with null subjects predictive of *-ra* and

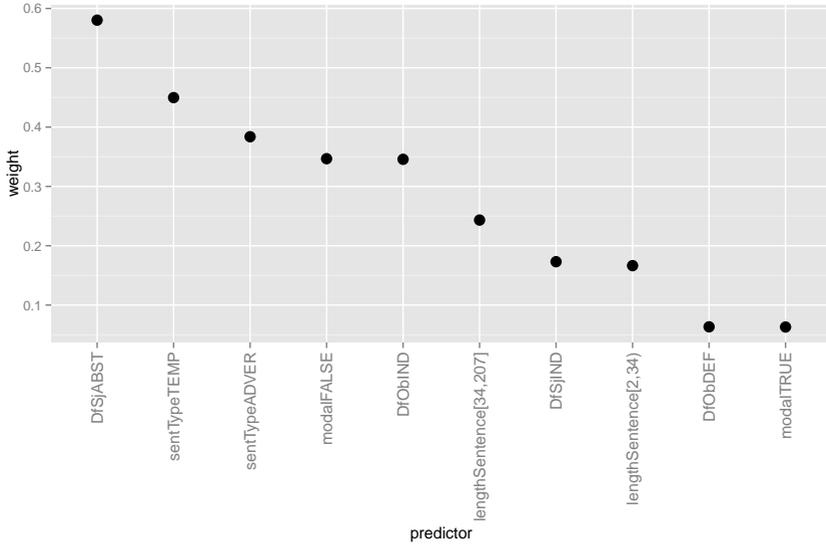


Figure 9: Best 10 predictors for *-se*

abstract subjects (those different from NPs) predictive of *-se*. We see, as second best predictor of both, the type of sentence, with adversatives and temporal sentences predictive of *-se* and indicative and potential sentences predictive of *-ra*. Also interesting is MODAL, which seems to be a moderately strong predictor for *-ra*. This is consistent with the previously observed differences in the use of modals between both forms. Finally *-se* seems to be preferred over *-ra* longer sentences, which might be indicative of discourse issues like formality or type of turn (e.g. monologue vs conversation).

A detailed interpretation for each single level of each predictor is not easy (and because of their low scores not very enlightening), but from this discussion it is clear that the strongest predictors of both *-se* and *-ra* are not grammatical levels on the verb, but elements of discourse and context in the sentence. This contradicts the results by Schwenter (2013).

### 6.3. Model evaluation and overfitting

Although the previous model achieved high accuracy, it is important to evaluate how much the patterns observed are specific to this particular data-set, and

which are more likely to be part of the alternation as a whole. There are two techniques we can use to test this. The first one is bootstrapping the model by splitting the data into training and testing portions, and repeating the process multiple times (30 in this case), and the second one is using machine learning algorithms that are less prone to overfitting<sup>9</sup>. The results from bootstrapping Model A are presented in Table 5.

Confusion Matrix		
	Prediction	
Reference	ra	se
ra	4.97	1.57
se	3.00	3.47
Mean Accuracy: 0.6487%		
Mean C score: 0.7173		

Table 5: Mean Confusion Matrix for bootstrap of Model A.

We can see in Table 5 that there is a significant drop in accuracy and C score, but nevertheless the model seems to retain a predictive capability well above random chance. This gives us some confidence that the model is on the right track, despite not being as powerful as initially thought.

The second technique we can use to evaluate the model is to use Random Forest (Breiman 2001, Liaw and Wiener 2002) which is a lot less prone to overfitting than other classification algorithms because it does splitting of the data during training. Fitting the same model but with a Random Forest classifier we get the results in Table 6.

From Table 6 we can see again that there is a considerable reduction in accuracy, but nonetheless the model still performs above chance. From the results of both evaluations we can conclude that the observed correlations are in fact real, but that the original model is overfitting the data to a certain extent. Also interesting is that if we examine the importance of each predictor as given by Random Forest (Table 7), we get a very similar picture to that in the Naive Discriminative Learning model. The strongest predictors in Random Forest were DEFINITENESS OF SUBJECT and DEFINITENESS OF OBJECT, followed by the

<sup>9</sup>Overfitting means that a model fits a particular data-set very well, but it does not work as well on new data.

Confusion Matrix			
	Prediction		
Reference	ra	se	
ra	134	50	
se	72	111	
Accuracy: 0.6676%			
C score: 0.7239			

Table 6: Confusion Matrix for Random Forest fit of Model A.

verbs *poder*, *querer*, and *cambiar*, and MODAL, which is roughly similar to what we saw with the NDL classifier.

Predictor	-ra	-se	MeanDecrease Accuracy	MeanDecrease Gini
DfOb	12.3634078	18.49193419	19.7888637	10.99018513
DfSj	11.4994495	11.38458302	14.1354551	6.13536258
verb <i>poder</i>	6.7802031	11.81506783	11.9360860	2.91252338
modal	5.2346876	12.49406023	11.7691853	3.92447546
verb <i>querer</i>	6.3810543	11.29882105	10.9612298	3.01719544
sentType	2.9030475	10.98845199	9.5821425	7.45687579
verb <i>cambiar</i>	7.9014889	5.37849872	8.5969787	1.17386609
lengthSentence	7.8189127	5.38468293	8.3552875	12.13443005

Table 7: Best predictors for Random Forest fit of Model A.

We can conclude that although our model is not a perfect fit, there are contextual factors, as well as lexical effects of the verb, that are correlated with the forms in the *-se/-ra* alternation.

## 7. Collostructional analysis

Finally, to investigate in depth the lexical preference of each morpheme I conducted a collostructional analysis (Stefanowitsch and Gries 2003, Gries and Stefanowitsch 2004). The idea behind collostructional analysis is that just as it is possible to measure the strength of attraction between a word and its collocates within a defined span, it is also possible to measure the attraction

between a construction and the lexemes that occur in a fixed structural position of that construction. For this analysis I focused only on the position of the verb (X in the schema presented in (2)) and not on positions in the sentence. I also looked at the whole data-set for this part of the analysis.

### 7.1. Attracted collexemes

First we look at the 20 collexemes that are most strongly attracted to both *-ra* (Table 8) and *-se* (Table 9). The first interesting fact that can be observed is that the top three positions for *-ra* are occupied by verbs that can be typically used as modals: *querer* 'want', *poder* 'can' and *deber* 'must'<sup>10</sup>. In contrast, for *-se* we find that the construction does not attract any of these modal verbs. We can see that the difference in collexemes is quite strong, there is no overlap in these first 20 verbs. Another important point is the strength of attraction. If we compare the strength of attraction of the first three collexemes for *-ra* we can see that it is considerably stronger than all other collexemes for *-ra*, suggesting that these are the most central to the meaning of the construction. Also, if we examine more closely the collexemes for *-se*, we can see that the strength of attraction is quite weak, and that the actual number of cooccurrences of these top 20 collexemes is not greater than three. This suggests that these numbers are more likely due to chance than any actual semantic effect, but because of the sparsity of the data we cannot be sure. We can only be confident that *-ra* strongly attracts modal verbs while *-se* does not show any clear preferences.

### 7.2. Repelled collexemes

We can also take a look at the repelled collexemes, that is, the lexemes that we find with a frequency lower than expected for *-ra* (Table 10) and *-se* (Table 11). The first interesting thing we find is that the verb *ir* 'go' (also as future tense auxiliary: *voy a dormir* 'I am going to sleep') is strongly repelled by *-ra* and it also appears on top (although with a weak effect) for *-se*. The most likely explanation is that the whole abstract construction in (2) is disliked with the periphrastic future form with *ir*. If we examine the eight cases of *ir* that occur with this construction, only three are clearly cases of *ir a* as a future marker,

<sup>10</sup>To be absolutely sure that all cases of *querer* are in fact modal uses, a manual coding of the whole corpus would be necessary, in a random sample of ten sentences containing the verb, only one was not a modal use of it. This not feasible due to the size of the corpus.

N	Verb	Gloss	Co-occurrences	Expected Frequency	Observed Frequency	Fisher's p
1	querer	want	114	12.164734	2375	1.954e-65
2	poder	can	103	25.455981	4781	2.721e-29
3	deber	must	23	4.263007	747	3.091e-10
4	acudir	come to	5	0.323384	59	2.900e-05
5	fallecer	die, perish	4	0.167837	32	4.001e-05
6	ser	be	184	131.988916	26637	7.163e-05
7	contestar	answer	5	0.898289	155	2.523e-03
8	financiar	pay for	2	0.066059	13	2.668e-03
9	quitar	take away	6	1.567549	268	5.826e-03
10	orear	air	1	0.000000	1	5.981e-03
11	transfundir	transfuse	1	0.000000	1	5.981e-03
12	pinchar	poke	2	0.108096	20	6.320e-03
13	usar	use	3	0.419983	73	9.715e-03
14	quedar	remain	13	5.860728	999	1.037e-02
15	aguar	ruin	1	0.006011	2	1.193e-02
16	apalear	beat	1	0.006011	2	1.193e-02
17	desbancar	unseat	1	0.006011	2	1.193e-02
18	desplomar	fall	1	0.006011	2	1.193e-02
19	fusilar	execute, shoot	1	0.006011	2	1.193e-02
20	constituir	constitute	2	0.174155	31	1.481e-02

Table 8: First 20 attracted collexemes for *-ra*.

N	Verb	Gloss	Co-occurrences	Expected Frequency	Observed Frequency	Fisher's p
1	disparar	shoot	2	0.032700	33	0.0005826
2	reabrir	reopen	1	0.000000	1	0.0010649
3	aclarar	clarify	2	0.053797	53	0.0014990
4	antojar	fancy	1	0.001060	2	0.0021286
5	cifrar	encode	1	0.002121	3	0.0031912
6	desear	desire	2	0.088607	86	0.0038838
7	equivocar	mistake	2	0.094936	92	0.0044292
8	escribir	write	3	0.321073	309	0.0045369
9	derrumbar	crumble	1	0.004242	5	0.0053130
10	marcar	mark	2	0.106539	103	0.0055151
11	suministrar	provide	1	0.005302	6	0.0063721
12	concertar	agree on	1	0.006363	7	0.0074302
13	levantar	lift	2	0.129745	125	0.0080112
14	adjudicar	adjudicate	1	0.007423	8	0.0084871
15	retomar	retake	1	0.010604	11	0.0116511
16	estallar	burst	1	0.012725	13	0.0137547
17	profundizar	go in depth	1	0.012725	13	0.0137547
18	concretar	fix, set	1	0.015906	16	0.0169018

Table 9: First 18 attracted collexemes for *-se*.

which suggests that it is in fact the periphrastic future form that is repelled by the construction. It is also interesting that *haber*, which is also used for periphrastic tenses (perfect and pluperfect), is repelled by *-ra*. What both these repelled collexemes suggest is that the whole construction repels periphrastic verb conjugations.

N	Verb	Gloss	Co-occurrences	Expected Frequency	Observed Frequency	Fisher's p
1	ir	go	5	45.435	7592	1.553e-13
2	haber	have (auxiliary)	65	91.692	16283	6.534e-03
3	saber	know	9	19.808	3329	1.141e-02
4	mirar	look	1	6.828	1137	1.802e-02
5	valer	be worth	1	4.604	767	9.957e-02
6	pensar	think	1	4.803	800	1.012e-01
7	decir	say	35	46.022	7941	1.279e-01
8	creer	believe	0	2.340	389	1.827e-01
9	fijar	fix	0	2.581	429	1.926e-01
10	hablar	talk	5	8.707	1459	2.999e-01
11	vivir	live	1	2.939	490	3.808e-01
12	encontrar	find	1	3.144	524	3.854e-01
13	entender	understand	1	2.807	468	5.372e-01
14	empezar	begin	2	3.483	582	5.936e-01
15	ver	see	21	24.175	4119	6.051e-01
16	considerar	consider	0	1.029	171	6.310e-01
17	realizar	make, do	0	1.077	179	6.318e-01
18	llegar	arrive	4	5.946	996	6.753e-01
19	intentar	try	1	2.038	340	7.283e-01
20	producir	produce	1	2.086	348	7.287e-01

Table 10: First 20 repelled collexemes for *-ra*.

Another apparent pattern we can find for *-ra* is that quite a few of the repelled verbs are expression verbs or psychological verbs: *saber*, *pensar*, *creer*, *decir*, *hablar*, *entender*, *considerar*. One possible explanation for these anti-collocations is that the construction simply repels the semantic field of expression and know/think verbs. It is, however, not clear at all why this should be the case. A different possibility is that verbs like *decir*, *creer* and *pensar* are often associated with subjectivity or evidentiality in the sentence, and the actual effect is not so much by the semantic field of these verbs but by the modality usually expressed by these kind of verbs. With the current data it is not possible to distinguish between these two explanations.

For *-se* there are no repelled lexemes that reach significance ( $p < 0.05$ ). In this cases *ir* is probably related to the same issues discussed for *-ra*, but an

N	Verb	Gloss	Co-occurrences	Expected Frequency	Observed Frequency	Fisher's p
1	ir	go	3	7.962829	7592	0.09562
2	hacer	do, make	2	5.840652	5539	0.13556
3	saber	know	1	3.529083	3329	0.27326
4	decir	say	5	8.238338	7941	0.36601
5	querer	want	1	2.517441	2375	0.52673
6	dar	give	1	2.532287	2389	0.52687
7	mirar	look	0	1.212045	1137	0.63769
8	ver	see	3	4.318752	4119	0.80445
9	ampliar	expand	0	0.026650	25	1.00000
10	cocinar	cook	0	0.026650	25	1.00000
11	comer	eat	0	0.321933	302	1.00000
12	comercializar	commercialize	0	0.008528	8	1.00000
13	comprar	buy	0	0.495691	465	1.00000
14	conocer	know	0	0.652394	612	1.00000
15	depender	depend	0	0.178022	167	1.00000
16	derivar	derive	0	0.027716	26	1.00000
17	distribuir	distribute	0	0.027716	26	1.00000
18	echar	throw out	0	0.272897	256	1.00000
19	enchufar	plug in	0	0.013858	13	1.00000
20	escoger	pick	0	0.027716	26	1.00000

Table 11: First 20 repelled collexemes for *-se*.

interpretation for *hacer* is less clear. The fact that all p-values are too large, and that the difference between observed co-occurrence and expected co-occurrence is too small means that it is quite possible that the distribution of most lexemes presented in Table 11 is a product of chance alone. However, we find some interesting overlap with the lexemes repelled by *-ra*: *ir*, *saber*, *mirar*, *ver* and *decir*. This suggests that the construction as a whole, independently of whether it is instantiated as *-se* or *-ra*, has lexical dispreferences regarding these verbs. More interesting yet is that we also find some overlap with the collexemes attracted by *-ra* and repelled by *-se*, namely *querer*. This indicates, not only very strong lexical preferences by both forms, but distinctive lexical preferences.

### 7.3. Contrastive collexemes

We can also contrast the collexemes for *-se* and *-ra* by evaluating whether the proportion observed for each verb for each form is likely due to chance as it would be expected from the proportion of both constructions, or if there is likely to be a preference. This method is simply testing the null hypothesis that the distribution of each verb would be the same for both forms if there were no

lexical preference. Using Fisher's exact test we can test the difference of each proportion and then rank them accordingly. The ten most distinct collexemes are shown in Table 12.

N	Verb	Gloss	-ra	-se	Global Observed Frequency	Fisher's p
1	querer	want	114	1	2375	0.0000006745
2	poder	can	103	6	4781	0.0040894370
3	pensar	think	1	3	800	0.0123960420
4	llegar	arrive	4	4	996	0.0223242134
5	aclarar	clarify	0	2	53	0.0229566898
6	desear	desire	0	2	86	0.0229566898
7	equivocar	mistake	0	2	92	0.0229566898
8	marcar	mark	0	2	103	0.0229566898
9	deber	must	23	0	747	0.0375682154
10	escribir	write	3	3	309	0.0487333244

Table 12: Contrastive collexemes for *-se* and *-ra*.

This table supports what we had already observed from the collostructional analysis, namely that *querer*, *poder* and *deber* are strong indicators for *-ra*, but it also tells us that the other seven verbs are all tipped in favour of *-se*. We see that some of the verbs that we already saw in the top 20 collexemes for *-se* appear here, namely *aclarar*, *desear*, *equivocar*, *marcar* and *escribir*, and we also see *llegar*, which was in the list for repelled collexemes for *-ra*. Because *-se* is a lot less frequent than *-ra* we would not expect to see verbs like *llegar* or *escribir* occurring with the same frequency with *-se* and *-ra*, and we would definitely not expect to see verbs like *pensar* being more frequent with *-se* than with *-ra*. This converging evidence strongly indicates again that there are clear and distinctive lexical preferences that distinguish *-se* from *-ra*, even though it is not clear what the criteria are behind the collexemes attracted to *-se*.

## 8. Discussion

As we saw, the Naive Discriminative Learning model showed that some discourse and context factors are weakly but significantly correlated with the *-se/-ra* alternation, while the core grammatical factors NUMBER and PERSON are not. These effects remained present and significant after controlling for overfitting. The model also presented evidence for strong lexical effects, both in

the lexical choices of individual verbs, as well as the overall preference of *-ra* for modal verbs.

From the collostructional analysis we can conclude that the construction has strong lexical effects. The strongest effect we found was that the form *-ra* attracts modal verbs but *-se* does not, and even possibly repels them. We can also be confident that the general construction repels the verb *ir* ('go'), most likely because it repels constructions with the periphrastic future tense, and possible other periphrastic constructions with *haber* ('have'). Finally, we also saw that the two verbs that most differentiate both constructions are *querer* ('want') and *poder* ('can'). All these facts very strongly support the case for discourse difference between both forms, but also for some discourse similarities.

These results are very relevant for the constructional analysis proposed for this alternation. Because the model only reached a moderate accuracy, and this accuracy dropped significantly in cross-validation and with Random Forest, we can conclude that there is in fact a very close relation between both forms, and speakers do use them interchangeably to a large extent. Especially interesting is that neither NUMBER nor PERSON helped distinguish between both forms. This can be understood withing the proposed framework of construction grammar if we allow the activation of these factors to occur at the level of the more general construction (2), while the activation of the lexical items and discourse factors are closer to the activation of one of the concrete schemas in (3). We can then propose an updated and more detailed representation of these constructions in (4) and (5):

- (4)  $[[X_{vi}] -Y_{se/ra} [\text{PERSON}] [\text{NUMBER}]]_v \leftrightarrow [\text{SEM}_i \text{ in imperfect tense subjunctive} + \text{PRAG}_1]$

Based on the results of the models we can propose that the NUMBER and PERSON constructions are instantiated on the abstract construction in (4). This means that at the level of (4) both NUMBER and PERSON are free slots in the constructions. The more specific constructions for *-se* and *-ra* would be the following:

- (5) a.  $[A_{vi(j)} -ra_j + \text{PERSON/NUMBER}]_v \leftrightarrow [\text{SEM}_i \text{ in imperfect tense subjunctive} + \text{PRAG}_1 + \text{PRAG}_j]$   
 b.  $[B_{vi(k)} -se_k + \text{PERSON/NUMBER}]_v \leftrightarrow [\text{SEM}_i \text{ in imperfect tense subjunctive} + \text{PRAG}_1 + \text{PRAG}_k]$

Where A and B stand for concrete lexical choices (not free slots as before) that are partially linked to the specific form *-se* or *-ra* (this represents the lexical preferences of *-se* and *-ra*). PRAG<sub>k</sub> and PRAG<sub>j</sub> are elements of discourse related to the complements of the verb and possibly the type of sentence where the subjunctive appeared. At this level both PERSON and NUMBER are not free slots, but are inherited from the more abstract construction in (4) (and the individual constructions for number and person). For PRAG<sub>1</sub>, discourse preferences common to both forms, it was not possible to find any direct associations. Nevertheless, some features like the dispreference of some periphrastic constructions by both forms, and the fact that conditional sentences are used equally for both forms, can be seen as common elements of *-se* and *-ra*. Understanding how definiteness of the object and subject play a role is less straightforward, and more work is required. It is possible that this variable is only acting as proxy for some semantic effect.

Independently of whether this specific analysis is correct, the results of the models and the collostructional analysis are empirical evidence that lend some support of a constructional approach to verbal inflection where grammatical constructions combine with lexical constructions to produce conjugated verbs. We need a constructional view because the schema that produces the imperfect subjunctive is not only associated with a specific grammatical meaning, but it also exhibits very complex distributional patterns that need to be represented and associated with it. The emergence of these patterns can only be explained from a usage-based perspective where each exemplar counts, and each exemplar can be richly represented including the context it appeared in.

## 9. Final considerations

The main result of this study is that the *-se/-ra* alternation is not completely unpredictable from the morpho-syntactic and discourse context, and that the null hypothesis is most likely wrong. However, it must be emphasized that the models presented only show the existence of correlations between the predictors and the response variable, and that this does not imply causation. Since we do not have a good understanding of how speakers actually plan and produce sentences, how they choose what to say and how to say it, it is not possible to give a detailed account of exactly what these correlations mean,

or how they actually work in production. In order to explore these issues an actual implementation in Fluid Construction Grammar would be necessary.

It must be noted that there is no ‘native’ implementation of stochastic processes in construction grammar. However, cognitive versions of construction grammar assume that domain general cognitive processes are responsible for, and interact with, constructions. This means that an NDL mechanism could be part of the whole system and operate at the different levels of granularity and abstractness (here lies the advantage of NDL over many other machine learning algorithms).

An issue that is always present when modelling alternations in language is that it is not possible to know beforehand how much variability we should be able to account for with our models, and how much variability should not be possible to model (it is likely that a degree of variation is just probability matching Kapatsinski 2010, 2014). We do not know a priori how much freedom speakers actually have when they choose one form or the other, and how much is determined by context. This means that it is in principle impossible to ever know whether the statistical model we chose reached ceiling or whether there are other still unknown predictors that, if included, would increase model performance. All we can say for certain is that the use of *-se* and *-ra* is not completely random, and that there are at least some real correlations with the factors mentioned.

Old issues that appeared to have been settled with the use of traditional linguistic methods have to be looked at again in the light of new statistical and corpus linguistic techniques. By doing so, we will either have even stronger evidence for the validity conclusions, or we will have gained much more interesting insights into these phenomena.

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# Morphological perspectives on the Georgian verb

Maël Gautier

## Abstract

This paper explores in detail Georgian verbal agreement/tense morphology and aims at uncovering regularities and natural classes in this paradigm, using in turn the tools of Distributed Morphology and Channel Theory, or artificial learning. After reviewing part of the morphological literature on the topic of affix blocking in transitive verbs in the present, I turn to a decomposition of all non-perfect person/tense combinations. I offer a preliminary analysis in the Distributed Morphology framework, allowing to establish meaning-form regularities in the paradigm. Admitting difficulties linked to the latter framework (many operations are needed and seem to be ad hoc), I turn to a Channel (or Accessibility-based) analysis that does away with these operations. It is not evident that the latter account is radically superior, though, since many manipulations not mentioned in Keine's (2012) seminal paper seem to be necessary in this special case, calling for an extension/discussion of this model. The last part deals with a different approach, that of inflectional learning, where affixes are selected by an artificial learner in a serialist optimality setting. The latter approach reveals interesting findings, notably with regard to a form-meaning pair not previously considered as forming a natural class, namely the -s suffix of Georgian found not only in the third singular, but also the third plural.

## 1. Introduction

In this paper I provide a comparison of several accounts by examining their capacity to explain morphological exponence of Georgian verbs conjugated in some of the language's most common tenses, roughly the non-perfect ones. The central phenomena here form a superset of the data analyzed in previous accounts, which are either morphology-oriented (e.g. Anderson 1986, 1992, Carmack 1997, Stump 2001, Halle, Morris and Alec Marantz 1993) or syntax-oriented (Béjar 2003, Lomashvili 2011). Generally, the questions raised by these data amount to (sometimes sophisticated, as in Carmack 1997 or Béjar 2011) analyses aimed at providing well-grounded reasons for the behavior of Georgian plural suffixes, i.e. why a third person plural subject argument (suffix

-en) is enforced to the detriment of the object's plurality (suffix *-t*), and why the latter is realized to the detriment of third person singular subject (suffix *-s*). Another question often raised in these accounts is why the prefix (or clitic) corresponding to a second person object (*g-*) systematically takes precedence over a first person subject's one (*v-*).

There I take up these issues to show some of the morphologically-oriented means that have been devised, i.e. the original Halle, Morris and Alec Marantz (1993) approach and the Extended Word and Paradigm approach of Anderson (1986, 1992), and I quickly review their results as far as Georgian is concerned. I further aim at giving an account of each Georgian verbal affix in several tense-aspect-mood combinations. In section 2 I offer an analysis fully in line with Halle, Morris and Alec Marantz's (1993) Distributed Morphology approach, with the addition of a set of data interacting with the previous smaller set.

In section 3 I contend that the relatively high number of morphological (known as postsyntactic) operations needed in Distributed Morphology (Vocabulary Insertion, Fusion, Fission, Impoverishment, Readjustment) renders worthwhile exploration of an alternative approach, the Accessibility-based theory developed in Keine (2012), which explicitly argues against such a variety of operations. The exact same set of data receives a slightly different segmentation and is not subject to as many operations as in Distributed Morphology, but nevertheless turns out to be particularly hard to handle with regard to the treatment of features and position classes.

Section 4, on inflectional learning (Bank and Trommer 2012), tackles higher-level analysis possibilities, whereby artificial creation of affix sets is more central than inter-affix relationships and, e.g. blocking. This optimality-based, serialist approach, gives insight into the role of constraint rankings, for a given language, in selecting affix hypotheses by checking their numerical accuracy with regard to their distribution in a whole paradigm.

Overall, it will be seen that neither of the two morphological analyses fares perfectly well with this set of data, either because of many operations that are often criticized and considered as ad hoc devices (Distributed Morphology), or because of a high number of diverse manipulations on features and position classes (Accessibility). The learning approach has a different status in that it has to occur before any morphological analysis proper; no special criticism is offered, since it is essentially a means of constituting affix sets which are themselves the matter onto which analyses are performed, i.e. the affix sets

are potential inputs to virtually any morphological analysis in the sense of Distributed Morphology or Accessibility.

## 2. Georgian verbal agreement

One often studied aspect of the language is its verbal agreement morphology. Purely morphological analyses are among others Anderson (1986) and Halle, Morris and Alec Marantz (1993). The central data in these accounts are represented by the pattern of regular transitive verb forms in the present tense<sup>1</sup> including both subject and object markers. The paradigm is shown in table 1. The fact noted in the cited approaches is known as blocking: in some places, markers that are expected do not show up. This is the case in:

- the forms with first person subject and second person objects, where the first person subject prefix *v-*, which is seen with a 3 object, fails to co-occur with the second person object prefix *g-*
- the forms with 3sg subject and 2pl object, where the 3sg subject suffix *-s* is overridden by the plural suffix *-t* (in this case marking plural of the 2 object)
- the forms with 3pl subject and 2pl object, where the same suffix *-t* fails to co-occur with the 3pl subject suffix *-en*

In this section, I first briefly review the approaches by Anderson (1986) and Halle, Morris and Alec Marantz (1993). It will be seen that the latter, morphemic approach, allows to derive the blocking effects more explicitly than the former.<sup>2</sup> Then I present a larger set of verbal forms that have not been systematically studied before (transitive verbs in five screeves). To conclude, I will propose a morphemic analysis of this data.

### 2.1. Previous analyses

Anderson (1986) developed a word-based model of affixation where the traditional notion of a meaningful inflectional morpheme is rejected and a system of

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<sup>1</sup>Or present *screeve*, as tense-aspect-mood (TAM) paradigms are called in the traditional literature.

<sup>2</sup>Although for this it is necessary to accept a set of operations not postulated in Anderson's (1986) work.

## PRESENT

	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...	v-...		g-...-t	v-...
2sg	m-...		...	gv-...		...
3sg	m-...-s	g-...-s	...-s	gv-...-s	g-...-t	...-s
1pl		g-...-t	v-...-t		g-...-t	v-...-t
2pl	m-...-t		...-t	gv-...-t		...-t
3pl	m-...-en	g-...-en	...-en	gv-...-en	g-...-en	...-en

Table 1: *Georgian transitive verb (present)*

interacting rules is preferred. These *Word-formation rules* (WFRs) are organized in blocks so as to correspond to position classes, i.e., each block of rules can be seen as adding material at a specific location in a word-form, which does not exclude application of rules from other blocks. Inside each block, rules apply disjunctively: an applicable rule more specific than another one applies and prevents application of the latter. I summarize below how Anderson's (1986) approach captures the mentioned cases of blocking.

***v-/g- competition:*** Both prefixes belong to the same rule block. *g-* is specified as  $[[..+2..]]^3$  and *v-* as  $[+1..]$ . It is not clear here how the specificity effect could arise; rather, it is an instance of the stipulated ordering Anderson assumes. It is simply stated that in the prefix list, *g-* must precede *v-*, since only this can yield the attested result.

***-t/-s and -en/-t competition:*** Again, a rule block is established for suffixes. An ordering suggested by the facts would be *-en* > *-t* > *-s*. This is precisely how the list is ordered in Anderson (1986). The relative order of *-t* and *-en* is given by specificity, since both realize third person, but the latter realizes a plural feature in addition. However, that *-t* is located in the middle of the list is again stipulated, since it realizes only plural and isn't more specific than *-s*.

In the syntax-based realizational model of Distributed Morphology (Halle, Morris and Alec Marantz 1993), fully specified syntactic positions (*morphemes*) are the target of vocabulary insertion, which provides them with a phonological form. The Vocabulary Items are pairs of such a phonological string and a

<sup>3</sup>In Anderson (1986), embedding in such morphological structures stands for subject-ness/objectness: here the features +2 have two levels of embedding, meaning that they signal the object.

possibly underspecified morphosyntactic specification. The basic requirement for insertion is that the items' features have to be non-distinct from that of the morpheme. Also, of two items competing for insertion, the most specific one is the one which is inserted, i.e. the one with more features to realize. The framework also makes use of four distinct operations that all find an illustration in this Georgian excerpt.

***v-/g- competition:*** In presence of a first person subject and a second person object, the syntactic features of both these arguments are each dominated by a pronominal clitic head. What prevents insertion of both prefixes is *fusion*, which gathers the features of two heads under only one head. Once this is done, and since vocabulary insertion occurs only once for a given head, a unique exponent can be inserted. *v-* expressing solely (first) person, and *g-* bearing a case feature in addition to its person feature – 2, ACC –, the latter systematically wins the competition.

***-t/-s and -en/-t competition:*** *-t* is a plural suffix reserved for first and second person arguments, but the latter are typically realized in prefix position. It is taken for granted that the plural feature of such arguments (except 1pl object) is generated there, and relocated in the suffix position through the operation of *fission*. Once this is done, the feature may interact with other features in postverbal position. Blocking of *-s* by *-t* is due to a *readjustment* rule which deletes the segment /s/ if followed by a plural feature. Blocking of *-t* by *-en* is due to an *impoverishment* rule which deletes the plural feature whenever preceded by the features 3 and pl.

From what precedes, Distributed Morphology fares better when it comes to explaining such blocking effects: in one case the principle of specificity is respected (contrary to Anderson 1986), and in the other the effect can be derived by means of special operations not available to Anderson (1986). I now turn to an extended set of data, adopting the analysis developed in Halle, Morris and Alec Marantz (1993).

## 2.2. Screeves in Distributed Morphology

In the descriptive and/or traditional literature (e.g. Tschenkéli 1958), the total number of screeves is eleven. They are grouped into a super-category *series*, of which there are three. Series I has six screeves and is traditionally called *present series*, although it also includes three future screeves; Series II has two screeves, which are characterized by perfectivity; Series III has three screeves and is

[-Pa]	[+Pa]	[-Pa]	[+Pa]	[-Pa]
[-P]	[-P]	[-P]	[+P]	[+P]
[-S]	[-S]	[+S]	[-S]	[+S]
<i>present</i>	<i>imperfect</i>	<i>subjunctive</i>	<i>aurist</i>	<i>optative</i>

Table 2: Feature specification of the five screeves

called the *perfect series*. The latter series exhibits the property of inversion for transitive (and unergative) verbs: verbal agreement and case-marking are subject to a redistribution whereby subjects are marked as indirect objects and direct objects as subjects. Since these changes are not directly relevant to the kind of morphological explanation I am pursuing here, I restrict myself to Series I and II.

As indicated, I tentatively take for granted the Distributed Morphology analysis exposed so far. That is, I assume the same as Halle, Morris and Alec Marantz (1993) about the prefixes (as pronominal clitics) and the suffixes *-s*, *-t* and *-en* (and its past aorist counterpart *-es*). This decision has direct descriptive consequences: the amount of data to analyze will be reduced in that the difference is abolished:

- between first and second person, since they never differ by anything else than the prefix
- between 1/2 sg/pl, since the plural suffix in these cases is normally *-t* (except in the case of a 1pl object, which calls for a specific *prefix*)

Only three distinct person/number (PN) combinations are then needed. These are all concerned with the specifications of the subject, since the only possible object affixes are *g-*, *m-*, *gv-*, as well as *-t*, have already been accounted for; moreover, the only subject prefix, *v-*, is the only difference between first and second person in all circumstances and thus doesn't need to be taken into account here. The relevant combinations are the following: 1/2 sg/pl, 3sg and 3pl.

As for the TAM component of the conjugation patterns, choosing Series I and Series II should lead to analyze eight paradigms, but examining Series I, it is clear that its future subpart is a morphological by-product of the present

	present [-Pa-P-S]	imperfect [+Pa-P-S]	subjunct. [-Pa-P+S]	aorist [+Pa+P-S]	optative [-Pa+P+S]
2sg	c'ér	c'érd-i	c'érd-e	c'ér-e	c'ér-o
3sg	c'ér-s	c'érd-a	c'érd-e-s	c'ér-a	c'ér-o-s
3pl	c'ér-en	c'érd-nen	c'érd-nen	c'ér-es	c'ér-o-n

Table 3: TAM/PN exponence with the verb *c'era* 'write'

subpart.<sup>4</sup> Thus the future tense is not taken into account for the morphological analysis, which reduces the number of screeves to five. The total number of forms is then 15 (3 PN combinations × 5 screeves). The next move is to attribute featural content to the screeves. I assume three binary features [ $\pm$ (Pa)st], [ $\pm$ (P)erfect] and [ $\pm$ (S)ubjunctive]. Table 2 represents all relevant screeves with their TAM-feature specifications. It can be seen that the most prominent natural classes revolve around the P(erfect) feature, since all screeves of the so-called *present* series (I) are -P while the two screeves of series II are +P. Table 3 represents the surface forms corresponding to these PN/TAM combinations with the regular verb *c'era*, “write”.<sup>5</sup> I also assume that two positions can follow the verb stem; this is suggested by the possibility of, e.g., either *-o* alone (optative), or *-s* alone (3sg present and subjunctive), or *-o-s* (3sg optative). Thus a position 1 is dedicated primarily to TAM features, while a position 2 is dedicated primarily to PN features (in fact 3sg/pl features).

The issue is to attribute a feature content to the affixes of the paradigm. Interesting characteristics are: 2sg imperfect *-i* stands isolated and has as a 3sg counterpart *-a*, which also appears in the aorist; the 2sg counterpart of 3sg *-a* in the aorist, however, is not *-i*, but *-e*, which also marks 2sg *and* 3sg in the subjunctive; 3sg *-s* is in complementary distribution with *-a*, but not with *-e* or *-o*; 3pl present *-en* seems to carry over to the other imperfective columns, but with an added segment: *-nen*, and appears as simple *-n* after optative *-o*; the latter appears to have the fullest distribution among the TAM affixes.

This pattern can be captured by positing two lists of vocabulary items, as in

<sup>4</sup>It differs only by the addition of a preverb.

<sup>5</sup>The 3pl pattern seems to be the most involved one with many /n/'s and an aorist /es/ reminiscent of 3sg subjunctive /-e-s/. The choice of segmentation, here plain *-es*, is a tentative one and could have been *-e-s* under different assumptions.

(1) and (2). Subscripts correspond to position 1 or 2 and serve for the indication of contexts. The two readjustment rules in (3) are dedicated to the 3pl affix /-n/.

(1) **TAM-position**

- a. [+P+S] ↔ /-o/
- b. [+Pa+P] ↔ /-e<sub>1</sub>/ / \_\_\_\_[-3]<sub>P2</sub>
- c. [+Pa-P] ↔ /-i/ / \_\_\_\_[-3]<sub>P2</sub>
- d. [-Pa-S] ↔ ∅
- e. [+Pa] ↔ /-a/ / \_\_\_\_ [+3-pl]<sub>P2</sub>
- f. ↔ ∅ / \_\_\_\_ [+3+pl]<sub>P2</sub>
- g. [+S] ↔ /-e<sub>2</sub>/

(2) **P/N-position**

- a. [+3-pl] ↔ /-s/ / [-Pa]<sub>P1</sub> \_\_\_\_
- b. [+3+pl] ↔ /-es/ / [+Pa+P]<sub>P1</sub> \_\_\_\_
- c. [+3+pl] ↔ /-n/

(3) **/-n/-readjustment**

- a. ∅ → /<e>n/ / <[[-Pa], [-P], [-S]]<sub>P1</sub>> \_\_\_\_ [[3],[pl]]<sub>P2</sub>
- b. ∅ → /<ne>n/ / <[[+Pa], [-P]]<sub>P1</sub>> \_\_\_\_ [[3],[pl]]<sub>P2</sub> ∨  
/ <[[-P], [+S]]<sub>P1</sub>> \_\_\_\_ [[3],[pl]]<sub>P2</sub>

This approach effectively accounts for the distribution of the affixes. Note that, in the TAM position, the first four VIs need not be ordered as they are featurally divergent. To avoid the insertion of any element in the 3pl TAM position apart from optative /-o/, an empty element is extrinsically ordered before the subjunctive affix /-e<sub>2</sub>/. Two /-e/ VIs are posited since they appear in featurally disjoint environments. Context features crucially restrict the distribution of affixes in both sets. Thus, for instance, the generalization that 3sg -s only ever surfaces in the present, the subjunctive and the optative is captured by its contextual feature [-Pa], which makes reference to the adjacent TAM position, and the two [+Pa] items /-e<sub>1</sub>/ and /-i/ are banned from third person contexts. The surface variation of 3pl -n is captured by two readjustment rules which extend the affix by one (→ -en) or two (→ -nen) segments in the relevant contexts (present and imperfective paradigms).

Let's recall that the above analysis is performed on a subpart of the general paradigm, since I adopt Halle, Morris and Alec Marantz's (1993) analysis of the prefixes and plural -t. If both analyses are to be integrated in this way, then, again, the operations of fusion, fission, readjustment and impoverishment have

to be adopted, too. A number of objections, be they linked to Halle, Morris and Alec Marantz's (1993) analysis or to the present one, can be raised with regard to the machinery needed. First there is the need for some empty elements, as materialized in (1) by the present marker and the marker with a 3pl contextual feature. Such devices are driven only by the necessity of blocking some other affix. The case of the present zero affix doesn't seem to be too problematic if it can be seen that the present tense is effectively an unmarked one where absence of a marker is in complementary distribution with presence of a marker in other tenses. But, second, whereas acceptance of this marker might be helped by the fact that it realizes a characteristic set of features ( $-P-S$ ), this is not the case with the other empty element. Namely, the latter does not realize any features – it simply says that the TAM position may not be filled in a given context. This is because it is impossible to write a TAM entry with 3pl substantial features. Moreover, and this is the third point, the fact that this blocking zero affix has to be extrinsically ordered before another affix ( $/-e/$ ) is not warranted in a system whose explicit goal is to rely fully on specificity. It is not clear how this important issue could be solved. Finally, concerning the 3pl marker proper, the use of readjustment to account for its different shapes (provided it is one affix), has the flavour of a set of ad hoc rules, since apparently arbitrary phonological modifications are modelled as the direct consequence of some morphosyntactic features' presence<sup>6</sup>. In addition, as this account of the distribution of *-nen* is based on the featural specifications  $[+Pa-P-S]$  (imperfect) and  $[-Pa-P+S]$  (subjunctive), it faces the problem of the disjunction seen in (3-b), specifying that the rule has to apply to divergent feature sets.

Overall, then, the present DM analysis has some shortcomings which, albeit not fatal (a weakened version of the theory emerges from allowing specificity and extrinsic ordering to be intermingled, from allowing disjunctive rules etc.), call for a theoretical cross-comparison. The next section is devoted to an analysis of the same data in an *accessibility-based* framework (Keine 2012).

### 3. An accessibility-based analysis of Georgian

The accessibility-based framework developed in Keine (2012) (also known as Channel Theory) is distinct from Distributed Morphology in an important

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<sup>6</sup>It is not obvious that listing three different affixes ( $/-n/$ ,  $/-en/$  and  $/-nen/$ ) would be a less arbitrary option, though.

respect: it seeks to do away with the assumption that the operation of vocabulary insertion is only conditioned by the morphosyntactic features of exponents. The argument is based on apparent morphology-syntax mismatches that come about whenever some exponent is inserted in an environment with a conflicting feature specification. Classically, such cases are treated by resorting to postsyntactic operations (e.g. impoverishment, feature-changing, enrichment). Since Keine (2012) argues against the multiplication of such operations, a system is developed there to dispense with them.

The system relies on pairwise accessibility relations holding among exponents of a language. This kind of relation is formulated in the following statement: “The exponent chosen at step  $n$  affects the set of exponents competing for insertion at step  $n + 1$ ”. Thus, informally, markers select which other markers can be inserted after them. The set of these relations is one of the two idiosyncratic sets relevant for a given language – the other one being the set of exponents. The insertion algorithm postulated here makes use of the notion of *state*: the derivation of morphological forms goes through successive states, starting with an initial state. Each state is conceived of as a triple: an exponent, a set of morphosyntactic features, and a set of phonological features. The initial state (represented as  $\emptyset$ ) is the location of root insertion, where no exponent is present, but two fully specified sets of features are present as in Distributed Morphology.

Successive insertion of exponents is as a sequence of transitions. A transition from one state to the following is one where insertion of an exponent subtracts morphosyntactic features from the corresponding set of the former state and adds phonological feature to its corresponding representation. For a transition to be well-formed, the exponent of state  $n+1$  has to: be accessible from the exponent of state  $n$  (“exp.1  $\rightarrow$  exp.2”); the morphosyntactic features of the exponent to be inserted have to be a subset of those of the relevant state (Subset Principle); among the accessible exponents, the most specific one is inserted (Specificity).

The relevant version of Specificity assumed in the system not only makes reference to the number of features that the exponents possess, it also makes reference to classes of features. The set of classes is a hierarchical object to be defined on a language-specific basis. The impact this has on the specificity of individual exponents, informally, is that, of two exponents with the same number of features of class  $F$ , the one that possesses more features from a higher-ranked class  $G$  is more specific (Müller 2004).

Another crucial assumption is that once features have been discharged by insertion, they become unretrievable (the Strict Feature Discharge Theorem). In this way, it is impossible for the morphosyntactic specification of an exponent to make reference to features that have previously been deleted by insertion of another marker. Finally, the system does not make use of contextual features: if features are mentioned in the specification of an exponent, they automatically discharge the corresponding features of the state – the latter cannot remain unaffected, as would be the case for contextual features.

### 3.1. Illustration

The empirical ramifications of this framework are explored in some detail in Keine (2012), basing on phenomena drawn from different languages. It is shown for instance how multiple exponence in Archi can be handled with the accessibility framework. Multiple exponence is problematic for frameworks which make the two assumptions that only the features of the exponents are relevant to insertion and that features on the input can only be active once. Namely, the effect of these combined assumptions is that a means has to be devised to insert an exponent specified for a feature that has already been discharged by a previous exponent. In Archi, this takes the form of an apparently doubly marked plural feature on oblique nouns (4). Concretely, the language distinguishes nominative nouns and nouns marked by any other case by means of a stem extension on top of which more specific case markers are added. A very minimal example is shown in (4).

(4)

	<b>aInš</b>		<b>dab</b>	
	SG	PL	SG	PL
NOM	aInš	aInš-um	dab	dab-mul
ERG	aInš-li	aInš-um-čaj	dab-li	dab-mul-čaj

In this small excerpt, two nouns, belonging to different classes, each exhibit a class-specific but case-independent plural suffix *-um* or *-mul*. In the singular, the difference between a nominative and an oblique noun is signaled by the marker *-li*. In the oblique plural, however, *-li* is superseded by the class-specific plural suffix, while a plural/oblique-specific suffix *-čaj* follows the class-dependent plural suffix. The pattern is clearly a case of multiple exponence, since *-čaj*, which occurs only in the oblique plural, repeats the plural feature already

expressed. Keine (2012) reviews briefly some feature-based accounts that have been entertained. Under the secondary exponence approach of Noyer (1997), *-um/-mul* could be primary exponents of plural, while *-čaj* would realize primarily the oblique feature and only secondarily the plural feature (as a bracketed diacritic). Under the enrichment approach of Müller (2007), a specific rule creates a plural feature in the environment of a plural *and* oblique specification (plural duplication), allowing the insertion of both suffixes.

However, a slightly divergent set of facts from Archi is brought to light by Keine (2012). Archi has numerous nominal classes, as well as lexical exceptions, and not all of them conform to the above pattern. Two instances of this are shown in (5).

(5)

	<b>ha<sup>ʕ</sup>təra</b>		<b>χ<sup>ʕ</sup>on</b>	
	SG	PL	SG	PL
NOM	ha <sup>ʕ</sup> təra	ha <sup>ʕ</sup> tər-mul	χ <sup>ʕ</sup> on	bu:c'i
ERG	ha <sup>ʕ</sup> tər-čaj	ha <sup>ʕ</sup> tər-mul-čaj	χ <sup>ʕ</sup> ini	bu:c'i-li

The word *ha<sup>ʕ</sup>təra*, “river”, has *-čaj*, and not *-li*, as a general oblique marker, i.e. also in the singular. Conversely, the word *χ<sup>ʕ</sup>on*, “cow” (where suppletion plays the role of an overt plural marker), exhibits *-li* as an oblique marker in the plural, but not in the singular. It seems then that specifying *-li* and *-čaj* as either singular or plural suffixes is not sufficient and leads to a dilemma. The solution proposed by Keine (2012) relies on a radical kind of exponent underspecification whereby both *-li* and *-čaj* are pure oblique markers; the concept of accessibility is the corollary of this assumption in explaining the distribution of such affixes (Figure 1).

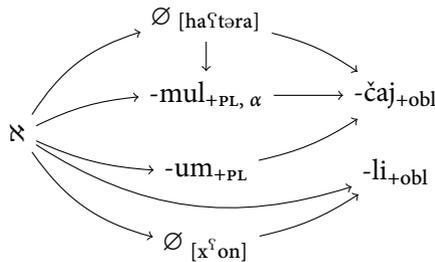


Figure 1: Archi oblique and plural markers

Figure 1 reveals a peculiar conception of exponence in that some exponents are zero ( $\emptyset$  [ $ha^s tara$ ]): these lexical class-bound empty affixes, along with the accessibility relations they are involved in, are here to ensure that the right exponents (in this case either the suffix *-čaj* or the suffix *-um* are attached). Although I will not be concerned further with nominal inflection or with exceptional classes, I go on in the following section to develop a tentative analysis of Georgian verbal agreement within the accessibility framework. Modifications and related comments will be provided in the discussion.

### 3.2. Georgian

A tentative analysis of the Georgian data in an accessibility-based framework is found in figure 2.<sup>7,8</sup>

I make the assumption that all person, number and case features are decomposed. Any such features present in the morphosyntactic heads carry with them their negative counterpart: a nominative feature is represented as +Nom–Acc, a third person feature as –1–2+3, a plural feature as –sg+pl etc. This has consequences for the insertion process and is built into the hierarchy.

The initial state  $\aleph$  hosts three feature structures of the form Subject Argument – Object Argument – TAM. For instance, the verbal form *v-xedav*, ‘I see him’, starts out with the features: [[+Nom–Acc+1–2–3][–Nom+Acc–1–2+3][–Pa–P–S]].

Of the two affix sets potentially encountered first after the initial state, one comprises all and only prefixes. It is possible to go to this set and then to the first set of suffixes, but not the other way around. Among the four prefixes, three are accusative, and one, *v-*, is nominative. To ensure insertion of the prefixes whenever they are attested, the hierarchy specifies that positive case

<sup>7</sup>Contrary to Keine (2012), where four different phenomena from different languages serve to illustrate the empirical coverage of the framework, here the data is constituted of all (regular) markers of all (non-inverse) tenses of one language. Numerous accessibility relations are not shown in the graphic representation. Instead, affixes are grouped together, (roughly) following co-occurrence possibilities. Thus readability improves, but this doesn't mean that all affixes of a block are accessible from all affixes of the previous block (e.g., *-a* is not accessible from *v-*). In such cases, it suffices to observe that their features are either identical or contradictory, making insertion of the second one impossible.

<sup>8</sup>Here prefixes are mixed with suffixes, although their behavior is different from the latter, as evidenced by the entire TAM paradigm, where it can be seen that they are completely insensitive to the TAM category. Nevertheless, I see no a priori reason to exclude them, since they realize feature-categories (person, number and case) that are relevant for suffixes as well.

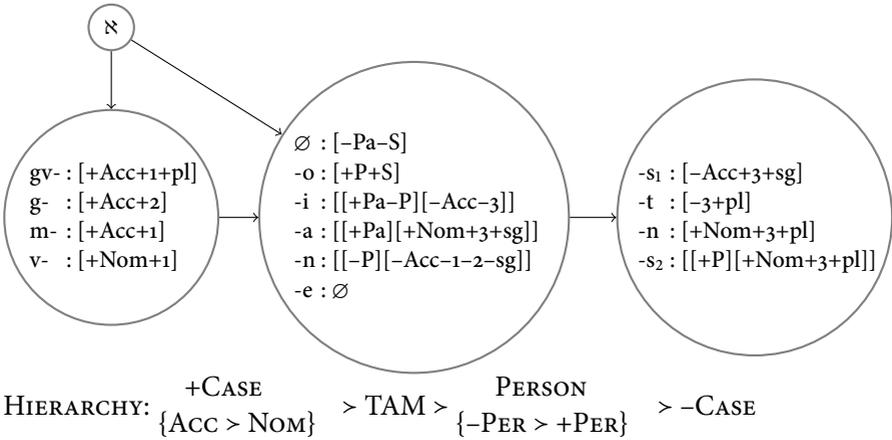


Figure 2: Georgian verbal agreement in Accessibility

should be the top-ranking feature class. In addition, (positive) accusative case takes priority over (positive) nominative case and both take priority over negative case in order to prevent too early insertion of a suffix; this is because some suffixes (*-a*, *-n*) do carry a case specification plus a number of additional features that would otherwise make them more specific. For example, were  $+\text{Nom}$  and  $+\text{Acc}$  on the same level, *-a* would be selected before, say, *m-*, because it possesses a TAM feature, a person feature and a number feature in addition. As suffixes normally only express features of the subject (with the exception of *-t*), *v-*, as the only nominative prefix, is the only one that could be in competition with suffixes. This is the case with *-i*, which does co-occur with *v-*. But since *-i*, carrying person features, must also specify the case of the relevant argument (the case of a subject), it would take priority over *v-* if it were specified as  $+\text{Nom}$ , since it possesses more features than it in addition to shared  $+\text{Nom}$ . The solution here is to specify *-i* as  $-\text{Acc}$  rather than  $+\text{Nom}$ , and rank  $-\text{Case}$  (short for  $-\text{Acc} > -\text{Nom}$ ) lower than  $+\text{Case}$ .

Turning to the first set of suffixes, two general markers, specified only for TAM-features, are apparent: a  $\emptyset$ -element for present and *-o* for the optative. The similarity between the two sets of forms is clear when seeing that the present has nothing wherever the optative has *-o*, and this distribution suffers no exception whatever the person-number combination. Next comes *-a*, which is restricted to 3sg in the past, that is, imperfect or aorist. *-i* is even more

restricted, realizing 1/2 person (-3) only in the imperfect, picked out by the features +Pa-P. The case of *-n* is more intricate, since it depends largely on the morphemic analysis that is chosen. Indeed, some form containing *-n* characterizes third person plural in all tenses apart from the aorist, and the form of the postradical string is not uniform: *-en* in the present, *-nen* in the imperfect and the subjunctive, *-n* in the optative. The choice here is to postulate two different *-n* belonging to two different affix sets, allowing for a sequence of two *-n*. The *-n* of the first suffix group is the one of the imperfect/subjunctive: its specification as -P restricts it to the three imperfective tenses. A case feature has to be specified to indicate which argument it encodes (the subject). For the  $\emptyset$  of the present to take priority over it, leaving it only to the two latter tenses, *-n*'s case specification cannot be +Nom, since it would then be inserted also in the present (I take the *-n* of the present to be the one of the second suffix set). To solve this, *-n* is given the specification -Acc instead, which belongs to the lowest-ranking feature class. *-e* is the elsewhere suffix. Its range is constituted of the subjunctive of all persons apart from 3pl and the aorist of all persons apart from 3sg.

In the second set of suffixes, *-t* signals plurality of either a first or second person subject or of a second person object. This distribution is captured by the features -3+pl; lack of a case specification ensures this result, while the impossibility of *-t* to signal plurality of a 1 object follows simply from the feature content +Acc+1+pl of the dedicated affix *gv-* (in contrast to *g-* with only +Acc+2, +pl is already discharged). This affix set comprises two *-s*. *-s<sub>1</sub>* is the 3sg exponent in the present, the subjunctive and the optative. Again, as for *-i*, a case feature has to be provided to indicate which argument the affix realizes, and again, specifying it as +Nom would wrongly make it more specific than another affix (*-t* doesn't bear any case feature). Step one of the solution is to associate it with a -Acc feature instead. As -Case is the lowest-ranking class, the difference between the two affixes is neutralized – they both contain as many PN features. Step two consists in ranking -Person above +Person: as *-t* bears a -3 feature, it is more specific than *-s<sub>1</sub>*, which bears a +3 feature. This derives one of the two well-known blocking effects involving *-t* (*-t* > *-s<sub>1</sub>*). Accounting for the non-occurrence of *-s<sub>1</sub>* in the past tenses imperfect and aorist, affix *-a*, which is specified as +3, discharges this feature, rendering insertion of *-s<sub>1</sub>* impossible afterwards. The second *-n* is the most general 3pl affix of the inventory; it is designed to occur in all 3pl forms except that of the aorist. Thus in the present and the optative, it shows up preceded by either  $\emptyset$  or *-o*, while

in the imperfect and the subjunctive, it is preceded by the first *-n*.<sup>9</sup> *-s<sub>2</sub>* is the specific 3pl aorist affix, whose feature content differs from *-n* only by the +P feature. It may only be inserted after the elsewhere affix *-e* since all others block it: for instance, optative *-o* discharges the +P feature, making insertion of *-s<sub>2</sub>* impossible. The other well-known blocking effect involving *-t* (*-n*, *(-e)-s > -t*) is accounted for straightforwardly if both 3pl exponents are specified for a positive case feature, namely +Nom: these will always take priority over *-t* since +Case is higher-ranked than person and number features.

### 3.2.1. *Summary*

Thus the system developed here offers the beginning of an account of the Georgian data in an accessibility-based framework. The reasons why it is only a beginning are as follows.

First, the account exhibits one visible technical drawback in the interaction of exponents *-i* and *-t*. *-i* cannot be left without a case/person/number specification, since it is not a *general* imperfect marker: it has to be restricted to first and second person; with a +Pa-P specification, it would be incorrectly inserted in 3pl imperfect/subjunctive contexts instead of *-n*. The problem has to do with the feature content of *-t*, which also has to be specified as -3. As it stands, *-t* couldn't ever follow *-i*. A putative, and non-standard, solution would be to specify one of the two suffixes as realizing some "conjunction" of the first and second person features – something like +1,2. But even this wouldn't be satisfactory, since a full sequence *v...-i-t* is part of the well-formed expressions of the language. In such a case, *v-* would discharge +1, and no person specification – positive or negative – of subsequent *-i* and *-t* would allow both of them to be inserted. This is clearly the beginning of a puzzle for the way an accessibility-based theory handles features.

Second, the interaction of the notions of position class (cf. the graphical representation) and of feature classes is not yet entirely clear. True, the paradigm appears to have a templatic character in that certain positions seem to be dedicated to a restricted set of suffixes, moreover allowing sequences like *-o-s/-o-t*, *-e-s/-e-t* where some autonomous affixal material is shared. True,

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<sup>9</sup>Of course, these choices do not yield exactly the right exponence in the present/imperfect/subjunctive, since the attested forms really contain *-en* and *-nen*. Ultimately, some phonological process should account for the apparent epenthesis of /e/ between the affix and the right stem boundary.

inspection of this pattern reveals that TAM features play a prominent role in the position immediately following the stem, while PN features are more prominent in the following position. The ideal picture would be that there are no exceptions to these statements. Still, two affixes pose a problem. The elsewhere affix *-e* is located in the first suffix group because of its obvious morphotactic resemblance to the other vocalic suffixes *-a*, *-i* and *-o*, although, as an elsewhere, it realizes no morphosyntactic feature at all. The question is then why such a suffix should be grouped with the TAM suffixes. The *-s<sub>2</sub>* suffix is located in the second suffix group because it has to occur after *-e*, but the fact that it (obligatorily) bears a TAM feature (+P) should lead, under the above generalizations, to locate it in the precedent suffix group. The present accessibility-based analysis of Georgian thus gives no conclusive evidence that “position classes” and feature classes correlate in a coherent way.

Third, it is not clear how to handle feature specifications like +Nom–Acc or +1–2–3. There is no theoretical motivation that I know of that would call for decomposing case features into something else than unique (binary or privative) features. It is nevertheless true that the present analysis would not function without this addition to our inventory, for two reasons. First, as in the case of *-s<sub>1</sub>* vs. *-t*, this is the only way (in combination with the hierarchy) to ensure that the attested blocking relations are captured. Second, and this is an important point, this assumption allows to mimick multiple exponence. At an intuitive level, this solution distributes “identical” feature realization among exponents as if there were “primary” and “secondary” exponents. But as was shown with *-i* and *-t*, use of binary features only reaches this aim to the extent that the language has no more than two exponents realizing the “same” feature.

Thus, as in the case of Distributed Morphology, the possibilities provided by Channel theory suffer from some apparent drawbacks when applied to a full inflectional paradigm like the present Georgian one. The complexities required to explain this case and the paradoxes that it brings are not necessarily fatal, but suggest that each of the above points should be taken as separate problems to be considered in further research.

#### 4. On Inflectional Learning

This section is concerned with computer-learning possibilities of the paradigms studied so far. The specific algorithm and assumptions developed in Bank and

Trommer (2012) form the basis of the discussion to come. I present here yet another analysis of the above Georgian data, but from this different point of view. In Bank and Trommer's (2012) model, the theoretician doesn't control directly the assignment of a meaning to affixes as they do in, e.g., Distributed Morphology or Channel Theory – rather this operation is mediated by the learner hypothesizing multiple form-meaning pairs (*morpheme hypotheses*) and checking them against patterns of distribution within full-scale inflectional paradims. Manipulation of learning possibilities is done in an optimality-theoretic setting, which allows the learner, according to a given constraint ranking, to “decide” what morphosyntactic content is best suited for a given phonological string on the basis of its distribution in the paradigm. Typical constraints refer to actual occurrence/predicted occurrence ratios of strings in (sets of) featurally fully specified paradigm cells, and establish a score that determines which features an affix should realize; re-ranking of course potentially gives different results. The first subsection gives indications as to how this is implemented in the case of Ainu, an example taken from Bank and Trommer (2012). The following subsections are concerned with Georgian and adopt the exposed point of view in taking whole paradigms as a subject of study. The goal will be to get insights into potentially different choices of affixes and meanings thereof, as compared to the previous two accounts, Distributed Morphology and Channel Theory.

#### 4.1. Illustration with Ainu (Bank and Trommer 2012)

The language studied in Bank and Trommer (2012), Ainu, has the property of possessing affixes with a problematic distribution. Table 4 is an Ainu transitive paradigm in simplified version: blank cells actually display affixes, which have been omitted here for illustration (gray cells stand for reflexive forms which are not expressed in the same way as transitive forms and are not included). It is used to exemplify what are called the *imperfect distribution* and *meaning assignment* problems in inflectional learning.<sup>10</sup>

This simplified paradigm has only two affixes, *e-* and *eci-*, which are present in most cases where a second person argument is present, be it a subject or an object. It can be seen that *e-* signals a 2sg argument when the other argument is third person; a different prefix, not shown here, is used when the subject is

<sup>10</sup> A third problem, the *subsegmentation* problem, which is tackled in Bank and Trommer (2012), will not be discussed here.

S \ O	1sg	1pl	2sg	2pl	3sg	3pl
1sg			eci-	eci-		
1pl			eci-	eci-		
2sg					e-	e-
2pl	eci-	eci-			eci-	eci-
3sg			e-	eci-		
3pl			e-	eci-		

Table 4: Ainu simplified transitive paradigm (Bank and Trommer 2012)

2sg and the object first person; in all other cases, *eci-* is used. A puzzle arises when considering what these prefixes actually stand for: it cannot be said with perfect accuracy whether they each mean 2sg or 2pl. That *eci-* is present in all 2pl cells is clear, but assigning it this meaning leaves its presence in the two first person subject/2sg object cells unexplained. Choosing the reverse option, namely assigning it the general meaning second person is also problematic, since it wrongly predicts its occurrence in a number of cells, the ones with a 2sg argument (except for the 1/2sg combination), which actually display *e-*.

The treatment adopted in Bank and Trommer (2012) relies on the following reasoning. An artificial learner is provided with the paradigm and makes multiple hypotheses about the meaning of affixes, i.e., it associates phonological strings and morphosyntactic feature structures into pairs, just as the *eci-2* or *eci-2pl*<sup>11</sup> mentioned above. In compliance with optimality, there is no upper bound to the number of possible candidates – these are just the two most plausible ones that can be generated. It is then checked how a given affix hypothesis fares with regard to the paradigm cells thanks to an accuracy measurement: rather informally, a cell is a true positive for the features of a morphosyntactically compatible affix if the former’s phonological string contain the latter’s one (properly or not) – this is the case of any “perfect” affix, occurring in all and only the cells compatible with it. True negatives represent the exact reverse situation where an affix shares neither features nor phonological material with a cell. The more difficult facts, a subset of those involving *eci-/e-* above, are

<sup>11</sup>Henceforth, all features will be notated with square brackets and a binary specification: e.g. [+2+pl].

called false negatives/positives. In that example, the cells with a 1 subject and a 2sg object are false negatives for the affix hypothesis *eci*-[+2+pl]: they are not compatible with its features, still they contain the string /eci/. Conversely, assuming an affix *eci*-[+2], mispredictions arise in all cells exhibiting *e*-, since such an affix is so general that it should be present in them, but is not: these cases are then called false positives.

This is the core of the imperfect distribution problem, and to show the implications of it, Bank and Trommer (2012) develop a range of optimality-based analyses. A crucial aspect is that each constraint ranking corresponds to a different grammar. What I'll be most interested in here is the interaction of two constraints, \*UNDERINSERTION and \*OVERINSERTION, which are most directly linked to the above remarks about *eci*-/*e*-. Below I illustrate briefly how the simplified paradigm in table 4 is treated in Bank and Trommer (2012). The first step consists in having the learner be “presented” with the paradigm and make hypotheses. The paradigm is shown again on the left, and some affix possibilities are parallelly shown on the right, with the two possible rankings.

S \ O	1sg	1pl	2sg	2pl	3sg	3pl		*U	*O
1sg			eci-	eci-			☞-eci:[+2]		*6
1pl			eci-	eci-			-eci:[+2+pl]	*!2	
2sg					e-	e-		*O	*U
2pl	eci-	eci-			eci-	eci-	-eci:[+2]	*!6	
3sg			e-	eci-			☞-eci:[+2+pl]		*2
3pl			e-	eci-					

Table 5: Learning of *eci*-

What this says is that the affix hypothesis *eci*-[+2+pl] incurs two violations of the constraint \*UNDERINSERTION, because it is predicted not to occur in the two 1-2sg cells, but still does, and that the affix hypothesis *eci*-[+2] incurs six violations of \*OVERINSERTION since it is predicted to occur in the four cells with a 2sg subject and the two with a third person subject and a 2sg object, but doesn't. The two tableaux shown in table 5 represent different grammars in that if the ranking \*UNDERINSERTION >> \*OVERINSERTION is chosen, the *eci*-[+2] hypothesis is kicked out of the run by the learner in favor of *eci*-[+2+pl], while the reverse ranking yields the reverse result. This is how the meaning assignment problem is addressed. Both rankings automatically give

rise to *primary distributions* of affixes: the primary distribution of *eci-*[+2+pl], for instance, is made of all cells where the features [+2+pl] are found. As mentioned, both affixes have imperfect distributions, because these are either larger or smaller than the distribution attested in the real language. I will return shortly to ways of coping with this problem in the discussion of what Bank and Trommer (2012) call *paradigmatic readjustment*.

I turn in the next subsection to the method for building the complete affix set of a given language, which is the concern of the harmonic-serialist side of the optimality account. In this I leave Ainu and get directly to the Georgian data. The problems of meaning assignment, imperfect distribution and paradigmatic readjustment will all be discussed in this subsection.

#### 4.2. A case study of Georgian

First, it is necessary to decide what paradigm the learner works with. In the Georgian case, my assumptions dictate that all possible subject-object combinations in all considered tenses be taken into account. Although prefixation, as mentioned, does not vary with TAM categories, it does express person and case features, which are also relevant to suffixation. It is thus fully included in the paradigm, and the above drastic simplification from six to three forms within each TAM subparadigm is not pursued here. Table 6 is an instance of this use of a full-scale paradigm meant especially for inflectional learning.<sup>12</sup>

Incidentally, the fact that prefixes don't change across TAM categories allows for a very efficient illustration of the system. I briefly show how this works in the Present screeve (table 7), ignoring all others for the time being.

In table 7, according to the preceding descriptions, the prefixes stand intuitively for the following meanings. *v-*: 1 subject, *g-*: second person object, *m-*: 1sg object and *gv-*: 1pl object. The number of cells of the paradigm in table 7 is 28 (as in Ainu, reflexive forms are omitted; indeed, they require use of special anaphors and are not directly linked to the distribution of affixes).

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<sup>12</sup>Another difference from the accounts presented above is that all strings corresponding to suffixal material are decomposed; concretely, this gives us sequences like *-n-n* for 3pl and *-e-s* for 3pl aorist, whose parts will have to be learnt separately.

PRESENT [-PA-P-S]						
	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...	v-...		g-...-t	v-...
2sg	m-...		...	gv-...		...
3sg	m-...-s	g-...-s	...-s	gv-...-s	g-...-t	...-s
1pl		g-...-t	v-...-t		g-...-t	v-...-t
2pl	m-...-t		...-t	gv-...-t		...-t
3pl	m-...-n	g-...-n	...-n	gv-...-n	g-...-n	...-n

IMPERFECT [+PA-P-S]						
	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...-i	v-...-i		g-...-i-t	v-...-i
2sg	m-...-i		...-i	gv-...-i		...-i
3sg	m-...-a	g-...-a	...-a	gv-...-a	g-...-a-t	...-a
1pl		g-...-i-t	v-...-i-t		g-...-i-t	v-...-i-t
2pl	m-...-i-t		...-i-t	gv-...-i-t		...-i-t
3pl	m-...-n-n	g-...-n-n	...-n-n	gv-...-n-n	g-...-n-n	...-n-n

SUBJUNCTIVE [-PA-P+S]						
	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...-e	v-...-e		g-...-e-t	v-...-e
2sg	m-...-e		...-e	gv-...-e		...-e
3sg	m-...-e-s	g-...-e-s	...-e-s	gv-...-e-s	g-...-e-t	...-e-s
1pl		g-...-e-t	v-...-e-t		g-...-e-t	v-...-e-t
2pl	m-...-e-t		...-e-t	gv-...-e-t		...-e-t
3pl	m-...-n-n	g-...-n-n	...-n-n	gv-...-n-n	g-...-n-n	...-n-n

AORIST [+PA+P-S]						
	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...-e	v-...-e		g-...-e-t	v-...-e
2sg	m-...-e		...-e	gv-...-e		...-e
3sg	m-...-a	g-...-a	...-a	gv-...-a	g-...-a-t	...-a
1pl		g-...-e-t	v-...-e-t		g-...-e-t	v-...-e-t
2pl	m-...-e-t		...-e-t	gv-...-e-t		...-e-t
3pl	m-...-e-s	g-...-e-s	...-e-s	gv-...-e-s	g-...-e-s	...-e-s

OPTATIVE [-PA+P+S]						
	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...-o	v-...-o		g-...-o-t	v-...-o
2sg	m-...-o		...-o	gv-...-o		...-o
3sg	m-...-o-s	g-...-o-s	...-o-s	gv-...-o-s	g-...-o-t	...-o-s
1pl		g-...-o-t	v-...-o-t		g-...-o-t	v-...-o-t
2pl	m-...-o-t		...-o-t	gv-...-o-t		...-o-t
3pl	m-...-o-n	g-...-o-n	...-o-n	gv-...-o-n	g-...-o-n	...-o-n

Table 6: Full Georgian paradigm

PRESENT [-PA-P-S]

	1sg	2sg	3sg	1pl	2pl	3pl
1sg		g-...	v-...		g-...-t	v-...
2sg	m-...		...	gv-...		...
3sg	m-...-s	g-...-s	...-s	gv-...-s	g-...-t	...-s
1pl		g-...-t	v-...-t		g-...-t	v-...-t
2pl	m-...-t		...-t	gv-...-t		...-t
3pl	m-...-n	g-...-n	...-n	gv-...-n	g-...-n	...-n

Table 7: Full present paradigm

Cyc. <i>n</i>		*UND.	*OV.
☞	gv-[Acc+1+pl]		
	gv-[Acc+1]		*4
☞	m-[Acc+1-pl]		
	m-[Acc+1]		*4
	g-[Acc+2]	*4	
	g-[+2]	*2	*6
	v-[Nom+1]-[Acc-2]	*4	
	v-[Nom+1]	*4	*4
	v-[+1]		*8

Table 8: Prefixes with \*UND. > \*OV. ranking (Cyc. *n*)

4.2.1. Cyclic iteration and affix selection

Table 8 show how a learner can treat these prefixes. The ranking is tentatively \*UNDERINSERTION >> \*OVERINSERTION.<sup>13</sup> More or less obvious possible meanings are indicated for each affix. *gv*-[Acc+1+pl], as opposed to *gv*-[Acc+1], is called a “perfect” marker because it doesn’t incur any violation: the string

<sup>13</sup>Another constraint not shown here, \*PORTMANTEAUX, is violated whenever an affix hypothesis realizes more than one feature structure. Although never crucial to the evaluations presented here, where \*OVER/UNDERINSERTION are always ranked higher, it nevertheless reminds that other rankings are possible which would exclude all such hypotheses, requiring special, dedicated morphological analyses. It is mentioned in the examples that will follow the prefixes’ one.

Cyc. $n + 1$		*UND.	*OV.
☞	g-[Acc+2]		
	g-[+2]		*6
☞	v-[Nom+1]-[Acc-2]		
	v-[Nom+1]		*4
	v-[+1]		*8

Table 9: Prefixes with \*UND. >> \*OV. ranking (Cyc.  $n + 1$ )

*gv-* is present in all and only the cells with the features [Acc+1+pl], while its concurrent is overinserted (i.e. *gv*-[Acc+1+pl] wins under both rankings). The same can be said about *m*-[Acc+1-pl] as opposed to *m*-[Acc+1]. The situation is different in the case of the two remaining prefixes. The intuitively more correct meaning for *g-* is [Acc+2]: it occurs wherever there is a 2 object; thus it would seem that its primary distribution is a perfect one. But the model presented here has more to say about strings, since another string present in the paradigm, *gv-*, has *g-* as a substring. As a consequence, *g*-[Acc+2] incurs violations of \*UNDERINSERTION in all cells with a 1pl object. As for *v-*, *v*-[Nom+1]-[Acc-2] is more accurate than *v*-[Nom+1] since it doesn't incur the \*OVERINSERTION violations linked to the absence of *v-* in contexts with a 2 object – truly a reflex of what morphological theories attempt to block. But again, *gv-* also has *v-* as a substring, which makes the two *v-* hypotheses also incur \*UNDERINSERTION violations.

A crucial aspect of the analysis exhibited by this small excerpt is that several affixes (in fact, all of them) compete together. In table 8, *gv-* and *m-* win together with zero violations. This is the serial component: after this first *cycle* is completed, step one, *freezing*, applies. Freezing “deletes” from the paradigm strings that are matched by winning affix hypotheses; thus *gv*-/*m-* are not considered anymore. Step two, cyclic iteration, initiates a new “round” of evaluation: the paradigm is considered again with removed strings, and evaluation of the candidate set is operated again, without the previous winners (table 9). The removal of *gv-* has the effect that the violations of \*UNDERINSERTION previously incurred by *g-* and *v-* disappear. The whole procedure has clear effects on affix selection. For instance, under the given ranking, an affix hypothesis *v*-[+1] would seem to win on the second cycle by only incurring violations of \*OVERINSERTION (it would not be underinserted

		*UND.	*OV.	*PM
☞	-i[Nom-3]-[+Pa-P]			*
	-i[Nom-3]		*64	
☞	-a[Nom+3-pl]-[+Pa]			*
	-a[Nom+3-pl]		*18	
	-s[Nom+3+pl]-[+P-S]	*15		*
	-s[Nom+3]		*39	
	...			

Table 10: Suffixes *-i* and *-a*

as it is coherent with the 1pl object cells, which contain *gv-*). However, its \*OVERINSERTION violations would make it a “less perfect” marker than *gv-* and *m-* and by the time the second cycle is reached, *gv-* is gone, eliminating the \*UNDERINSERTION violations of the hypotheses *v*-[Nom+1] and *v*-[Nom+1]-[Acc-2]. Only because of this does the latter win, and not *v*-[+1].

Examination of each and every affix hypothesis under both rankings, taking into account the cyclic nature of the procedure, would take us at some length given the amount of data (it can be mentioned that *-o*, as could be expected, is also a “perfect marker” if it is given the meaning [+P+S]). Instead, I will present a couple of illustrative examples. I maintain the ranking \*UNDERINSERTION >> \*OVERINSERTION here, plus lowest-ranked \*PORTMANTEAUX. It is useful to keep in mind, though, that no ranking is more “legitimate” than another. Of course, departing from the simple example of TAM-insensitive prefixes, figures must range over the whole paradigm and refer specifically to how affix hypotheses fare with regard to it (i.e. violations appear to be more numerous).

**The vocalic suffixes *-i* and *-a*** seen in the preceding accounts are among the easiest ones here too (table 10). *-i*-[Nom-3]-[+Pa+P] cannot be superseded whether the ranking is \*UNDERINSERTION >> \*OVERINSERTION, or the reverse. The same holds for *-a*-[Nom+3-pl]-[+Pa]. Both indeed have a perfect distribution, their only disadvantage being that of violating \*PORTMANTEAUX.

**The “*-n*-like” 3pl suffixes** that occur in all subparadigms but the aorist are a further interesting example. This is shown in table 11, which represents all

TAM \ Obj.	1sg	2sg	3sg	1pl	2pl	3pl
Pres. [-Pa-P-S]	m-...-n	g-...-n	...-n	gv-...-n	g-...-n	...-n
Imp. [+Pa-P-S]	m-...-n-n	g-...-n-n	...-n-n	gv-...-n-n	g-...-n-n	...-n-n
Subj. [-Pa-P+S]	m-...-n-n	g-...-n-n	...-n-n	gv-...-n-n	g-...-n-n	...-n-n
Aor. [+Pa-P-S]	m-...-e-s	g-...-e-s	...-e-s	gv-...-e-s	g-...-e-s	...-e-s
Opt. [-Pa-P+S]	m-...-o-n	g-...-o-n	...-o-n	gv-...-o-n	g-...-o-n	...-o-n

Table 11: Nominative 3pl subparadigm

and only the cells of the paradigm in table 6 which have a 3pl argument; it is somewhat uniform as properties of the object (plural *-t*, apart from prefixes) are never expressed. Facts are treated here in a way similar to the Channel analysis above in that 3pl exponence in the imperfect and subjunctive is decomposed into two distinct segments spelled [n]. This is shown in table 12, which features two distinct sets of *-n* candidates with parallel feature specifications, plus an affix *-nn*, a potential candidate for the imperfect and subjunctive tenses. Not so many choices are plausible for the simple *-n* affixes: either they range over all 3pl cells and incur \*OVERINSERTION violations in the aorist, or they range over 3pl non-present imperfective ([-P]) cells and incur the same number of \*UNDERINSERTION violations in the optative ([+P+S]) cells. The two sets of candidates being parallel, one, the overinserted *-n*-[Nom+3+pl], wins and freezes one instance of a string /n/ in each relevant cell (shown in italics), leaving unfrozen *-n*'s only in the imperfect and the subjunctive. *-nn* candidates are discarded since the best faring candidate, *-nn*-[Nom+3+pl]-[-P], is overinserted in the present *and* is a portmanteau affix. Given such results, the following cycle (table 13) leads to the selection of a second isolated *-n* (no *-nn* hypothesis is plausible anymore because no such string is present in the paradigm), the violation figures being as before modified by the outcome of the preceding cycle. One, *-n*-[Nom+3+pl] is overinserted but suited for the most general case of 3pl exponence, while the other, *-n*-[Nom+3+pl]-[-P], also overinserted, suits to the imperfect and subjunctive tenses.

**The third person *-s* and *-es* affixes** are something of a puzzle for many theories. As a reminder, in the Distributed Morphology analysis presented above, 3pl *-es* was seen as a fully independent suffix realizing unequivocally the features “3pl aorist”: as it blocks *-t* the same way “*-n*-like” suffixes do, it is easily thought

Cyc. <i>n</i>		*UND.	*OV.	*PM
☞	-n <sub>1</sub> [Nom+3+pl]		*6	
	-n <sub>1</sub> [Nom+3+pl]-[-P]	*6		*
	-n <sub>2</sub> [Nom+3+pl]		*6	
	-n <sub>2</sub> [Nom+3+pl]-[-P]	*6		*
	-nn[Nom+3+pl]		*18	
	-nn[Nom+3+pl]-[-P]		*6	*

Table 12: 3pl -*n*-suffixes with \*UND. >> \*OV. ranking (Cyc. *n*)

Cyc. <i>n</i> + 1		*UND.	*OV.	*PM
☞	-n <sub>2</sub> [Nom+3+pl]		*18	
	-n <sub>2</sub> [Nom+3+pl]-[-P]		*6	*

Table 13: 3pl -*n*-suffixes with \*UND. >> \*OV. ranking (Cyc *n* + 1)

to be an affix of this very “family” and to be unrelated to either *-e* or *-s* (3sg present, subjunctive and optative). A different analysis was offered in the Channel framework as *-e* was treated as an elsewhere while two distinct *-s* suffixes were postulated: one for 3sg, including the *-e-s* sequence found in the subjunctive, while the second *-s* was specifically marked for 3pl *and* perfective, allowing it, through specificity, to occur only in the aorist. I show here how letting a learner select the affixes can lead to different choices. Table 14 shows the competition between *-s*, *-e*, and *-es* and has, again, to be checked against the full paradigm in 6. It appears that the latter suffix is eliminated quickly whatever its features, because it always incurs violations of \*UNDERINSERTION. As for *-e*, only one of its most plausible hypotheses doesn’t incur such violations, and this is the one with no specification at all and the greatest number of \*OVERINSERTION violations – a pure elsewhere marker. Still, the winner of the first cycle is a general *-s*-[Nom+3] hypothesis; all others somehow draw a line between 3sg and 3pl and thus incur fatal \*UNDERINSERTION violations, while the winner only incurs \*OVERINSERTION violations. The following cycle is vacuous since only *-e* remains as a candidate.

The preceding explanations thus mention how a given portion of the affixes of the language are selected in a way that is not directly guided by preferences of

		*U	*O	*PM
	-s[Nom+3-pl]-[-Pa]	*6	*3	*
	-s[Nom+3+pl]-[+P-S]	*15		*
	-s[Nom+3-pl]	*6	*15	
☞	-s[Nom+3]		*39	
	-e[+P-S]	*22	*6	
	-e[-P+S]	*22	*6	
	-e[-P]	*6	*6	
	-e[ ]		*96	
	-es[Nom+3+pl]-[+P+S]	*5		*
	-es[Nom+3+pl]	*5	*24	

Table 14: *-s/-e/-es* with \*UND. >> \*Ov. ranking

[	
gv-	: [Acc+1+pl]
m-	: [Acc+1-pl]
-o	: [+P+S]
g-	: [Acc+2]
v-	: [Nom+1]-[Acc-2]
-i	: [+Pa-P]-[Nom-3]
-a	: [-Pa]-[Nom+3-pl]
-n <sub>1</sub>	: [Nom+3+pl]
-n <sub>2</sub>	: [-P]-[Nom+3+pl]
-t	: [-3+pl]
-s	: [Nom+3]
-e	: [ ]
]	

Table 15: Pool of affixes after cyclic iteration (\*UND. &gt;&gt; \*Ov.)

the theoretician. The choice made by the latter may only be an initial one, a pool of affixes being afterwards incrementally constructed by cyclic iteration. These affixes are presented in table 15.

## 4.2.2. Summary: rankings and morphological theories

The preceding discussion was entirely dedicated to a learning procedure which leads to the creation of lists of affixes, as developed in detail in Bank and Trommer (2012). The list in table 15 is the outcome of ranking \*UND. before \*OV.; reversing the ranking can give different results, which I won't delve into here (it is notable, for instance, that under the reverse ranking, *-s* would not be selected as a general third person affix, but rather *-es* would be first selected, as in many analyses, as a 3pl aorist affix, and only then would *-s* be chosen as a specific non-plural, non-past third person affix). Moreover, Bank and Trommer (2012) discuss a number of additional constraints which force a more fine-grained selection procedure.

Most importantly here, as mentioned in the introduction to this section, there is a persistent problem of *imperfect distributions*, to which the proposed answer lies in *paradigmatic readjustment*. Many affixes from the pool above are indeed imperfect; mostly, these are affixes with violations of the constraint \*OVERINSERTION. As a consequence, affixes like  $n_1$ , *-s* or *-e*, given their specifications, should be in a lot of places in the paradigm where in fact, they are not. This is considered a normal consequence of the optimality model which doesn't seek perfection. Yet, some "post-optimality" means must ensure that the selected affixes stick to the real distributions.

The relevant tools are to be found in existing or yet to be invented morphological theories. The typology found in Bank and Trommer (2012) comprises two large families: the *retractionist* and *expansionist* theories. Retractionist theories are devised for sets of overinserted affixes, and vice-versa. That is, retractionist theories will include special tools to render application of affixation narrower when necessary, e.g., by manipulating the featural representation of paradigm cells. The latter case is characteristic of the impoverishment rules postulated in Distributed Morphology, which delete features. It is also the approach I have pursued in the short demonstration above, which featured exclusively the \*UNDERINSERTION  $\gg$  \*OVERINSERTION ranking. As a matter of fact, approximately half of the affixes selected in this way are in need of a retractionist treatment: all the perfect markers would fare equally well under both rankings, but the cases of *textit* $_1$ ,  $n_2$ , *-t*, *-s*, and *-e* cannot fit directly the picture offered by the real language.

A first step in managing these overinserted affixes would be, as above with Distributed Morphology and Channel theory, to reflect upon the problem of

position classes (or any approximation to this notion), since it cannot be the case that these affixes (peculiarly the suffixes) are randomly inserted in the verbal complex (e.g. both *-n*'s realize 3pl features and are spelled the same, so there is a need for two slots; the order of other consonantal and vocalic suffixes must be clearly determined; etc.). Bank and Trommer (2012) explain clearly that these issues are of a different nature than the study of how rankings are organized to create various pools of affixes. A look into options of paradigmatic readjustment related to this problem of position classes might then be an crucial side question.

## 5. Conclusion

In this paper I have tackled the morphology of Georgian affixes. I have first inspired myself from work like that of Halle, Morris and Alec Marantz (1993) or Anderson (1986), who among the first have described and analyzed puzzling facts in the distribution of prefixes/suffixes like the plural suffix *-t* as against other plural suffixes (blocking) or the competition between first person subject and second person object prefixes. Keeping track of the Distributed Morphology account of Halle, Morris and Alec Marantz (1993), I suggested an extension of it to a larger set of data, including all the tense-aspect-mood affixes found outside of the more complicated perfect series, which remains a challenge. The system of Distributed Morphology allows a treatment of most affixes, but still raises questions as to the status of some apparently unmotivated empty elements, that, moreover would seem to have to be extrinsically ordered before other items, disregarding specificity.

The Channel, or Accessibility-based, analysis proposed by Keine (2012) has also been introduced and considered as an option to possibly overcome shortcomings of Distributed Morphology (in this particular instance). The globally more attractive simplicity of the model, where it is an explicit part of the stipulations that affixes may follow some affixes but not others, is potentially tied to the notion of position classes, making the model apparently suited to the observed nature of Georgian suffixes, which respect a certain order. It is however difficult to see what, for instance, determines that elsewhere exponents, by definition empty of features, will stick to a given position class. Moreover, the accessibility relationships proposed in this paper are often very intricate and require massive manipulation of features, like negative specification or

a complicated hierarchy, to allow otherwise impossible co-occurrence facts, among other problems. I do not conclude that the theory is bad (or the language), but rather that a separate examination of each of these problems should be carried out.

Finally, the learning algorithm proposed in Bank and Trommer (2012) has been exposed in relation to the same set of data. The fundamental difference between this last part and the two preceding ones was that no particular morphological analysis was at play. It was shown that it is possible to rely on predetermined parameters to establish lists of affixes, whereby intervention of the theoretician is somewhat confined to the initial choice of the constraint ranking. I have tentatively followed a ranking among many others, that lets the learner select affix hypotheses which are in many cases “overinserted” in the relevant paradigm. One interesting finding was that under this ranking, it is possible to derive without much difficulty the third person plural *n-n* (or *-nen*) of the imperfect and subjunctive, which are not natural classes in my system; above all, it was possible to show that the almost omnipresent third person *-s* can be generalized to third person plural aorist *-e-s*, instead of being confined to third person singular, thus revealing correspondence between a natural class “third person” and the exponent *-s*.

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In (1), the possessor *Juan* bears both the genitive case marker *-pa* and the accusative case marker, which is the case of the entire possessive DP.<sup>1</sup>

Additionally to overt case stacking, Pesetsky (2013) and Assmann et al. (2014) argue for Russian and Udmurt respectively that case stacking might also apply abstractly: the DP bears two abstract cases, but only one case marker shows up overtly. Pesetsky (2013) uses abstract case stacking to explain the case mismatches in Russian paucal numerals. Assmann et al. (2014) show that abstract case stacking elegantly derives the case split on possessors in Udmurt.

In general, case stacking raises two theoretical questions. First, a special assumption about case assignment must be made since a DP receives only one case. However, the existence of case stacking phenomena implies that a case-bearing category must, in principle, be able to receive more than one case. The question is what kind of mechanism allows multiple case assignment. Second, for cases of abstract case stacking, the concrete overt case marker must be determined. The question is which principles determine the choice?

In the minimalist program, these questions can be answered as follows: As for the first question, since case assignment is standardly assumed to be an instance of Agree, an additional Agree relation besides the standard case assignment relations is needed. This could either be case concord between the possessum and the possessor (e.g. downward spreading, see Matushansky 2008, Bjorkman 2013, Erlewine 2013) or a direct relation between the possessor and the head that assigns case to the possessum (e.g. Multiple Agree, see Hiraiwa 2001, Vainikka and Brattico 2014).

As for the second question, the choice for the only overt marker in abstract case stacking configurations is not determined in narrow syntax. Instead the several case feature values the possessor has received in syntax, are once again manipulated in a postsyntactic morphological component before the case features are realized by markers. This manipulation could involve simple deletion of all but one feature or the computation of a completely new case feature (see Assmann et al. 2014 for such an approach.)

But how can the two problems of case stacking be solved in a nanosyntactic framework? The first problem is that case assignment is modeled as syntactic movement. The even bigger problem is that nanosyntax does not assume a sep-

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<sup>1</sup>Note that the possessive DP in (1) is split. The possessum *daughter* is topicalized. I come back to this split in section 3.2.1

arate level of morphology. Rather, every morphosyntactic feature is a single syntactic head. Building on the work by Caha (2009), I show that nanosyntax can derive instances of overt case stacking as well as abstract case stacking. The main idea is that a case checking head can attract more than one K(ase)P. This leads to configurations where more than one K-head in the case sequence of one argument is checked. Overt case stacking comes about if all checked cases in one case sequence are realized separately. Abstract case stacking results if only the KP that has been stranded by additional case movement is realized.

The paper is structured as follows: Section 2 will summarize the relevant assumptions about case assignment in nanosyntax as presented in Caha (2009). In section 3, an extension to the framework is suggested that seems to be necessary in order to derive instances of overt case stacking. In section 4, the analysis is applied to an instance of abstract case stacking in Udmurt. Section 5 concludes.

## 2. Case assignment in nanosyntax

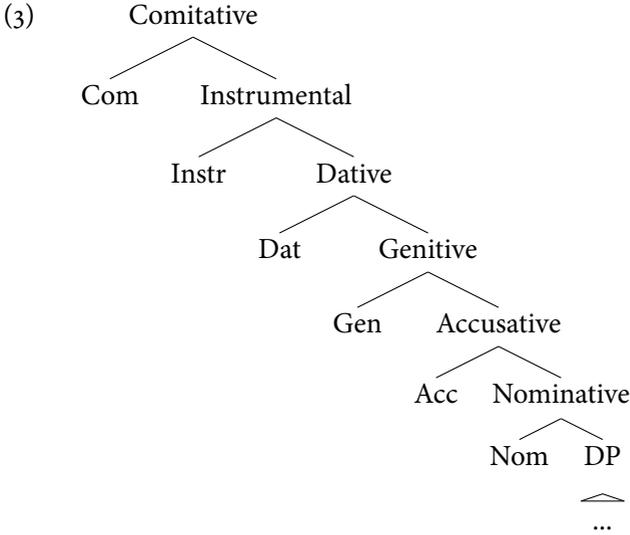
In nanosyntax, every category that constitutes a feature in standard minimalism is a separate syntactic head (an extension of cartographic approaches to syntax, see e.g. Cinque 2002, Rizzi 2004, Belletti 2004). These heads are merged in syntax and result in complex morphosyntactic structures that are translated into phonological and semantic representations with the help of a lexicon in which all translation rules are stored. This spell-out of syntactic structure proceeds cyclically and bottom-up.

One of the main consequences of these assumptions is that there is no independent morphological component that can, additionally to the syntactic component, manipulate features the way it is done in e.g. Distributed Morphology. Rather, the syntactic operations of Merge and Move are the only tools we have in order to derive a morphosyntactic surface structure.

As for case, the nanosyntactic approach assumes that every case is represented by a head in syntax, which is merged above the DP layer of arguments. Moreover, these case heads are ordered on a functional sequence which corresponds to the typologically well-established case hierarchy of syncretisms in (2) (cf. Baerman et al. 2005).

- (2) Nominative/Absolutive > Accusative/Ergative > Oblique cases

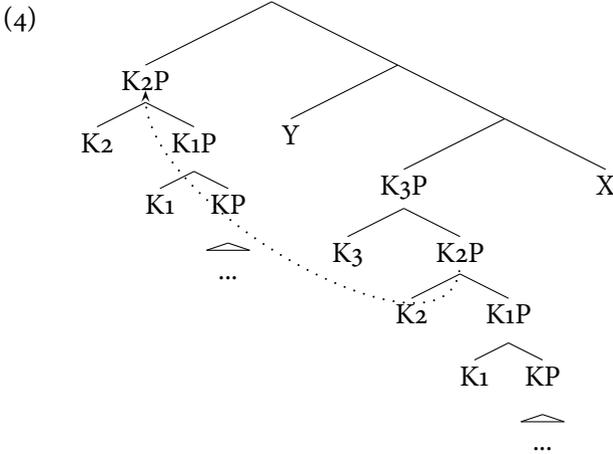
Under a nanosyntactic view, every head  $X$  that corresponds to a case  $C_1$  is dominated by a head  $Y$  that corresponds to a case  $C_2$  directly below  $C_1$  on the hierarchy. The explicit universal case sequence proposed by Caha (2009) is given in (3). A case high on the case hierarchy in (2) corresponds to a case head low in the functional sequence.



In syntax, every DP is generated with a number of case layers on top of it. The resulting phrases, henceforth KPs, are merged in argument positions whereby the case features on top of a DP must be appropriate for the  $\theta$ -role associated with this position. Thus, instruments are always generated with the instrumental, recipients bear dative, themes accusative and so on.

Within the KP, the DP can move into any KP-layer. The KP-layers which are lower than the moved DP are realized as suffixes or postpositions. Higher layers are realized as prefixes or prepositions.

Certain case features of KPs must be checked in the syntax against special case checking heads. Case checking is done by movement of a case layer to the specifier of the respective case checking head. This results in stranding of higher case layers. Therefore, the case checking theory in nanosyntax is also referred to as the “Peeling Theory” of case assignment. The abstract schema is given in (4).

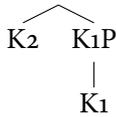
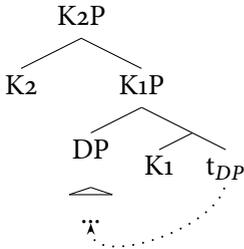


In (4),  $K_3P$  is first merged into its  $\theta$ -position as the sister of a head  $X$ . Afterwards for case reasons it has to move to the specifier of another head  $Y$ . However, since  $Y$  only checks case  $K_2$ , the  $K_3$ -layer is stranded in its base position.

After syntax, the trees are interpreted phonologically and semantically. Note that, as regards the spell-out of case markers, both the checked KPs as well as the stranded peels can in principle be realized (Caha 2009: 157ff). Morphological realization is governed by the four principles given in (5) to (8).

- (5) *The Superset Principle* (Starke 2005, Caha 2009: 55):  
A phonological exponent is inserted into a node if its lexical entry has a (sub-)constituent which matches that node.
- (6) *Match* (Caha 2009: 67):  
A lexical constituent matches a node in the syntax if it is identical to that node, ignoring traces and spelled out constituents.
- (7) *The Elsewhere Condition* (Caha 2009: 55):  
In case two rules,  $R_1$  and  $R_2$ , can apply in an environment  $E$ ,  $R_1$  takes precedence over  $R_2$  if it applies in a proper subset of environments compared to  $R_2$ .
- (8) *The Anchor Condition* (Caha 2009: 89):  
In a lexical entry, the feature which is lowest in the functional sequence must be matched against the syntactic structure.

The way these four principles work together is illustrated by the abstract example in (9)–(10). (9) shows two hypothetical examples of lexical entries for case markers. (10) shows a structure created in syntax.

(9) *Lexical Entries*a. /ba-/  $\leftrightarrow$  K<sub>2</sub>Pb. /-ab/  $\leftrightarrow$  K<sub>1</sub>P(10) *Syntactic Structure 1*

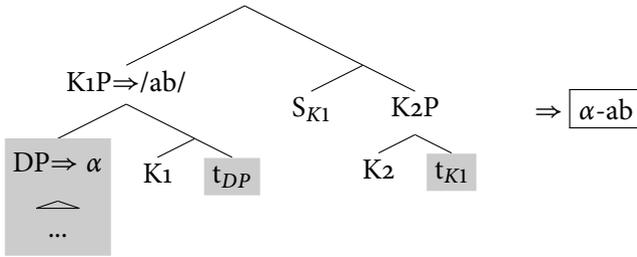
First, since only /-ab/ is a suffix, but /ba-/ is a prefix, the DP in (10) must to the specifier of K<sub>1</sub> (otherwise the structure could not be spelled-out assuming that lexical entries are sensitive to the prefix-suffix distinction). In principle, a DP can move above every case head that licenses realization as a suffix (Caha 2009: 53).

Next, the case features must be realized. Following the Superset Principle in (5), the lexical entry must be identical to or be a superset of the features in the syntactic structure. Since both K<sub>1</sub> and K<sub>2</sub> should be realized, only the rule in (9a) can apply.<sup>2</sup> The marker /ba-/ matches the structure because traces and spelled-out constituents (shown in gray boxes in (11)) can be ignored according to Match in (6), that is, the moved DP and its trace are invisible for the spell-out rules for the case features.

<sup>2</sup>Caha (2009) discusses cases of compound case markers. He assumes that first a lower KP is spelled out and afterwards a higher KP is realized. This raises the question as to what the contexts for compound case marking are and in which contexts a higher KP must be realized even if there is a lexical entry for a lower KP. I will not discuss this issue here.



(13)

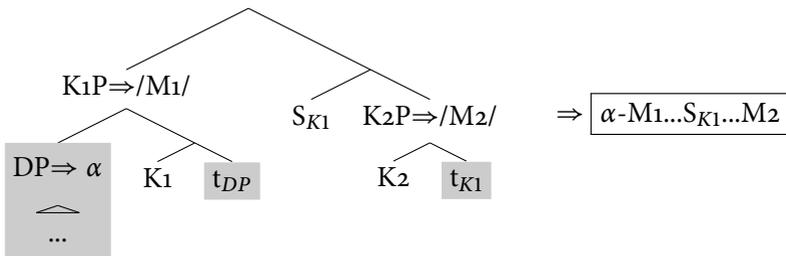


This concludes the summary of Caha’s approach to case assignment. We can now turn to the analysis of the case stacking.

### 3. Case stacking in nanosyntax

The peeling theory of case assignment is not designed to account for instances of case stacking in the world’s languages. Rather, as the system stands now, it rules out any instance of case stacking. The reason is that the different structures which can potentially be spelled out as case markers are separated by other material due to case movement and there are no morphological rules which can reunite them. To illustrate this problem, assume that both the moved K1P and the stranded K2P in (13) could be spelled out by some markers M1 and M2.<sup>3</sup> But since the two markers are disconnected in the structure due to movement, the surface structure does not point to a case stacking configuration. The structure is given again in (14). As we see the two case markers M1 and M2 are disconnected by (possibly overt) material in between K1P and K2P.

(14)



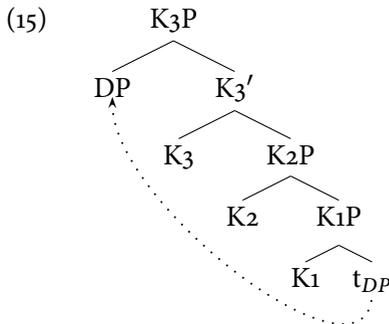
In this section, I will suggest some extensions and adjustments to the nanosyntactic framework to rule in case stacking. Ultimately, the analysis of case stack-

<sup>3</sup>In fact, this is the analysis for applicative marking in Mokilese (Oceanic) and Chichewa (Bantu) in Caha (2009: 157ff.).

ing will be the same as for applicative markers, the only difference being that, in the former, the two markers occur in the same phrase due to pied-piping of K<sub>2</sub>P when K<sub>1</sub>P moves.

### 3.1. Assumptions

The first assumption concerns DP movement within the KP. Since virtually all case stacking languages have only suffixal case markers, I assume (following Caha's approach) that the DP in case stacking languages has to move up to the highest case layer. Then, all case markers will follow the DP.

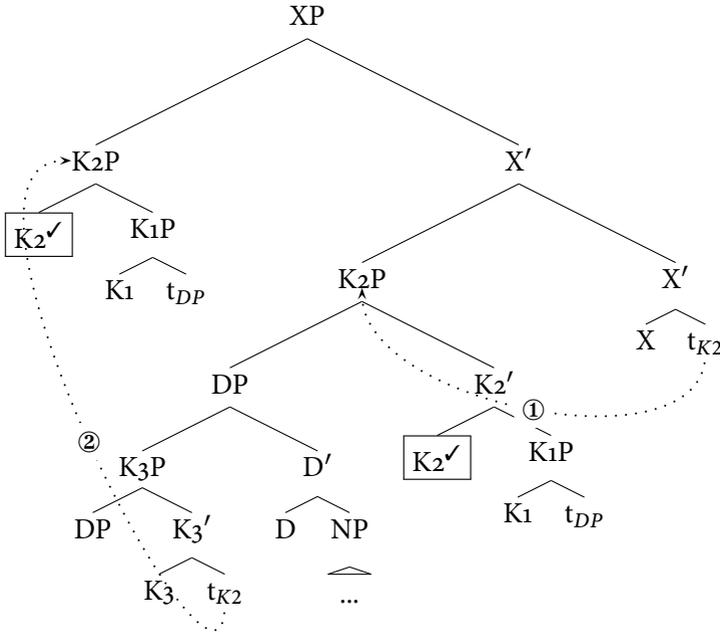


The second assumption concerns multiple case checking. Since there is no separate morphological component in nanosyntax, case stacking cannot be a postsyntactic phenomenon. Rather, it has to come about by multiple case checking. In order for this to occur, a case checking head X must be able to attract more than one KP.<sup>4</sup> More concretely, once X has attracted a KP to its specifier, it must be able to attract a KP of an argument embedded in its specifier.<sup>5</sup> The abstract schema is given in (16).

<sup>4</sup>An alternative would be to assume that there are multiple case checking heads X (Sandhya Sundaresan, p.c.), each of which checks one KP. This solution is discussed in section 3.3, where it is shown that an analysis involving multiple case heads needs additional assumptions to predict case stacking in the correct contexts.

<sup>5</sup>This seems to violate the Freezing Condition on movement which says that a moved constituent becomes an island for movement. Caha (2009: 47) discusses Freezing and argues that what holds is the *Criterial Freezing* Condition of Rizzi (2007) that forbids movement of a category X that has already reached a criterial position, but permits subextraction out of X. The peeling theory of movement is thus another example where the Criterial Freezing Condition holds.

(16)



The final assumption concerns spell-out of the case markers. I assume that the spell-out rules must be able to distinguish between checked and unchecked cases. As will be shown below, the distinction correctly predicts which spell-out rules have to apply. Furthermore, the distinction is crucial to allow pied-piping in case movement. In what follows, I will label checked cases with a superscript ✓, as exemplified in (16). With these assumptions in place, I turn to two examples of overt case stacking.

### 3.2. Overt case stacking: Huallaga Quechua and Ngiyambaa

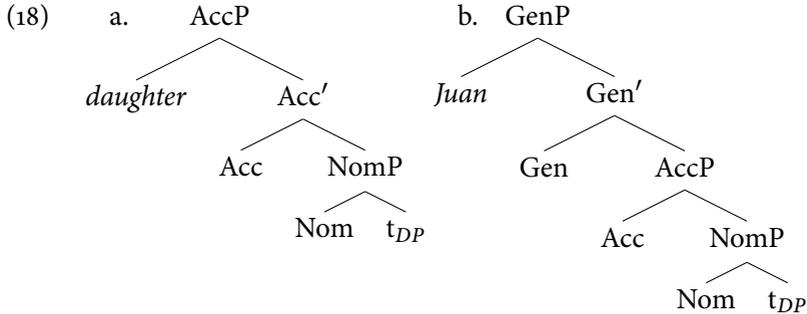
#### 3.2.1. Huallaga Quechua

The first instance of case stacking comes from Huallaga Quechua. The relevant example is given in (17).

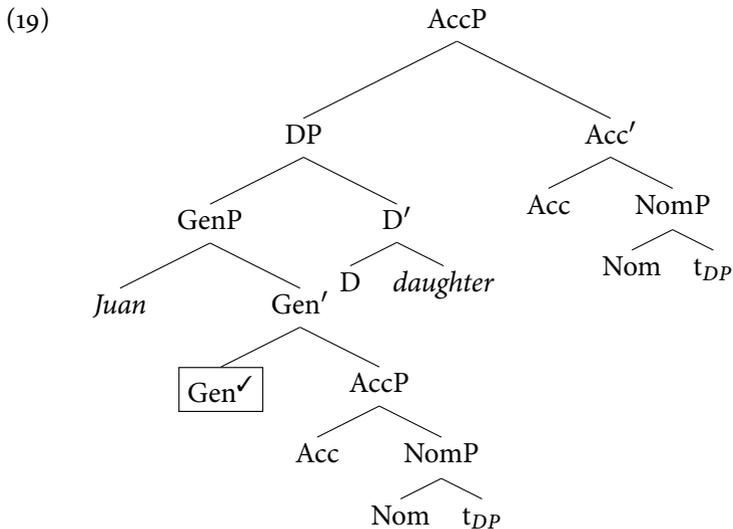
- (17) hipash-nin-ta            kuya-: Hwan-pa-ta  
 daughter-3POSS-ACC love-1 Juan-GEN-ACC  
 ‘I love Juan’s daughter.’

(Plank 1995: 47)

In (17), the possessum *daughter* is the direct object and bears the accusative. The possessor *Juan* bears the genitive and additionally the accusative in agreement with the possessum. (18) shows the KPs of the relevant nominal phrases *daughter* and *Juan*. The DPs have moved to the highest KP since, in Quechua, case markers are suffixes.

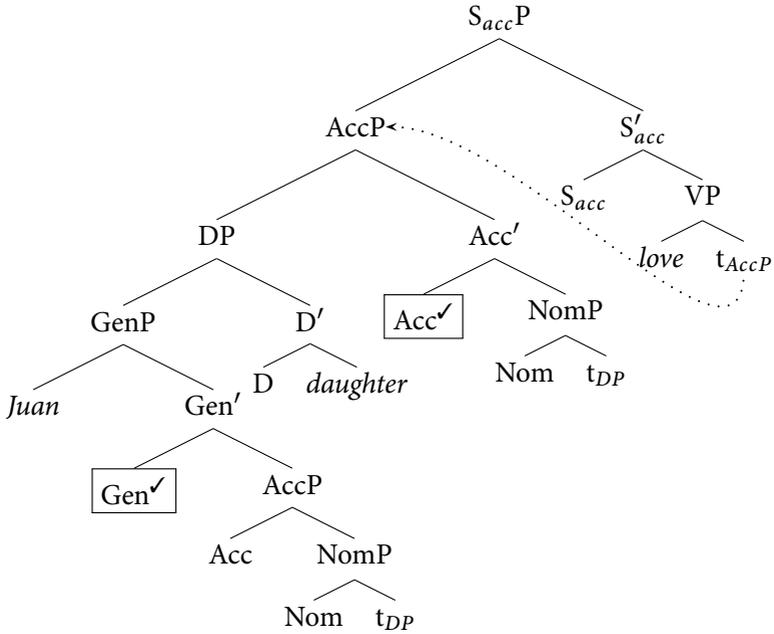


By assumption, the possessor in (18b) is merged as the specifier of the DP in (18a), where the genitive case is checked by D. The structure is shown in (19).



This entire  $\text{AccP}$  is merged in the object position of *love* and moves for case reasons into the specifier of a case checking head  $S_{acc}$  above VP.

(20)

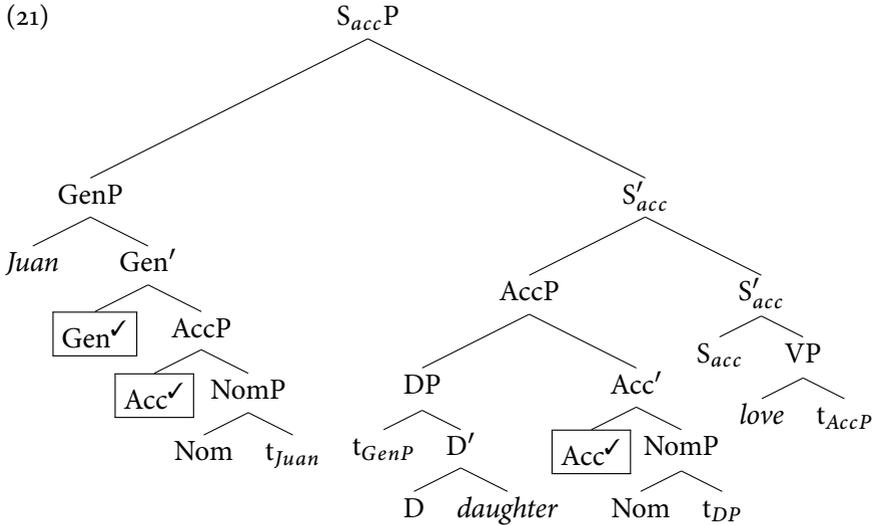


Now, since Quechua is a case stacking language, the  $AccP$  of the possessor *Juan* must move into  $Spec-S_{acc}$  as well. (Note that by assumption,  $Spec-S_{acc}$  allows multiple specifiers.) In the end, both the genitive and the accusative marker should show up on the possessor  $DP$ . In order to get this result, I suggest that movement of a  $KP$  in Quechua to a target case position involves pied-piping of higher  $KPs$ .<sup>6</sup> Pied-piping of the  $GenP$  in (20) is shown in (21). Note that the accusative can be checked by  $S_{acc}$  since the only case head between  $Acc$  and  $S_{acc}$  is  $Gen$ , which has already been checked and thus does not intervene for case checking of  $Acc$ .

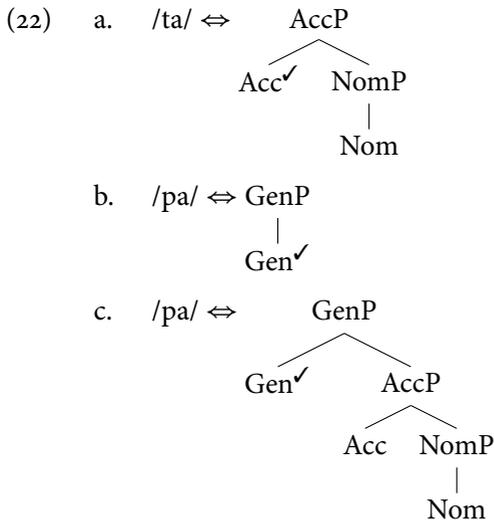
<sup>6</sup>Note that a mechanism of pied-piping must be available independently for standard cases of pied-piping such as (i), where an embedded  $wh$ -phrase drags along the dominating  $DP$ .

(i) Whose mother was born in England?

I will remain silent about the concrete implementation of pied-piping in a nanosyntactic framework and simply assume that some mechanism is available. See Ross (1967) for the phenomenon and Heck (2004) and references cited therein for theoretical approaches to pied-piping.



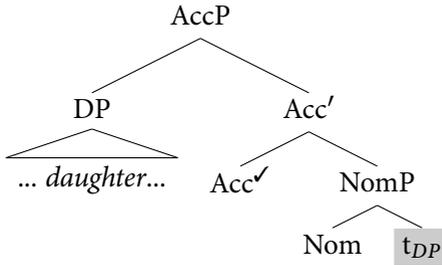
The resulting syntactic structure has to undergo spell-out now. The relevant spell-out rules for Huallaga Quechua are given in (22).



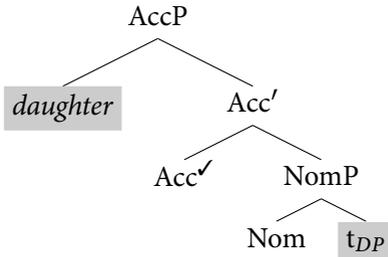
(22a) is the rule for the accusative marker /ta/. Note that the spell-out rule can only apply to checked accusative. This guarantees that case stacking only applies in configurations where two cases have been checked. Otherwise we

would expect Quechua to have compound case markers. The rules in (22b) and (22c) are two rules for the genitive marker /pa/. The rule in (22c) is a general rule, which applies whenever there is no case stacking. The rule (22b) is the rule for the case stacking configuration in (21). When (22a) applies due to case checking of the embedded AccP, the spelled-out AccP becomes invisible and only the checked case feature Gen remains to be spelled out. (Note that (22c) cannot spell out this structure due to the Anchor Condition.) At this point, the rule (22b) can apply. The spell-out of the two DP's is shown in (23)–(24).

(23) a.



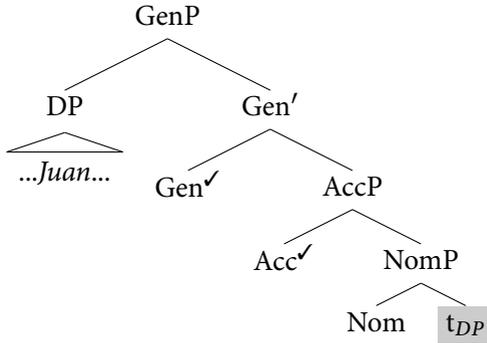
b. ⇒ Spellout DP



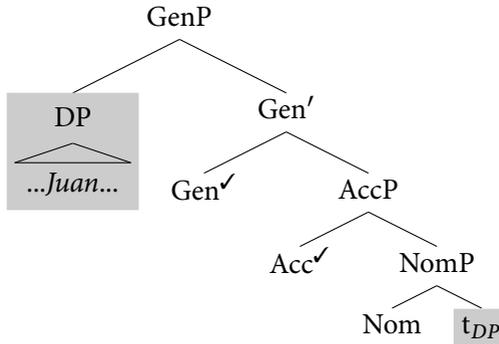
c. ⇒ Spellout AccP (22a)

*daughter-ta*

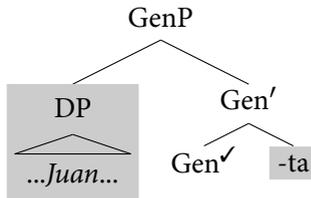
(24) a.



b. ⇒ Spellout DP



c. ⇒ Spellout AccP (22a)



d. ⇒ Spellout GenP (22b)

Juan-pa-ta

Finally, it should be noted that case stacking in Huallaga Quechua can only occur if the possessum and the possessor are separated. This follows directly from the analysis above: Movement of the possessor to Spec-*S<sub>acc</sub>* will lead to case stacking on the one hand, but also to separation from the possessum on

the other hand. Once the two are separated, the possessum can move freely as a remnant category to its target position.<sup>7</sup>

### 3.2.2. *Ngiyambaa*

While Quechua exhibited an instance of case stacking where a case high on the case hierarchy (accusative) stacks on a low case (genitive), *Ngiyambaa* exhibits an instance of case stacking where a low case stacks on a high one. The relevant example is given in (25).

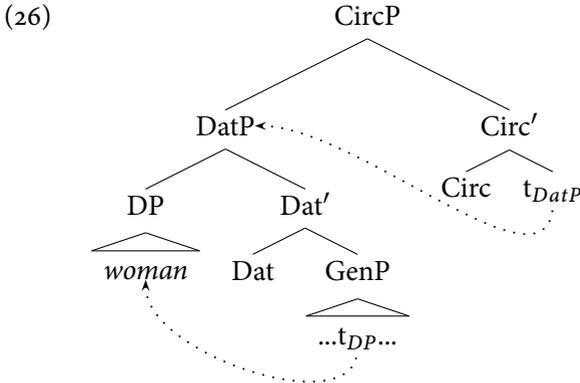
- (25)    *ɲadhu*    *gijanhdha-nha* *ɲidji-la:*    *winar-gu-dhi*    *miri-dji*  
 1SG-NOM fear-PRES    this.CIRC-EST woman-DAT-CIRC dog-CIRC  
 ‘I am frightened of this woman’s dog.’  
 (Donaldson 1980, Schweiger 2000: 258)

In (25), the possessor *woman* bears not only the possessive case dative but additionally the circumstantive of the possessum *dog*.<sup>8</sup> Since the circumstantive is a semantic case, it must be lower on the case hierarchy than the dative. For the nanosyntactic case theory, this means that the circumstantive is merged higher than the dative. To keep the derivations as simple as possible I will assume that the circumstantive is directly above the dative in the case sequence. Nothing hinges on this assumption.

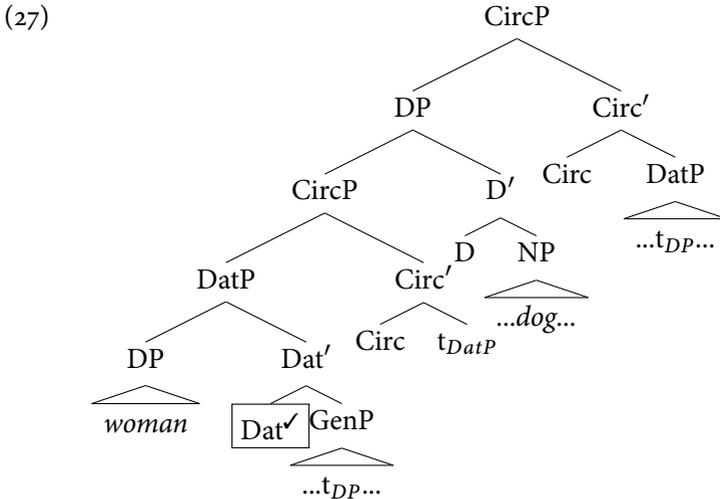
The derivation of (25) begins with the possessor. The possessor is generated as a CircP since this case needs to be checked later. Within the CircP, the DP moves into the specifier position of the possessor case dative. Afterwards, the DatP moves into Spec-CircP. This movement is necessary because the dative must be checked by the D head in the possessive DP. If the DatP did not move, the unchecked circumstantive, which cannot be checked by D, would intervene for case checking of Dat. The structure is given in (26).

<sup>7</sup>In other case stacking languages, possessor movement might be banned due to other constraints. On the other hand, there are languages without overt case stacking that allow the separation of possessor and possessum, e.g. Udmurt (see Assmann et al. 2014: 472). At this point, I cannot offer a full-fledged solution to this problem. First, the correlation between case stacking on possessors and possessor movement needs to be studied in more detail. Then, it has to be examined whether the generalization to be found is compatible with the nanosyntactic approach to case stacking presented in this paper. I leave these issues to future research.

<sup>8</sup>The circumstantive marks the dog as being the reason for the fear of the woman.

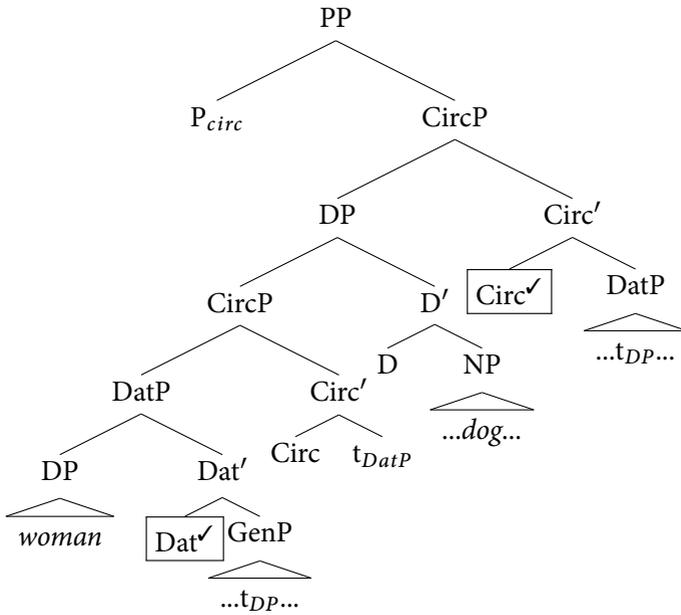


Next, the CircP in (26) is merged as the specifier of *dog*, where the possessor case dative is checked by D.



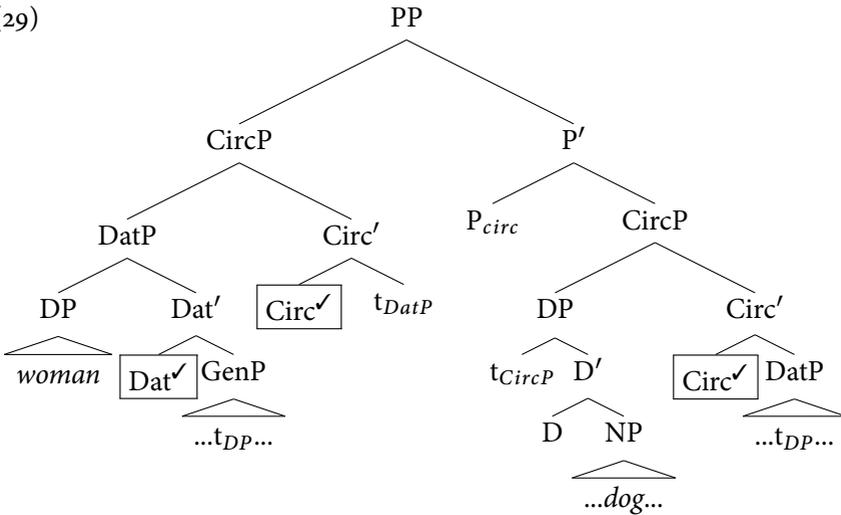
By assumption, semantic cases are checked by empty prepositions. Again, nothing hinges on that. The CircP in (27) is merged as the complement of such a preposition and gets its Case checked.

(28)



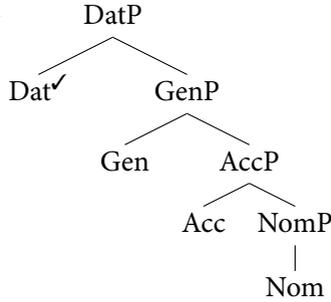
Afterwards the CircP of the possessor moves to Spec-PP and the Circ head gets checked.

(29)



Finally, the structure must be spelled-out. Like in Quechua, all checked cases must be realized separately. The spell-out rules for the case markers in (29) are given in (30). Again we have at least two lexical entries for the circumstantive marker: (30b) applies in case stacking configurations, while (30c) applies in non-stacking configurations.<sup>9</sup>

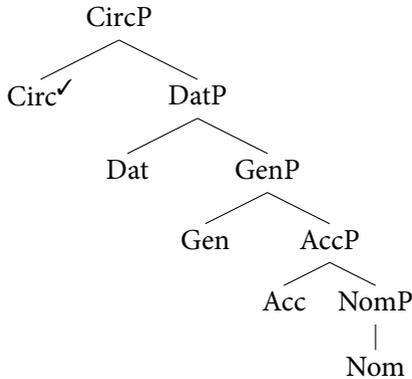
(30) a. /gu/ ⇔



b. /dhi/ ⇔ CircP



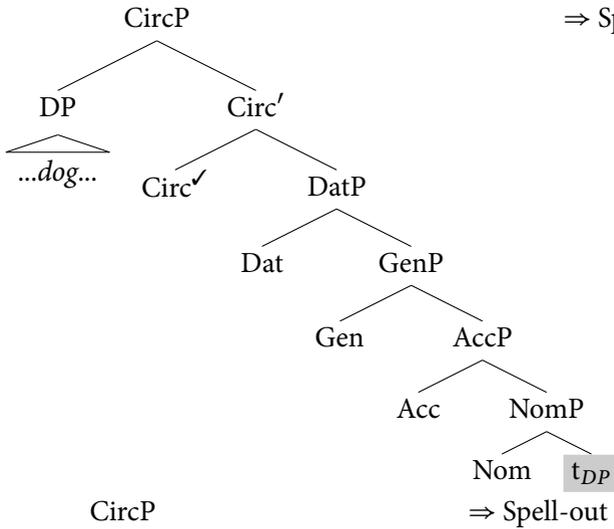
c. /dhi/ ⇔



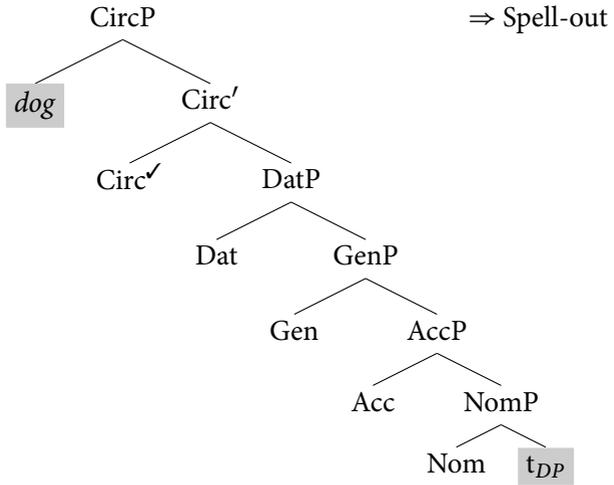
The spell-out proceeds similar to the spell-out in Quechua. We start with the possessum phrase.

<sup>9</sup>Note that the markers /dhi/ and /dji/ in (25) are allomorphs. The rules in (30b) and (30c) are meant to stand for the abstract morpheme.

(31) a. ⇒ Spell-out DP



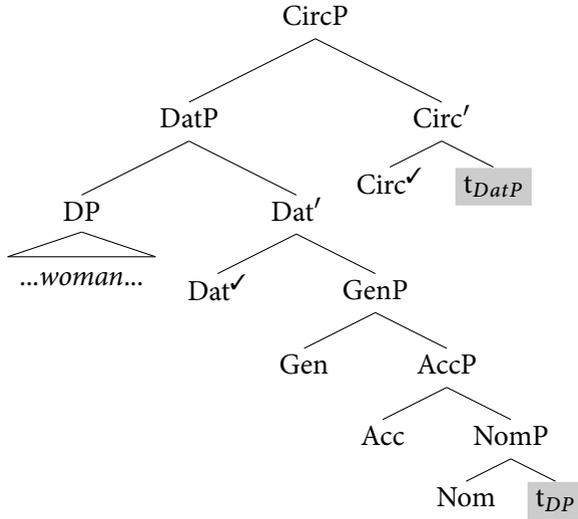
b. ⇒ Spell-out CircP (30c)



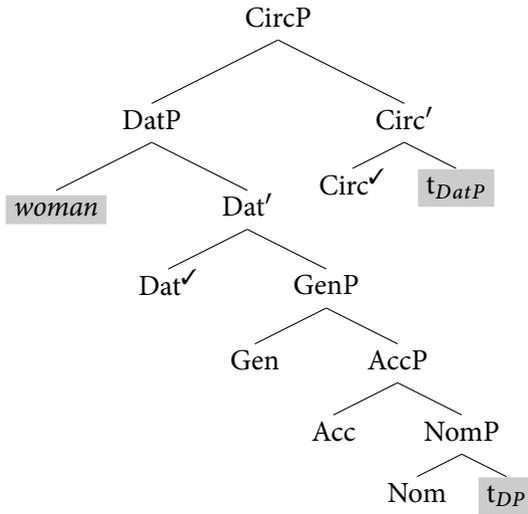
c. dog-dhi

First, the DP *dog* is spelled out. Afterwards, the rest of the *CircP* is realized by the circumstantive marker /dhi/ according to (30c). The spell-out of the possessor is shown in (32).

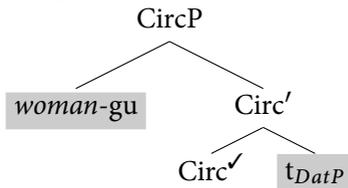
(32) a.



b. ⇒ Spell-out DP



c. ⇒ Spell-out DatP (30a)



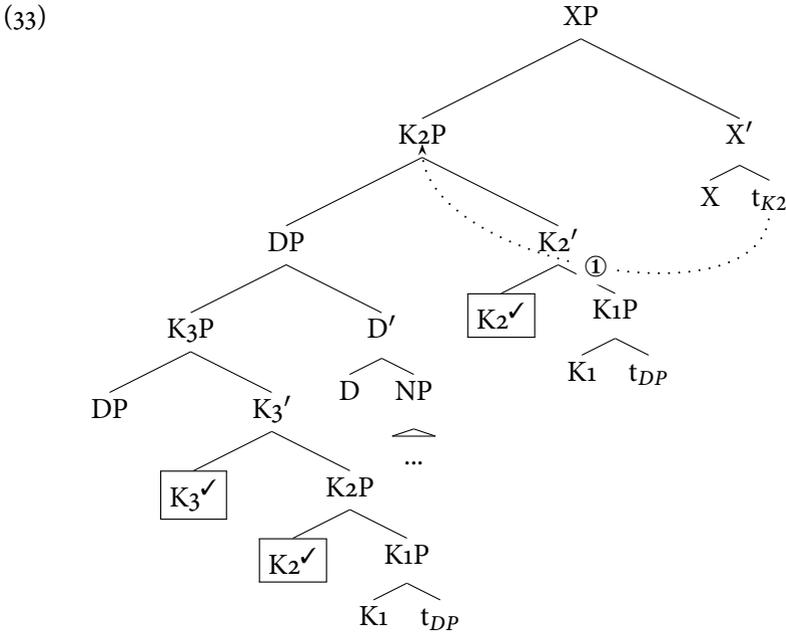
- d. ⇒ Spell-out CircP (3ob)  
woman-gu-dhi

Again, the DP *woman* is spelled-out first. Then, the rule in (30a) can apply, because the dative case has been checked in syntax. The remaining CircP must be spelled out by rule (3ob).

### 3.3. Discussion

This concludes the analysis of overt case stacking. The analysis essentially builds on the idea that case stacking comes about by multiple movement of KPs to the specifier of one case checking head. Overt case stacking results, if movement to a second case position pied-pipes the entire KP and if the two checked cases are realized with different markers.

There are, however, two alternatives to the present analysis. The first one involves case checking *in situ*. The assumption here is that a head checking case C can check any C head in its specifier. Therefore, multiple case movement is not needed. The abstract scheme is given in (33).



In (33), the head X checks the case K<sub>2</sub>. The higher K<sub>2</sub>P moves to Spec-X. In this position, both the higher and the lower K<sub>2</sub>P can be checked.

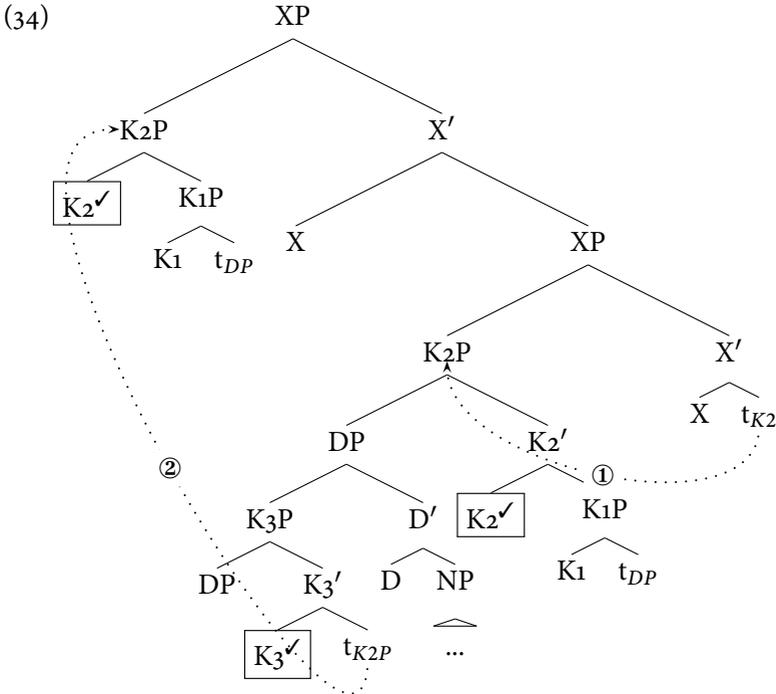
A potential problem with this approach concerns parametrization. In the analysis developed in section 3.1, the parameter between case stacking and non-case stacking languages involves the number of possible specifiers of a case checking head: In case stacking languages, a case checking head can have multiple specifiers. In languages that do not exhibit case stacking, only one specifier is allowed.<sup>10</sup> In the alternative analysis in (33), however, the parameter concerns a syntactic principle, namely in which configurations a head can check case: In case stacking languages the entire KP in specifier position, including embedded KPs, is visible to the case checking head, but in non-case stacking languages, only the highest KP is visible. While the parameter in the multiple specifier analysis can be modeled as a difference in the properties of a syntactic head, the *in situ* alternative requires the parametrization of a syntactic principle.

However, assuming that the Borer-Chomsky-Conjecture about linguistic variation (all variation is restricted to the lexicon, primarily to properties of inflection, see Chomsky 2001, Borer 1984, Baker 2008) also holds for the nanosyntactic approach, the latter way of parametrization is less than desirable.

A second alternative to the present multiple specifier approach to case stacking involves the presence of multiple case checking heads. The alternative is sketched in (34).

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<sup>10</sup>This is reminiscent of the distinction between single and multiple wh-movement, as in English vs. Bulgarian (see Richards 1997).



First of all, it should be mentioned that the analysis in (34) does not represent the generalization about case stacking that the embedded DP receives the same case as the dominating DP. In (34), the embedded and the dominating K2P are checked by two different heads. It is more or less a coincidence that they are identical.

It is also more difficult in this approach to account for restrictions of case stacking. In many case stacking languages the number of cases that can stack is limited, e.g. in Thalanyii in (35) (Austin 1995: 373). In Thalanyii, at most two case markers can show up.

- (35) juma jirrilarri-a thuthu-wu nganaju-wu yakan-ku-wu  
 child.ABS be.afraid-PRES dog-DAT I.DAT-DAT spouse-DAT-DAT  
 ‘The child is afraid of my wife’s dog.’

While the number of specifiers can be determined locally within a phrase, a restriction of the number of identical phrases requires a less local principle. Again, it seems that the multiple specifier approach is superior.

This concludes the discussion of two possible alternatives. In the next sec-

tion, I will turn to an instance of abstract case stacking in Udmurt and show that it can be derived with the same means as overt case stacking.

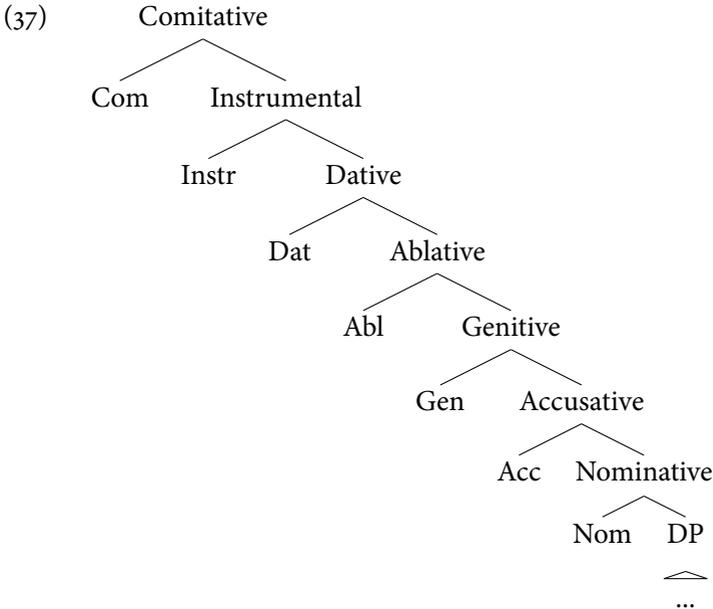
#### 4. Udmurt: an instance of abstract case stacking

As shown in Assmann et al. (2014), Udmurt exhibits a case split on the possessor between genitive and ablative case. The concrete case of the possessor depends on the case of the possessum: If the possessum bears accusative case, the possessor is marked for ablative case. In all other cases, the possessor bears genitive case. This is an interesting problem for theories of case assignment because, derivationally, the case of the possessum is determined after the case of the possessor. This leads to a look-ahead problem. Assmann et al. (2014) argue that this case split can be reanalyzed as an instance of abstract case stacking: The possessor always receives the same possessive case (genitive) but additionally receives the case feature of the dominating DP. Certain morphological constraints and rules lead to a postsyntactic manipulation of the case features which change the contexts for vocabulary insertion. Concretely, if a possessor bears genitive and accusative case, its case features must be realized by the ablative marker. All other case combinations are realized with the genitive marker. In what follows, I show that the case split can be analyzed in the nanosyntactic approach as case stacking as well. This corroborates the case stacking analysis of Udmurt since the main idea of the analysis seems to be independent of the concrete morphosyntactic framework. The relevant data are given in (36).

- (36) a. so-len/\*leš anaj-ez siče ug dišaški  
 he-GEN/ABL mother-3SG such dress NEG.PRES.3  
 ‘His mother does not dress in such a way.’  
 (Edygarova 2009: 105)
- b. so-\*len/leš eš-s-e ažži-ško  
 he-GEN/ABL friend-3SG-ACC see-PRES.1SG  
 ‘I see his friend.’ (Edygarova 2009: 101)
- c. mon [ Petyr-len/\*leš puny-jez-leš ] mözm-is’ko  
 1SG Peter-GEN/ABL dog-3SG-ABL miss-PRES.1SG  
 ‘I miss Peter’s dog.’ (Assmann et al. 2014: 453)
- d. Petyr Masha-len apaj-ez-leš puny-z-e zhug-i-z  
 Peter Masha-GEN sister-3SG-ABL dog-3SG-ACC beat-PST-3SG  
 ‘Peter has beaten Masha’s sister’s dog.’  
 (Assmann et al. 2014: 454)

(36a) shows that the possessor bears genitive case if the possessum is the subject. In (36b) the possessor bears ablative because the possessum is marked for accusative case. (36c-d) show that the ablative on the possessor in (36b) is indeed due to the accusative of the possessum: if the object is marked with any other case, even the ablative as in (36c), the possessor receives genitive case. (36d) shows that in multiple possessor constructions, only the highest possessor is marked ablative in line with the generalization that the DP directly dominating an ablative possessor must bear accusative.

The first assumption for an account of the case split in Udmurt concerns the ablative case feature. In Caha (2009: 16), the ablative and the locative case are not included in the universal case hierarchy. Thus, it is reasonable to assume that their position in the case hierarchy is language-specific. I assume that the ablative in Udmurt is located right above the genitive in the functional sequence (cf. Caha 2009: 213 for a similar case hierarchy for Armenian). This captures the fact that the ablative in Udmurt functions as the default semantic case that occurs whenever there is no more specific semantic case feature. (Nominative, accusative, and genitive are structural cases in Udmurt.) This will be important in section 4.2 when the case split is discussed.



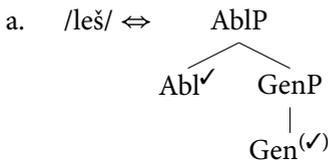
Next, just as in Huallaga Quechua and Ngiyambaa, objects are base-generated with an appropriate case. For Udmurt that means that ablative assigning verbs take Abl-PPs as complements (assuming that semantic cases are checked by prepositions), accusative assigning verbs take AccPs, etc. Furthermore, all case markers in Udmurt are post-nominal (including adpositions), thus, following the general logic of the nanosyntactic approach, the DP in Udmurt moves into the highest case layer in the respective KP.

To simplify the derivations below, I assume that all cases except the accusative and the nominative are checked in situ. (Nothing hinges on that.) The accusative and nominative case are checked by movement to the specifier position of case checking heads  $S_{acc}$  and  $S_{nom}$ .

In order to derive the effects of case stacking and to stay as close as possible to the minimalist analysis in Assmann et al. (2014), I assume that both case checking heads  $S_{acc}$  and  $S_{nom}$  are present in every active transitive structure. (In the passive and in intransitive clauses,  $S_{acc}$  is missing.) Like in other case stacking languages, these two case heads are able to check more than one case.

Finally, the reason why we don't observe overt case stacking in Udmurt is that there is no pied-piping in Udmurt. Instead movement in order to check a second case strands higher KP-shells including the DP. Since the case markers in Udmurt are suffixes and as such morphologically dependent on a DP, a moved KP without a DP cannot be realized. Instead, only the stranded KP, which contains the DP, is morphologically realized. This leads to the absence of overt case stacking in Udmurt. The lexical entries for Udmurt are given in (38). Despite the ablative, only one other semantic case is listed in (38), which should illustrate the general scheme. Crucially, the ablative is the most specific semantic case and can only be inserted in the environments  $[_{AblP} D [_{GenPC}]]$  and  $[_{GenPC}]$ . Thus, the ablative will always out-rank the other semantic cases due to the Elsewhere Condition (7). This is in line with the default character of the ablative.

(38) *Lexical Entries*



- b. /li/  $\leftrightarrow$
- ```

      DatP
     /  \
  Dat✓  AblP
         /  \
        Abl  GenP
           |
          Gen
  
```
- c. /len/  $\leftrightarrow$
- ```

      GenP
     /  \
  Gen✓  AccP
         |
        Acc
  
```
- d. /ez/  $\leftrightarrow$
- ```

      AccP
     /  \
  Acc✓  NomP
         |
        Nom
  
```
- e. /∅/  $\leftrightarrow$  NomP
- ```

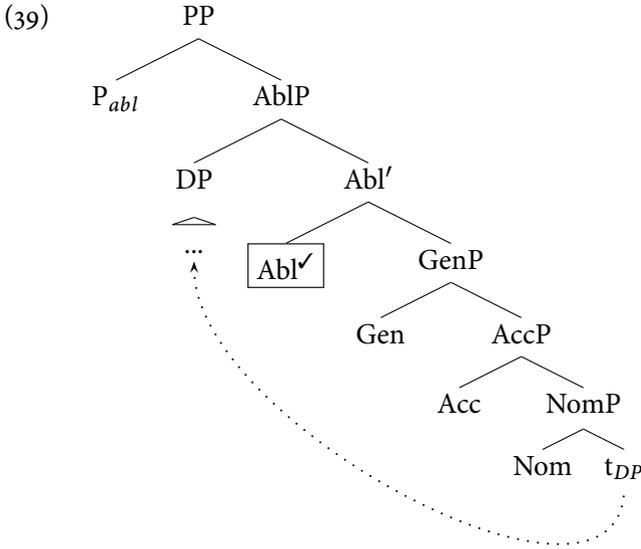
      |
     Nom✓
  
```

Note that the marker /leš/ in (38a) is insensitive to whether the genitive case is checked or not. Thus, it can be said, that the entry is underspecified for whether Gen is checked or not. This will be important for the derivation of the case split on the possessor in section 4.2. But first, 4.1 shows how case checking of syntactic arguments in Udmurt proceeds in general.

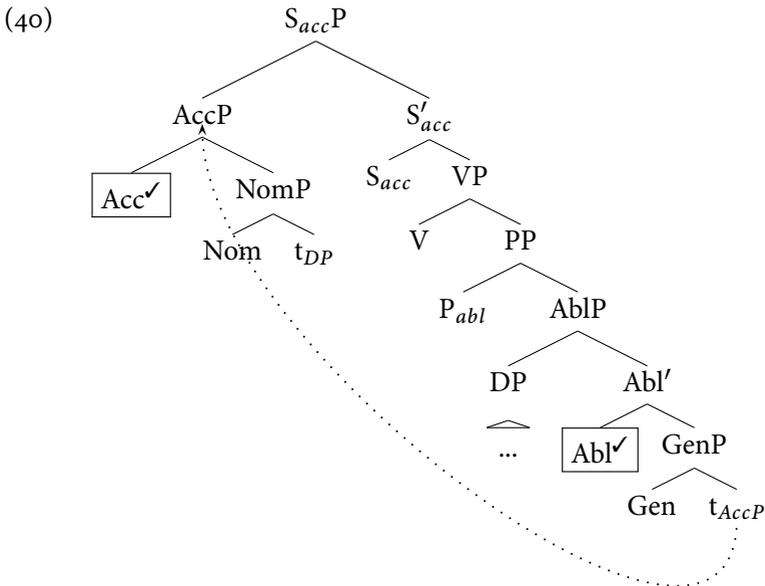
#### 4.1. Case checking of syntactic arguments

The first derivation I would like to illustrate is a structure where a verb takes an ablative object. First, a DP with an AblP on top is base generated. Since the ablative is a suffix, the DP moves above AblP. This AblP is merged with an empty preposition  $P_{abl}$ , which checks the case head Abl.<sup>11</sup>

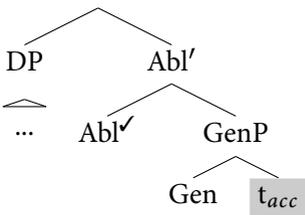
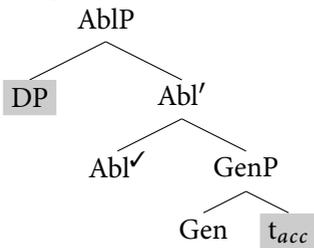
<sup>11</sup>Note that the ablative is a semantic case. By assumption, all semantic cases are checked by prepositions. Nothing hinges on that.



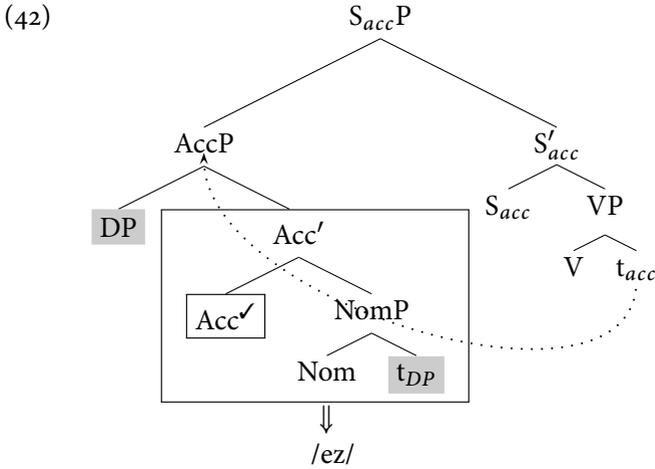
Next, the verb and the obligatorily present case checking head  $S_{acc}$  are merged. The AccP inside the PP moves to the specifier of  $S_{acc}$ , stranding AblP including the DP. The feature of AccP is checked.



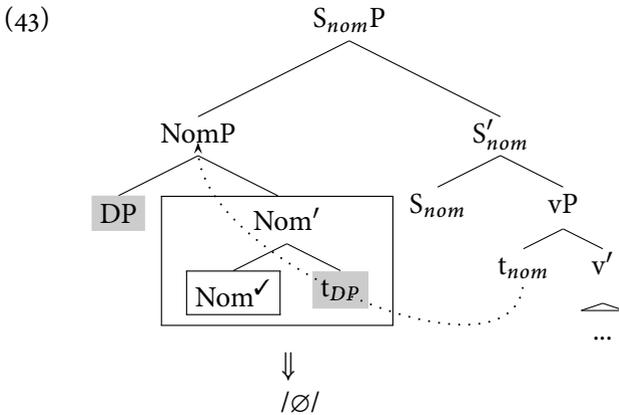
The stranded AblP is now morphologically realized using the rule in (38a).

- (41) a. 
- b. ⇒ Spellout DP  

- c. ⇒ Spellout AblP (38a)  


Next, we turn to a derivation with an accusative object. Here, the DP is base-generated with an AccP on top. Again, the verb and the case checking head  $S_{acc}$  are merged and AccP moves to the specifier of  $S_{acc}$ , stranding nothing behind. The case head Acc of AccP is checked and AccP is morphologically realized by /ez/ according to the rule in (38d).

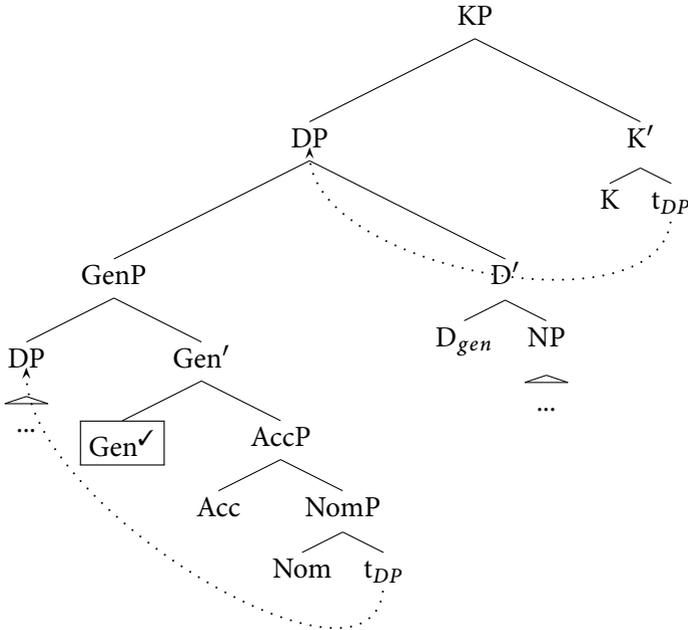


Similarly, subjects are base-generated with a NomP on top and check their case by movement to the specifier of a case checking head  $S_{nom}$ . NomP is realized by  $/\emptyset/$  according to (38e).



Finally, genitive case checking proceeds as follows. A possessor with a GenP on top is base-generated as the specifier of its possessum. The D-head of the possessum checks the genitive case of the possessor. The entire possessive DP is moved to the specifier of the highest case layer (here KP) of the possessum. In the following section, KP will be replaced by concrete case layers and we will see how this affects further case assignment and case feature realization.

(44)

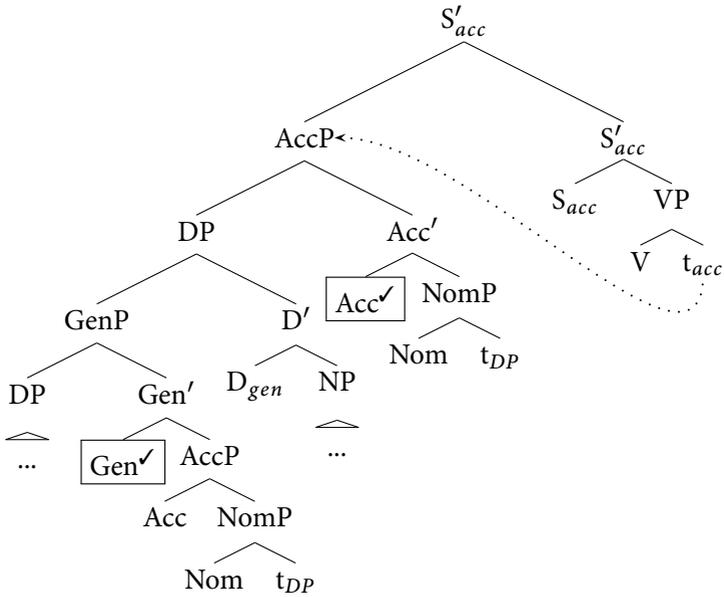


So far, we have seen simple instances of case checking. No case stacking applied so far. The next section shows how abstract case stacking, that is, multiple case movement, can derive the case split in Udmurt. Since Udmurt does not exhibit overt case stacking, one KP of an argument – the one containing the DP – is spelled-out.

#### 4.2. The case split on the possessor

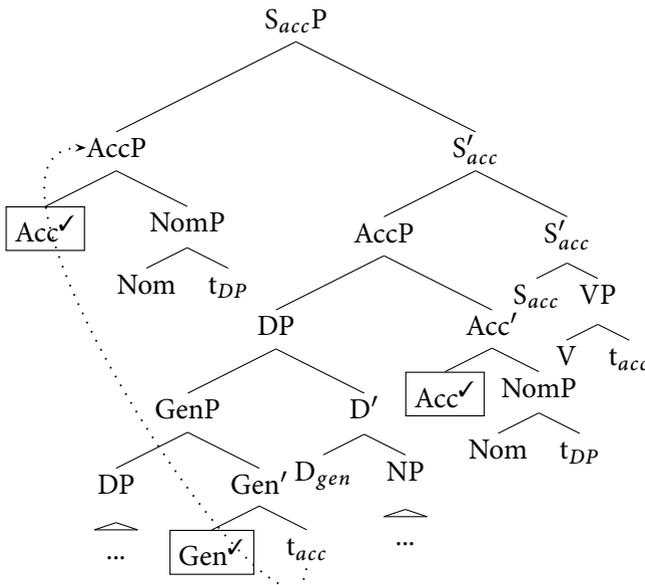
Let's begin with the case where a DP is the possessor of an accusative argument. As in the derivation in (42), the entire AccP, this time including the possessor in its specifier, is moved and checks its accusative case feature against the head  $S_{acc}$ .

(45)

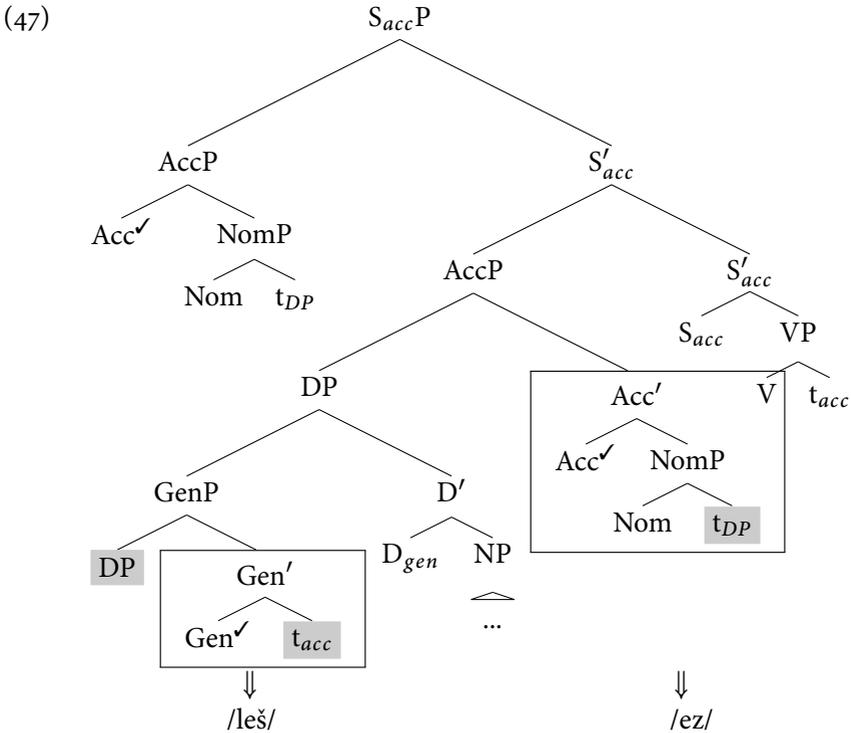


Now, the AccP of the possessor can move to Spec- $S_{acc}$  and checks its accusative case feature.

(46)



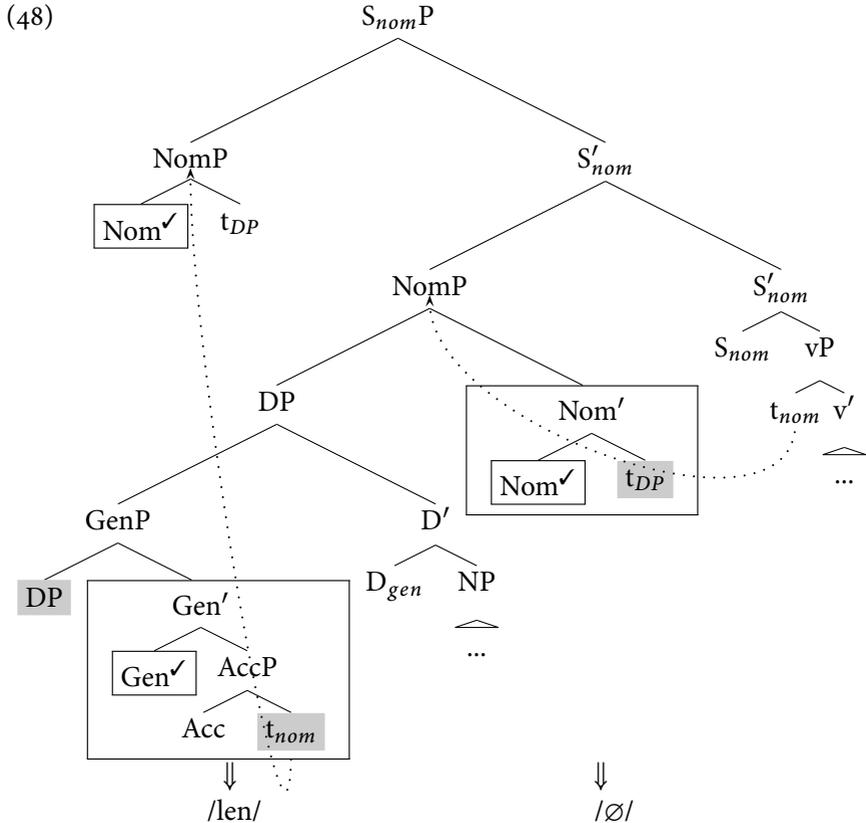
In Spell-out, both the case features of the possessum and the possessor must be realized. The case of the possessum is straightforward: it must be /ez/, just as in (42). The case marker of the possessor must by assumption realize the stranded GenP. (The moved AccP does not contain a DP.) Since the genitive marker in (38c) does not fit (due to the Anchor Condition in (8)), the ablative case rule in (38a) must do the job.



This derives one part of the case split in Udmurt. Due to multiple case checking of the possessor, the configuration inside the GenP of the possessor changes in a way that only the ablative marker can be inserted. So abstractly, Udmurt exhibits case stacking. However overtly, Udmurt only realizes the stranded KP. Thus, there is no multiple case marking on the possessor, which points to overt case stacking.

If a DP is the possessor of a nominative possessum, the realization of the case features must involve other rules. In the syntax, the entire NomP including the possessor is moved and checks its nominative case feature against the

head  $S_{nom}$  (cf. (43)). Next, the NomP of the possessor can move and check its nominative case feature. The case of the possessum must be realized by  $/\emptyset/$ , analogous to (43). The possessor can, in contrast to (47), be realized by the matching genitive marker  $/len/$  in (38c). The NomP that moved out of the possessor is not realized because it does not contain a DP.



This derives another part of the case split in Udmurt. Similar to the abstract case stacking of genitive and accusative in (47), we have abstract case stacking of genitive and nominative in the derivation in (48). But this time, the spell-out rule for the genitive marker applies.

The final part to derive the case split are configurations where case stacking is blocked. Not all possessors of objects are marked with ablative case. If the possessum bears a case other than accusative, the possessor is marked for

genitive case. In what follows, I will show that this genitive marking is due to blocking of case stacking. As shown below, the configuration for case stacking is only given if the case of the possessum is accusative or nominative (cf. the derivations in (47) and (48)). This is partly due to the case sequence in (37): Possessors are always GenPs. In the case sequence in (37), the only KPs that can move out of this GenP are AccP and NomP. The KPs of the semantic cases are higher. Therefore, a semantic case cannot stack on the genitive.

But assuming that the case checking heads  $S_{acc}$  and  $S_{nom}$  are always present in active transitive clauses, we could in principle have case stacking of genitive and nominative and genitive and accusative in structures where the possessum is a KP higher than accusative. This would lead to the same case split as derived in (47) and (48). To block case stacking here, I assume that, if a case checking head X has specifiers, it can only subextract a second KP from its highest specifier, not from its complement or inner specifiers.<sup>12</sup> The condition is formulated in (49).<sup>13</sup>

- (49) In a configuration  $[_{XP} \alpha [_{X'} \dots X \beta]]$  X may subextract a category only from  $\alpha$ .

If the possessum is a KP that is higher than accusative, the first case checking will target a position that is not in Spec- $S_{acc}$  or Spec- $S_{nom}$ , respectively. Subsequent movement to any of these two position will strand the possessum

<sup>12</sup>The idea resembles to some extent the concept of *cyclic expansion of the search domain* (see Béjar and Řezáč 2009: 49).

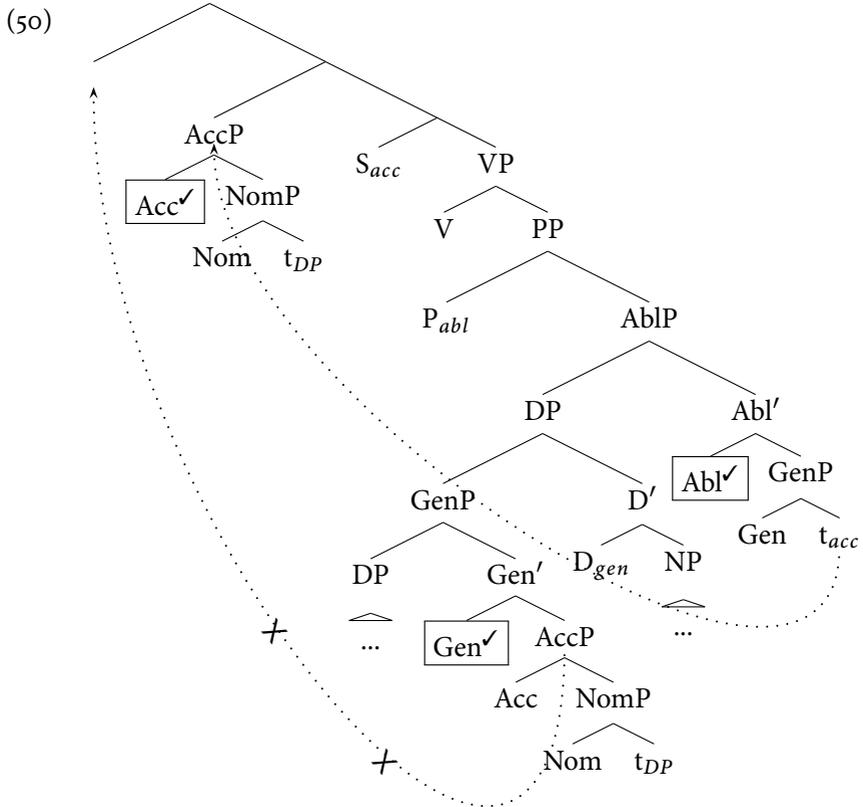
<sup>13</sup>This constraint might follow if it is assumed that the search domain of an attracting head X is subject to the strict cycle condition Chomsky (1973). Under a certain understanding of the SCC, a second search in the complement of X would violate the SCC, since it is not the root node that is affected. The configurations are shown in (i).

- (i) a.  $[_{XP} X [ \dots \alpha \dots ]]$   
       b.  $[_{XP} \alpha [_{X'} X [ \dots t_\alpha \dots ]]$   
       c.  $[_{XP} \alpha [_{X'} X [ \dots t_\alpha \dots ]]$
- 

In (ia), there is no specifier in the XP. Thus the search of X for a matching goal in the complement affects the entire tree XP. In (ib), a specifier of X has been merged. Now, a search in the complement would violate the SCC since it would only affect a subtree. Therefore, as shown in (ic), X has to search in its outermost specifier.

DP, which contains the possessor. Thus, the possessor is not in the outermost specifier of  $S_{acc}$  or  $S_{nom}$ . Therefore, the AccP or NomP of the possessor is not visible to  $S_{acc}$  or  $S_{nom}$ , respectively, and case stacking is blocked.

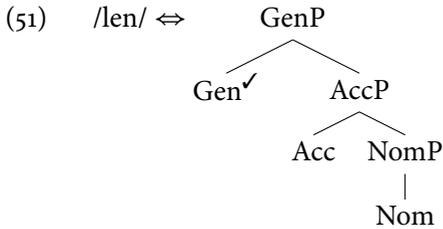
The first configuration where case stacking is blocked is a configuration where the possessum bears a semantic case like, for example, the ablative. The structure is shown in (50).



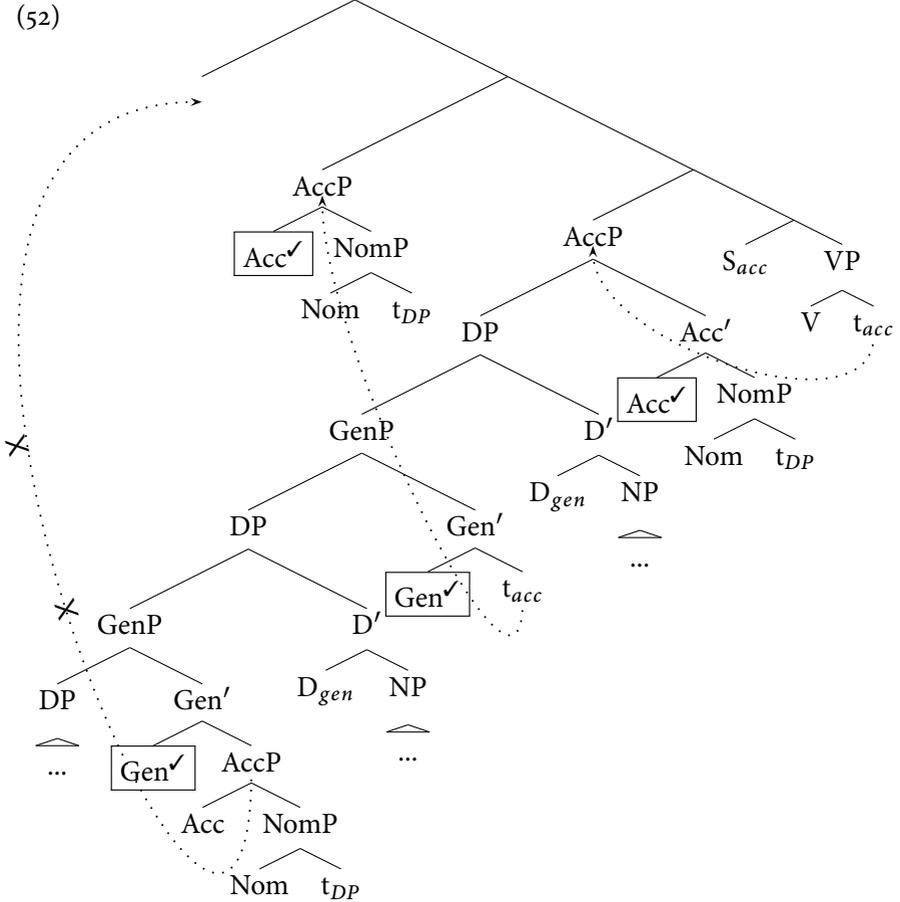
Here, the AccP inside the possessor cannot move to Spec- $S_{acc}$  because the dominating KP of the possessum is not a specifier of  $S_{acc}$ . At the point when  $S_{acc}$  has attracted the AccP of the possessum to its specifier, only this AccP is visible to  $S_{acc}$ . But since this AccP does not contain another AccP,  $S_{acc}$  cannot attract a second specifier.

When it comes to spell-out of the possessor's case marker, none of the rules in (38) applies because the context is not given due to the Anchor Condition in

(8). Therefore, we must add a third lexical entry for the genitive marker /len/, that applies when no case stacking takes place. The GenP of the possessor in (50) is realized with the genitive marker /len/, if we add the following lexical entry.



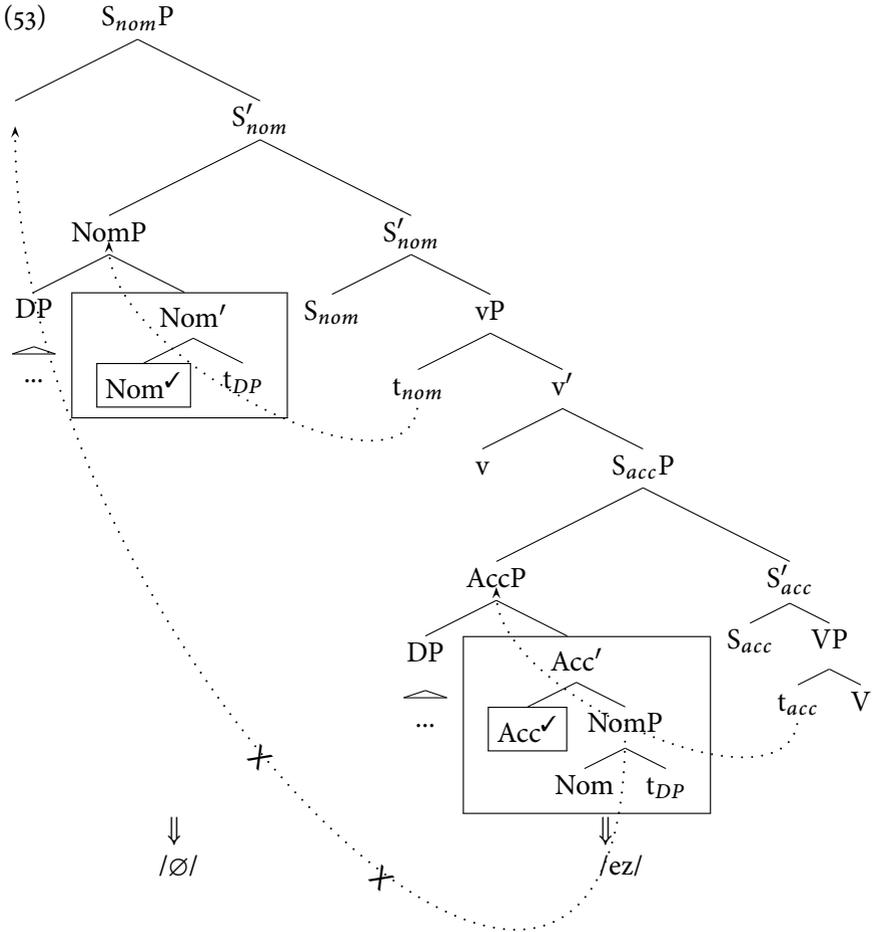
The next blocking configuration involves multiple possessors as illustrated in (52).



Similar to the derivation in (51), the AccP of the most embedded possessor cannot move to Spec- $S_{acc}$  because its possessum, which is the higher possessor, is not in the highest specifier of  $S_{acc}$ . When the AccP of the higher possessor moves to Spec- $S_{acc}$ ,  $S_{acc}$  can only search in this AccP. But since it doesn't find another AccP, no case stacking takes place. The GenP of the lower possessor must be realized by the rule in (51), similar to the derivation in (50).

Finally, there is a third configuration where case stacking is blocked, namely in simple transitive sentences with a nominative subject and an accusative object. The reason is the following:  $S_{nom}$  first attracts the NomP of the subject, due to minimality. But then, the search domain of  $S_{nom}$  is restricted to this

NomP. The NomP of the object is not visible to  $S_{nom}$ . The structure is shown in (53).



This concludes the case study of abstract case stacking. I have made a suggestion as to how the case split in Udmurt can be analyzed as abstract case stacking in a nanosyntactic approach. Case stacking in nanosyntax simply means that multiple heads inside one case sequence are checked by movement. This is identical to the derivations of overt case stacking in section 3. The difference between overt and abstract case stacking is whether multiple case movement involves pied-piping or not. In Huallaga Quechua and Ngiyambaa, movement of KPs involved pied-piping of higher and lower KPs, including the DP. Since

the DP was pied-piped, all case suffixes could be realized. In Udmurt, however, further movement of KPs does not pied-pipe other KPs, including the DP. Assuming that the spell-out rules for case suffixes can only apply in the context of a DP, the lack of pied-piping causes leads to the structures, where only the stranded KP that contains the DP can be realized. Overtly, no case stacking shows. Finally, in some configurations, case stacking must be blocked. I have proposed that this is due to a constraint that only the outermost specifier of a head is visible to this head. This restricts the number of contexts for case stacking and correctly block case stacking in Udmurt when the possessum bears a case other than accusative or nominative.

## 5. Conclusion

In this paper, I made a proposal as to how case stacking can be modeled in a nanosyntactic approach to case assignment. The main idea is that a case checking head can attract more than one KP. Combining this with a mechanism of pied-piping such that higher or lower KPs tag along after the target KP, derives overt case stacking as shown for Huallaga Quechua and Ngiyambaa. If multiple case movement applies without pied-piping, abstract case stacking as in Udmurt can be derived. Blocking of case stacking is derived under the assumption that outer specifier positions can only be filled by categories from inside the outermost specifier.

The present analysis confirms the account in Assmann et al. (2014) that claims that Udmurt exhibits an instance of abstract case stacking. It was shown that this idea can be maintained even if a different morphosyntactic framework is used.

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# Opacity in the lexicon: a generative lexicon approach to Korean VV compounds

Ludger Paschen\*

## Abstract

This paper aims at providing a formal description of three types of Korean compounds made up of two verbs (VV compounds) in the Generative Lexicon framework. I will first discuss several properties commonly ascribed to VV compounds and address the problem of identifying lexical VV compounds as opposed to SVCs and similar constructions. I will then argue that the complex semantic structure and the syntactic behaviour of VV compounds in Korean can in some cases be accounted for by performing elementary unification (SIMPLE\_UNIFY) of Generative Lexicon Entries (GLEs). For cases in which SIMPLE\_UNIFY is not applicable, I will propose two additional unification operations – MANNER\_UNIFY and METAPHOR\_UNIFY – and discuss their functioning in detail. In this context, it will be suggested that enriching a verb's QUALIA with specifications for CONST facilitates the resolution of issues brought along by verbs with partially psychological meaning. Finally, it will be argued that the three unification operations can be regarded as instances of opaque interactions in the lexicon since the motivation for overwriting and restructuring that takes place during unification is obscured in the resulting compound GLEs.

## 1. Introduction

Although compounding is a productive means of word formation in most languages of the world, research on compounding has focused mainly on compounds with at least one nominal element and has mostly neglected VV compounds (cf. Lieber and Štekauer 2009). While discussions of *verbal compounds* (or similarly coined terms) are in fact not uncommon in the literature, they often refer to compounds with *one* verbal element. Thus, Roeper and Siegel (1978) use the term *verbal compound* to refer to English compounds such as *oven-cleaner* (this type is also known as *synthetic compound*, e.g. Bauer

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2008), *fast-acting* or *church-goer*, i.e. to a class of compounds that are built after the highly productive pattern ‘argument/adjunct + verb (+ conversion affix)’ in English. Scalise and Bisetto (2009) try to resolve the confusion that the ambiguous term *verbal compound* brings about by using the term *verbal-nexus compound* for classifying mono-verbal compounds such as the endocentric *taxi driver* and the exocentric *lavapiatti* (Italian, ‘dish-washer’).

This paper is concerned with yet another type of verbal compounds, viz. compounds consisting of *two* verbal elements. Examples of such VV compounds are Japanese *kami-kiru* (bite-cut) ‘to bite through’ (Gamerschlag 2005: 11) or Korean *ttwi-nolda* (jump/run-play) ‘to frolic’. However, it is important to note that not every construction involving two verbs is to be considered a VV compound. Thus, many serial verb constructions (SVCs) resemble VV compounds in the way meaning is built up and the component verbs’ arguments are handled (Li 1990, Collins 1997, Nishiyama 1998). In some languages, certain SVCs can also be very frequent in use, which further obfuscates the distinction between constructions with delexicalised verbs, SVCs with two full verbs, and quasi-lexical idiomatic constructions (e.g. Zavala 2006: 287-289). This means that it is often far from self-evident where to draw the line between complex predicates that are constructed at some (later) level in the syntactic derivation and “true” VV compounds that are stored in and drawn directly from the lexicon. Therefore, any attempt to address the problem of compositional building of VV compounds from a lexicalist point of view should provide arguments for why the constructions under discussion are to be treated as lexical units.

This paper is structured as follows. In chapter 2, I will discuss a number of criteria relevant for distinguishing lexical VV compounds from other constructions involving two (or more) verbs. Chapter 3 then presents the major morphological classes of compounds in Korean and discusses several types of verbal compounds. In chapter 4, an analysis of the semantic compositionality of three Korean VV compounds belonging to the stem-stem class is given. The analysis is carried out in the Generative Lexicon (Pustejovsky 1995), a framework developed for deriving the semantics of complex structures by drawing mainly on lexical resources.

## 2. VV compounds and multi-verb constructions

There is considerable disagreement in the literature concerning the question which constructions with more than one verbal element are to be considered compounds. In the following, I will discuss some of the features that are typically associated with VV compounds, although it must be stated right at the beginning that it is probably impossible to define a set of criteria by which VV compounds are to be identified beyond doubt in all cases. As there will always be individual cases in which classification is difficult, the features under discussion are rather to be considered parameters contributing to either the lexical or grammatical status of a specific construction (cf. the more general lexicon-grammar-continuum debate, e.g. Bybee 2007).

Throughout the article, I will use the term *multi-verb construction* (MVC) to refer to any construction in which two (or more) verbs are involved. Such constructions can be VV compounds, or SVCs, or other similar constructions that resemble VV compounds with respect to one or more of the features that will be discussed below. The term *VV compound* will be used to refer to a single compound verb. For a multi-verb construction to qualify as *VV compound*, there are numerous syntactic (see chapter 2.1), morphological (see chapter 2.2) and lexical (see chapter 2.3) indications<sup>1</sup> that can be consulted. As I will present an analysis for VV compounds in a lexicalist framework later on, emphasis will be put on the latter set of criteria.<sup>2</sup>

### 2.1. Syntactic structure

VV compounds by their very nature possess some kind of internal structure, a property shared with any (non-lexical) multi-verb construction. Thus, in (1), a sequence of three verbs (the last two separated by the conjunction *zu* 'to'), all marked for infinitive, is used to express a dual modal modification of *lesen* 'read', which in turn is governed by a *verbum cogitandi* in the matrix clause.

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<sup>1</sup>In general, phonological features can be expected to be relevant to this question, too. To my knowledge, there are no (morpho-)phonological processes involved in Korean VV compounds (unlike /s/-affixation in some Korean noun compounds, see Lee and Ramsey 2000: 110-112), and therefore phonological criteria will be omitted in the following discussion.

<sup>2</sup>In this context, it would be interesting to pursue the idea of refining a feature catalogue and surveying cross-linguistic variation of VV compounds in order to examine what predictions can be made for universalist typology (e.g. Dryer and Haspelmath 2013) or canonical typology (Corbett 2005).

## (1) Standard High German

Er dachte, das Buch lesen können zu müssen  
 he thought the book read.INF can.INF to must.INF

‘He thought he had to be able to read the book.’ (Salzmann 2013: 73)

There are a number of reasons for not considering this construction a VV compound. From a syntactic point of view, the fact that each of the three verbs freely combines with other verbs in an infinite number of possible constructions strongly speaks in favor of a non-lexical account. Also, the modal auxiliaries *können* ‘can’ and *müssen* ‘must’ are best described as taking exactly one phrasal argument marked by the infinitive, which already presupposes a complex phrasal structure for (1).<sup>3</sup> Next, the morphological marking on the verbs also suggests a certain degree of autonomy of the individual verbs. Finally, from a semantic point of view, the lexical meaning of the main verb *lesen* ‘read’ in the subordinate clause is not altered by the two auxiliaries but enriched by modal restrictions (this is probably even more true for *müssen* than for *können*).

Let us now turn to cases in which the syntactic arguments are more subtle and not always as conclusive. A wide range of multi-verb constructions involving one complex predicate have been subsumed under the cover term *Serial Verb Constructions* (SVCs) (e.g. Aikhenvald 2006). SVCs are found predominantly in the languages of West Africa, South America, Southeast Asia and Oceania. Bovern (2008) lists four properties commonly associated with SVCs: one single intonation contour, full lexical verbs, at least one shared argument, and single tense, aspect and polarity marking. While these criteria are well suited to differentiate between SVCs and other syntactic phenomena such as clause-chaining (Foley 1986, Good 2003, see the example in (2)), it is more difficult to employ them for the identification of VV compounds: Since VV compounds are considered to form one lexical unit, they necessarily share the same TAM and polarity marking and intonation contour. The importance of the full lexical status of the verbs will be stressed further below in section 2.3. Argument sharing, finally, can sometimes be one domain in which VV compounds differ from SVCs, as lexical processes can directly access the

<sup>3</sup>Note, however, that in some syntactic approaches such as nanosyntax (Starke 2009, 2011, Caha 2009) arguments for assuming structure encompassing several phrases may not count as evidence against ‘lexicalness’: If one proposes syntactic tree structure and units at the level of the lexicon, one can no longer rely on such criteria to distinguish between constructions produced by the lexicon and the grammar.

argument structure of a VV compound (see Li 1990 and section 4); however, this criterion on its own cannot suffice for a clear distinction.

(2) Chechen

Maliika, tykana 'a jaghna, zhejna 'a iecna, c'a je'ara.

Malika store.DAT & J:go:CVB book & buy:CVB home J:come:WP

'Malika went to the store, bought a book, and came back home.'

(Good 2003)<sup>4</sup>

Because compounds form one single morphological word, a decisive property of compounds in general is their impermeability for argument NPs (or other syntactic material). Compare the two sentences in (3). In the Japanese example, the two verbs are adjacent, and they denote a telic action with V1 bearing the main meaning and V2 contributing a resultative reading. In the Akan example, on the other hand, the verbs are separated by the direct object of first (and second) verb. The differences in syntactic structure can be seen as reflections of event conceptualisation in an iconic way: While 'putting the baby on the bed' in Akan is conceptualised as two events, viz. 'taking the baby' and 'putting the baby on the bed', the accomplishment 'biting the rope until it is cut through' is envisioned as one event which consists of the two just mentioned subevents.

(3) a. Japanese: VV compound

inu-ga roopu-o kami-kit-ta

dog-NOM rope-ACC bite-cut-PST

'The dog bit the rope through.'

(Gamerschlag 2005: 11)

b. Akan: SVC

mààmé nó dè àbòfábá nó tó-ò m'pá nó dó

woman DEF take baby DEF put-COMP bed DEF on

'The woman put the baby on the bed.'

(Osam 2008: 58)

Further examples of SVCs are given in (4). Even among the languages in the small sample, considerable variation as to whether and which objects can be placed between two verbs in an SVC is found, and languages are usually not restrained to one of the three types illustrated. Thus, SVCs in Edo are also attested with core and no arguments intervening (Agheyisi 1986). In

<sup>4</sup> J: gender prefix, WP: witnessed past, & : preverbal conjunctive

Chinese, the VV pattern is very common and productive, which makes it difficult to decide which multi-verb constructions are lexical and which are purely syntactic.

Lastly, the classification of the Mian construction in (4c) as SVC and not as a VV compound relies in fact solely on morphosyntactic criteria and will possibly be subject to reanalysis once more data become available: “the current analysis of verb suprasegmentals is not fine-grained enough” (Fedden 2011: 382).

In sum, syntactic criteria alone do not reliably reveal the status of a MVC: If there are elements such as NPs between the verbs, the construction is not a VV compound, but if there are no such elements, we cannot be sure how to classify the construction.

- (4) a. Chinese: core argument intervening  
 Lisi kǎn chái shāo.  
 Lisi chop wood burn  
 ‘Lisi chops wood in order to burn it.’  
 (Luo 1999, cited in Gamerschlag 2005: 174)
- b. Edo: inherent argument intervening  
 òzó ʁulé le èvàré ɾē  
 Ozo quickly.PST cook food eat  
 ‘Ozo quickly cooked and ate.’ (Agheyisi 1986: 270)
- c. Mian: no argument intervening  
 no=i  
 marsupials=PL.AN  
 ya-l(o)-eb-n-e=ta  
 PL.AN.O-kill.PFV-take-PFV-SS.SEQ-3SG.M.SBJ=MED  
 ‘He killed and took the marsupials and then he ...’  
 (Fedden 2011: 382-383)

## 2.2. Morphological marking

The languages of the world vary considerably as to whether and how compounds (as a whole and with respect to their components) are marked morphologically (Bauer (2009)). In general, it seems reasonable to assume that the less morphological marking a (potential compound) construction has, the higher the probability that the construction is indeed a lexical compound. Such a

prediction is, at least at the present stage, of course tentative due to the lack of thorough and sound typological studies addressing this particular question.

I will nevertheless discuss some examples of how morphological marking and compound status can be related to each other. Consider the examples in (5). Both Vietnamese (Austroasiatic) and Hmong Njua (Hmong-Mien) are highly isolating languages, and the absence of morphological marking in the multi-verb constructions in (5) is what one would expect for such languages. However, while (5a) presents an example of a VV compound (see also chapter 2.3.4), the construction in (5b) is an instance of a SVC (or a *verb concatenation* in Harriehausen-Mühlbauer's terminology).

- (5) a. Vietnamese: VV compound

Họ mua bán đồ cũ.  
 3PL buy sell items old  
 'They trade old items.'

- b. Hmong Njua: SVC

Puav dlha tawm moog.  
 3PL run leave go  
 'They ran out (away from the speaker).'

(Harriehausen-Mühlbauer 1992: 402)

In morphologically richer languages, on the other hand, the morphological criterion sometimes proves more helpful. As the examples in (6) demonstrate, Korean is one such language. Note that in some cases, the V<sub>1</sub> in Korean VV compounds has to be marked, either by a suffix or by choice of a specific stem, while in other cases, compounding is achieved by bare stem concatenation.

- (6) Korean:

- a. clausal coordination, marking (V<sub>1</sub>-ko)

I kə-n iss-ko kuɪ kə-n ɔbs-ta.  
 this thing-TOP exist-COOR that thing-TOP not.exist-FIN  
 'This thing exists and that thing does not exist.'

- b. clausal subordination, marking (V<sub>1</sub>-sə)

tɕip-e torəə-sə kuɪ-ruɪl manna-ss-ta.  
 home return-SEQ/CAUS 3SG-DO meet-PST-FIN  
 'I met him when/because (I) returned home.'

- c. SVC, marking (V<sub>1</sub>-ta)  
 Sagwa- ruul mək- ta tɕa-ss-ta.  
 apple- DO eat- ISEQ sleep-PST-FIN  
 ‘(He) fell asleep immediately after eating an apple.’
- d. SVC~compounding, marking (V<sub>1</sub>-ko)  
 t<sup>h</sup>a- ko- na- ta  
 get- KO- be.born- INF  
 ‘to be born with’
- |  |   |
|--|---|
| e. compounding,<br>marking (V <sub>1</sub> .CVB) | f. compounding,<br>no marking (V <sub>1</sub> = stem) |
| ara- tut ta                                      | kulm- tɕuri- ta                                       |
| know.CVB- hear- INF                              | hunger- starve- INF                                   |
| ‘to understand sth. said’                        | ‘to starve’   |

Korean displays morphological marking in coordination and subordination of larger phrases, in SVCs and also in some VV compounds. What is interesting about the Korean verbal suffix (and postposition) system is not only the abundance of markers, but also the fact that some markers have a wide array of functions (for a general overview, see Ihm et al. 2001). Thus, *-sə* in (6b) can express both temporal sequentiality and causality. The *-ko* that is used for coordinating two matrix clauses in (6a) is also used in *t<sup>h</sup>a-ko-na-ta* in (6d). This complex verb is ambiguous as to its compound status: *t<sup>h</sup>a* ‘get’ has completely lost its lexical meaning and has only a valency-increasing function in that it licenses an oblique argument that is marked with the direct object marker */(r)ul/*, a feature inherited from the original V<sub>1</sub>. While these properties are usually found in SVCs rather than in VV compounds, which typically preserve the lexical meanings of both component verbs, this particular combination also displays a high degree of autonomy, and the pattern *t<sup>h</sup>a + ko + V* is not productive in Korean (*t<sup>h</sup>a-ko-na-ta* is the only such construction listed in Minjung 2009). Finally, *-ta* is not only the ending for a verb’s dictionary form (glossed INF), but also appears as a closing element in a number of contexts in some of the more formal registers (glossed FIN here). In SVCs, *-ta* signals immediate sequentiality (glossed ISEQ); only in this function, it has an allomorph */-taga/*.

## 2.3. Lexical properties

In this section, I will discuss four types of modifications which are often found in multi-verb constructions in various languages: *aktionsart/aspect*, *causatives*, *movement verbs* and *converses*. It will be argued that only one type, *converses*, is likely to form VV compounds, whereas the remaining modification types are more likely to hint at SVCs. I will base my argumentation in lexical semantics, with the common denominator for all types being their ‘lexicalness’. Therefore, the notion of *lexicalisation* will be discussed separately at the end of this chapter.

Let us begin with the simple (but non-trivial) observation that the semantic structure of VV compounds can – just like that of nominal compounds – be described in terms of their head-modifier relation. Thus, Lieber (2009: 100-102) distinguishes between three types of VV compounds in Japanese:

- (7) a. coordinative, 2 heads  
       naki- saken  
       cry- scream  
       ‘to cry and scream’
- |                             |                        |
|-----------------------------|------------------------|
| b. causative, 1 head        | c. manner, 1 head      |
| odori- tukare               | ture- sat              |
| dance- get.tired            | take- leave            |
| ‘to get tired from dancing’ | ‘to leave taking sth.’ |

In these examples, the semantic structure strongly depends on the lexical properties of the verbs. In (7a), the two verbs *naki* ‘to cry’ and *saken* ‘to scream’ are coordinated to form a 2-head coordinative structure, which denotes an event characterised by one person both crying and screaming. Note that *naki* and *saken* have a non-empty intersection, which often facilitates coordinative compounding. The two components in (7b), however, are heterogeneous with respect to meaning and *aktionsart*, and their relation is interpreted as modificational: a person’s action of V1 causes that person to experience V2. A similar account holds for (7c): The semantics of V2 is getting enriched by the semantics of V1 in that V1 specifies how V2 is done.

## 2.3.1. Aktionsart/aspect

The first group of special multi-verb constructions comprises constructions in which one verb modifies the other with respect to aspect or aktionsart. Languages can express such modifications either syntactically, e.g. by special verbs that denote the way another verb is modified and do not have a lexical meaning on their own (as in English *he began to worry*), or morphologically, e.g. by affixation (as in Russian *vs'jo srazu za-rabotalo* (all at.once INCH.PFV-worked) 'everything started working at once'), or lexically (compare English *he read the newspaper* with a default telic interpretation as opposed to *he always read the newspaper* with a habitual interpretation added by the adverb *always*). Whichever strategy a language relies on, the sketched modifications do not affect the lexical meaning of a verb but rather highlight a phase inherently present in the verb's meaning. Furthermore, as the examples below demonstrate, aspect-changing multi-verb constructions do not involve two full verbs, as the modifier is often grammaticalised to a certain degree. Accordingly, I will not regard such constructions as VV compounds. And in fact, cross-linguistic evidence shows that this type of modification is very common among the SVCs in the world's languages (cf. Aikhenvald and Dixon 2006).

Languages with aspect-changing SVCs differ as to which verbs have been grammaticalised; some examples are given in (8). In Savosavo, an unmarked verb *alu* originally meaning 'stand' has acquired inchoative meaning in the SVC illustrated in (8a). The aspectual modifier comes right before the fully inflected lexical verb in sentence-final position. In Kannada, completion is expressed by a verb with the original meaning 'leave', as seen in (8b). Note that in Kannada, it is the main verb that comes before the aspectual modifier. In Bangla, the verb *poṛ* 'fall' is used to highlight the beginning of an activity verb, i.e. it has been delexicalised and now contributes inchoative meaning. Note that the construction in (8c) resembles its English counterpart *to fall asleep* in which the same two lexical items are employed. The similarity to the English light verb construction and the participial marking of V<sub>1</sub> raise the question of how to classify the construction in (8c). On the one hand, at least for the English construction it can be said that *fall* has undergone some delexicalisation and acquired an inchoative meaning. On the other hand, the use of *fall* in this sense highly idiomatic and restricted to few constructions such as *fall in love* and possibly *fall victim to*. Therefore, *fall asleep* can be said to be a lexicalised construction containing a grammaticalised verb *fall* to a certain degree.

- (8) a. Savosavo  
 bo sara tulolo to-va kama alu gore-ɪɪu=e  
 go reach then 3DU-GEN.M already stand dig-NMLZ=EMPH  
 ‘Arrived there and then they started digging.’  
 (Wegener 2008: 192)
- b. Kannada  
 naanu ella haalənnu kuɽɽdu biɽutt eene  
 1SG all milk drink leave:FUT:PFV  
 ‘I’ll drink up all the milk.’ (Abbi and Gopalakrishnan 1991: 171)
- c. Bangla  
 ritu g<sup>h</sup>um-ije poɽ-l-o  
 Ritu sleep-PTCP fall-3-PST  
 ‘Ritu fell asleep.’ (Paul 2003: 5)

### 2.3.2. *Causatives*

Causativisation, like aspect-modification, is another process that can be expressed by different lexical and grammatical means in the world’s languages, including in some languages multi-verb constructions which are sometimes taken for VV compounds. As was the case with aspect-modifying verbs, this is problematic from two perspectives: Firstly, the verb bearing the causative meaning usually does not contribute its original, full lexical meaning to the construction, which means that it underwent grammaticalisation. Secondly, causativisation is a pattern frequently observed in SVCs. The following examples illustrate the use of causativising verbs in SVCs in various languages.

- (9) a. Akan  
 Araba dè ñtàr nó sèn-sén-ñ àhómá nó mú  
 Araba take dresses DEF hang-hang-COMPL rope DEF in  
 ‘Araba hung the dresses on the line.’ (Osam 2008: 59)
- b. Olutec  
 min=wop-tiʔkx-u pe:ʔan  
 A2(ERG)=hit-snap-COMPL.INDEP broom  
 ‘You broke the broom.’ (Zavala 2006: 285)



interpreted, as there are (at least) three possible ways to describe the relations: *temporal* ( $V_1 \gg V_2$ ), *causal* ( $V_1 \rightarrow V_2$ ), and *manner* ( $V_2(\dots, V_1)$ ). Finally, in the Tariana data in (9e), an example of a SVC (note the marking asymmetry) with one verb ( $V_1$ ) bearing lexical causative function is given.

### 2.3.3. *Movement verbs*

Movement verbs are abundant among multi-verb constructions. Consider the data in (10). In (10a), a  $V_2$  meaning ‘go’ adds a deictic specification to  $V_1$  which is specified only for the manner of motion, ‘fly’. The use of verbs corresponding to ‘go’ and ‘come’ with basic deictic meaning to specify movement away from or towards a speaker’s location is a very common pattern in MVCs involving verbs of movement. (10b) illustrates another domain of movement verbs: in Meithei, the verb *thə-* ‘to fall’ is used to add a directional component (a downward movement) to the full verb *pa-* ‘splash’. Thus, we have seen three semantic and functional blocks involved in movement constructions: *manner* of motion, including manner of transportation (running, creeping, climbing, flying, driving), *directionality* (up, down, to, in; also referred to as *path*), and *deixis* (towards or away from a specific location, usually the speaker’s).<sup>5</sup> Hmong Njua is a language that allows for multi-verb constructions with more than two verbs and that can specify a movement for all these three relevant components (cf. (10c)).

- (10) a. Bangla  
 pakhi-ra ur-e gee-l-o  
 bird-CLF fly-PTCP go-3-PST  
 ‘The bird flew away.’ (Paul 2003: 1)
- b. Meithei  
 isij ədu pa-thə-re  
 water that splash-fall-PFV  
 ‘The water is splashing down.’ (Abbi and Gopalakrishnan 1991: 176)

<sup>5</sup> Extensive cross-linguistic research has been done on the composition of movement events. For a more extensive discussion, the reader is referred to Talmy (1985) and subsequent work as well as Croft et al. (2010) and references therein.

## c. Hmong Njua (= (5b))

Puav dlha            tawm            moog.  
 3PL run(=MOT) leave(=DIR) go(=DEICT)  
 ‘They ran out (away from the speaker).’

(Harriehausen-Mühlbauer 1992: 402)

Integrating verbs denoting deixis or directionality into VV compounds poses the same problems as the cases discussed earlier: their usage is often productive, they can be freely combined with a large set of verbs, and they often display a high degree of grammaticalisation.<sup>6</sup>

Below, examples from two more languages are presented. The SVCs in (11) are enlightening because they show that multi-verb constructions can be subject to contact-induced language change (Krasovitsky and Sappok 2004: 88-95). In Contemporary Standard Russian, such constructions under one single intonation contour are not possible (or strongly marked stylistically), whereas they have become a productive and frequently used pattern in several Siberian (and also some North) Russian dialects. Finally, the example in (12) demonstrates that grammaticalised movement verbs can also fulfill aspectual functions (see also Tenny 1995).

- (11) a. Mezen’ region (North Russia): no intervening element  
 Tol’ko vot ryb-u ezd-jat lov-jat.  
 only PART fish-ACC go-3PL catch-3PL  
 ‘They only catch fish.’ (Russian Regional speech database,  
 www.rureg.de, code MEZ1-02-27-a)

<sup>6</sup> English is perhaps not so well-suited to explain the notion of *grammaticalisation* in the sense of a decrease in lexical specification, as English is satellite-framed and the most basic English movement verb *go* as only deictic meaning, being underspecified for directionality and manner of transportation (with moderate-pace on-foot-movement as default interpretation). For that reason, it is completely grammatical (and even more idiomatic) to say *to go by bus* instead of *to drive by bus*. In other languages, however, basic movement verbs can have richer representations. Thus, Polish *iść* ‘go’ is specified for deixis and manner of motion (and also for the determinate/indeterminate distinction typical of Slavic motion verbs), and therefore, only *jechać pociągami* (drive train:INS) ‘to go by train’ is grammatical, whereas *\*iść pociągami* (go train:INS) is not.

- b. Russkoe Ustè region (Siberia): PP intervening  
 A ja sid-ju v narte ed-u.  
 and 1SG sit-1SG in sledge ride-1SG  
 ‘And I sit in the sledge and ride.’

(Russian Regional speech database,  
 www.rureg.de, code RUS1-03-23-a)

(12) Thai

bà:i ní: p<sup>h</sup>òm djà? pai sú: k<sup>h</sup>ɔŋ  
 afternoon this 1SG.M FUT go buy things

‘I will go shopping today in the afternoon.’

2.3.4. *Converses*

One semantic property found among VV compounds in some languages is a converse relation between the component verbs. A converse relation holds when two entities specify the direction relative to each other along some axis (*below/above*, *before/after*; axes can be metaphorically extended, e.g. in *master/servant*) or two events logically entail each other, as in *buy/sell* or *teach/learn* (Cruse 1986: 231-240). This type of relation in multi-verb constructions seems to be especially widespread in the Southeast Asian area. Thus, in the verbs in (13), both *hū-xī* ‘to breathe’ and *mua bán* ‘to trade’ can be seen as actions that consist of two antithetical (converse) subactivities: *breathing* involves both *inhaling* and *exhaling*, and *trading* usually involves at least one person *selling* and another person *buying* goods.

- |      |                               |                          |
|------|-------------------------------|--------------------------|
| (13) | a. Mandarin Chinese           | b. Vietnamese (see (5a)) |
|      | hū-xī                         | mua-bán                  |
|      | inhale-exhale                 | buy-sell                 |
|      | ‘to breathe’ (Ralli 2009: 51) | ‘to trade’               |

There are two reasons for assuming most converse MVCs are VV compounds and not SVCs. Firstly, the combinations are highly restricted: for each verb that qualifies as converse, there is only one corresponding verb to form a compound with (not considering synonyms), and the respective counterpart is selected on genuinely semantic grounds. Secondly, it is safe to assume that converses are

conceptualised as one event and not as multiple events. One indication for this assumption is that languages lacking such constructions usually have a single lexeme corresponding to the converse compounds, for instance English *trade* for (13b) and *breathe* for (13a)<sup>7</sup>.

Converse VV compounds can be seen as a special instance of coordinative dvandva compounds (Bauer 2009). It is unclear, however, if they can be further classified as belonging to Bauer's 'additive' group or 'co-hyponymic' group. While it is true that *buy* and *sell* are co-hyponymic with respect to *trade*, so are *bargain* and *negotiate*, but to my knowledge no language has a VV compound consisting of two such verbal elements and denoting 'trade'.

### 2.3.5. Lexicalisation

If we accept that compounding results in the creation of new lexemes, it is reasonable to assume the same criteria associated with lexicalisation in general (transparency, productivity, autonomy, etc.; see Brinton and Traugott 2005 for a detailed discussion) to be applicable to the task of identifying VV compounds. Take the examples in (14). Obviously, both verbal nexus compounds do not have transparent meaning: For a non-native speaker of German who is confronted with (14a) or (14b) for the first time, any of the suggested readings may seem plausible at first. Therefore (and for obvious other morphological reasons), these words can well be argued to be stored in a speaker's lexicon as one unit and are unlikely to be decomposed during processing.

(14) German:

a. Hell- seh- er

bright- see- NMLZ

'clairvoyant' / 'someone who is only capable of seeing in a well illuminated environment'

---

<sup>7</sup>Curiously, in the original outline of the Generative Lexicon framework, converses are formalised as  $e_1^* R_\alpha e_2^*$ , i.e. as denoting two equally prominent events (Pustejovsky 1995: 73). In my view, this is problematic given Pustejovsky's two example verbs *give* and *marry*: in Pustejovsky's account, the difference between the event structures of these verbs lies solely in their temporal alignment, with  $e_1$  preceding  $e_2$  in *give*, and  $e_1$  taking place simultaneously with  $e_2$  in *marry*. However, to me, the crucial difference is in *head* rather than in temporal structure: *give* highlights the giver's part in a transaction event, whereas *marry* has no internal preference (though in sentences like *John married Sue* the subject will be more salient simply by virtue of semantic role hierarchy (Keenan and Comrie 1977)).

- b. Fern- seh- er  
 far- see- NMLZ  
 ‘television set’ / ‘someone who stares into the distance’

However, a large amount of *verbal compounds* discussed in the literature are lexicalised to a substantially lower degree, and in fact, the data discussed in section 2.3 has provided some examples of grammaticalised verbal material in various MVCs.<sup>8</sup> Throughout the preceding sections, it has been argued that only converses are likely to pose instances of lexicalised VV compounds. While the reasoning has been predominantly semantic, it should not be forgotten that grammatical and phonetic criteria must ultimately complement lexical criteria. Thus, in Edo, evidence for the lexicalisation of the V + particle construction comes from the ability to combine these constructions with vowel prefixes to form derived nouns, in the same way that nouns can be derived from simple monosyllabic (CV) verbs: *ɔ̀fùré* ‘peace’ < *ɔ̀* ‘NMLZ’ + *fùré* < *fù* ‘be calm, peaceful’ + *ré* ‘PART’ (Agheyisi 1986: 278). Inally, it should be noted that several types of grammaticalised verb meanings in MVCs such as benefactive, emphasis, abruptness or psychological senses have not been mentioned in the preceding chapters for the sake of brevity. At this point, the reader is referred to Abbi and Gopalakrishnan (1991) for a survey of such functions in Indian and South Asian languages.

#### 2.4. Conclusion

This section discussed some of the criteria that can be helpful for identifying VV compounds as opposed to other multi-verb constructions. It was observed that among the semantic factors, functional shifts associated with grammatical-

<sup>8</sup> Brinton and Traugott (2005: 122-129) present a subtle debate on the lexical status of phrasal and prepositional verbs in English. Phrasal verbs (e.g. *fall down* ‘collapse’, *grind sb. down* ‘oppress sb.’) are analysed as consisting of a lexical verb and one out of a limited set of phrasal particles with aspect function that evolved out of spatial meaning predominant in OE. They are therefore argued to represent an instance of grammaticalisation (though the authors acknowledge a certain “gradience in grammaticality”; consider also the high token frequency of some phrasal verb combinations such as *pick up* and *write down*). Prepositional verbs such as *frown on* ‘disapprove’ or *take sth. for* ‘regard’, on the other hand, are argued to be lexicalised. Since syntactic tests such as fronting and passivisation yield ambiguous bracketing of [NP V Prep NP] sequences, the authors point out a high degree of idiomatisation and unpredictability of such sequences, and propose a diachronic account that sees prepositional verbs as functional replacement for obsolete prefixed verbs.

sation are a strong indicator for a non-lexical status. The discussion in this section bears relevance to the present study because it argues for a distinction between syntactic and lexical multi-verb units and thus justifies the use of lexicalist models to treat those MVCs that qualify as lexical VV compounds.

### 3. VV compounds in Korean

Composition is a highly productive means of word formation in Korean. Based on which part of speech the resulting compound belongs to, the four major groups of compounds in (15) can be identified (Lee and Ramsey 2000: 108-116). (15b) is a rather heterogeneous group and comprises at least six sub-types which are given in (16) (Lee and Ramsey 2000: 109).

- |                                |                            |
|--------------------------------|----------------------------|
| (15) a. nominal compounds      | c. adjectival compounds    |
| son- mok                       | kəm- pulk- uin             |
| hand- neck                     | black- red- pTCP           |
| ‘wrist’                        | ‘dark red’                 |
| b. verbal compounds (cf. (16)) | d. adverbial compounds     |
| p <sup>h</sup> a- ko- tuul -ta | pam- nas                   |
| dig- KO- raise- INF            | night- day                 |
| ‘to investigate’               | ‘day and night’            |
| (16) a. N + V (SBJ + PRED)     | d. $V_{infl} + V (= (6e))$ |
| him- tuul- ta                  | ara- tuul- ta              |
| strength- take- INF            | know.CVb- hear- INF        |
| ‘to be difficult’              | ‘to understand sth. said’  |
| b. N + V (OBJ + PRED)          | e. $V_{stem} + V (= (6f))$ |
| him- ssu- ta                   | kulm- tçuri- ta            |
| strength- use- INF             | hunger- starve- INF        |
| ‘to try hard’                  | ‘to starve’                |
| c. N + V (ADV + PRED)          | f. ADV + V                 |
| kəul- sam- ta                  | tçal- toe- ta              |
| mirror- take as- INF           | well- become- INF          |
| ‘to take as an example’        | ‘to turn out well’         |

Note that (16a-c), (16d-e) and (16f) differ from one another with regard to which part of speech the first constituent belongs to and that the distinction of (16d) from (16e) is the only one where morphological marking comes into play: two verbs can be combined to form a compound either by adding a stem to an inflected verb form (16d) or by bare stem concatenation (16e), as discussed in chapter 2.2. Note further that the six verbs in (16) differ from one another considerably as far as their semantic transparency is concerned: while (16e-f) display a transparent semantic make-up (the details concerning the semantics of (16e) will be discussed in chapter 4.1), the case is more ambiguous with (16a-b). Albeit the respective meanings are well derivable from the two elements of the synthetic compound, the two expressions are lexicalised and highly idiomatic. In (16d), the participants' structure is not represented in the compound, which also hints at a certain degree of lexicalisation. (16c), finally, represents a clear case of metaphoricity: *take a mirror* in the sense of *take as an example* implies a metaphoric relation between 'mirror' and 'example' with a conceptual link to 'visibility' and 'pictoriality'. This implies that metaphoricity in compounding is not restricted to phrasal and appositive nominal compounds like *punch-in-the-stomach-effect* or *mushroom cloud* discussed in Scalise and Bisetto (2009) but can also be employed for word formation in NV compounds. In fact, it will be argued later on that metaphoric compounding is possible for VV compounds, too.

#### 4. Korean VV compounds in the generative lexicon

This section presents an analysis of three Korean VV compounds in the Generative Lexicon framework (Pustejovsky 1991, 1995, Pustejovsky et al. 2013). As stated earlier, the analysis will be limited to stem-concatenating compounds. In all three compounds, both component verbs contribute lexical (and not grammatical) meaning, and neither of them allow intervening material, which in sum justifies the claim that they are indeed true VV compounds. It will be argued that three lexical operations are necessary to derive the semantics of the three compounds *kulmtçurida* 'to hunger (involuntarily), to yearn', *ttwinolda* 'to frolic', and *purutçitta* 'to demand, to protest loudly' (Lee and Ramsey 2000: 109): SIMPLE\_UNIFY, which unifies two GLEs with compatible argument structures (ARGS) and QUALIA structures; MANNER\_UNIFY, which can be applied

to GLEs with incompatible QUALIA structures; and METAPHOR\_UNIFY, which provides a means to unify GLEs with incompatible entries in the ARGS.

#### 4.1. Simple unify

The first operation, SIMPLE\_UNIFY, applies to VV compounds whose components are semantically similar in that they share certain semantic features in all three major domains of their GLEs.

When structure, entries and values in one GLE are fully identical to those of another GLE or a subset thereof, two GLEs can be unified without having to define any further steps. However, unification is also possible when there is only partial agreement between two GLEs, provided the most crucial parameters in ARGS are identical: for each of the obligatory arguments of one GLE, there must be an identical entry with the same index included in the other GLE's obligatory arguments or no entry at all, but not two entries with different types. For instance, two GLEs with one obligatory argument ARG1 each, the first one specified for **human** and the second one specified for **artifact**, cannot undergo simple unification, as some sort of controlling mechanism (rule, constraint etc.) is required to determine which of the argument specifications are to be inherited by the compound's ARGS. Likewise, if the mismatch was to be resolved by passing both arguments to the compound's GLE separately, one would need to somehow discern how the arguments are ordered and how they relate to the two originally intransitive verb meanings.

Optional arguments (D-ARG), however, are not affected by this restriction, as they do not belong to a verb's core arguments. D-ARG type clashes are resolved by serialising the D-ARG entries, i.e. creating a list L containing all D-ARG entries of V1 and appending all D-ARG entries of V2 to L, adding  $n(\text{D-ARG}(V_1))$  to every index of *d-arg* in V2.

Consider the sentences in (17)–(23). The compound *kulmtçurida* 'to hunger (involuntarily), to yearn' is composed of the verbs *kulmda* 'to not eat, to hunger, to fast' and *tçurida* 'to hunger; to yearn'. While both components share the meaning 'to not eat', *kulmda* is not specified for voluntariness and lacks the second meaning 'to yearn' which is present in *tçurida*. V2, however, is not only richer with respect to sense number, it is also more specific, as it is specified for involuntariness for the first sense 'to not eat': *tçurida* can only be used to express a situation in which a living being is forced to hunger against its will. In the examples below, both the arguments of V1 (food in (17) and (23)) and V2

(abstract nouns in (19) and (21)) are included in the argument structure of the VV compound ((21)–(23)).<sup>9</sup> In addition, the polysemous state of V<sub>1</sub> regarding the voluntariness of the actions explicated in the QUALIA (see (17) and (18)) has been resolved in favor of the negative reading from V<sub>2</sub> (cf. (19) and (20)). Finally, note that the inherent argument of V<sub>2</sub> denoting the affected body part in (20) is also present in the lexical representation of the VV compound (see (26)), although the usage of *kulm+tɕurida* with its shadow argument seems to be not so common and the number of actual occurrences is rather low (therefore, this argument-verb combination is missing in the examples).

- (17) Sora-ka muge ttaemune i il tɕənjək kulm-nuunda.  
Sora-SBJ weight because.of two day dinner not.eat-PRS  
'Because of her weight Sora abstains from dinner for two days.'
- (18) Kamum ttaemune saram-ttul-i kulm-nuunda.  
drought because.of person-PL-SBJ not.eat-PRS  
'Because of the drought people hunger.'
- (19) Kuu-nuun tɕisik-e tɕuri-nda.  
3-TOP knowledge-IO yearn-PRS  
'He yearns for knowledge.'
- (20) Pjəŋsa-ka pae-ruul tɕuri-n saram-tɕ<sup>h</sup>əɾəm poi-nda.  
soldier-SBJ belly-DO not.eat-PTCP person-like look-PRS  
'The soldier appears to be starving.'
- (21) tɕən-i saraj-e kulm+tɕuri-ko issta.  
John-SBJ love-IO yearn-PROG PRS  
'John yearns for love.'
- (22) Kulm+tɕuri-n tasəŋ ai-ttul-tul məkjə sal-ljə-yaman han-ta.  
not.eat-PTCP five child-PL-DO feed live-CAUS-NEC do-PRS  
'(He) has to feed five hungry children.'
- (23) Sora-ka i il tɕənjək kulm+tɕuri-nuunda.  
Sora-SBJ two day dinner not.eat-PRS  
'Sora has to leave out dinner for two days.'

<sup>9</sup> Note that the sole D-ARG in V<sub>1</sub> gets the direct object marker and the sole D-ARG in V<sub>2</sub> is marked by the indirect object marker while the S-ARG in V<sub>2</sub> is marked for direct object. These syntactic properties are fully inherited by the VV compound. As the syntactic behaviour of VV compounds is not subject to the present study, this and similar issues regarding the GL-syntax interface will have to be neglected in the following discussion.

The respective GLEs are given in (24)–(26). The first component, *kulmda*, is specified for one obligatory argument (a living being that does not eat food) and one optional argument (the type of food that the living being does not eat). The fact that *kulmda* can be used regardless of whether or not the animate being voluntarily chooses to abstain from eating is captured by underspecification of voluntariness in the QUALIA of (24).

*tçurida*, on the other hand, is specified for voluntariness in order to account for the differences in meaning exemplified in (17) and (20). Therefore, a CONST key with the required specification has been included in (25). It is important to bear in mind that the original idea behind the CONST mode (Pustejovsky 1991, 1995) was to define the relation between an object and the parts that constitute it, or, to put it in a more simple fashion, what an object is made of. It is obvious that CONST can easily be stated for concrete nouns like *beer*, but it becomes more difficult to handle with more complex concepts like *despair*. Since verbs are usually considered to have a high degree of abstractness, the question arises how a CONST specification can fit into a verb's QUALIA. A survey of recent papers on the Generative Lexicon framework (Pustejovsky et al. 2013) reveals that the CONST mode is hardly ever used in the GLEs of verbs. But this probably does not imply that CONST is inapplicable for verbal QUALIA structures in general, although, to my knowledge, this issue has not been addressed explicitly in the literature as of yet. Rather, it is more likely that languages simply tend to prefer making use of other lexical resources in the course of generative lexical processes.

In the case of the Korean verbs *kulmda* and *tçurida*, however, it is the “psychological state” or “constitution” of one of the participants that is the crucial semantic component, and CONST appears to be the best mode to place such a representation. While psychological states have been argued to be located in the FORMAL quale for adjectives (or derived nouns) which denote a psychological experience like *angry* or *anger* (Pustejovsky 1995: 211), the difference with the Korean verbs lies in the fact that they primarily denote events that on their own are not related to any psychological states, which is why FORMAL in *tçurida* is already occupied and therefore inaccessible for a voluntariness specification. Further support for resorting to CONST comes from the fact that a “psychological background” implies a temporal relation in which some event is preceded by this background. In fact, in many cases CONST and TELIC also allow for a temporal interpretation apart from their canonical interpretation: CONST refers to entities or events in the past, while

TELIC points to something in the future. Thus, a GLE of *beer* will have a CONST mode containing a list of ingredients (water, malt, etc.), while its TELIC mode will contain a predication of the type **drink\_act(e,x,...)**. This exactly replicates the temporal relation that holds between production, the product itself and consumption: CONST >> FORMAL >> TELIC.<sup>10</sup> Returning to the Korean verbs, what this means is that a deliberate decision for or against abstinence from nutrition is usually made *before* (or at the very beginning of) the process in question. Therefore, integration of the concept of “involuntariness” into the GLE structure by making use of a CONST key can be argued to be a viable analysis.

The event structure of *t̄eurida* in (25) and the associated QUALIA specifications require some comments. The ‘yearning’ sense of *t̄eurida* is represented as state ( $e_2$ ) and referenced in FORMAL. This **state** is not to be confused with the CONST value **involuntary\_state**, as the latter is linked to another event,  $e_1$ , that is associated with the verb’s first sense ‘to hunger’.

(24)	KULMDA	‘to hunger, to not eat (±voluntarily)’										
	ARGS	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;">ARG1</td> <td style="padding-left: 1em;"><b>x:anim_indef</b></td> </tr> <tr> <td style="padding-right: 1em;">D-ARG1</td> <td style="padding-left: 1em;"> <table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;">1</td> <td style="padding-left: 1em;"> <table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table> </td> </tr> </table> </td> </tr> </table>	ARG1	<b>x:anim_indef</b>	D-ARG1	<table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;">1</td> <td style="padding-left: 1em;"> <table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table> </td> </tr> </table>	1	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table>	<b>food</b>		FORMAL	<b>entity</b>
ARG1	<b>x:anim_indef</b>											
D-ARG1	<table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;">1</td> <td style="padding-left: 1em;"> <table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table> </td> </tr> </table>	1	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table>	<b>food</b>		FORMAL	<b>entity</b>					
1	<table style="border-collapse: collapse;"> <tr> <td style="padding-right: 1em;"><b>food</b></td> <td></td> </tr> <tr> <td style="padding-right: 1em;">FORMAL</td> <td style="padding-left: 1em;"><b>entity</b></td> </tr> </table>	<b>food</b>		FORMAL	<b>entity</b>							
<b>food</b>												
FORMAL	<b>entity</b>											
	EVENTS	[E1 <b>e<sub>1</sub>:process</b> ]										
	QUALIA	[AGENTIVE <b>not-eat_act(e<sub>1</sub>,x<sub>1</sub>,<span style="border: 1px solid black; padding: 2px 5px;">1</span>)</b> ]										

<sup>10</sup>The relationship between FORMAL and AGENTIVE possibly allows for an aspectual reinterpretation: AGENTIVE seems to be often associated with imperfective readings, whereas FORMAL attracts perfective (resultative, in particular) readings.

(25)  $\left[ \begin{array}{l} \text{T}\mathcal{C}\text{URIDA} \text{ 'to hunger (-voluntarily), to yearn'} \\ \text{ARGS} \left[ \begin{array}{l} \text{ARG1} \quad \text{x:anim\_indef} \\ \text{D-ARG1} \quad \boxed{1} \quad \left[ \begin{array}{l} \text{abstract} \\ \text{FORMAL} \quad \text{entity} \end{array} \right] \\ \text{S-ARG1} \quad \text{y:body\_part} \end{array} \right] \\ \text{EVENTS} \left[ \begin{array}{l} \text{E1} \quad \text{e}_1:\text{process} \\ \text{E2} \quad \text{e}_2:\text{state} \end{array} \right] \\ \text{QUALIA} \left[ \begin{array}{l} \text{AGENTIVE} \quad \text{not-eat\_act}(e_1, \text{x}, \text{y}) \\ \text{FORMAL} \quad \text{want}(e_2, \text{x}, \boxed{1}) \\ \text{CONST} \quad \text{involuntary\_state}(e_1, \text{x}, \text{y}) \end{array} \right] \end{array} \right]$

(26)  $\left[ \begin{array}{l} \text{KULMT}\mathcal{C}\text{URIDA} \text{ 'to hunger (-voluntarily), to yearn'} \\ \text{ARGS} \left[ \begin{array}{l} \text{ARG1} \quad \text{x:anim\_indef} \\ \text{D-ARG2} \quad \boxed{1} \quad \left[ \begin{array}{l} \text{food} \\ \text{FORMAL} \quad \text{entity} \end{array} \right] \\ \text{D-ARG1} \quad \boxed{2} \quad \left[ \begin{array}{l} \text{abstract} \\ \text{FORMAL} \quad \text{entity} \end{array} \right] \\ \text{S-ARG1} \quad \text{y:body\_part} \end{array} \right] \\ \text{EVENTS} \left[ \begin{array}{l} \text{E1} \quad \text{e}_1:\text{process} \\ \text{E2} \quad \text{e}_2:\text{state} \end{array} \right] \\ \text{QUALIA} \left[ \begin{array}{l} \text{AGENTIVE} \quad \text{not-eat\_act}(e_1, \text{x}, \boxed{1}, \text{y}) \\ \text{FORMAL} \quad \text{want}(e_2, \text{x}, \boxed{1}, \boxed{2}) \\ \text{CONST} \quad \text{involuntary\_state}(e_1, \text{x}, \boxed{1}, \text{y}) \end{array} \right] \end{array} \right]$

The VV compound GLE in (26) results from combining the two verbs' GLEs according to a set of unification rules given in (27). Note that the only obstacle to plain unification is the handling of the D-ARG entries in ARGS, for which an appending procedure is employed.

- (27) Let  $GLE_1$  and  $GLE_2$  be lexicon entries of  $V_1$  and  $V_2$  and let  $V_1$  and  $V_2$  form a VV compound with  $GLE_3$  being its lexicon entry and let  $L_{1\dots n}$  be lists of all  $D$ -ARG entries in  $V_{1\dots n}$ , then the following holds for  $GLE_3$ , provided  $\tau(\text{ARG}_i(\text{ARGS}(GLE_1))) = \tau(\text{ARG}_i(\text{ARGS}(GLE_2)))$  for all  $i$  and  $\pi(j(\text{QUALIA}(GLE_1))) = \pi(j(\text{QUALIA}(GLE_2)))$  for all  $j$  in  $GLE_1$ :
- $$L_3 = L_1 + L_2,$$
- $$\text{ARGS}(GLE_3) = (\text{ARGS}(GLE_1) - L_1) \cup (\text{ARGS}(GLE_2) - L_2) \cup L_3,$$
- $$\text{EVENTS}(GLE_3) = \text{EVENTS}(GLE_1) \cup \text{EVENTS}(GLE_2),$$
- $$\text{QUALIA}(GLE_3) = \text{QUALIA}(GLE_1) \cup \text{QUALIA}(GLE_2).$$

#### 4.2. Manner unify

When one or more components of the two verbs' GLEs (EVENTS, QUALIA or core arguments in ARGS) do not agree, we need to state explicitly how the substructures of the verbs' GLE are to be unified in order for unification to succeed. This means that it becomes necessary to specify routines of how to restructure, alter or delete certain parts of the GLE structure.

I will now discuss a case in which distinct QUALIA prohibit simple unification, and argue that feature preservation by restructuring yields the correct semantics of the resulting compound, which exhibits manner modification. The verb under discussion is *ttwinolda* 'to frolic', which contains the stems *ttwi-* 'run; jump, hop and *nol-* 'play'. Examples of these three verbs are given in (28)–(32).

- (28)  $t\check{c}\acute{e}n-i$   $mom$   $t\acute{a}p^hi-rj\acute{e}go$   $ttwi\acute{a}-ssta.$   
 John-SBJ body warm.up-FIN jump-PST  
 'John jumped around to warm up.'
- (29)  $Mulgogi-ka$   $naesmul$   $wiro$   $ttwi\acute{a}-ssta.$   
 fish-SBJ stream over jump-PST  
 'Fish jumped over the stream.'
- (30)  $Kuu-nun$   $t\acute{e}ip-kkat\acute{e}i$   $ttwi\acute{a}$   $ka-ssta.$   
 3-TOP house-LIM run.CVB go-PST  
 'He ran all the way to his home.'
- (31)  $Ai-tuul-i$   $pakk-es\acute{a}$   $nol-ko$   $issta.$   
 child-PL-SBJ outside play-PROG PRS  
 'The children are playing outside.'
- (32)  $Oraettojan$   $pakk-es\acute{a}$   $ttwi+nol-assta.$   
 long.time outside frolic-PST  
 '(They) frolicked around for a long time outside.'

The semantic relation between *ttwinolda* ‘to frolic’ and its second component, *nolda* ‘to play’, resembles that of endocentric nominal compounds: ‘frolicking’ can be considered a hyponym of ‘playing’, with an additional semantic component of ‘running and jumping around’ provided by *ttwida*. Such manner modifications are not uncommon for VV compounds in the Southeast Asian area (see Lieber 2009: 103 for a discussion of manner modification in Japanese VV compounds). What is special for Korean *ttwinolda*, however, is that it combines both readings of *ttwida* ‘to run; to jump’. While the two readings can be argued to be linked conceptually (both denote actions involving movement, especially in a sportive context), we nevertheless have to assume that we are dealing with two different homonymous lexemes with the corresponding GLEs given in (34) and (33). The fact that the resulting compound draws upon both the **run** and the **jump** senses suggests that some kind of semantic merging must have taken place. More precisely, the relations specified in the verbs’ AGENTIVE quale must have been merged while fully retaining both individual actions associated with them in the event structure.

(33)	<table style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding-right: 10px;"><b>TTWIDA-2</b></td> <td style="padding-right: 10px;">‘to run’</td> </tr> <tr> <td style="padding-right: 10px;">ARGS</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ ARG1 x:anim_indef ]</td> </tr> <tr> <td style="padding-right: 10px;">EVENTS</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ e<sub>1</sub>:process ]</td> </tr> <tr> <td style="padding-right: 10px;">QUALIA</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ AGENTIVE run_act(e<sub>1</sub>,x) ]</td> </tr> </table>	<b>TTWIDA-2</b>	‘to run’	ARGS	[ ARG1 x:anim_indef ]	EVENTS	[ e <sub>1</sub> :process ]	QUALIA	[ AGENTIVE run_act(e <sub>1</sub> ,x) ]
<b>TTWIDA-2</b>	‘to run’								
ARGS	[ ARG1 x:anim_indef ]								
EVENTS	[ e <sub>1</sub> :process ]								
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(34)	<table style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding-right: 10px;"><b>TTWIDA-1</b></td> <td style="padding-right: 10px;">‘to jump, to hop’</td> </tr> <tr> <td style="padding-right: 10px;">ARGS</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ ARG1 x:anim_indef ]</td> </tr> <tr> <td style="padding-right: 10px;">EVENTS</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ e<sub>1</sub>:process ]</td> </tr> <tr> <td style="padding-right: 10px;">QUALIA</td> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 2px 5px;">[ AGENTIVE jump_act(e<sub>1</sub>,x) ]</td> </tr> </table>	<b>TTWIDA-1</b>	‘to jump, to hop’	ARGS	[ ARG1 x:anim_indef ]	EVENTS	[ e <sub>1</sub> :process ]	QUALIA	[ AGENTIVE jump_act(e <sub>1</sub> ,x) ]
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In (35), a definition of a procedure that merges the two GLEs and fuses the actions specified in AGENTIVE is given. Merging works in a way similar but not identical to the Merge operation in Minimalist Syntax (Chomsky 1995). The relevant fragment of the merged GLE is given in (36).

- (35) HOMONYMIC MERGING: GLEs of conceptually related homonyms which differ in QUALIA key specifications and which have only one entry in EVENTS can be merged by overwriting EVENTS with a list containing the

events in V<sub>1</sub> and V<sub>2</sub> and a specification for  $e_1 \mathbf{o}_\alpha e_2$  and by  $\mathcal{E}$ -conjoining the respective QUALIA relations.

$$(36) \left[ \begin{array}{l} \text{EVENTS} \\ \text{QUALIA} \end{array} \left[ \begin{array}{l} \boxed{1} \\ \left[ \begin{array}{l} e_1:\text{process} \\ e_2:\text{process} \\ e_1 \mathbf{o}_\alpha e_2 \end{array} \right] \\ \text{AGENTIVE} \quad \text{jump\&run\_act}(\boxed{1}) \end{array} \right] \right]$$

Returning to the problem of VV composition, the issue of the ununifiable QUALIA is still unresolved. The semantics of *ttwinolda* can be described as ‘playing while jumping and running around’ or ‘playing by moving around in a manner that involves jumping and running’. To derive such semantics from the two component verbs, we have to assume a process that makes the compound take the second verb as its semantic head and the first verb as its modifier. A unification process therefore has to deal with two tasks at once:

- (37) a. MODIFIER TASK: The internal structure of the compound has to include a specification of the head-modifier relation of V<sub>1</sub> and V<sub>2</sub>.  
 b. MANNER TASK: The representation of the compound has to include a manner modification relation between V<sub>1</sub> and V<sub>2</sub>.

In the Generative Lexicon, the tasks (37) can be completed as follows. Since the two ARGS are identical, unification of this component does not pose a problem. The two EVENTS are both being integrated into the compound’s GLE and remain separate events. The relation of V<sub>1</sub> and V<sub>2</sub> is being stated as simultaneous and the event of V<sub>2</sub> is assigned head status (thus fulfilling the MODIFIER TASK). QUALIA, finally, is being created with an empty FORMAL and an empty AGENTIVE structure. The complete QUALIA of V<sub>1</sub> is inserted into the compound’s AGENTIVE and the complete QUALIA of V<sub>2</sub> is inserted into the compound’s FORMAL, which solves the MANNER TASK.

Note that MANNER\_UNIFY has the exact opposite effect as COLLAPSE, a process transforming the complete QUALIA of V<sub>1</sub> into the compound’s FORMAL and the complete QUALIA of V<sub>2</sub> into the compound’s AGENTIVE, that has been suggested for Japanese verb concatenations like *mite kita* ‘to see and come’ (Nakatani 2013).

Below, the GLEs of the two component verbs and the VV compound are given; a formal definition of *MANNER\_UNIFY* is given in (41).<sup>11</sup> Note that *D-ARG* items are not relevant to the current discussion and are therefore not included in the GLEs.

$$(38) \left[ \begin{array}{l} \mathbf{TTWIDA-1\&2} \quad \text{'to hop, to run'} \\ \mathbf{ARGS} \quad \left[ \mathbf{ARG1} \quad \mathbf{x:anim\_indef} \right] \\ \mathbf{EVENTS} \quad \left[ \boxed{1} \quad \left[ \begin{array}{l} \mathbf{e_1:process} \\ \mathbf{e_2:process} \\ \mathbf{e_1} \mathbf{o}_\alpha \mathbf{e_2} \end{array} \right] \right] \\ \mathbf{QUALIA} \quad \left[ \mathbf{AGENTIVE} \quad \mathbf{jump\&run\_act}(\boxed{1}, \mathbf{x}) \right] \end{array} \right]$$

$$(39) \left[ \begin{array}{l} \mathbf{NOLDA} \quad \text{'to play'} \\ \mathbf{ARGS} \quad \left[ \mathbf{ARG1} \quad \mathbf{x:anim\_indef} \right] \\ \mathbf{EVENTS} \quad \left[ \mathbf{e_1:process} \right] \\ \mathbf{QUALIA} \quad \left[ \mathbf{AGENTIVE} \quad \mathbf{play\_act}(\mathbf{e_1}, \mathbf{x}) \right] \end{array} \right]$$

<sup>11</sup> The event structure of *ttwinolda* in (40) is inconsistent with a claim made by Abasalo (1977) regarding semantic governance in *V- $\emptyset$ V* compounds such as *n $\emptyset$ m $\emptyset$ -kada* (cross-go) 'to go over'. Abasalo argues for a lexical aspect hierarchy that automatically predicts head selection: *action-process*  $\gg$  *action*  $\gg$  *process*  $\gg$  *state*. This hierarchy would make the (incorrect) prediction that the first component of (40) is assigned head status. However, as the majority of Abasalo's VV compound data involve movement verbs or are better analysed as morphological derivations, it is questionable whether this hierarchy qualifies for VV compounds in the narrow sense employed in the present study in the first place.

(40)  $\left[ \begin{array}{l} \text{TTWINOLDA} \text{ 'to frolic'} \\ \text{ARGS} \quad \left[ \text{ARG1} \quad \text{x:anim\_indef} \right] \\ \text{EVENTS} \quad \left[ \begin{array}{l} \boxed{1} \quad \left[ \begin{array}{l} \text{e}_1:\text{process} \\ \text{e}_2:\text{process} \\ \text{e}_1 \text{ o}_\alpha \text{ e}_2 \end{array} \right] \\ \boxed{2} \quad \left[ \text{e}_3:\text{process} \right] \\ \boxed{1} \text{ o}_\alpha \boxed{2}^* \end{array} \right] \\ \text{QUALIA} \quad \left[ \begin{array}{l} \text{FORMAL} \quad \text{play\_act}(\boxed{2}, \text{x}) \\ \text{AGENTIVE} \quad \text{jump\&run\_act}(\boxed{1}, \text{x}) \end{array} \right] \end{array} \right]$

- (41) Let  $GLE_1$  and  $GLE_2$  be lexicon entries of  $V_1$  and  $V_2$  and let  $V_1$  and  $V_2$  form a VV compound with  $GLE_3$  being its lexicon entry, then the following holds for  $GLE_3$ , provided  $\tau(\text{ARG}_i(\text{ARGS}(GLE_1))) = \tau(\text{ARG}_i(\text{ARGS}(GLE_2)))$  for all  $i$  and  $\pi(j(\text{QUALIA}(GLE_1))) \neq \pi(j(\text{QUALIA}(GLE_2)))$ ,  $j = \text{AGENTIVE}$ :
- $\text{ARGS}(GLE_3) = \text{ARGS}(GLE_1) \cup \text{ARGS}(GLE_2)$ ,  
 $\text{EVENTS}(GLE_3) = \text{EVENTS}(GLE_1) \cup \text{EVENTS}(GLE_2)$ ,  
 $\text{HEAD}(\text{EVENTS}(GLE_3)) = \text{EVENTS}(GLE_2)$ ,  
 $\text{FORMAL}(\text{QUALIA}(GLE_3)) = \text{AGENTIVE}(\text{QUALIA}(GLE_2))$ ,  
 $\text{AGENTIVE}(\text{QUALIA}(GLE_3)) = \text{AGENTIVE}(\text{QUALIA}(GLE_1))$ .

### 4.3. Metaphor unify

The third operation, METAPHOR\_UNIFY, is designed to deal with clashes caused by type mismatch of the core arguments in ARGS. Assume the unification mechanism for two Vs has come to a stage  $\Sigma$  at which an  $\text{ARG}_i$  with a semantic type specification  $\tau_i$  in  $V_1$  has to be unified with an  $\text{ARG}_i$  in  $V_2$  specified for  $\tau_j$ . Out of the several possible strategies how to resolve this mismatch, I argue that it is *deleting* which correctly derives the semantics of metaphoric VV compounds in Korean. Deletion of an argument  $\text{ARG}_i$  in  $V_x$  and subsequent unification of  $V_x$  with a  $V_y$  that contains a (formerly) incompatible specification for  $\text{ARG}_i$  will succeed because it bypasses the value checking procedure of the standard unification procedure and can therefore avoid crashes when

encountering incompatible structures or features. The same holds, of course, for the manipulation of larger structures such as a whole *ARGS*. Note that technically, *overwriting* or *selecting and copying* could be argued to yield the same results as deletion, but we will see that this is not the case for the VV compound under discussion in this chapter.

For two verbs to form a compound in a lexicon and to thereby allow for conceptual combination of their individual events, one could expect all (core) participants of *V*<sub>1</sub> and *V*<sub>2</sub> to be included in the compound's semantic structure. Some compounds, however, behave differently in this respect and include only a subset of the two verbs' arguments when unification of some *ARG*<sub>*i*</sub> is blocked by incompatible type specifications. When one of the problematic entries is not integrated into the compound, this can lead to a metaphoric semantic interpretation, which is the case in *puruŋtɕitta* 'to demand, to protest loudly.' Consider the examples in (42)–(44). The agent role of *V*<sub>1</sub>, *puruuda* 'to call', is occupied by a human being, whereas in the second verb, *tɕitta* 'to bark', the agent is necessarily a dog. The action denoted by the VV compound, 'to demand loudly', has nothing to do with dogs, but it is possible to imagine a scenario in which a group of people shout violently all at once while protesting for e.g. an increase in pay during a union strike. For the addressee (or a passive observer), having problems to make out the individual utterances made by each of the group members in such a situation, those people could resemble (a group of) dogs in emitting loud, indecipherable noises.

- (42) Ai-nuŋ əmma-rul buru-nda.  
child-TOP mother-DO call-PRS  
'The child calls its mother.'
- (43) Kae-ka saram-ul (po-ko) məŋməŋ tɕit-ta.  
dog-SBJ man-DO (see-CNJ) ONOM bark-PRS  
'The dog barks at the man (/sees the man and barks).'
- (44) Hanguk-ŋin kuktɕehwa-rul puru+tɕitɕ-əssta.  
Korea-TOP internationalisation-DO call+bark-PST  
'As for Korea, voices have been raised demanding internationalisation.'

Apart from the type incompatibility, the verbs also differ in crucial aspects in all of their GLEs' representational levels; the only shared property is the basic meaning of sound emission. This is represented by the **make-noise\_act** relation in the AGENTIVE quale in the verbs' GLEs in (45) and (46). When examined more closely, it is conspicuous that the GLE of *V*<sub>1</sub> is not only richer in

specification than the GLE of V<sub>2</sub> but that its EVENTS and QUALIA levels are even proper supersets of the respective levels in V<sub>2</sub> as far as structure and relations are concerned. The ARGS entries and their semantic type values, however, are not compatible, as the agent role of the compound *puruṭṭitta* ‘to demand, to protest loudly’ is reserved for human beings and not for animals. Unification of V<sub>1</sub> and V<sub>2</sub> can therefore be achieved by discarding ARGS of V<sub>2</sub> and subsequently unifying the two verbs’ ARGS, EVENTS and QUALIA.

‘Discarding’ here means that the respective structure is not considered in the ensuing unification procedure, and the technical implementation of that idea is crucial if one wants to fully and correctly derive the compound’s GLE given in (47). It is vital to the current discussion that there is a mismatch in the argument types referenced by the **make-noise** relation in the AGENTIVE quale: In (45), reference is made to ARG<sub>1</sub> and S-ARG<sub>1</sub>, whereas in (46), reference is made to ARG<sub>1</sub> and D-ARG<sub>1</sub>. The fact that unification is successful despite this mismatch and that the compound’s **make-noise** relation is identical to that of V<sub>1</sub> is strong evidence for assuming *deletion* to have taken place. If ARGS of V<sub>2</sub> is deleted before the proper unification procedure is initiated, the two arguments in the AGENTIVE quale will have lost their problematic references. It does not affect the outcome of the unification whether the structure at this stage is analysed as containing empty place holders (**R**(e<sub>1</sub>, –, \_)) or no argument slots at all (**R**(e<sub>1</sub>)). Now consider the alternatives. Selection of ARGS of V<sub>1</sub> and its copying into VV would pose serious problems for the subsequent unification process of QUALIA, as the argument mismatch in AGENTIVE would not be resolved. Overwriting ARGS in V<sub>2</sub> with ARGS of V<sub>1</sub> would even cause greater problems because some of the referring symbols in the QUALIA would no longer be aligned with those in ARGS: the referrers would point to some non-existing arguments and other arguments would not be referred to in the QUALIA at all.<sup>12</sup>

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<sup>12</sup> The argument shift of ARG<sub>2</sub> to D-ARG<sub>1</sub> and the concomitant type shift from **anim\_indef** to **abstract** is an issue yet to be resolved and will not be particularly addressed in this study. I do not have any story about motivating factors for this shift nor any formal account at hand, except for the speculative assumption that those situations in which the metaphorical extension of V<sub>1</sub> to V<sub>2</sub> is appropriate tend to frequently involve very well specified demands for different, but predominantly abstract things. While such a conjecture could explain why the two shifts took place at a certain point after the VV compound had been lexicalised, it is still unclear how to integrate these shifts into a general model of unification if one does not want to resort too much to word-specific rules.

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A formal definition of METAPHOR\_UNIFY is given in (48). It is important to point out that the type specifications of ARG<sub>1</sub> in V<sub>1</sub> and V<sub>2</sub> are not only non-identical, but also logically incompatible, as there is no ontological hyperonym-hyponym relation between them. Rather, both types are co-hyponymic to **anim\_indef**

(or, less general, **mammal**), but trying to resolve the type clash by choosing the co-hyperonymic type would create an overly general ARGs and thus lead to an incorrect GLE.

- (48) Let  $GLE_1$  and  $GLE_2$  be lexicon entries of  $V_1$  and  $V_2$  and let  $V_1$  and  $V_2$  form a VV compound with  $GLE_3$  being its lexicon entry, then the following holds for  $GLE_3$ , provided  $\tau(\text{ARG}_i(\text{ARGS}(GLE_1))) \times \tau(\text{ARG}_i(\text{ARGS}(GLE_2)))$  for at least one  $i$ :

$$\text{ARGS}(GLE_2) = [],$$

$$\text{ARGS}(GLE_3) = \text{ARGS}(GLE_1) \cup \text{ARGS}(GLE_2),$$

$$\text{EVENTS}(GLE_3) = \text{EVENTS}(GLE_1) \cup \text{EVENTS}(GLE_2),$$

$$\text{QUALIA}(GLE_3) = \text{EVENTS}(GLE_1) \cup \text{QUALIA}(GLE_2).$$

#### 4.4. Opacity in the lexicon

Opacity refers to a situation in which building blocks interact non-transparently (Kiparsky 1973, Assmann et al. 2013). There can be several reasons why a structure does not reveal the motivation why certain processes have been applied to it. Usually, two interaction types are identified: a certain mechanism has not applied although its trigger is visible in the output (*counter-feeding*) or a certain mechanism has applied although its trigger is not visible in the output (*counter-bleeding*). While opaque interactions are probably best studied and understood in phonology, they have also attracted attention in morphology and syntax recently (e.g. Müller 2012).

Unifications always involve *structural* opacity: Given a set  $S = \{a, b\}$ , it is not possible to determine which of the following pairs of sets were unified when only the output  $S$  is considered:  $T_1 = \langle \{a\}, \{b\} \rangle$ ;  $T_2 = \langle \{a, b\}, \{a, b\} \rangle$ ;  $T_3 = \langle \{a, b\}, \{\} \rangle$ ;  $T_4 = \dots$ . In addition, when different refined unification strategies which are triggered by certain properties of the unified objects are called upon (e.g. to overcome various sorts of clashes, as was proposed for Korean VV compounds in the preceding paragraphs), there can (but does not necessarily has to) be *operational* opacity with respect to why a specific strategy has been chosen. In the following, I will recapitulate two instances of operational opacity in the unification processes discussed above.

Let us first consider `SIMPLE_UNIFY`. Recall that for *kulmtçurida* ‘to hunger (involuntarily), to yearn’, the two component verbs’ GLEs were unified according to general value matrix principles with one additional rule that enforced

appending of D-ARG entries. The VV compound's ARGs does not contain any information that could reveal which D-ARG were taken from V1 and which from V2, so there is structural opacity in the compound's lexical representation. The context requirements in (27) explicitly state that identical ARGs and partially identical QUALIA are needed for SIMPLE\_UNIFY to be applied. Obviously, this cannot be inferred from the compound's GLE alone, either: the structure in (26) could just as well have been constructed on the basis of two GLEs with incompatible QUALIA (the trigger for MANNER\_UNIFY) or incompatible semantic types in ARGs (the trigger for METAPHOR\_UNIFY). This holds analogously for the two other VV compounds, *ttwinolda* and *purutçitta*, as neither of their GLEs contains any hints at the component verbs' relation. Therefore, we observe operational opacity in all three compound unification processes discussed in this paper.

Let us finally have another look at METAPHOR\_UNIFY, more specifically at one of the more subtle subroutines involved in *purutçitta*. I have advocated a metaphorical interpretation due to a deletion operation of one whole argument structure. Recall that deletion must apply before unification and that this ordering effectively bleeds unification crashing. However, one could also take a different perspective and say that deletion feeds unification under the condition that type incompatibility blocks unification before it can even reach a critical point. From yet another viewpoint, it could be argued that an early ordered unification would have destroyed the context for the application of deletion (thereby bleeding it), as deletion was specifically defined to target a module in V2, which (depending on the details of the unification theory) is possibly inaccessible or completely erased after unification has taken place. If such a rule ordering is assumed, the consequence would be that the actually late ordered unification would be counter-bled by deletion. If that is the or a correct analysis, then that represents a classical case of opaque rule interaction, located however at the lexical and not the grammatical level (for a more detailed discussion on the nature of rule reversal and ordering paradoxes, consult Hein, Murphy & Zaleska, this volume).

## 5. Conclusion

This paper argued for a lexical semantic account for compositionality in three Korean VV compounds using the Generative Lexicon framework. In chapter

2, I presented evidence from multi-verb constructions in various languages and argued for a set of factors that are helpful in distinguishing between VV compounds and non-lexical constructions such as SVCs. I then discussed several Korean MVC types and argued that some of them qualify for lexicon-driven approach to phenomena related to their composition. In chapter 4, I then offered an analysis of three VV compounds in the Generative Lexicon framework. I argued that in all three cases it is possible to derive the semantics of the compounds with the help of unification routines that each provide the means to circumvent obstacles for standard unification processes: D-ARG mismatch, QUALIA mismatch and  $\tau$  incompatibility. While METAPHOR\_UNIFY entailed a metaphoric sense extension, MANNER\_UNIFY led to a manner-modifying reading of the compound.

As a side note, I have also pointed out that there is a possible way of enriching a verb's CONST quale with psychological state specifications if this function is not occupied by the verb's core meaning. Furthermore, it has been proposed that a VV compound can have access to multiple lexical meanings of homonymous component verbs.

Finally, the paper put forward the idea that the interaction of lexical building blocks in the course of various complex unification processes can result in opaque structures at various levels, suggesting that opacity is not an uncommon situation in lexical representations. It is my hope that this study will contribute to a better understanding of VV compounds (in Korean, but also in general) and will inspire further insights into the nature of building block interactions in the lexicon.

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# Lexical representations of nouns in German rely on underspecified gender features

Psycholinguistic evidence for global underspecification

Andreas Opitz & Thomas Pechmann\*

## Abstract

This paper is concerned with the lexical representation of grammatical features. While by far the most of current theoretical approaches to inflectional morphology make extensive use of the two concepts of abstract feature decomposition and underspecification, psycholinguistic models of inflection, in contrast, lack such fine-grained morphological analyses almost in total. This paper reports a series of experiments that investigated the processing of grammatical gender of nouns in German. The results of these experiments support the idea that elements in the mental lexicon may be underspecified with regard to their grammatical features. But, in contrast to all established morphological and psycholinguistic approaches, we provide evidence that even the lexical representation of bare noun stems may rely on underspecified gender information. Thus, the domain of underspecification of grammatical features is extended from inflectional markers to noun stems themselves, making *underspecification a global characteristic of the mental lexicon*. We finally conclude that this fact is mainly driven by economical reasons: A feature (or a feature value) that is never used for grammatical operations (e.g., inflectional marking or evaluation of agreement) might not be necessarily represented in the language system at all.

## 1. Background: Syncretism and underspecification

Traditionally, instances of a certain grammatical category (e.g., gender or case) are categorically labeled to differentiate between distinct classes (e.g., masculine, feminine, neuter referring to gender in German). Current morphological theories, however, propose more fine-grained analyses of these categories. One of the most central empirical observations that lead to this view is the

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\*The study presented here is basically an extension of some side-findings of a PhD-Thesis which was supervised by Gereon Müller. Without his valuable and essential comments, inspirations, and critics this work wouldn't have been possible.

	‘the fork’	‘the knife’	‘the spoon’
	FEMININE	NEUTER	MASCULINE
NOM SG	<i>die Gabel</i>	<i>das Messer</i>	<i>der Löffel</i>
ACC SG	<i>die Gabel</i>	<i>das Messer</i>	<i>den Löffel</i>
DAT SG	<i>der Gabel</i>	<i>dem Messer</i>	<i>dem Löffel</i>
GEN SG	<i>der Gabel</i>	<i>des Messers</i>	<i>des Löffels</i>

Table 1: Example of syncretism in German nominal declension

case of inflectional syncretism in many languages of the world with fusional morphology. In such languages, an inflectional marker that represents (or realizes) one of the grammatical categories of the language (e.g., gender, case, or number) may either clearly correspond to one particular grammatical context, or it may be ambiguous by referring to more than one grammatical context. In other words, an inflectional paradigm may exhibit instances of syncretism, i.e., ambiguous morphological forms as illustrated in table 1 for inflectional marking on determiners in German.

This phenomenon of syncretic morphological marking is accounted for by *abstract feature decomposition* and the concept of *underspecification* in almost all current morphological frameworks, as in Distributed Morphology (cf. Halle and Marantz 1993, 1994), Paradigm Function Morphology (cf. Stump 2001), Minimalist Morphology (cf. Wunderlich and Fabri 1995, Wunderlich 1996), Network Morphology (cf. Corbett and Fraser 1993), various accounts in Optimality Theory (cf. Trommer 2006, Grimshaw 2001) and many others.

The over-all idea behind these two concepts is a decomposition of ‘traditional’ labels of morphosyntactic categories into more abstract, binary features, thereby yielding the possibility to refer to natural classes of such categories. Thus, the three instances of grammatical gender in German could be described by two abstract binary features [ $\pm$ fem] and [ $\pm$ masc]: ‘feminine’ [+fem, –masc], ‘masculine’ [–fem, +masc], ‘neuter’ [–fem, –masc].

Therefore, a single morphological exponent, e.g. the form of the German determiner *dem*, which occurs both in masculine and neuter contexts in dative singular, can be referred to with only one but *underspecified* set of features containing only [–fem]. With this gender specification for dative singular<sup>1</sup>

<sup>1</sup>Note that this is simplifying the actual feature specifications of the determiner. Of course,

the determiner *dem* will show up in both masculine and neuter contexts but, crucially, not in feminine contexts. This is in contrast to the alternative, traditional view that would assume two separate but homophone forms *dem*<sub>1</sub> and *dem*<sub>2</sub> both comprising of full gender specifications, i.e. [-fem, +masc] and [-fem, -masc], respectively.

## 2. Underspecification of grammatical features in psycholinguistics

While analyses of inflectional systems that crucially rely on abstract feature decomposition and underspecification are very common in many different frameworks in theoretical morphology (see section 1), psycholinguistic models of inflection consistently lack such fine-grained morphological analyses. Virtually all current psycholinguistic models do not make use of underspecified, abstract features specifications. This holds, e.g., for such diverse models as the Satellite Model (Lukatela et al. 1978, 1980), schema-based models (Bybee 1985, 1995), variants of connectionist models (cf. among many others Rumelhart and McClelland 1982, Seidenberg and Gonnerman 2000), serial modular models (as prominently represented by Levelt et al. 1999), the Full Decomposition Model (Stockall and Marantz 2006), the Augmented Addressed Morphology Model (Caramazza et al. 1985, 1988) and others.

Interestingly, while all these models operate with rather traditional, categorical features (implementing them as generic nodes or lexically stored features, depending on the architecture and type of the model), they are all in principle compatible with a more fine-grained featural specification. As a first step, all that would be necessary is replacing categorical features by their decomposed (and underspecified) equivalent notations.

However, it could be argued that such a ‘complication’ of the architecture, induced by purely theoretical considerations, would by no means be necessary in order to derive an adequate and empirically justified cognitive model of language processing. At a first glance, replacing a traditional label of, e.g., a combinatorial node like ‘masculine’ by [-fem, +masc] might be nothing more than a notational variant. It is not readily obvious that the retrieval or processing of, e.g., the masculine gender feature should be qualitatively different due to a different labeling. Or, to put it in other words, a relevant reason

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morphological markers will have to be specified for other features such as number and case as well, which are left out here for the sake of illustration.

to implement the notions of decomposed features and underspecification into a cognitive model of language would only be given if traditional and underspecification-based approaches would make different, empirically testable predictions regarding human language processing.

This question is barely addressed in psycholinguistic research yet. Although there is first evidence that underspecification and abstract feature-decomposition are involved in human language processing (for evidence mainly based on different priming paradigms see, e.g., Penke 2006, Penke et al. 2004, Clahsen et al. 2001) their implementation into the modeling of human language processing and production has been very limited. In a recent ERP-study Opitz et al. (2013) found additional neurophysiological evidence for the cognitive reality of underspecification of morphosyntactic features. The authors investigated the processing of inflectional markers on adjectives in German phrases of the type *durch gutes Design* ('by good design') and found, using a ERP violation paradigm, that different incorrect markers on the adjective yielded different neurophysiological responses depending on which of the two different criteria (specificity versus compatibility) that are both inherently related to the notion of underspecification were violated. More precisely, the authors reported a stronger left-anterior negativity (LAN) for incompatible markers (i.e. markers that yield a feature mismatch) than for illicit markers that were in principle compatible (i.e. markers that did not yield conflicting features) but that were not specific enough. What is of importance here is that the effect was observed while the noun was processed. The authors interpret the different LAN amplitudes as mirroring the checking process of the agreement relation between adjective and noun. An example of the features involved in this checking process and the related LAN effects is given in (1)<sup>2</sup>. Note that only specifications for gender features are given here. Case and number features are omitted for the sake of illustration and because they do not interfere with the observed gender effects.

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<sup>2</sup>Theoretically, there are many different abstract feature specifications possible. This is mirrored, for instance, in a number of different morphological analyses proposed in the literature (see, among others, Blevins 1995, Sauerland 1996, Wunderlich 1997, Bierwisch 1967, Gallmann 2004). However, the feature specification assumed in Opitz et al. (2013), which is basically grounded in Blevins' analysis, is chosen by a couple of conceptual reasons, e.g., it maximally reduces the number of distinct markers and it is also compatible with their empirical findings.

(1) Two types of illicit neuter agreement and related LAN effects (following Opitz et al. 2013: 242)

a. *correct*

durch	schlichtes	Design
by	plain <sub>Neut</sub>	design <sub>Neut</sub>
	<b>[-fem]</b>	<b>[-masc, -fem]</b>

b. *incorrect 1*

compatible (excluded by Specificity) →LAN

*durch	schlichte	Design
by	plain <sub>Fem</sub>	design <sub>Neut</sub>
	[ ]	<b>[-masc, -fem]</b>

c. *incorrect 2*

incompatible (excluded by Compatibility)<sup>3</sup> →stronger LAN

*durch	schlichten	Design
by	plain <sub>Masc</sub>	design <sub>Neut</sub>
	<b>[+masc, -fem]</b>	<b>[-masc, -fem]</b>

Moreover, Opitz et al. also found processing differences in a LAN-region between the three genders in German when they compared the processing of well-formed phrases (i.e., a stronger negative amplitude for masculine nouns).<sup>4</sup> There are at least two crucial points with respect to this observation. The first is that there is an observable effect on the processing of well-formed phrases, depending on the gender of a noun. The second point is that Opitz and colleagues provide a possible explanation of the observed effect in terms of a (rather simple) processing model of the checking of grammatical agreement relations. The checking process was modeled as a simple comparison of two feature sets: the set of features of the adjective is compared with that of the noun.<sup>5</sup> The more features are involved, the higher the amplitude of the LAN for

<sup>3</sup>Conflicting features set in bold face.

<sup>4</sup>Note that the phrases for each gender category were matched regarding frequency, length, plausibility, and familiarity.

<sup>5</sup>This, of course, is also the stage in which agreement errors are detected. These errors can in principle be of two types: a) both sets contain conflicting feature specifications, e.g. [+masc] and [-masc], or b) another sub-process (that has to be assumed by Opitz and colleagues but is

the processing of correct phrases. The assumed feature sets for well-formed phrases are given in (2).

- (2) Sizes of feature sets in well-formed NPs before A-N agreement (following Opitz et al. 2013: 257)
- a. durch schlichten Geschmack  
 by plain<sub>Masc</sub> taste<sub>Masc</sub>  
 [+masc, -fem] [+masc, -fem]  
*comparison of many features* → strongest LAN
- b. durch schlichtes Design  
 by plain<sub>Neut</sub> design<sub>Neut</sub>  
 [-fem, ] [-masc, -fem]  
*comparison of fewer features*
- c. durch schlichte Struktur  
 by plain<sub>Fem</sub> structure<sub>Fem</sub>  
 [ ] [ -masc, +fem ]  
*comparison of fewest features* → weakest LAN

However, there is an important objection that could be raised against the reasoning proposed by Opitz et al. The critical word on which the effect was observed was the noun. Although all nouns were matched regarding length and frequency, one cannot exclude the possibility that the observed differences were caused by other factors inherent to these nouns themselves.

### 3. The present study

The starting point of the present study was primarily the attempt to address the above mentioned objection concerning the results and the reasoning in Opitz et al. (2013), respectively. Thus, we raised the following question underlying our research: Do we find differences in the processing of German nouns between grammatical genders that are not due to a syntactic process of agreement

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not spelled out in detail) detects that there is another marker in the system that is more specific and that should have been chosen.

checking? If so, can the assumption of underspecification of grammatical features be maintained?

Three experiments were carried out in order to address this issue. The first experiment examines differences between nouns of different genders when they are embedded in short phrases. In contrast, Experiments 2 and 3 examine the processing of bare nouns without any syntactic context. In addition, the influence of word frequency and morphological structure is addressed, respectively.

### 3.1. Experiment 1 – Gender and Agreement

The first experiment is basically an attempt to replicate the findings of Opitz et al. (2013) using a behavioral experimental paradigm. Due to the technical requirements of the design no reaction times were registered in the original ERP experiment. Nevertheless, reaction times as well as error rates may reliably indicate processing difficulties. Experiment 1 thus served as an additional control whether behavioral experimental designs such as grammaticality judgments and lexical decisions yield significant data sensitive enough to reveal effects that are supposed to be grounded in very subtle variations of abstract grammatical features. Thus we expected to find analogous results mirroring the different amplitudes of LAN in Opitz et al. (2013) obtained with grammatically well-formed phrases of the three genders.

#### 3.1.1. *Method*

##### *Participants*

A total of 30 German native speakers were tested. Their age ranged from 20 to 39 (mean age of 28 years). Eighteen of them were female. All were paid for their participation.

##### *Materials*

The same materials as in Opitz et al. (2013) were used, comprising of 180 German nouns (60 belonging to each of the three genders), each of which was embedded in a syntactic structure of the type Preposition + Adjective + Noun (see examples in (3)).

- (3) Examples of critical items in Experiment 1 (well-formed phrases)
- a. gegen geplanten Transfer  
against intended<sub>Masc</sub> transfer<sub>Masc</sub>
  - b. gegen geplante Zensur  
against intended<sub>Fem</sub> censorship<sub>Fem</sub>
  - c. gegen geplantes Logo  
against intended<sub>Neut</sub> logo<sub>Neut</sub>

All nouns were matched for frequency (frequency class 11 and 12 according to <http://wortschatz.uni-leipzig.de>), length (an average length of six letters), and syllable structure (only disyllabic words), differing only in gender. For the morphosyntactic violation conditions, for each correct phrase two additional incorrect versions were created by combining them with illicit morphological gender markings on the adjective (e.g. *gegen geplantes<sub>Neut</sub> Transfer<sub>Masc</sub>* and *gegen geplante<sub>Fem</sub> Transfer<sub>Masc</sub>* for the grammatically correct form in (3a)). A total of 540 items (180 correct, 360 incorrect) were distributed over three experimental lists, each list containing 60 correct and 120 ungrammatical phrases. In order to balance the number of correct and incorrect phrases, 60 additional correct filler phrases of the same structure as the experimental phrases were constructed and added to each list. In sum, each list contained 240 phrases. The order of items within each list was pseudorandomized for each participant with the following constraints: no more than three items of the same gender or three items of identical grammaticality status were allowed to follow each other consecutively.

### *Procedure*

Each participant was administered to one experimental list and was tested individually. Experimental sessions were run using the EPrime software suite. At the beginning participants received a written instruction in which they were told that they would have to judge presented phrases with respect to their grammaticality (two choice forced decision). They were instructed to respond as fast and accurate as possible. Each trial started with a fixation sign that was displayed on the screen for 500 ms. After that the phrases were presented visually word-by-word centered on a computer screen with a duration of 300 ms per word. As soon as the noun appeared participants could make their judgment by pressing a corresponding yes or no button.

	feminine	neuter	masculine
RT in ms	738	769	777
% of correct responses	96.6	92.9	90.9

Table 2: Results for grammatical phrases of Experiment 1

### 3.1.2. Results

Only data of well-formed phrases (intended yes-answers) are reported here. Error rates for each gender as well as reaction times of correct responses are given in Table 2 and illustrated in Figure 1.

Accuracy of responses was further analyzed using a one-way ANOVA with the factor Gender (feminine, neuter, masculine). This test showed a significant influence of Gender on the accuracy of responses:  $F_{1(2,12)} = 2.95$ ,  $p < .05$ ;  $F_{2(2,177)} = 4.94$ ,  $p < .01$ . A statistical post hoc test (Scheffé, critical diff. = 4.8%) revealed that feminine phrases were rated with the highest accuracy (96.9%) and masculine phrases with the lowest accuracy (90.9%). Neuter nouns scored in between and differed statistically neither from masculine nor feminine phrases.

Reaction time data were only analyzed for correct responses to grammatical phrases. First, responses were checked for outliers. All data points that were outside a range of  $\pm 3$  standard deviations of a participant's mean were considered as outliers and removed from further analyses. For the remaining data ANOVAs were computed yielding a significant influence of Gender on reaction times:  $F_{1(2,12)} = 4.59$ ,  $p < .05$ ;  $F_{2(2,177)} = 3.27$ ,  $p < .05$ . A post hoc test (Scheffé, critical diff. = 38 ms) revealed that decisions for feminine phrases were fastest (738 ms) and for masculine phrases slowest (777 ms). Again, neuter nouns scored in between and differed statistically neither from masculine nor feminine phrases.

### 3.1.3. Discussion

Our results provide evidence for processing differences between the three grammatical genders in German. Both the analyses of accuracy rates as well as of latencies in a grammaticality judgment task strongly indicate that the task was more difficult to perform when phrases presented to participants contained

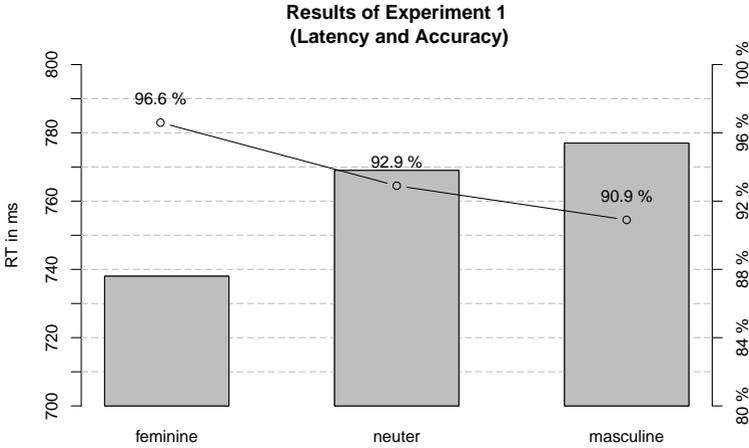


Figure 1: Results for grammatical phrases of Experiment 1

a masculine noun compared to a situation when it contained a feminine noun. Recall that this effect emerged in participants' responses even to perfectly well-formed phrases. As the materials were carefully controlled for length, frequency and plausibility of the phrases, these factors can be ruled out as source of the effect. Therefore, we conclude, in accordance with the explanation provided in Opitz et al. (2013) (see above) that the observed difference was caused by the inherent parsing process that has to check grammatical agreement in order to build up a adequate structure of the incoming phrase.

The second important finding is a methodological one. The results perfectly mirror the findings of Opitz et al. (2013) who obtained a stronger LAN for well-formed phrases with masculine nouns compared to phrases with feminine or neuter nouns. Thus, behavioral methods as the measurement of reaction times and accuracy rates are sensitive enough even for subtle grammatical processes assumed to be the underlying cause of the effect.

However, at least two objections may be raised against our proposed explanation for the observed pattern of responses. In the present study as well as in Opitz et al. (2013) participants had to perform a rather unnatural task. It might be that this kind of meta-linguistic task triggers cognitive processes and

strategies not normally involved in language processing, although it would be unclear why masculine forms should be more affected by these processes and strategies than feminine forms. The second objection is that one cannot reliably conclude that it is indeed the matching process (comparing differently large feature sets) that causes the effect and not, instead, some other properties inherent to the nouns themselves.

In order to address these questions, two further experiments were carried out.

### 3.2. Experiment 2 – Gender and frequency

In the second experiment we used a very common behavioral task that has been extensively used to investigate different aspects of lexical retrieval and lexical representation: lexical decision. Furthermore, the main question in this experiment was whether we could identify differences between the three gender categories of nouns themselves. As an additional factor the frequency of the nouns was systematically manipulated.

#### 3.2.1. *Method*

##### *Participants*

Twenty-three German native speakers were tested. Their age ranged from 19 to 29 (mean of 24 years).

##### *Materials*

A total of 144 nouns were used as experimental items, 48 of each of the three genders. In addition, 24 items in each group were of relative low frequency (class 13 according to <http://wortschatz.uni-leipzig.de>) and 24 were of relative high frequency (class 8). All items were controlled for length. In addition 144 pseudowords were created that served as fillers in order to balance the yes and no responses.

##### *Procedure*

Participants were tested individually. The items were presented visually on a computer screen in a pseudo-randomized order. Participants were instructed

	neuter	feminine	masculine	
high freq.	547	557	572	559
low freq.	586	588	591	588
	567	573	582	

Table 3: Results of Experiment 2 (in ms)

to decide as fast and accurately as possible whether the presented word was an existing word of German or not by pressing one of two response buttons.

### 3.2.2. *Results*

Responses were checked for outliers. All data points that were outside a range of  $\pm 3$  standard deviations of a participant's mean were considered as outliers and removed from further analyses. Statistical tests were performed on the remaining latency data of correct yes-responses using ANOVAs. Main effects were obtained for Gender ( $F(2,44) = 4.56, p < .05$ ) and Frequency ( $F(1,22) = 59.85, p < .001$ ) as well as a tendency towards an interaction of both factors ( $F(2,44) = 2.77, p < .07$ ). This interaction was resolved by two separate analyses for the high frequency and low frequency group, respectively, revealing no effect of Gender for low frequency nouns ( $F(2,44) = 0.29, p = .75$ ) but a highly significant effect for high frequency nouns ( $F(2,44) = 12.87, p < .001$ ). Post hoc tests (Scheffé, crit. diff. = 13 ms) for the nouns of high frequency revealed that it took longer to accept masculine (573 ms) nouns than feminine (557 ms) or neuter nouns (547 ms). The results are summarized in Table 3 and illustrated in Figure 2.

### 3.2.3. *Discussion*

The first result of Experiment 2 is quite clear: nouns of higher frequency are recognized faster (559 ms) than words of lower frequency (588 ms). This is a trivial finding. Two other findings, in contrast, were quite surprising. Not only were responses influenced by the noun's gender, but this influence was only significant for nouns of relatively high frequency. Again it was the group of masculine nouns that yielded the longest latencies compared to feminine and neuter nouns (which did not differ from each other statistically).

Thus, the results are to be taken as a first indication that processing differences reported in former experiments may not solely be caused by a grammatical checking process. Instead, some properties of the nouns themselves cause a measurable delay in the processing of masculine forms. Moreover, this influence seems to be stronger for nouns of high frequency than for nouns of low frequency. A first explanation of this unexpected frequency and gender interaction could be that, if lexical decision is considered a complex process involving many different sub-processes, the impact of one such sub-process (i.e., retrieval of gender) on the overall task performance is stronger if the impact of other sub-processes (frequency) is reduced. Thus, the higher demands on cognitive resources for nouns of lower frequency obscure the effects of more subtle processes like those underlying the gender effect. For further discussion see section 4.

However, it could be objected that the inherent property of the nouns that seems to cause the effect does not necessarily need to be their gender information. It is at best unclear whether information about the gender of a



Figure 2: Results for grammatical phrases of Experiment 2 (in ms)

noun is accessed during a lexical decision task at all. To address this issue, a third experiment was carried out.

### 3.3. Experiment 3 – Gender and morphological marking

Results of Experiment 2 indicated that some inherent properties of a noun (that are at least correlated with their gender) influence their processing in lexical decision. To be sure that information about the gender is accessed during the task, but—crucially—without using any phrase structure yielding agreement, we decided to employ another task, namely gender verification. In this kind of task participants have to decide whether a certain noun is a member of a given gender category or not.

Furthermore, we addressed the question whether the morphological structure of the noun influences this decision. The rationale behind this was the fact that certain derivational suffixes in German clearly determine the noun's gender (e.g., *-ung* for feminine, *-ling* for masculine).<sup>6</sup>

#### 3.3.1. *Method*

##### *Participants*

A total of 18 German native speakers were tested. Their age ranged from 22 to 32 (mean 26 years).

##### *Materials*

Only feminine and masculine nouns were used. This was due to the fact that the task should be executable by pressing one of two buttons ('Is the presented noun masculine (Button A) or feminine (Button B)?') and because there are far less derivational suffixes for neuter than for feminine and masculine nouns. A total of 84 nouns were chosen, 42 feminine and 42 masculine. In each of these two groups there were 21 mono-morphemic nouns and 21 nouns with derivational affixes clearly indicating their gender. All nouns were controlled for length (mean length: 7 graphemes) and frequency (mean frequency class 13).

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<sup>6</sup>Note that in Experiment 1 as well as 2 roughly 20%-30% of the nouns within the group of each gender comprised of such derivational affixes. Thus, it could not be excluded that these particular morphological cues (or structures) were responsible for the observed effects.

	feminine	masculine	
morph. marked	707	768	738
moprh. unmarked	723	770	747
	715	769	

Table 4: Results of Experiment 3 (in ms)

*Procedure*

Participants were tested individually. Items were presented visually and in a pseudo-randomized order. Participants' task was to decide whether the presented word was masculine or feminine by pressing a corresponding button. Latency of their decisions was recorded and later analyzed.

*3.3.2. Results*

Data were scanned for outliers and all data points that deviated more than three standard deviations from a participant's mean were excluded. The remaining data were analyzed using an ANOVA, yielding a main effect for Gender ( $F(1,17)=4.98, p<.001$ ) but no effect for Morphological Marking (i.e., presence or absence of a derivational affix) nor any interaction (all  $p$ -values  $>.20$ ). The results are summarized in Table 4 and illustrated in Figure 3. As can be seen, the difference between masculine and feminine was 54 ms with masculine nouns, again, yielding significantly longer reaction times. We found no evidence for any influence of morphological marking.

*3.3.3. Discussion*

The results of Experiment 3 are in principle in line with the findings of all previous experiments. It was again the group of masculine nouns that yielded longer reaction times. As the particular task of the experiment required gender information of nouns to be accessed, it is now even more likely that the obtained effect in this and the former experiments was indeed caused by the gender features themselves. Interestingly, we did not obtain any evidence indicating that morphological gender marking influences retrieval and/or checking of gender features.

#### 4. General discussion

In all three experiments we found evidence that gender features of nouns have a measurable impact on language processing in German. This influence was found both when the nouns were embedded in grammatical phrases and when they were processed as bare nouns. It was consistently the case that masculine nouns (or phrases containing them) induced longer reaction times and lower accuracy rates, both indicating increased processing demands for these nouns compared to members of the neuter and feminine category.

The starting point of this study was a verification and replication of findings of an ERP experiment reported in Opitz et al. (2013). There it was argued that the observed effects on the processing of phrases were caused by underspecified inflectional markers and a parsing process that checks grammatical agreement.

In our interpretation of the present data we want to maintain the underspecification hypothesis. In order to do so and to find a unified explanation for the former ERP data as well as the new empirical findings, two new assumptions are necessary that are crucial. The first is the very central point of this paper. We

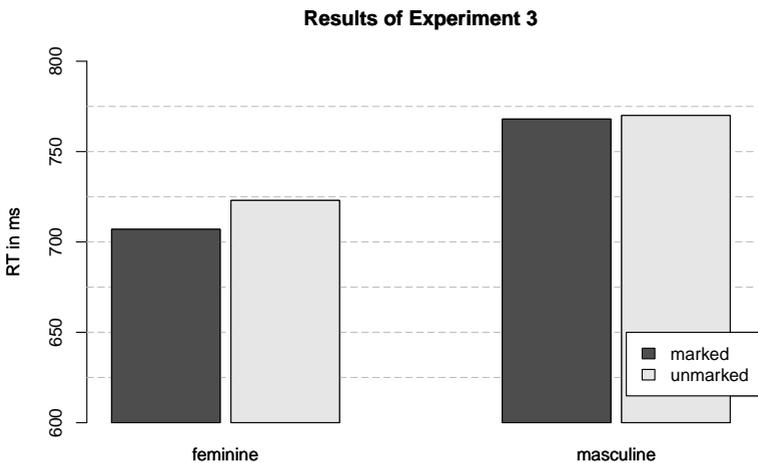


Figure 3: Results for grammatical phrases of Experiment 3 (in ms)

assume that underspecification is not restricted to the domain of inflectional markers but, instead, is a fundamental principle for the lexical representation of nouns themselves. Therefore we propose the following preliminary specification of gender features for German nouns in the mental lexicon, as given in (4). We assume that masculine nouns comprise of the most features, i.e. two features specifications, and that they are thus the most specific forms. In contrast, neuter and feminine nouns comprise of fewer features. At the point being, let us assume that both lack at least one feature. They are therefore underspecified regarding their grammatical gender information.<sup>7</sup>

- (4) Lexical specification of gender features in the mental lexicon  
version A:
- a. masculine nouns  $\leftrightarrow$  [+masc, -fem]
  - b. neuter nouns  $\leftrightarrow$  [            -fem]
  - c. feminine nouns  $\leftrightarrow$  [            +fem]

The second new assumption concerns the formerly assumed process of feature matching for the evaluation of grammatical agreement. The precise mechanism of this process, as proposed in Opitz et al. (2013), cannot be maintained without modification.

In the following section we will provide a sketch of this modified mechanism, followed by some considerations regarding the assumed specification of gender features of nouns.

As just mentioned, the evaluation process that checks for grammatical agreement while parsing a phrase has to be modified and worked out in more detail in order to explain the pattern of empirical data. It will be shown later that the evaluation process is not crucially challenged with regard to the processing of grammatically *well-formed* phrases (see below). But, however, in the case of *ungrammatical* phrases it cannot any longer be argued that the observed differences in Opitz et al. (2013) between two different violation conditions are caused by a qualitatively different violation of Compatibility versus Specificity because there is no conflicting feature [-masc] present in the specification of neuter nouns anymore.

However, we suppose that the observed differences in the LAN amplitudes

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<sup>7</sup>Note that, at this point, the supposed number of features roughly corresponds with the empirically indicated processing demands. A more detailed explanation for this particular configuration as well as a further modification is given below.

can still be explained while maintaining the assumption of underspecification. In the crucial illicit cases for neuter nouns, a system with underspecified gender features as in (4) would yield configurations like in the examples in (5). (Note that for the sake of clarity case and number features are omitted here, as they do not interfere with the evaluation of gender features).

(5) Two types of illicit neuter agreement and related LAN effects, modified version (following Opitz et al. 2013: 242)

a. *correct*

durch	schlichtes	Design
by	plain <sub>Neut</sub>	design <sub>Neut</sub>
	<i>[-fem]</i>	<i>[-fem]</i>

b. *incorrect 1*

(‘compatible’, excluded by Specificity) →LAN

*durch	schlichte	Design
by	plain <sub>Fem</sub>	design <sub>Neut</sub>
	[ ]	<i>[-fem]</i>

c. *incorrect 2*

(no longer ‘incompatible’, thus no violation of Compatibility)<sup>8</sup>  
→stronger LAN

*durch	schlichten	Design
by	plain <sub>Masc</sub>	design <sub>Neut</sub>
	<b>[+masc, -fem]</b>	<i>[-fem]</i>

Evidently, under such an analysis there is no longer a conflict of feature values between the adjective and the noun in (5c). However, the observed asymmetry between the two illicit phrases in terms of different LAN amplitudes can still be accounted for. But instead of presuming a violation of the Specificity versus the Compatibility criterion, the source of the effect has to be shifted to other sub-parts of the mechanism of the feature checking process.<sup>9</sup> Instead of just comparing two feature sets as a whole and detecting mismatches (like

<sup>8</sup>Formerly conflicting features set in bold face.

<sup>9</sup>And thereby unifying the cause of this particular effect and the cause of the LAN effect for well-formed phrases, see below.

in a unification process), the feature checking could be better modeled in a two-stage or bi-directional way. At first, every feature of a previously parsed word (e.g. [+masc, –fem]) is looking for a corresponding feature on the new incoming word that has to be integrated into the structure (e.g. [–fem]). If a given feature (like [+masc]) does not find its counterpart, then this yields a severe violation. Vice versa, every feature of the new word has to search for a corresponding feature in the previously parsed structure. There are in principle at least two ways in order to achieve the observed asymmetry between the two violation conditions. It could either be that a) these two sub-processes operate consecutively and thus the failure of the first search is a more immediate disturbance of the parsing process, or b) both searches may operate simultaneously but a violation of the search from the already parsed structure to the incoming material is regarded as more severe than a violation of the search in the opposite direction for independent reasons. Nevertheless, the observed asymmetry in LAN responses then should be due to the *different directionality* of the two searches. As can be seen in (5c), this particular configuration now yields a major violation because the feature [+masc] does not find a corresponding feature associated with the incoming word *Design*. In contrast, in (5b), there is no gender feature in the structure so far that could search for a corresponding feature in the incoming word. Thus the first search runs without any complications. Contrary, the feature [–fem] associated with the incoming noun *Design* now searches for a corresponding feature in the available structure. As it does not find an appropriate matching feature this, in turn, yields a minor violation (as mirrored in a smaller LAN amplitude). Clearly, this issue has to be addressed in more detail in further research.

But, besides these minor complications, as mentioned above, the empirical results of the processing of well-formed phrases and single words can be uniformly accounted for by this revised feature checking process together with the notion of underspecified gender features of nouns.

If one looks at the matching process for well-formed phrases with a reduced, i.e. underspecified, inventory of gender features for nouns, it becomes readily obvious that the process is still operational and, moreover, is still compatible with the observed LAN effects as well as with the pattern of behavioral results. Even under the revised version of the matching process and the assumption of underspecified gender features of nouns, it is still the case that the number of checking operations (number of searches for features) corresponds with the

observed changes in amplitude of LAN as well as increased reaction time and reduced accuracy. This is illustrated in (6). Again, case features are omitted here for the sake of the argument, as they do not interfere with the checking of gender features.

(6) Matching process with underspecified gender features, well-formed phrases

- a. durch schlichten Geschmack  
 by plain<sub>Masc</sub> structure<sub>Masc</sub>  
 [+masc, -fem] [+masc, -fem]  
*comparison of many features: 2 by 2* → strongest LAN  
 → longest reaction times  
 → lowest accuracy
- b. durch schlichtes Design  
 by plain<sub>Neut</sub> structure<sub>Neut</sub>  
 [-fem] [-fem]
- c. durch schlichte Struktur  
 by plain<sub>Fem</sub> structure<sub>Fem</sub>  
 [ ] [(+fem)]  
*comparison of fewest features: 0 by 1* → weakest LAN  
 → shortest reaction times  
 → highest accuracy

Beyond the fact that the number of features still mirrors processing load, there is another striking observation: *none* of the features of the inflectional markers makes use of any of the features that are omitted in the underspecified nouns. This finding does not seem to be accidental. In (7) the whole inventory of markers of the maximally underspecified analysis in Opitz et al. (2013) is listed. None of the markers there realizes any feature [-masc].

- (7) Exponents of the strong pronominal/adjectival inflection in German *maximally underspecified account*, (Opitz et al. 2013: 244):

<i>entry of</i>	<i>morpho-syntactic</i>
<i>lexical item</i>	<i>context of occurrence</i>
/n/ ↔ [+pl,+obj,+obl]	(dat.pl.)
/m/ ↔ [-fem,+obj,+obl]	(dat.masc.sg./neut.sg.)
/s/ ↔ [-fem,+obl]	(gen.masc.sg./neut.sg.)
/r/ ↔ [+obl]	(dat./gen.fem.sg., gen.pl.)
/n/ ↔ [+masc,-fem,+obj,-obl]	(acc.masc.sg.)
/r/ ↔ [+masc,-fem]	(nom.masc.sg.)
/s/ ↔ [-fem]	(nom./acc.neut.sg.)
/e/ ↔ [ ]	(nom./acc.fem.sg./pl.)

In other words, no morphological process that instantiates an inflected form ever makes use of the feature [-masc]. In a striking parallel, no such feature has to be assumed as part of any lexical representation of nouns, as supported by our empirical findings. In other words, the feature [-masc] can safely be omitted in nouns without inducing failures in the process of inflectional marking.

Thus, while the results in Opitz et al. (2013) support the notion of a maximally underspecified marker inventory instead of an minimally underspecified one, the present findings indicate that this demand for an economically organized lexicon, that stores only as much information as necessary, extends from the inventory of inflectional markers to the lexicon as a whole: underspecification is a *global* principle of the mental lexicon.

Together, the present empirical findings and the results of Opitz et al. (2013) indicate that the lexicon is organized in a highly efficient way. Of course, more research has to be carried out on this issue in order to exclude further possible confounds and to investigate whether the principle of global underspecification extends to other domains or can be found in other languages.

Another aspect that is worth investigating is the concrete role and specification for feminine and neuter nouns. In almost all results so far, masculine nouns showed clear effects of contrast to feminine and/or neuter nouns. The relation between the latter, on the other hand, is less clear as they tended not to differ statistically from each other. For this reason, both are associated with one gender feature each in the preliminary specification in (4), which is in contrast to two such features for masculine nouns.

But, however, if one looks closer at the inventory of markers in (7), it becomes

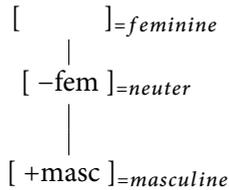
obvious that [-masc] is not the only missing binary feature value there. In addition, the inventory also makes no use of the feature value [+fem]. And, again, it is a most striking finding that the whole checking mechanism would still be completely operational if none of the nouns would carry any such feature. This can be regarded as a first argument that [+fem] is not necessary for gender specifications of nouns. A second argument for this assumption is the case of well-formed feminine phrases. Imagine a case in which [+fem] is present at the nouns like it is illustrated in (6c). The first stage of the process (i.e., the first search) would yield no complications at all, as there are no (gender) features present in the structure already parsed. But, however, after that, a secondary search, which would look for the features [+fem] associated with the noun in the already parsed structure would fail. This, in turn, should lead to a violation and a defective parsing. This situation can be avoided, however, if feminine nouns even lack the feature [+fem]. If there is no such feature on the noun in the first place, it could not trigger a search and therefore no parsing problem (missing of a corresponding feature in the already parsed structure) would occur.

Thus, if even [+fem] is removed from lexical specifications of nouns in total because it is never part of any specification of inflectional markers (and therefore never used for morphological operations), one would end up with the following gender specifications for nouns in (8), making feminine gender the absolute default of the system.

- (8) Lexical specification of gender features in the mental lexicon, version B:
- a. masculine nouns  $\leftrightarrow$  [+masc, -fem]
  - b. neuter nouns  $\leftrightarrow$  [-fem]
  - c. feminine nouns  $\leftrightarrow$  [       ]

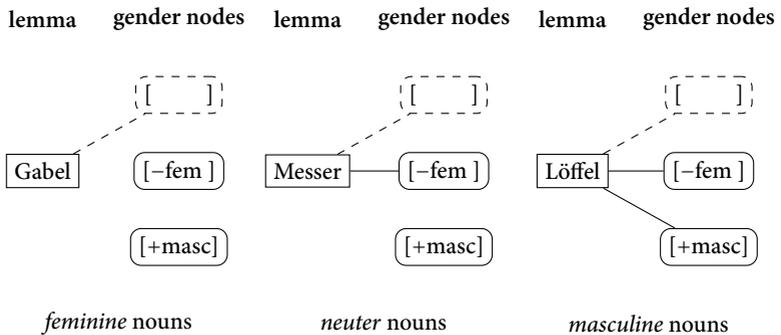
A final remark concerns the question how such a lexical specification as in (8) can cause the observed differences for the processing of bare nouns as in, for instance, lexical decision and gender verification tasks. The preliminary answer would be that lexical retrieval of less specific information, as for feminine nouns, should be less costly than the retrieval of more specific and therefore more complex information. Given the specifications in (8) one could alternatively think of this process as the activation of hierarchically dependent features (nodes). This idea is illustrated in the inheritance tree in (9).

- (9) Lexical specifications of gender features in the mental lexicon, modeled as hierarchically dependent nodes:



Or, alternatively, gender representations can be modeled as generic gender nodes in an activation based model (see, e.g., Levelt et al. 1999). In such a case, nouns of different gender categories would differ in their association to these generic gender nodes. This idea is illustrated in (10).

- (10) Lexical specification of gender features in the mental lexicon, represented as generic nodes  
 examples for feminine (*Gabel*), neuter (*Messer*), and masculine (*Löffel*) nouns



The retrieval of feminine nouns would not necessarily include activation of any gender features, as indicated by the gender node comprising of an empty feature set. Moreover, it is not clear whether the activation (or even existence) of such an empty node would be necessary at all, as indicated by the dashed lines. On the other hand, retrieval of neuter nouns would demand the activation of at least a [-fem] node. Finally, the retrieval of masculine nouns would require both, the activation of [-fem] and [+masc]. Thus, the least amount of activation is needed for the retrieval of feminine nouns, more activation for

the retrieval of neuter nouns, and, finally, the retrieval of masculine nouns would demand most activation. This architecture would have implications, for instance, for priming experiments.

Of course, all these assumptions and implications have to be further tested empirically in order to support the hypothesis of global underspecification. Beyond additional empirical evidence, our assumptions need to be supported by more grounded theoretical considerations and implementations into parsing models. At least at the point being, we could think of one supporting theoretical argument in favor of a global underspecification hypothesis. There is good reason to assume that if a principle-like underspecification—is an essential part of the architecture of a cognitive system (for which there is a wealth of evidence in theoretical morphology in the domain of inflectional), this principle might be used more universally in a large range of domains. Note also that there is empirical evidence for conceptually related notions of underspecification in other domains of the grammar as well (see, for instance, Frisson and Pickering (1999), Pickering and Frisson (2001) for semantic underspecification, or the theory of the Featureally Underspecified Lexicon (FUL) in phonology (cf. Lahiri and Reetz 2010, 2002)).

## 5. Conclusion

In this paper we have presented empirical evidence that lexical representations of German nouns may be underspecified with regard to abstract gender features. In a series of experiments it was consistently found that masculine nouns show indications of an increased processing load compared to feminine or neuter nouns. We assume that the observed effects are due to an underspecified representation of grammatical features. We propose that underspecification is more broadly used by the human language system than normally assumed and that it might be a *global* characteristic of the mental lexicon. The mental lexicon is organized in a highly efficient and economic way. Correspondingly, if a grammatical feature is never used for morphosyntactic operations (as, e.g., [–masc] in inflectional marking in German) it is probably not represented in the system at all. Thus, the human language system may be considered as optimal from an optimal design's perspective. It reduces both the demands for storage (by reducing the amount of stored information) and for processing component (by not taking into account redundant information in online evaluation processes

and therefore keeping the number of required sub-processes, i.e. search operations, to a minimum) (cf. Chomsky 2005).

We further introduced a modified version of a basic parsing model for the evaluation of grammatical agreement that was originally proposed in Opitz et al. (2013). In order to make this parsing model compatible with both the neurophysiological evidence reported in Opitz et al. (2013) and the behavioral results of the present paper, we assume it to comprise of a two-directional search for corresponding features between new, incoming elements and already parsed structures.

However, it is clear that all assumptions and conclusions provided in this paper are of preliminary nature. Further empirical evidence is needed to support our conclusions and, moreover, the results will have to be implemented into theoretical models of inflection and language processing in more detail.

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# Stacked passives in Turkish

Andrew Murphy\*

## Abstract

This paper deals with ‘stacked passives’ in Turkish, an impersonal passive construction with two occurrences of passive morphology and two instances of argument reduction. The aim will be to adequately capture the fact that each instance of passivization seems to be mirrored by a morphological reflex on the verb. I will adopt the theory of passivization in Müller (2014), who assumes that passivization involves merging and subsequently removing the external argument from the structure. The analysis of double passivization will involve assuming two Voice projections above vP, each headed by a passive suffix. This approach will allow us to capture the relevant data for Turkish and it will also be shown how this approach extends to another case of double passivization in Lithuanian as well as antipassive constructions.

## 1. Introduction

In this paper, I propose an analysis of stacked passives, that is passives with two occurrences of passive morphology, which assumes that each passive morpheme corresponds to the head of a Voice projection. Furthermore, I argue that argument reduction in passivization is triggered by each of these heads and is carried out by an operation I call *Slice* (proposed by Müller 2014), which removes arguments from the structure. Accordingly, two Voice projections in SP entails that two instances of argument reduction must take place. This analysis will capture two main properties of stacked passives as identified by Postal (1986): (i) They are only possible with transitive verbs, (ii) both internal and external arguments are understood as implicit. Since two Voice projections entail two argument reduction operations, only transitive verbs will allow for all relevant features to be checked. Furthermore, the fact that these syntactic

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arguments were present in the structure at some point in the derivation, will allow their traces to be existentially bound and therefore derive the implicit argument property of passives in (ii). In Section 2, I will present the data pertaining to passives and stacked passives in Turkish. Section 3 will discuss various approaches to argument reduction and to what extent they can be applied to stacked passives. Section 4 presents an analysis of stacked passives based on the operation *Slice*. Section 5 will discuss some further implications of this approach to the passive such as accusative absorption as well how this analysis extends to argument demotion in double passives in Lithuanian and antipassive constructions with argument reduction.

## 2. The data

Passivization is typically analysed as suppression of the ‘most prominent’ (external) argument coupled with promotion of the internal argument to the subject. In this paper, I will focus on a particular passive construction in Turkish involving two occurrences of passive morphology as well as what looks like two instances of passivization, i.e. reduction of both the internal and external argument. In the following, I use the term ‘stacked passive’ to refer to double passivization coupled with two instances of a passive suffix. Thus, the passive suffixes are ‘stacked’ on top of each other. The term ‘double passivization’ is more general and used for cases of dual argument reduction without two morphological reflexes of passivization. Instances of ‘stacked’ or double passives have received little attention in the literature for perhaps two reasons: (i) They are typologically rare (Kiparsky 2013 attributes this to a ‘morphological bottleneck’), (ii) They do not exist in English and other languages where the passive has been particularly well studied. Nevertheless, instances of double passives have been reported in Turkish (Özkaragöz 1986), Kazakh (Şahan Güney 2006), Lithuanian (Timberlake 1982, Keenan and Timberlake 1985), Sanskrit (Ostler 1979) and Irish (Nerbonne 1982). Its existence has important implications for any theory of the passive since a theory of the passive designed to handle one instance of argument reduction should be able to be extended to account for instances of dual argument reduction. As will be shown, this is not always straightforward for many of the analyses we will encounter.

## 2.1. Stacked passives in Turkish

Being a nominative-accusative language like English, the passive in Turkish is expressed by suppression of the external argument (*Hasan* in (1)), promotion of the argument normally marked with accusative to the nominative and passivization is indicated by a morphological reflex on the verb:

- (1) a. Hasan-Ø kapı-yı kapad-ı  
 Hasan-NOM door-ACC close-PAST  
 ‘Hasan closed the door.’  
 b. Kapı-Ø (Hasan tarafından) kapat-ıl-dı  
 door-NOM Hasan by.ABL close-PASS-PAST  
 ‘The door was closed (by Hasan)’ (Kornfilt 2010)

The passive suffix takes the form *-(I)l* after consonants (1), *-n* after vowels (2) and *-(I)n* after laterals, where (*I*) stands for a vowel, which harmonizes to the closest vowel in the stem.

- (2) Dün bütün gün kitap oku-n-du  
 yesterday whole day book read-PASS-PAST  
 ‘Books were read the whole day yesterday.’

The focus of this paper are so-called ‘stacked passives’, where there are two occurrences of this passive morpheme. Examples are given in (3)-(5):

- (3) a. Bu şato-da boğ-ul-un-ur  
 this chateau-LOC strangle-PASS-PASS-AOR  
 ‘People are being strangled in this chateau.’  
 b. Harp-te vur-ul-un-ur.  
 war-LOC shoot-PASS-PASS-AOR  
 ‘People get shot in wars.’ (Özkaragöz 1986)
- (4) Bu oda-da döv-ül-ün-ür  
 this room-LOC beat-PASS-PASS-AOR  
 ‘There is beating going on in this room.’ (Kiparsky 2013)
- (5) Bu hamam-da iyi yıka-n-ıl-ır  
 this bath-LOC well wash-PASS-PASS-AOR  
 ‘[One] can get washed pretty well in this bath house.’  
 (Göksel and Kerslake 2005)

Note that in each example we have a transitive verb and therefore two instances of argument reduction. Furthermore, each sentence has an implied internal and external argument, which follows from the fact that only transitive verbs are possible in the construction. Finally, all above examples exhibit aorist tense. These are identified as the main three characteristics of stacked passives by Postal (1986) and can be summarized as follows:

- (6) *Characteristics of stacked passives in Turkish* (Postal 1986):
- a. Only passives of transitive verbs are possible.
  - b. Both arguments must be understood as implied arguments.
  - c. They are only possible with aorist tense.

In this paper, I will focus on providing an explanation of the first two characteristics as the third is perhaps largely semantically motivated.<sup>1</sup> Evidence for (6a,b) comes from the fact that stacked passives are not possible with non-transitive verbs such as unergatives (7) and unaccusatives (8):

- (7) \*Bura-da koş-ul-un-ur.  
 here-LOC run-PASS-PASS-AOR  
*Int.* 'There is running here.' (Unergative)
- (8) \*Okyanus-ta bat-ıl-ın-ır  
 ocean-LOC sink-PASS-PASS-AOR  
*Int.* 'In this ocean, there is sinking.' (Unaccusative)

### 3. Previous approaches to argument reduction

A central characteristic of passive clauses is that they often involve argument reduction.<sup>2</sup> Every theory of personal passives has to explain argument reduction and thus, an analysis should be applicable to instances of dual argument reduction.

<sup>1</sup>Furthermore, it seems to be more of a strong tendency than an inviolable property of the construction (Göksel and Kerslake 2005: 136). The fact that both arguments are implied may strongly lend itself to a generic interpretation and thus explain the use of the aorist. (Özkaragöz 1986: 78) provides some examples with past tense marking rather than aorist. However, she also claims that these are not 'genuine' double passives as the passive marker can be used in disambiguate cases where the passive marker -n is syncretic with the reflexive marker.

<sup>2</sup>Or 'argument demotion', i.e. realization of an argument in an oblique case, but the focus of this paper is on argument reduction as in the Turkish cases. See Section 5.1 for a tentative analysis of argument demotion in Lithuanian, however.

Ideally, one should simply be able to apply a passivization operation twice (once to the active structure and again to the resulting personal passive) and arrive at double passive. In the following section, I will review the main approaches to argument reduction in the literature and assess how each analysis can be extended to double passivization. We will see that extending these analyses to the problem at hand is not always without problems.

### 3.1. Lexical approaches

Some of the earliest approaches to argument reduction in passive assumed that this process takes place in the lexicon (Chomsky 1981, Bresnan 1982, Jackendoff 1987, Booij 1992, Wunderlich 1993). Although these theories obviously differ in the details of the frameworks they are couched in, the basic idea is the same: Passivization modifies the valency requirements/theta grid/argument structure of a verb to remove one of the arguments (namely, the external argument). If we consider a possible lexical entry for a transitive verb taking to two arguments in (9a) and compare it with the passivized form in (9b), we see that we can derive the latter from the former using the rule in (10).

- (9) a. *Active verb*:  $V(x,y)$   
 b. *Passive verb*:  $V(x,-)$
- (10) *Lexical passivization rule*:  
 $V(x,y) \rightarrow V(x,-)$

For cases of double passivization, one could simply propose an additional rule removing both arguments rather than one.<sup>3</sup> Such a rule would look as in (11).

- (11) *Double passivization rule*:  
 $V(x,y) \rightarrow V(-,-)$

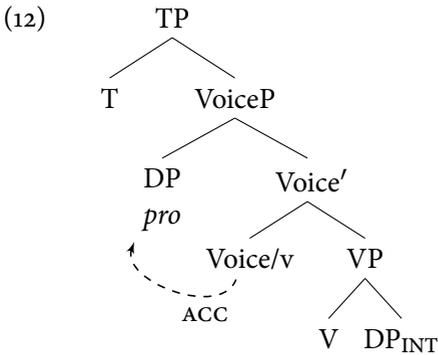
The question at this juncture is whether this approach can derive the properties in (6). A rule such as the one in (11) will only apply to transitive verbs and as such will derive this property, however, the second property (implied arguments) is more difficult. Lexical approaches would have to assume that there are no arguments in double passives. The lexical entry is modified before syntax and will thus bleed any combination of a verb and its arguments. As a result, one

<sup>3</sup>Another option would be to apply the passivization rule twice, although see Müller (2013, to appear) for problems with this approach in certain frameworks.

would have to simply build this implied property into the rule itself. While this may not be entirely satisfying, it would work. A more serious problem is posed by data we will encounter in Section 3.3 showing that the external argument does seem to syntactically present after all (i.e. as the controller of PRO, or as the argument of a subject-oriented adverb). It seems that lexical approaches are not straightforwardly compatible with this kind of data.

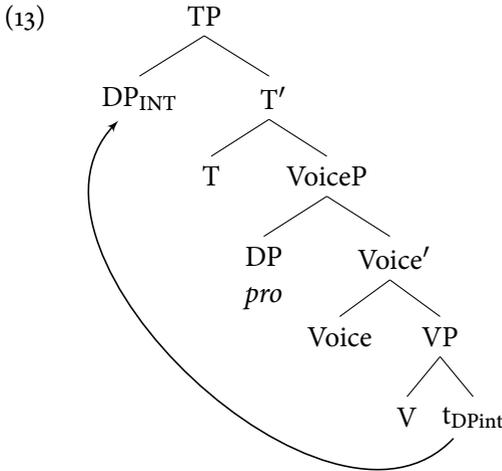
### 3.2. Silent external arguments

A entirely different approach is to assume that the external argument is in fact present but simply not pronounced (Sternefeld 1995, Borer 1998, Collins 2005). In generative approaches, this is normally assumed to be *pro*. This silent argument then occupies the ordinary subject position (e.g. Spec-vP) and absorbs accusative case and the external theta-role usually assigned to the external argument:



One of the main criticisms that can be levelled at this kind of approach when applied to double passivization is that they do not derive the link between dual passive morphology and dual instances of argument reduction. The analysis of stacked passives under this view would simply consist of ensuring that two *pro* arguments be merged in place of the internal and external argument. Thus, the link here seems somewhat arbitrary. Also, the approach by Sternefeld (1995) requires very complicated assumptions about case assignment (Case Linking to  $\theta$ -roles to be precise) in order to yield the correct results. As I will show, it is possible to provide an account of these data without modifying standard assumptions about case assignment. Furthermore, such approaches suffer

another technical problem: if the external argument is syntactically present, then it is unclear why it does not count as an intervening goal for movement to Spec-TP. In (12), the silent external argument is higher and thus Minimality considerations should block movement of the internal argument (13).<sup>4</sup>



Furthermore, the existence of a small *pro* does not receive any kind of independent motivation for passives in non *pro*-drop languages such as English (Wanner 2009: 145). Its postulation is only motivated a solution for this problem in passives and is therefore an *ad hoc* solution to a technical problem. Furthermore, the question of how this *pro* argument is semantically-linked to a DP in a *by*-phrase is far from trivial and will certainly entail more than simple co-indexation (cf. Sternefeld 1995).

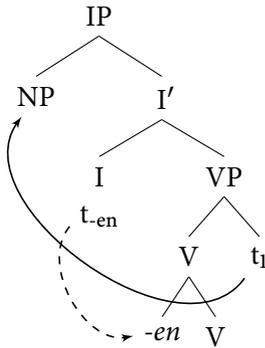
### 3.3. Passive morphemes as arguments (Baker, Johnson & Roberts 1989)

Following Jaeggli (1986), Baker, Johnson and Roberts (1989) propose approach to the passives in the framework of Government & Binding, where the passive morpheme (*-en* in English) has argument status. I summarize the details of the approach and how it captures some important properties of passives, but I will

<sup>4</sup> This is what Collins (2005) worked hard to avoid with his ‘smuggling’ analysis. Nevertheless, I will not discuss his approach here as it is essentially a *pro* approach: He assumes that the external argument in *by*-phrases is in the canonical Spec-vP position, however, in passives without a *by*-phrase he is forced to assume a *pro* argument.

not recount all the details since much of the theoretical apparatus utilized by them is now obsolete. Under their approach, the passive morpheme is present in syntax and behaves like an NP argument in that it can be assigned  $\theta$ -roles and case. Following assumptions in Chomsky (1981), the passive morpheme is base-generated in I and then assigned accusative case and the external argument  $\theta$ -role. It is assumed that the passive morpheme behaves like a clitic syntactically. Thus, BJR propose a ‘downgrading’ operation where -PASS lowers onto the verb:

(14) *Passivization in English* (Baker, Johnson and Roberts 1989):



The assumption here is that accusative case is assigned to the passive morpheme under government and this ultimately forces movement of the internal argument to Spec-IP in order for it to receive case. This captures both case-driven movement of the internal argument to subject position and absorption of accusative case in passive clauses. Baker, Johnson and Roberts (1989: 232f.) discuss stacked passives such as those discussed here in Turkish and those in Lithuanian. They claim that these can be captured by making different assumptions about the syntactic nature of the passive morpheme in such languages. Double passivization is ruled out in English as this would entail having two passive morphemes outside the VP yet only having one external  $\theta$ -role to assign. They claim that the passive morpheme in languages such as Lithuanian and Turkish, which allow stacked passives, is actually an N element and not INFL. This element is then base generated directly in argument positions. This allows for the possibility of having two instances of passive morphology: one in subject position and the other in argument position. Their proposed derivation of stacked passives is given in (15):

## (15) Derivation of stacked passives (BJR 1989: 233):

- a. [IP -PASS [<sub>I'</sub> I [VP V -PASS ]]]
- b. [IP t<sub>pass</sub> [<sub>I'</sub> I+PASS [VP V -PASS ]]] (Incorporation)
- c. [IP -PASS [<sub>I'</sub> I+PASS [VP V t ]]] (NP-movement)
- d. [IP t<sub>pass</sub> [<sub>I'</sub> I+PASS+PASS [VP V t<sub>pass</sub> ]]] (Incorporation)
- e. [IP t<sub>pass</sub> [<sub>I'</sub> t<sub>I+PASS+PASS</sub> [VP V+I+PASS+PASS t<sub>pass</sub> ]]] (Cliticization)

Both argument positions are occupied by a passive morpheme (15a). The first step is that the passive morpheme in subject position lowers onto INFL (15b). Next, the passive morpheme in object position moves to the subject position (15c). This would be the derivation of a normal passive clause in these languages. However, since it is another passive morpheme that moves to subject position and not an NP, this also incorporates into INFL (15d). In a final step, the entire complex cliticizes to the verb (15e).

This analysis mirrors the one I will eventually propose in Section 4 in that we first form a standard passive (15c) by promoting the internal argument to the subject position and then passivize the resulting construction by demoting this subject. Furthermore, this analysis can capture the observation in (6) that stacked passives are only possible with transitive verbs. Under the assumption that each passive morpheme is an argument of the verb, then this restriction follows naturally. In this sense, BJR's analysis seems to capture the basic facts about stacked passives nicely. There are, however, a number of issues that make the analysis less attractive. I will discuss each in turn.

The most glaring issue is that the theory as it stands seems to make incorrect predictions regarding affix order in Turkish. The order of affixes in Turkish is rigidly V+PASS+PASS+I (cf. (5)), yet following Baker's own *Mirror Principle* (1985), the order of affixes mirrors the order in which syntactic operations take place and therefore the structure in (15) derives the incorrect order \*V+I+PASS+PASS since the complex I+PASS+PASS (15d) is first formed and then this entire complex cliticizes onto I (15e). No matter how it is linearized (\*V+[I+PASS+PASS] (16) or \*[I+PASS+PASS]+V), it is not possible to derive the correct order without further assumptions.

- (16) \*Bu hamam-da iyi yıka-ır-n-ıl.  
 this bath-LOC well wash-AOR-PASS-PASS  
*Int.* '[One] can get washed pretty well in this bath house.'

This may work if one is willing to entertain the idea that adjunction can be to the right for one kind of head and to the left for another, but this goes against assumptions about incorporation in Baker (1988, 1998), namely that adjunction is always to the left of the targeted head (Baker 1998: 29).

Another major drawback of their approach is that the argument status of the passive morpheme means that there is no external argument syntactically present. This is problematic in the light of evidence suggesting that there is a syntactically present external argument. For example, it is possible for this phonologically absent subject to control a PRO in a lower clause (Manzini 1983, Sternefeld 1995):

- (17) a. They<sub>i</sub> decreased the price [PRO<sub>i</sub> to the help poor].  
 b. The price was decreased [PRO<sub>i</sub> to the help poor].

Furthermore, it possible for so-called 'subject-oriented adverbs' to occur in passives. In (18b), the passivized variant of (18a), it is still possible for the subject-oriented adverb to occur. This suggests that there is in fact a syntactically/semantically present external argument at some point of the derivation in order to establish control and adverbial modification of the subject.

- (18) a. Die Mädchen haben die Cocktails nackt serviert.  
 the girls have the cocktails naked served  
 'The girls served the cocktails (while) naked.'  
 b. Die Cocktails sind nackt serviert worden.  
 the cocktails have naked served been  
 'The cocktails were served naked.' (Sternefeld 1995)

Baker, Johnson and Roberts (1989) do in fact discuss some of these data and want to claim that the passive suffix can fulfil all the functions of a genuine referential DP, but as far as I can see, these assumptions are implausible from a semantic point of view.

Another issue is that their analysis employs a number of non-standard operations not only resulting from the out-datedness of the analysis. Even if we restate the analysis in modern terms, the situation does not improve. We could instead, assume the following clause structure:

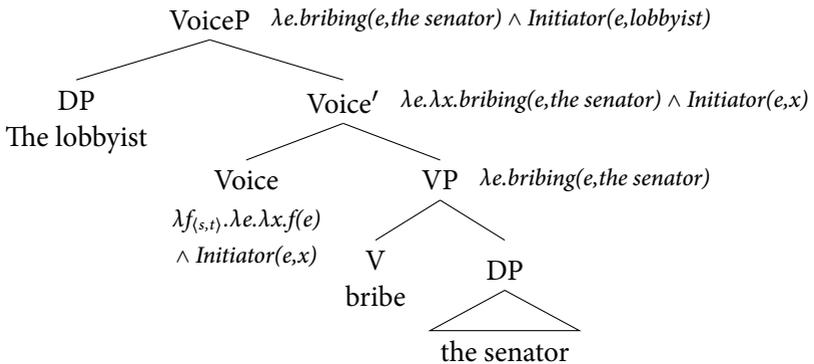
- (19) [TP [vP -PASS [v' v [vP V DP<sub>int</sub> ]]]]

Here, the passive morpheme is base-generated in Spec-vP. Crucially, the downgrading operation (lowering to V) has to take place in syntax proper. If we were to conceive of it as a postsyntactic 'lowering' operation in a Distributed Morphology approach, then it would still be present in Spec-vP at syntax and thus act as intervener for Relativized Minimality (cf. Section 3.2). The way out of this quandary is to assume 'downward' movement in Narrow Syntax, which would be highly problematic under a Minimalist approach as it is (i) unmotivated in other areas of grammar, (ii) not clearly feature-driven and (iii) violates the Extension Condition (Chomsky 1995). Questions also arise with regard to the syntactic status of the suffix. Why is it only passive morphology that has this privileged argument status? Why does tense morphology (e.g. *-ed*), also assumed to be in I not also fulfil an argument function? Lastly, it is unclear what the semantics of these quasi-arguments is. We have seen that there is an 'implied' characteristic of suppressed arguments under passivization, this would require that the suffixes actually be <e>-type arguments semantically and crucially, only passive morphemes would have this status.

#### 3.4. Argument reduction by existential closure (Bruening 2013)

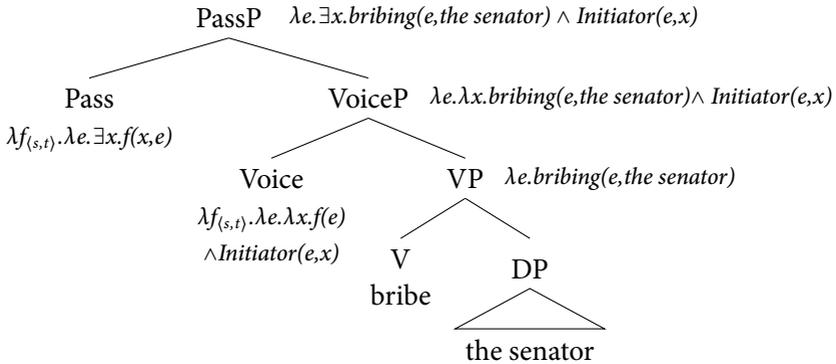
A different approach is proposed by Bruening (2013), who claims that argument reduction is carried out by existential binding of the external argument slot. His assumption is that the Voice head (=vP) introduces the external argument. He assumes a semantics for Voice (v) in active clauses that is very similar to that of Kratzer (1996) as in (20):

(20) The lobbyist bribed the senator.



Under his account, there is an additional Pass projection in passives, which corresponds to the Voice projection in the majority of other analyses we will discuss here. Bruening assumes that this head selects a Voice projection without an external argument.<sup>5</sup> This Pass head therefore introduces existential closure ( $\exists$ ) of the unsaturated variable corresponding to the external argument ( $x$  in this case):

(21) The senator was bribed.

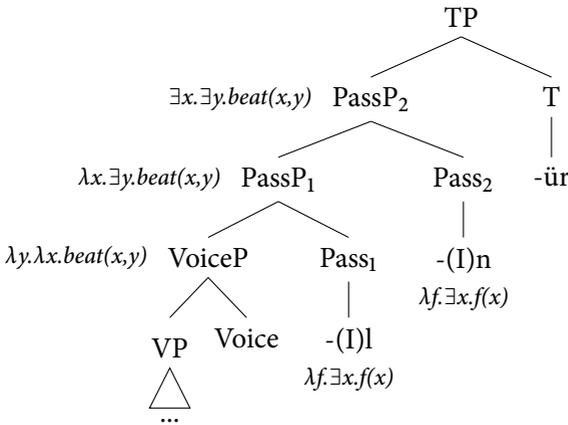


The fact that the denotation of PassP contains an existentially bound variable explains the implied existence of the argument corresponding to that variable (external argument) and, furthermore, the fact that this argument slot is now closed, removes the possibility of introducing the external argument somewhere higher in the structure. For stacked passives, where we assume that there are two instances of argument reduction, we could assume that there are two Pass heads each introducing existential closure of an argument as in (22):<sup>6</sup>

(22) Bu oda-da döv-ül-ün-ür  
 this room-LOC beat-PASS-PASS-AOR  
 ‘There is beating going on in this room.’

<sup>5</sup>I will not go into the details of his selection mechanism here. Furthermore, I will omit his discussion of *by*-phrases and concentrate on the relevant issue of reduction of the external argument.

<sup>6</sup>I have simplified the semantic denotations in the following to easier illustrate reduction. Nothing changes using full event semantics and the denotations assumed by Bruening in (20) and (21).

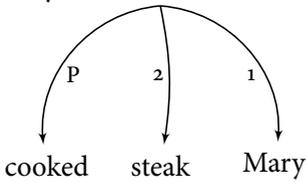


The problem with this approach is that the lower Pass head ( $\text{Pass}_1$ ) first reduces the internal argument (by closing the  $y$  slot) and then the higher head existentially binds the external argument slot. Thus, the derivation of the passive in Turkish under this approach would be *transitive*  $\rightarrow$  *antipassive*  $\rightarrow$  *passive*. If this analysis were correct, a single passivization operation in Turkish should result in an antipassive and then stacked passives would be derived by a second passivization operation. The antipassive is characterized by reduction or demotion of the internal argument rather than the external argument (see Silverstein 1972 and Section 5.2). The fact that the antipassive construction is impossible in Turkish yields this analysis untenable.

### 3.5. The passive in Relational Grammar

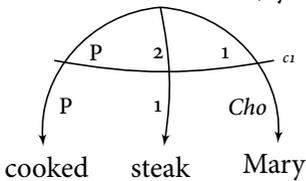
In Relational Grammar (Perlmutter 1980), grammatical relations are represented by arcs annotated with relations such as P (predicate), 1 (subject), 2 (direct object) and 3 (indirect object). Unlike in other theories of grammar (e.g. GB, Minimalism, HPSG), these relations constitute primitives of the theory. A simple example of the analysis of an active clause in Relational Grammar is given below:

(23) Mary cooked the steak.



Here, the subject *Mary* bears the relation 1 corresponding to the subject and the object *steak* bears the relation 2. Grammatical function changing operations such as passivization are captured by assuming that these relations are not fixed, but rather fluid, i.e. they can change (Perlmutter and Postal 1983*a*, 1984*a,b*). Relational Grammar makes use of different levels of representation, or strata, to capture this. It is possible for a given lexical item to bear a relation (e.g. 1 for subject) in one stratum and a different relation (e.g. 2 for object) in another. For example, in the RG analysis of the passive (Perlmutter and Postal 1983*a*), the thematic object can bear the object relation (2) in the first stratum ( $c_1$ ) and the relation 1 in the second stratum:

(24) The steak was cooked (by Mary).

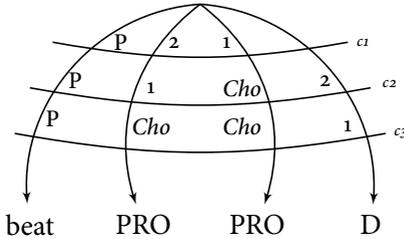


Much in the same way as transformational approaches, we have promotion of the internal argument to the highest grammatical role (subject). In the same way, the demotion/suppression of the external argument in passives is captured by demotion of the external argument from 1 to *Cho*, which stands for *chômeur* (the process is referred to as *chômage*). I will not go into the nature of this relation here (see Perlmutter and Postal 1983*a*, 1984*a* for discussion), it suffices to view this as an argument, which has undergone some kind of demotion/reduction.

Now, let us consider how double passives can be analyzed in Relational Grammar. Özkaragöz (1986) discusses stacked passives in Turkish in this framework and claims the phenomenon constitutes passivization of a 'personal passive'. Essentially, this results in two instances of passivization or multiple

advancement to 1.<sup>7</sup> As shown in (25), in the second stratum (*c*<sub>2</sub>) *Mary* is demoted from 1 to *Cho* and *steak* undergoes advancement from 2 to 1. In a later stratum (*c*<sub>3</sub>), the internal argument is demoted to *Cho* and the dummy advances from 2 to 1.

(25) *Double Passivization in Relational Grammar* (Özkaragöz 1986):



What Özkaragöz (1986) fails to capture, however, is that this double passivization is linked to two instances of passive morphology.<sup>8</sup> The status of the dummy element she assumes is not particularly clear in Turkish, i.e. what exactly is advances to one in the final stratum seems to unexplained in this analysis (although the intuition seems to be that it needs to be something and therefore assume it is a dummy element). In languages such as Dutch, Perlmutter and Postal (1984*b*) claim that the expletive advances to 1:

(26) Er werd gevaren  
 EXPL be.PASS sail  
 'People were sailing' (Zwart 2011)

A more parsimonious approach might be to assume that each argument advances to a passive morpheme in the case of stacked passives. In this way, it may be possible to more directly capture the link between two instances of passive morphology. In the first stratum the external argument would be demoted to *Cho* and the first passive suffix would advance to 1 and the internal argument would advance to 1. This forms a standard personal passive. In the next stratum, the first passive morpheme would undergo *chômage* and the

<sup>7</sup> In early Relational Grammar (Perlmutter and Postal 1983*b*), it was assumed that there can only be one advancement to 1 per clause (cf. their 1 *Advancement Exclusiveness Law* (1AEX)). This was then challenged by Özkaragöz (1986). Since the focus of this paper is not an in-depth discussion of RG analyses of the passive, I will not go into this issue.

<sup>8</sup> Furthermore, two PRO elements are assumed before any reduction takes place, which means that it is not clear to what extent argument reduction is not (at least partially) lexical.

second passive suffix would then advance to 1. This would capture double passivization but remains still problematic under the assumption of the 1 *Advancement Exclusiveness Law* (Perlmutter and Postal 1983*a*, 1984*a*) banning multiple advancement to 1. One of the main questions here, and a problem that arose with Baker, Johnson & Roberts' (1989) approach, is that we are giving argument status to passive morphology. In a framework such as RG where grammatical roles are primitives of the theory, it is not clear what it would mean to say that a dummy element or passive morpheme is the subject of a clause. Many analyses in this framework (e.g. Özkarağöz 1986) are not too explicit about the exact semantics of their proposals but this a more general problem with analyses that account for argument reduction by assigning argument status to non-canonical arguments such as suffixes. One redeeming quality of the Relational Grammar approach also shared by Baker, Johnson and Roberts (1989) is that we capture the intuition that double passives are simply two instances of a standard passivization operation applied successively (i.e. *transitive* → *passive* → *impersonal passive*). In the RG approach, this is two instances of advancement to 1 and *chômage* and in BJR's approach it is two instances of lowering to the INFL from Spec-IP.

### 3.6. Summary

In this section, we encountered various approaches to argument reduction and how they could be applied to instances of double passivization. Recall the problematic situation that we have evidence both for and against the existence of an external argument in passive constructions. Since lexical approaches simply deny the existence of an external (since its introduction is bled in the lexicon), they are not compatible with evidence for some syntactically-present external argument (e.g. control, subject-oriented adverbs). Furthermore, it is not made explicit how the link between argument reduction and passive morphology is captured, meaning that the link between two instances of passive morphology and dual argument reduction is not accounted for.

Approaches that assume a syntactically-present, silent external argument do not suffer from the same problems but instead incur into Minimality violations as it is not clear how the object DP can raise over the higher subject DP. Furthermore, the assumption of a *pro* element in passives seems independent of the availability of *pro*-drop in the language in question and thus has a decidedly *ad hoc* flavour to it.

The approaches by Baker, Johnson and Roberts (1989) and Özkaragöz (1986) share many similarities despite being couched in different frameworks. The BJR approach can circumvent many of the problems with regard to the external argument if one adopts the (controversial) assumption that lowering can take place in syntax proper. Nevertheless, both analyses inevitably suffer from the same problem of the argument status assigned to passive morphology, whose implications for both syntax (e.g. selection) and semantics are far from trivial.

Thus, it seems that whether one assumes that there is an external argument syntactically present or not, different problems arise in each case. The question at this juncture is whether there is a third possibility that avoids all these problems. An alternative recently explored by Müller (2014) assumes that the external argument is present for part of the derivation and is then later removed. This is the approach to argument reduction that I will adopt in the analysis to follow.

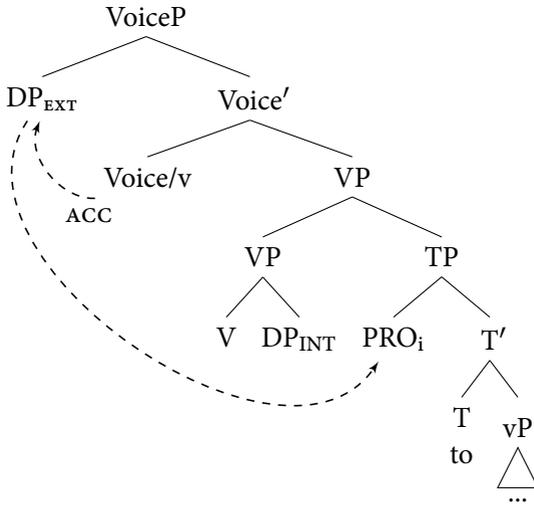
#### 4. The analysis

The problem we are facing with regard to the external argument in passives is that there seem to be arguments both for and against its syntactic presence. Thus, a completely satisfactory analysis would need to ‘have its cake and eat it’ by assuming that external argument is both syntactically present and absent. Rather pursue deep metaphysical questions of how a syntactic object can be both present and absent at the same time, I will follow Müller (2014) in assuming that the external argument is present for only part of the derivation and is then later removed. This is what he calls the ‘short life-cycle of external arguments’. This will allow an external argument to present in the structure long enough to established downward relations such as binding/control as well as absorbing accusative case<sup>9</sup> (27), but be removed from the structure at later stage of the derivation early enough for it not to act as an intervener for movement of the subject (28):

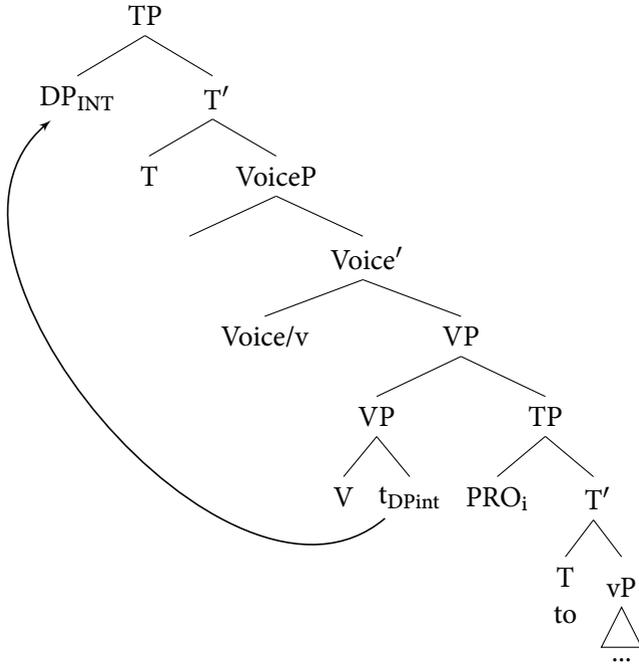
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<sup>9</sup> This assumption is not entirely unproblematic, however. See Section 5.3 for discussion

(27) Case absorption and establishment of downward relations:



(28) No intervention after removal of DP<sub>EXT</sub>:



The question at this point is what kind of operation can be proposed in a Minimalist framework to achieve this result. Such an operation will be presented and discussed in the following section.

#### 4.1. Reversing Merge: *Slice*

In this section, I will present a syntactic operation recently discussed in Müller's (2014) analysis of the passive that will allow us implement the analysis sketched above. Whereas External Merge takes elements from the workspace/numeration and adds them to the existing structure, the operation I call *Slice* removes elements from the tree.<sup>10</sup> Note that this is very similar to Sideward Movement (Nuñez 2004), which is an operation that moves elements between workspaces. An important difference between *Slice* and Sideward Movement is that *Slice* occurs in a very strict structural configuration; in a Spec-Head configuration with a head bearing a [-D-] feature. As such it is very much the reverse operation of Merge (Merge = workspace → tree, Slice = tree → workspace).<sup>11</sup> We can view this structure removal therefore as movement back into the workspace. Müller (2014) assumes that, like Merge, this operation only applies at the root node and therefore does not violate the Extension Condition (Chomsky 1995). Following the notational conventions in Heck and Müller (2007), Müller (2011), there are two types of structure building features: 'bullet' features triggering (External or Internal) Merge [ $\bullet$ D $\bullet$ ], and 'star' features triggering Agree operations [ $\ast$ F $\ast$ ]. Assuming that *Slice* is also feature-driven, we can then add a corresponding *Slice* feature to our list of structure building features:

- (29) *Structure-building features*
- a. *Merge* features: [ $\bullet$ D $\bullet$ ]
  - b. *Probe* features: [ $\ast$ F $\ast$ ]
  - c. *Slice* features: [-D-]

In the following section, we will see how these features can be combined to successfully derive both passives and stacked passives in Turkish.

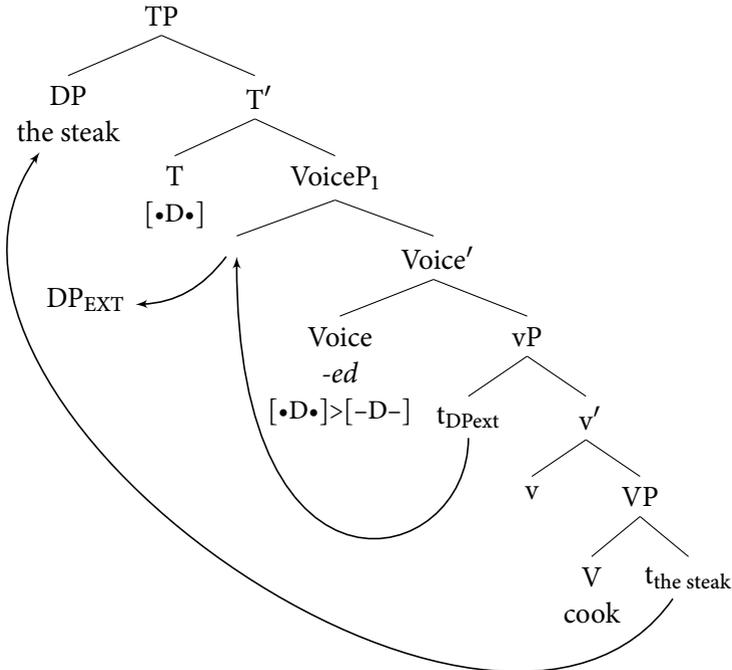
<sup>10</sup> Müller (2014) calls this operation *Cut*. I feel *Slice* is more appropriate as it implies that only a thin layer is removed. As will be discussed below, it is assumed that this operation only applies at the root node and therefore it is only ever the top layer of a given structure that can be removed.

<sup>11</sup>The triggers for Sideward Movement are somewhat unclear and thus it remains less-restricted than *Slice*, although see Nuñez (2012) for recent discussion of this point.

4.2. A *Slice*-approach to standard passives

Now, let us see how *Slice* can be applied to standard passives. I follow Merchant (2013), Harley (2013) and the growing body of literature, suggesting that Voice and *v* constitute distinct heads (contra Kratzer 1996) in the clausal spine. The morphological reflex of passivization is captured by assuming the passive suffix is the head of VoiceP above *v*P and that it bears a Merge-triggering feature [ $\bullet$ D $\bullet$ ] and a *Slice*-feature [-D-]. These are featured are ordered with regard to one another so that [ $\bullet$ D $\bullet$ ] precedes [-D-]. The derivation will precede as follows: The [ $\bullet$ D $\bullet$ ] feature first triggers internal merge of the closest DP (since the numeration is empty); in (30), the external argument. This DP is then moved back into the workspace in order to check the *Slice* feature [-D-] and is therefore no longer present at the point of the derivation where T probes for a goal for movement to Spec-TP:

(30) The steak was cooked.



As a result, it is the internal argument that is moved to Spec-TP, thus deriving a standard passive construction. Now that the analysis of a personal passive, the

corollary of our theory of double passivization was that we simply apply this passivization operation twice. In the following section, we will see that simply assuming a second Voice projection for stacked passives will derive this result.

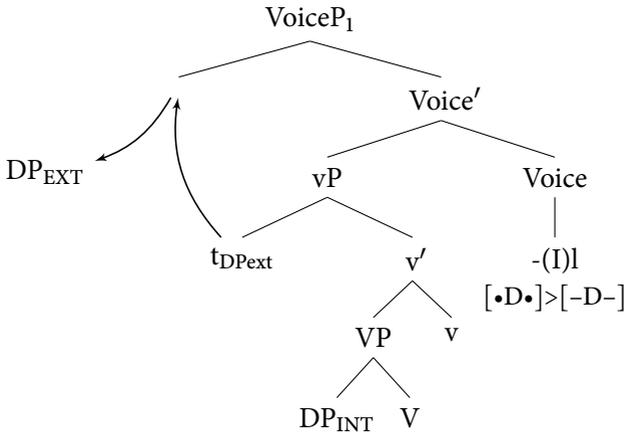
#### 4.3. Deriving stacked passives

Recall the following example of stacked passives from (4) (repeated below):

- (4) Bu oda-da döv-ül-ün-ür  
 this room-LOC beat-PASS-PASS-AOR  
 ‘There is beating going on in this room.’

The derivation of these structures proceeds as follows: the first passive suffix on Voice<sub>1</sub> bears both a Merge feature and a Slice feature. The Merge feature will trigger movement of the closest c-commanded DP to Spec-VoiceP. In this case, it is the external argument in Spec-vP. Subsequently, the next feature to be discharged is the Slice feature. This feature removes a DP from the specifier and moves it ‘sideways’ back into the workspace:

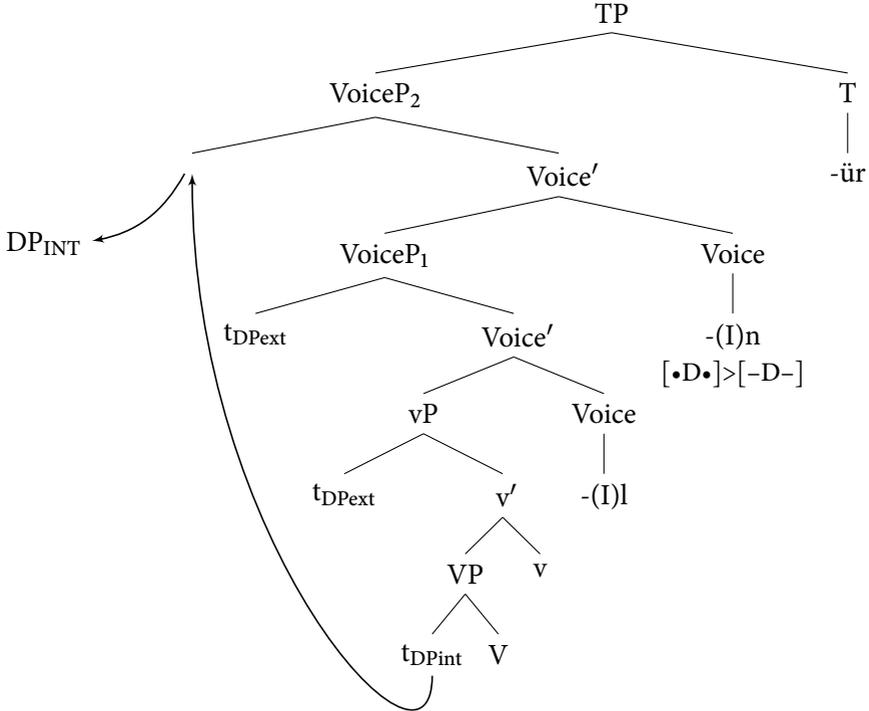
- (31) *Reduction of the External Argument:*



Since each passive morpheme corresponds to a Voice projection, stacked passives contain a second Voice projection headed by another passive suffix. This Voice projection has exactly the same features as the first and will thus result in a second passivization operation being carried out. The Merge feature **[•D•]** on Voice<sub>2</sub> requires that the closest c-commanded DP moves to its specifier.

Since the external argument has been removed, the closest (and only) DP in the structure is the internal argument (Müller 2014). Accordingly, the internal argument moves to Spec-VoiceP<sub>2</sub>. As before, the Slice feature now forces removal of this argument:

(32) *Reduction of the Internal Argument:*

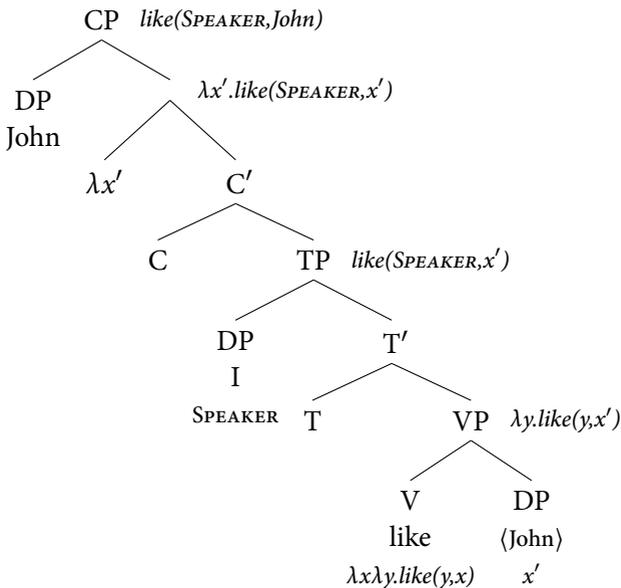


The structure we have now contains neither an internal nor external argument, i.e. double passivization constitutes two instances of argument reduction. This can therefore explain the fact that stacked passives are only possible with transitives and not possible with unergatives (7) or unaccusatives (8). In each of these cases, the second VoiceP would not be able to check its Merge and Slice features since there would be no further DP present in the structure after the first argument had been removed.

## 4.4. Semantic interpretation

One question that arises at this point is what *Slice* does semantically and how we can capture the characteristic of stacked passives in (6) that both the external and internal argument are implicit. If we remove arguments from the structure, what consequences does this have for semantic interpretation? The fact that both arguments are still implied can be captured in the following way: Assuming that movement leaves some kind of trace or copy that is interpreted as unbound variable (or a variable for an assignment function in Heim and Kratzer 1998), we can also assume that the *Slice* operation (being essentially a form of Sideward Movement) leaves a trace/copy of the DP corresponding unbound variable in its launching site.<sup>12</sup> Let us assume that the trace of a moved element is interpreted as an unbound variable (here:  $x'$ ):

(33) John<sub>1</sub>, I like t<sub>1</sub>.



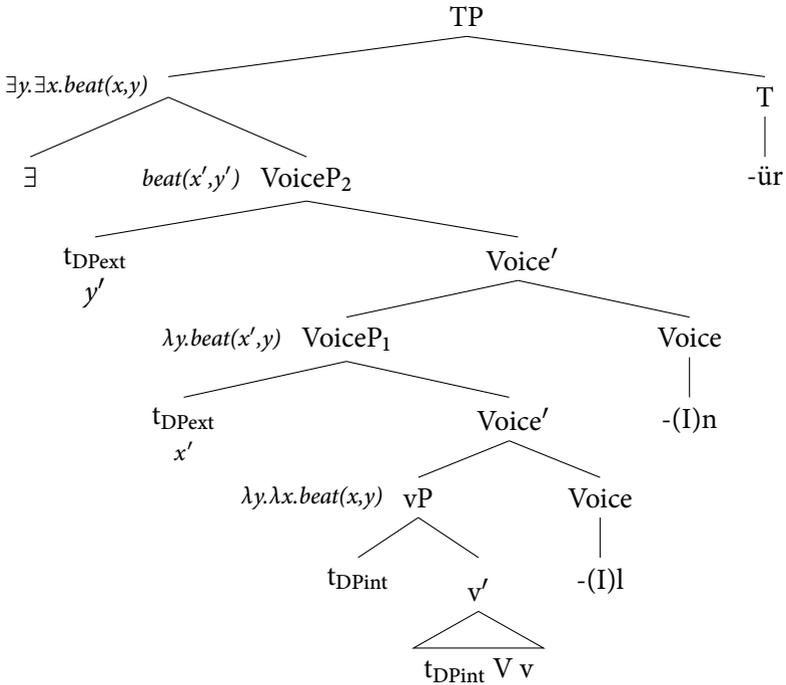
<sup>12</sup>In the following, I will simplify assumptions about traces/copies slightly for reasons of exposition and simply assume that lower copies are unbound variables. Nevertheless, an implementation using the assignment function in Heim and Kratzer (1998) would derive the same result.

Following Heim and Kratzer (1998), let us assume lambda abstraction over the variable below the point at which the moved phrase is remerged. Under this approach, what happens if the moved element is not remerged into the structure? Let us assume that the variables remain unbound in such cases. Furthermore, I will follow Diesing (1992) in proposing that existential closure of variables takes place at what she called the ‘VP’ edge. For present purposes, this corresponds to everything below T (so the highest VoiceP). Diesing (1992) discussed examples such as the following that show that if a bare plural (assumed to have a variable-like meaning) stays inside the VP, it receives an existential interpretation (34)b:

(34) Sharks are visible.

- a. [<sub>IP</sub> Sharks<sub>*i*</sub> ∃ [<sub>VP</sub> t<sub>*i*</sub> are visible]]  
‘Sharks generally have the property of being visible.’
- b. [<sub>IP</sub> ∃ [<sub>VP</sub> Sharks are visible]]  
‘There are some sharks visible right now.’

Similarly, we can assume that existential closure of unbound variables takes place below T:

(35) *Existential closure of traces of Sliced DPs:*

Above, we are forced to assume the domain of existential closure is actually at the VoiceP edge rather than, say, vP. Evidence supporting this idea comes from the examples in (36) from Carlson (1977):

- (36) a. Children were dancing in the street. (✓ existential)  
 b. Doctors are intelligent. (\*existential)

Here we see that existential closure of bare plurals only seems possible with passives. This suggests that the domain of existential closure is at VoiceP and thus higher than the subject in (36b).

## 5. Extensions: Deriving other properties of the passive

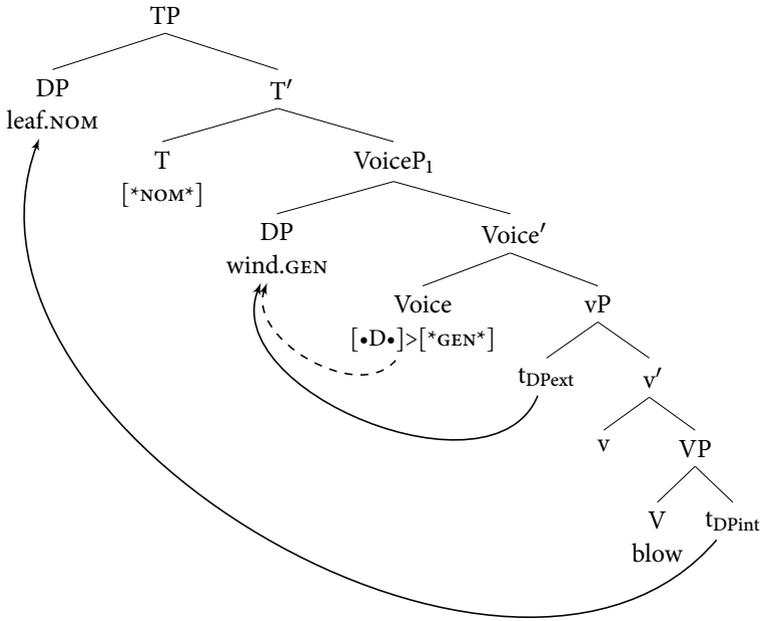
### 5.1. Double passives in Lithuanian

In this section, we will see how the analysis developed here for Turkish can be applied to similar cases of double passivization, e.g. in Lithuanian (Timberlake 1982, Keenan and Timberlake 1985). Double passives in Lithuanian differ from those in Turkish in that there are not two instances of passive morphology in double passivized structure, which is why I have refrained from calling them ‘stacked’ (since stacking refers here to morphemes). Furthermore, Lithuanian does not form the passive by means of argument reduction, but rather argument *demotion*. The external argument in passives is realized as an oblique argument in the genitive case (38), rather than the nominative as in active clauses (37):

(37) Vėjas nupūte tą lapelį.  
 wind.NOM blow that leaf.ACC  
 ‘The wind blew down that leaf.’

(38) Tas lapelis vėjo nupūstas.  
 this leaf.NOM wind.GEN blow  
 ‘That leaf was blown down by the wind.’ (Timberlake 1982)

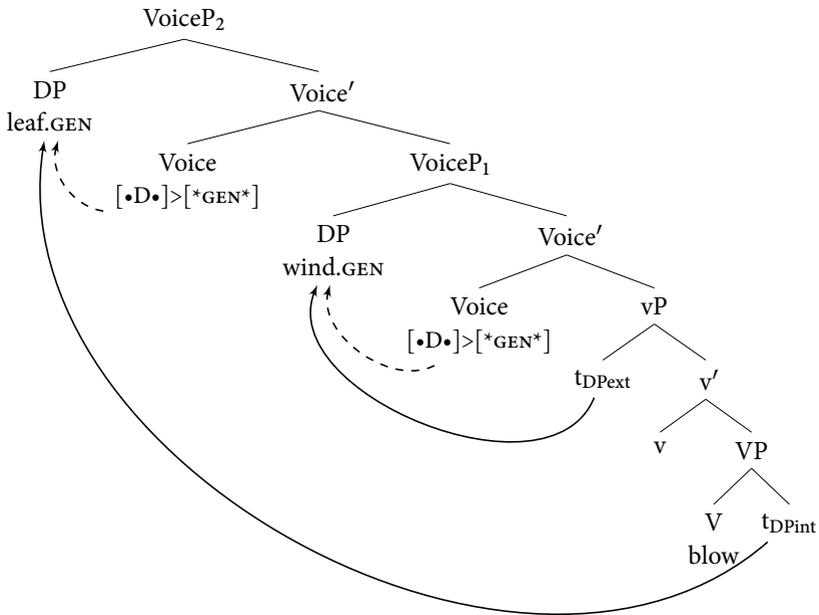
Since there is no argument removal, we can assume that the Voice head in Lithuanian does not bear a [-D-] feature, but rather a case feature for genitive ([\*GEN\*]). This feature will assign genitive to the external argument that moves to Spec-VoiceP via Spec-Head Agree and will thereby bleed further assignment of nominative to the external argument. Instead, the internal argument is assigned nominative and moves to Spec-TP:

(39) *Personal passive in Lithuanian:*

In Lithuanian double passives, the internal argument is also realized with genitive case as shown in (40):

- (40) To lapelio būta vėjo nupūsto.  
 this leaf.GEN was wind.GEN blow  
 'That leaf was blown down by the wind.' (Timberlake 1982)

Thus, we have two instances of argument demotion parallel to the two instances of argument reduction in stacked passives in Turkish. Accordingly, we can follow the analysis of the Turkish data and assume that double passives in Lithuanian contain a second VoiceP projection bearing the same features ([.D.], [\*GEN\*]) thereby resulting in movement of the internal argument to Spec-VoiceP<sub>2</sub> where it is also assigned genitive and thus bleeding of nominative case assignment:

(41) *Double passive in Lithuanian:*

Thus, we see that languages can differ with regard to their passive strategies (argument reduction vs. demotion) and whether passivization is realized morphologically (i.e. whether the Voice head has an overt Spellout or not), but nevertheless the analysis with two identical VoicePs can be extended to both.

## 5.2. Antipassives

This section will show how the *Slice* approach to passives sketched above can explain the availability of so-called ‘antipassive’ constructions in ergative-absolutive languages. The ‘antipassive’ (Silverstein 1972) is a construction in ergative languages that is characterized as the demotion or reduction of the internal argument. In antipassives in Godoberi (42), the internal argument is suppressed and the antipassive marker *-a* appears on the verb. In Chukchee (43) and West Greenlandic Inuttut (44), we see a similar process of reduction of the internal argument coupled with antipassive marking on the verb.

(42) *Antipassive in Godoberi:*

- a. ?ali-di q'iru b-el-ata-da.  
 Ali-ERG wheat NEUT-thresh-IPF.CONV-AUX  
 'Ali is threshing wheat.'
- b. ?ali w-ol-a-da.  
 Ali MASC-thresh-APASS.CONV-AUX  
 'Ali is threshing.' (Kibrik 1996)

(43) *Antipassive in Chukchee:*

- a. yemronə-na qərir-ərkən-in ekək  
 Yemron-ERG<sub>i</sub> search-PRES-3SG<sub>i</sub>.3SG<sub>j</sub> son.NOM<sub>j</sub>  
 'Yemron is searching for his son.'
- b. yemron ine-lqərir-ərkən  
 Yemron.NOM<sub>i</sub> APASS-search-PRES-3SG<sub>i</sub>  
 'Yemron is searching.' (Bittner and Hale 1996)

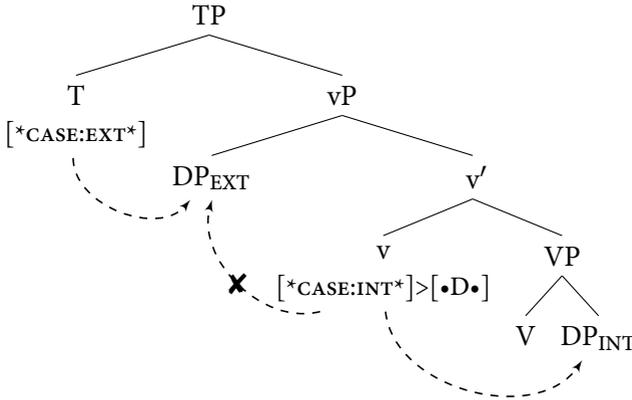
(44) *Antipassive in West Greenlandic Inuttut:*

- a. toqut-Va-a ('Toquppa')  
 kill-IND-3S/3S  
 'He/she/it killed him/her/it.'
- b. toqut-si-Vu-q ('Toqutsivoq')  
 kill-APASS-IND-3S  
 'He/she/it killed (something).' (Saddock 2003)

The analysis I propose rests on assumptions in Müller (2009) about how ergative-absolutive systems are derived. Müller proposes that the order of the operations on *v* determines what the alignment system will be. Let us assume abstract types of case: A morphologically marked internal case (ACC, ERG) and a morphologically unmarked external case (NOM, ABS). Müller assumes that the former is assigned by T and the latter by *v*. At the point in the derivation  $\sigma$  where *v* has merged with VP, there is what Müller calls an 'indeterminacy in rule application'. Assuming the *v* head carries out (at least) the following two operations, (i) externally merge an argument in its specifier ([•D•]), (ii) assign case to the 'closest element' (e.g. [\*CASE:INT\*]), whereby elements in its specifier are preferred (*Spec-Head Bias*), then in principle, either rule can apply at  $\sigma$ . If [\*CASE:INT\*] applies before [•D•], then the 'closest' goal will be the internal argument and internal (or accusative/ergative) case will be

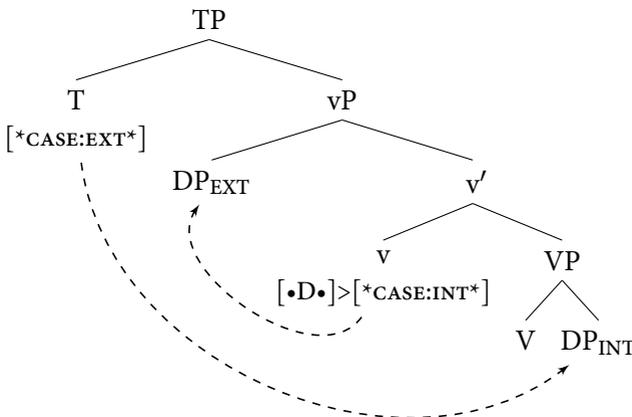
assigned. Subsequently, T will assign external case to the external argument (45).<sup>13</sup> This derives a nominative-accusative alignment:

(45) *Nominative-Accusative Alignment:*



For ergative-absolutive alignments (those languages, which tend to have antipassive constructions), the order of operations on *v* is reversed. Since [•D•] applies before [\*CASE:INT\*], it feeds Spec-Head Agree and internal (ergative case) is assigned to DP<sub>EXT</sub>. T then assigns external case (absolutive) to the internal argument as in (46).

(46) *Ergative-Absolutive Alignment:*



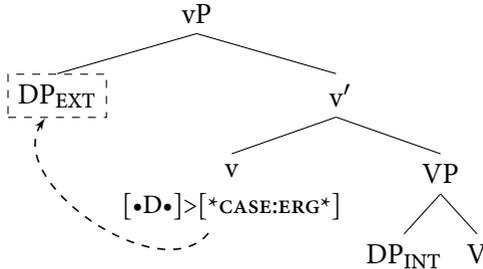
<sup>13</sup> This is a case of *counterfeeding* (Kiparsky 1973) of Spec-Head Agree as if [•D•] had applied before [\*CASE:EXT\*], it would have fed this operation.

Thus, the difference between ergative-absolutive and nominative-accusative languages is simply the order of operations on the *v* head. Accordingly, the analysis of the antipassive will rely on this fact. It is often assumed that the availability of a DP as potential goal for Agree is directly linked to whether it has been assigned case or not. DPs which have not yet been assigned case are still ‘active’ for Agree operations, whereas those already assigned case are ‘deactivated’ in the process. This can be summarized as follows:

- (47) *Activity Condition* (Chomsky 2000, 2001):  
A syntactic object  $\alpha$  is a potential goal for syntactic operations iff  $\alpha$  bears an unvalued Case feature.

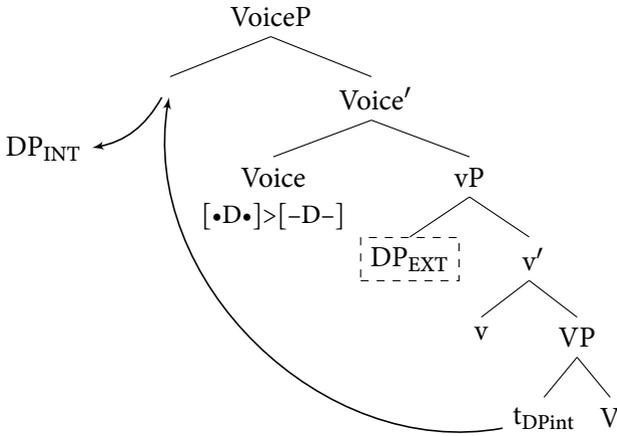
In ergative-absolutive languages such as (42)–(44), [ $\bullet$ D $\bullet$ ] feeds Spec-Head assignment of internal case to the external argument in Spec-*v*P. In the derivation of structures in an ergative language, the external argument is assigned internal (ergative) case and is therefore deactivated for further Agree operations as indicated by the dashed box:

- (48) *Deactivation of DP<sub>EXT</sub>*:

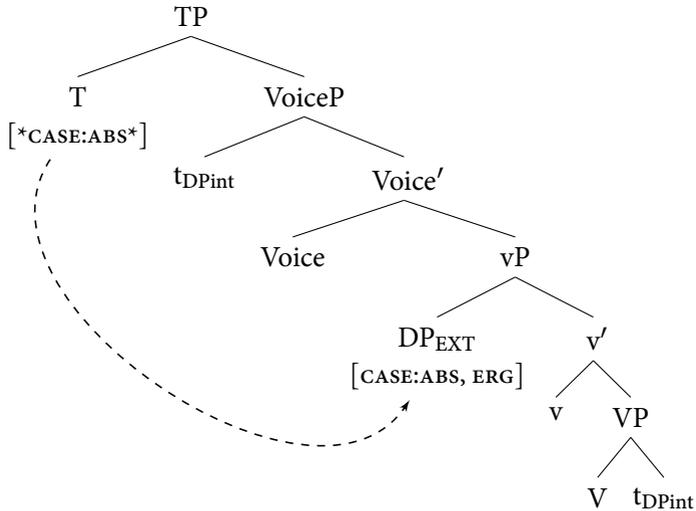


Thus, when Voice is merged above *v*P, DP<sub>EXT</sub> is not an active goal for the [ $\bullet$ D $\bullet$ ] feature. Instead, it probes further and attracts the internal argument to Spec-VoiceP and subsequently removes it from the structure:

(49) *Reduction of Internal Argument:*



A necessary assumption at this point is that cases can be ‘stacked’ (see McCreight 1988, Yoon 2004, Merchant 2006, Richards 2013), i.e. multiple case assignment is possible. Since assignment of absolutive to **DP<sub>INT</sub>** in (49) was bled by the *Slice* operation, T still has internal (absolutive) case to assign: [ $\ast$ CASE:INT $\ast$ ]. Therefore, let us assume that a case-marked DP is inactive for all syntactic operations (e.g. movement or extraction; Chomsky 2000) apart from further case assignment. Accordingly, T can assign absolutive case to the external argument as in (50) (where internal and external case have been replaced by the corresponding ergative and absolutive):

(50) *Case Stacking:*

The case features on the external argument DP now bears two values and the question arises at this point as to which case is realized on a DP with stacked cases. I assume that this conflict is resolved by referring to the Case Accessibility Hierarchy proposed in (Otsuka 2006: 84) given in (51):

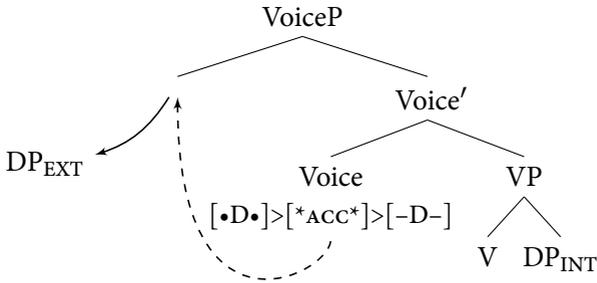
(51) *Case Accessibility Hierarchy:*

Unmarked Case (NOM/ABS) > Marked Case (ACC/ERG) > Oblique

This means that for a DP which was assigned both internal and external case (or absolutive and ergative in this present example), only the highest case on the hierarchy in (51) would be morphologically realized (i.e. absolutive).

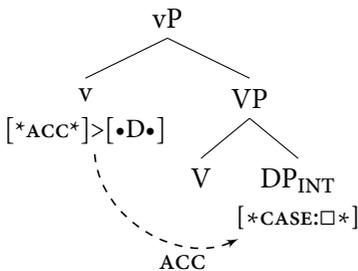
## 5.3. Accusative absorption

The question of how internal (accusative/ergative) case is 'absorbed' in passives still remains unanswered. This problem is not entirely straightforward, however. There are two options for capturing this fact under present assumptions. The first would be to assume that the external argument DP is first assigned accusative after it is merged in Spec-vP and is then removed from the structure (with accusative case). We would therefore require the order of operations on Voice to be  $[\bullet\text{D}\bullet > \ast\text{ACC}\ast > -\text{D}-]$ . This would work as follows:

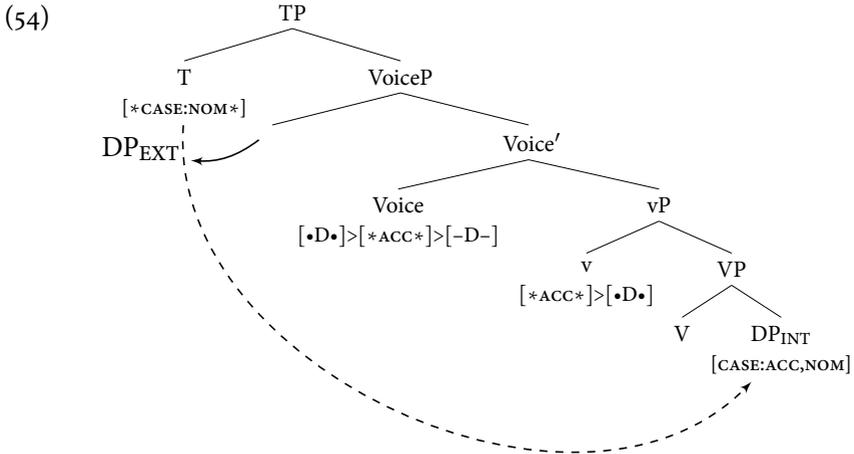
(52) *Accusative case absorption:*

This approach has a number of drawbacks, however. First, it is necessary to assume that Voice and *v* are in fact the same head after all since *Slice* needs to apply directly after the operations normally carried out by *v*. Furthermore, note that the order of operations on Voice/*v* would have to be [ $\bullet D \bullet$ ] >  $\ast ACC \ast$ ] > [-D-] for nominative-accusative languages. Recall from (45) that nominative-accusative alignment was derived by the exact opposite order [ $\ast ACC \ast$ ] > [ $\bullet D \bullet$ ], i.e. counterfeeding of Spec-Head Agree. It seems that we would have to assume that passives contain a special *v*/Voice head with the reverse order of operations. This would, however, seem to undermine the elegance of the present analysis and essentially reduce this analysis to a lexical approach to passivization.

A different option emerging from the discussion of antipassives in the previous section would be to assume case stacking in English as well. We can maintain our assumption that *v* and Voice are distinct heads (which was necessary for the analysis of antipassives) and the order [ $\ast ACC \ast$ ] > [ $\bullet D \bullet$ ] would result in accusative assignment to internal argument:

(53) *Accusative case assignment*

At a later stage of the derivation, the Voice head will attract the external argument and remove it. Subsequently at TP, the T head will be able to assign nominative to the internal argument:



If we follow the assumptions made in Section 5.2 that the highest case on the hierarchy in (51) (repeated below) is the one that is morphologically realized, then nominative will be realized over accusative.

- (51) *Case Accessibility Hierarchy* (Otsuka 2006: 84):  
 Unmarked Case (NOM/ABS) > Marked Case (ACC/ERG) > Oblique

#### 5.4. *by*-phrases

The last property of the passive that I will consider is the availability of the agent as an adjunct in *by*-phrases. With the exception of Collins (2005) and Bruening (2013), most theories of the passive do not have anything insightful to say about this fact. If we follow Müller's (2014) approach, the external is moved back into the workspace. This opens up the possibility of remerging it as either an oblique argument or as the argument of prepositional phrase. Since there is a semantic trace/copy of the external argument in subject position, the semantic linking will be unproblematic (see Section 4.4).

## 6. Conclusion

In this paper, I have presented an analysis of stacked passive constructions in Turkish, which exhibit both two instances of passive morphology and two instances of argument reduction. Although there are a number of theories of the passive available, it is clear not all of them can straightforwardly apply to instances of double passivization, where it seems that we have two subsequent applications of a passivization rule. It seems that any satisfactory theory of the passive should capture that fact that we have a morphological reflex, which seems to correspond to each instance of passivization. Furthermore, it was shown that there is a syntactic dilemma posed by the fact there is evidence (e.g. from control) suggesting that an external argument is present, however, at the same time this creates a problem as it should then act as intervener for raising of the object. Thus, it was shown that adopting the theory of the passive described in Müller (2014) and applying it, with some minor additions, to stacked passive in Turkish allows us to avoid these problems. Argument reduction is treated as introduction and subsequent removal of the external argument. As proposed by Müller (2014), there is an external argument present long enough in the structure to establish downward relations such as control, but it is removed in a subsequent step so as not to act as an intervener for movement of the internal argument. If one instance of passivization involves a Voice projection carrying out argument reduction of the closest c-commanded argument, then double passivization is simply achieved by adding another Voice projection on top and thereby repeating the process. The link between passive morphology and passivization/argument reduction is captured by the fact that the head of this Voice projection is the passive morpheme. Thus, two instances of argument reduction as in stacked passives will always result in two morphological reflexes of passivization. It was also shown that this analysis can adequately capture two important characteristics of stacked passives in Turkish (i) the restriction to transitive verbs, (ii) both an internal and external argument are implicit. The first property is captured by the fact that two Voice projections will require two DPs in order for all features to be checked. The second property comes from the fact that the DPs were syntactically present at some point and thereby leave a trace/copy behind that is interpreted as an unbound variable that undergoes existential closure.

Some extensions of this analysis were also shown, for example, how we can account for dual argument demotion (i.e. realization as an oblique argument)

in impersonal passives in Lithuanian by assuming two Voice projections, each assigning genitive to an argument in its specifier rather than removing it. An analysis of antipassive constructions in ergative languages was also proposed, which rests on the idea in Müller (2009) that ergative-absolutive alignments are derived by Spec-Head assignment of internal (ergative) case to the external argument. Unlike in nominative-accusative languages where this assignment is counterfed, the external argument in ergative languages is deactivated early in the derivation. This means that when the Voice head probes for the element it will move to its specifier and then remove, it will find the internal argument as the closest, active goal. A more problematic issue is posed by internal (accusative/ergative) case absorption under the present approach. In order to capture the fact the internal case is assigned to the DP that is subsequently removed, it is necessary to abandon the assumption that Voice and *v* constitute distinct heads and furthermore that their reverse order of operations must apply (i.e. Spec-Head assignment of accusative to the external argument must be fed in passive clauses). A possible alternative involving case stacking was also discussed but this issue, along with the semantics of *by*-phrases, still requires further attention.

In sum, this paper shows that Müller's (2014) theory of the passive can be successfully extended to cases of double passivization and even beyond. The status of the *Slice* operation may, however, prove to be controversial. Nevertheless, it is not necessarily just a tool tailor-made for the problem at hand. If one thinks more carefully about the nature of Internal Merge, it may well turn out that this operation decomposes into two separate operations: *Slice* which moves an already merged item back into the numeration/workspace and then External Merge. If this is the case, then an operation such as *Slice* would be independently motivated outside of passive constructions. The wider implications of this analysis still have to be investigated. For example, what is the relationship between double passives of the kind discussed here and run-of-the-mill impersonal passives with oblique arguments. Nevertheless, since transferring some of the older more parsimonious analyses from GB and Relational Grammar prove difficult (and come with their own independent problems), the present analysis is a promising Minimalist approach to a variety of passive constructions such as stacked passives, impersonal passives, antipassives and indeed passives in general.

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# On opaque agreement relations in German A-N-N compounds

Katja Barnickel\*

## Abstract

A(djective)-N(oun)-N(oun) compounds in German exhibit unexpected internal inflection with respect to case and number. On the surface it seems as if compound internal agreement would violate Earliness and locality conditions. The aim of this paper is to shed some light on the question what kind of opaque processes take place in German A-N-N compounds. I briefly discuss an analysis of A-N-N compounds that has been proposed for Dutch. First, I will show that this analysis alone, which involves feature-sharing, cannot account for German A-N-N compounds. Secondly, I will propose an alternative analysis which produces the correct empirical results for German. This alternative crucially relies on the order of the elementary operations Merge and Agree and the bias for Spec-Head-Agree in order to resolve the agreement opacity.

## 1. Introduction

### 1.1. The phenomenon

A(djective)-N(oun)-N(oun) compounds are compounds that consist of two parts: a noun  $N_1$  which is modified by an adjective A and a second noun  $N_2$  which is modified by  $[_{NP} A N_1]$ . (1) illustrates documented cases of the productive pattern in German.

- (1) Documented A-N-N compounds (taken from Lawrenz 1995: 39)
- a. das Verdrängte-Aggressionen-Syndrom  
the suppressed-aggression-syndrome  
'the suppressed aggression syndrome'

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\*For very helpful advice, comments and discussion I would like to thank Martin Salzmann, Doreen Georgi and Timo Klein. Furthermore, thanks to Andrew Murphy for the English translations of the German A-N-N compounds and thanks to all who participated in my written or oral grammaticality judgement survey.

- b. der Graue-Schläfen-Effekt  
the gray-temples-effect  
'the gray (hair on the) temples effect'
- c. das Heile-Bergwelt-Image  
the idyllic-mountain.landscape-image  
'the imagine of unspoilt mountains'
- d. die Brave-Kind-Haltung  
the honest-child-attitude  
'the behaving like a good child'
- e. Obere-Mittelklasse-Wagen  
upper-middle.sized.class-car  
'upper mid-range car'
- f. Höhere-Töchter-Manieren  
higher-daughters-manners  
'lady-like manners'
- g. Kleine-Leute-Viertel  
little-people-neighborhood  
'the district for ordinary people'
- h. die Starke-Mann-Manier  
the strong-man-manner  
'the tough man act'
- i. ein Alte-Herren-Verein  
an old-men-club  
'a gentleman's club'
- j. das Graue-Maus-Dasein  
the gray-mouse-existence  
'the plain Jane existence'

In the following subsection I will show that A-N-N compounds exhibit unexpected internal inflection, which is interesting from a morphological as well as from a syntactic perspective.

### 1.2. Opaque agreement

In the German DP the determiner and the attributive adjective agree with the following noun in case, number and gender. In (2) case is assigned by the preposition.

- (2) wegen d-es brav-en Mädchen-s  
 because.of the-N.SG.GEN good-N.SG.GEN girl-N.SG.GEN  
 'because of the good girl'

There seem to be two groups of A-N-N compounds. In the first group the head noun  $N_2$  agrees in case, gender and number with the determiner. The adjective and  $N_1$  are marked with default, i.e. they bear nominative case, independent of  $N_2$ 's inflection. In (3), (4) and (5) A- $N_1$  cases with regular agreement of A and  $N_1$  (a-examples) are contrasted with the A- $N_1$ - $N_2$  cases where A does not agree with  $N_2$  (b-examples).

- (3) a. bei d-er Erst-en Hilfe  
 at the-F.SG.DAT first-F.SG.DAT aid.F.SG.DAT  
 'during first aid'  
 b. bei d-er Erst-e Hilfe Ausbildung  
 at the-F.SG.DAT first-F.SG.NOM aid.F.SG.NOM education.F.SG.DAT  
 'during first aid training'<sup>1</sup>
- (4) a. vor d-er Dritt-en Welt  
 before the-M.SG.DAT third-F.SG.DAT world.F.SG.DAT  
 'before the Third World'  
 b. vor d-em Dritt-e Welt  
 in.front.of the-M.SG.DAT third-F.SG.NOM world.F.SG.NOM  
 Laden  
 store.M.SG.DAT  
 'in front of the Third World Shop'
- (5) a. an d-em schön-en Wochenende  
 at the-N.SG.DAT nice-N.SG.DAT weekend.N.SG.DAT  
 'at the nice weekend'  
 b. mit d-em Schön-es Wochenende  
 with the-N.SG.DAT nice-N.SG.NOM weekend.N.SG.NOM  
 Ticket  
 ticket.N.SG.DAT  
 'with the Nice-Weekend-Ticket'

<sup>1</sup>In order to avoid confusion with bound morphemes, hyphens between the German A,  $N_1$  and  $N_2$  are omitted in all upcoming glossed examples.

In the second group it seems as if the adjective and  $N_1$  agree in case, gender and number as well, together with the head noun  $N_2$ .<sup>2</sup>

- (6) a. ohne sein-en Gut-en Morgen  
without his-M.SG.ACC good-M.SG.ACC morning-M.SG.ACC  
Tee  
tea.M.SG.ACC  
'without his good morning tea'
- b. mit ihr-em Brav-en Mädchen Image  
with her-N.SG.DAT good-N.SG.DAT girl.N.SG.DAT image-N.SG.DAT  
'with her good girl image'
- c. neben d-er Rot-en Kreuz Schwester  
beside the-F.SG.DAT red-F.SG.DAT cross.N.SG.DAT nurse.F.SG.DAT  
'next to the Red Cross nurse'

However, as observed by Lawrenz (1995) there is neither case nor number agreement between the adjective and  $N_1$ . This becomes obvious when the preposition assigns genitive case. If there was case agreement between the adjective,  $N_1$  and  $N_2$ , as illustrated in (6),  $N_1$  would show the appropriate genitive-marker *-(e)s*. The examples in (7) show that this is not the case.

- (7) a. wegen sein-es Gut-en Morgen(\*s)  
because.of his-M.SG.GEN good-M.SG.GEN morning-M.SG.NOM  
Tee-s  
tea.M.SG-GEN  
'because of his good morning tea'

---

<sup>2</sup>Nominative inflection seems to be possible as well (informal judgments vary):

- (i) a. ohne sein-en Gut-e Morgen Tee  
without his-M.SG.ACC good-M.SG.NOM morning-M.SG.NOM tea.M.SG.ACC  
'without his good morning tea'
- b. mit ihr-em Brav-e Mädchen Image  
with her-N.SG.DAT good-N.SG.NOM girl.N.SG.NOM image-N.SG.DAT  
'with her good girl image'
- c. ?neben d-er Rot-e Kreuz Schwester  
beside the-F.SG.DAT red-F.SG.NOM cross.N.SG.NOM nurse.F.SG.DAT  
'next to the Red Cross nurse'

- b. aufgrund ihr-es      Brav-en      Mädchen(\*s)  
 because.of her-N.SG.GEN good-N.SG.GEN girl.N.SG.NOM  
 Image-s  
 image-N.SG.GEN  
 ‘because of her good girl image’
- c. wegen d-er      Rot-en      Kreuz(\*es)  
 because.of the-F.SG.GEN red-F.SG.GEN CROSS.N.SG.NOM  
 Schwester  
 nurse.F.SG.GEN  
 ‘because of the Red Cross nurse’

Further evidence that A and N<sub>1</sub> do not agree comes from number agreement (Lawrenz 1995). If A agrees with N<sub>1</sub>, one would expect that if N<sub>1</sub> is specified for plural, A is specified for plural as well. This is not the case. (8) and (9) show that A rather agrees in number with N<sub>2</sub>.<sup>3</sup>

- (8) a. die Schön-e Ding-e Boutique  
 the nice-SG thing-PL boutique.SG  
 ‘the boutique of nice things’
- b. \*die Schön-en Ding-e Boutique  
 the nice-PL thing-PL boutique.SG  
 ‘the boutique of nice things’

<sup>3</sup>One could guess that the *-e* in *schön-e* and *kurz-e* is not the weak inflection singular marker (*die schön-e Boutique* ‘the nice boutique’), but the marker for the nominative strong inflection which appears e.g. if there is no determiner (*Ø schön-e Boutique* ‘nice boutique’). That this is not the case can be seen in the singular A-N-N examples, where strong inflection on the adjective is never grammatical (beside in proper names like *Schön-es-Weekenende-Ticket* ‘Nice-Weekend-Ticket’):

(i) *Adjectives with strong inflection*

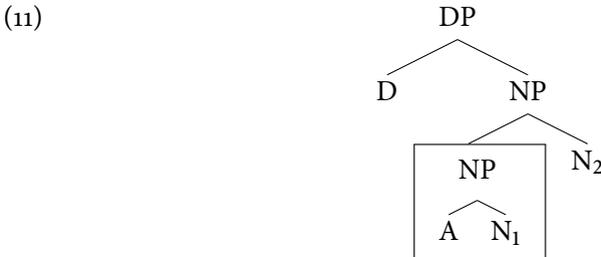
- a. \*d-er      [Gut-er      Morgen]      Tee  
 the-M.SG.NOM good-M.SG.NOM morning-M.SG.NOM tea.M.SG.NOM  
 ‘the good morning tea’
- b. \*d-as      [Brav-es      Mädchen]      Image  
 the-N.SG.NOM good-N.SG.NOM girl.N.SG.NOM image-N.SG.NOM  
 ‘the good girl image’
- c. \*d-ie      [Brav-es      Kind]      Haltung  
 the-F.SG.NOM good-N.SG.NOM child.N.SG.NOM attitude.F.SG.NOM  
 ‘the behaving like a good child’

- (9) a. das Kurz-e Hose-n Wetter  
 the short-SG trousers-PL weather.SG  
 ‘the shorts weather’
- b. \*das Kurz-en Hose-n Wetter  
 the short-PL trousers-PL weather.SG  
 ‘the shorts weather’

Agreement in A-N-N compounds can be summarized as follows:

- (10) *Agreement in A-N-N compounds*
- a. The adjective and N<sub>1</sub> are default case-marked (nominative), N<sub>2</sub> receives case from an external head.
- b. The adjective agrees with N<sub>2</sub> in case and number; N<sub>1</sub> bears the unmarked case (nominative) (vgl. (7)).

For the scenario in (10a), where adjective and N<sub>1</sub> both are nominative marked, I assume the following structure.



In (11) the adjective is part of an A-N compound (framed) which is built in the lexicon before it enters the syntactic derivation. Evidence for this assumption comes from the observation that A-N components that do not agree with N<sub>2</sub> seem to be strongly lexicalized (*Dritte Welt* ‘Third World’, *Erste Hilfe* ‘first aid’, *schönes Wochenende* ‘nice weekend’, *gute Nacht* ‘good night’) or even idiomatic ones (*graue Maus* ‘grey mouse’ = mousy person).<sup>4</sup>

<sup>4</sup>The finding that adjectives which are part of a lexicalized expression rather do not show any agreement is based on an informal survey with German native speakers. The survey indeed showed that this is only a tendency. An example which violates the generalization that adjectives in lexicalized expression do not show agreement, e.g. is *wegen der Roten-Kreuz-Schwester* ‘because of the Red Cross nurse’. In some cases the judgments strongly vary: As many participants preferred *mit ihrer Heile-Welt-Stimmung* as *mit ihrer Heilen-Welt-Stimmung* ‘with her perfect world feeling’.

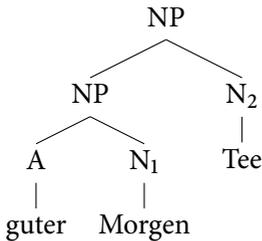
A further option to account for the default case-marking on A and N<sub>1</sub> is early spell-out of the [A-N<sub>1</sub>]-component (De Belder and van Koppen 2013, see section 2.1 of this paper for details). This means that speakers send the [A-N<sub>1</sub>]-component to PF as soon as it is merged. In this paper I will leave aside all cases which include strongly lexicalized or idiomatic expressions that are built in the lexicon or are sent to spell-out immediately. Instead, I will focus on the group of A-N-N compounds in (10b). In these cases it is not plausible to assume that A and N<sub>1</sub> enter the syntactic derivation as a fixed idiomatic expression or that they are spelled out early, since the adjective interacts with N<sub>2</sub>. These cases are interesting because this interaction is opaque.

(12) *Opaque agreement*

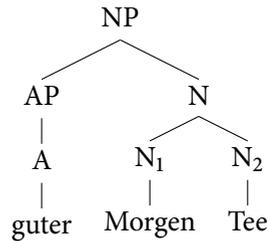
The adjective agrees with N<sub>2</sub> in case and number; N<sub>1</sub> bears the unmarked case (nominative).

Concerning the structure of these cases, they seem to be an instance of a bracketing paradox: semantically the adjective specifies N<sub>1</sub> (13). Syntactically, however, it seems to be related to N<sub>2</sub> (14).

(13) Semantic structure



(14) Syntactic structure



The structure in (13) has to be the underlying one to yield the correct semantic interpretation. Given the generalization in (10b), repeated as (12) above, the following two questions arise:

1. Why does the adjective not agree with N<sub>1</sub>?

According to the Earliness requirement (Pesetsky 1989), which demands that operations apply as soon as their context is met, Agree- and Merge-inducing features must be discharged as soon as possible. In the case of A-N-N compounds it seems like as if this requirement is vio-

lated: as soon as A and  $N_1$  are merged, one would expect A to agree with  $N_1$  immediately.

2. What does the adjective rather force to agree with  $N_2$ ?  
Agreement of A and  $N_2$  seems to violate the condition on locality: if there is any interaction of A with one of the N's, under the assumption of bottom-up structure building one would expect A to agree with the closer  $N_1$ .

The aim of this paper is to shed some light on the question what kind of opaque processes take place in German A-N-N compounds which on the surface seem to violate Earliness and locality conditions. The paper is organized as follows: First, I will briefly introduce the analysis of A-N-N compounds proposed by De Belder and van Koppen (2013) for Dutch. I will show that this analysis, which involves feature-sharing, cannot account for the agreement facts in German A-N-N compounds alone. After the illustration and discussion of the problems with this analysis, I will present an alternative proposal which provides the correct empirical results for German. This alternative also includes feature-sharing, but the crucial point is that it makes use of the order of the elementary operations Merge and Agree and the bias for Spec-Head-Agree.

## 2. Analysis

- 2.1. Analyzing Dutch A-N-N compounds (De Belder and van Koppen 2013)

De Belder and van Koppen (2013) report on internal inflection in Dutch A-N-N compounds.

- (15) kaal-e-kat-adoptie  
hairless-AGR-cat-adoption  
'adoption of hairless cats'

Adjectives in the Dutch DP are marked for definiteness.

- (16) *Adjective inflection in the Dutch DP*  
/Ø/ → [neuter, singular, indefinite]  
/e/ → elsewhere

Definiteness is encoded on D. The [A-N<sub>1</sub>]-constituent lacks the definiteness information, since it lacks its own D-layer.

- (17) \*een de-kaal-e-kat-adoptie  
 a the-hairless-AGR-cat-adoption

If the [A-N<sub>1</sub>]-constituent lacks its own D-layer which contains the definiteness information, how can the unvalued definiteness feature [udef] on the adjective get valued? De Belder and van Koppen (2013) mention two possible strategies:

- (18) a. Strategy 1:  
 The [udef]-feature on the adjective does not get valued and a default spell out obtains (Preminger 2011), resulting in the elsewhere affix *-e* on the adjective.
- b. Strategy 2:  
 Adjectival inflection inside the [A-N<sub>1</sub>]-constituent is sensitive to functional material belonging to the D-head of the compound. The [udef]-feature on the adjective gets valued by the [idef]-feature of the D-head of the entire compound. In the context of the feature specification [neuter, singular, indefinite] this would lead to the marker  $\emptyset$ .

A huge online survey (nearly 700 participants) showed that both strategies occur. The elsewhere affix *-e* is always an option. De Belder and van Koppen (2013) account for this observation assuming that spell-out obtains before [A-N<sub>1</sub>] is merged with N<sub>2</sub>. The *e*-affix realizes a defective feature set, namely a set that contains an unvalued feature.

The second observation was a preference for the  $\emptyset$ -marker on the adjective in the context of indefinite A-N<sub>neut</sub>-N compounds.<sup>5</sup> The  $\emptyset$ -marker is only available for the feature specification [neuter, singular, indefinite]. De Belder and van Koppen (2013) conclude from this finding that the [udef]-feature of the adjective gets valued from the [idef]-feature on the D-head of the entire compound. Technically, this is done via feature-sharing.

<sup>5</sup>This marker is neither preferred in the case of definiteness nor for compounds where N<sub>1</sub> is different from neuter.

In the following section I will briefly introduce the idea of feature-sharing (Frampton and Gutman 2006, Pesetsky and Torrego 2007). Subsequently, I will show that a feature-sharing analysis as proposed for Dutch A-N-N compounds poses serious problems for German A-N-N compounds. This is due to the fact that German has case-agreement which Dutch lacks.

## 2.2. Feature-sharing in German A-N-N compounds

I will make the following assumptions: All syntactic operations are feature-driven. The two basic operations are *Merge* for structure building and *Agree* for argument encoding by case assignment/agreement. These are triggered by the following features (Heck and Müller 2007).

- (19) *Two types of features that drive operations*
- a. Structure building features (e.g. subcategorization features) [ $\bullet F \bullet$ ] trigger Merge with an element that bears a corresponding feature [F].
  - b. Probe features [ $*F*$ ] trigger Agree.

I adopt the following definition of Agree (Chomsky 2000, 2001).

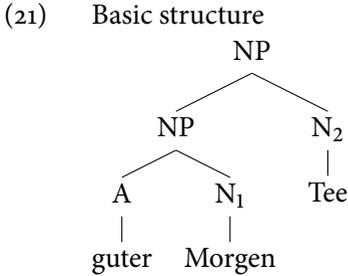
- (20) Agree between a probe P and a goal G obtains if the following conditions are met:
- a. A probe P c-commands a goal G.
  - b. G is the closest goal to P (e.g. there is no other goal H which asymmetrically c-commands G).
  - c. G is active (G has an unvalued case feature).
  - d. P bears at least one unvalued probe feature and thereby seeks the value of a matching feature of G  
... with the result that ...
  - e. G values P ( $\phi$ -features) and P values G (case).

I take Agree to be feature-sharing (Frampton and Gutman 2006, Pesetsky and Torrego 2007). This means if G does not provide a value for G, P and G share the unvalued feature. This feature is valued on P and G later in the derivation by a probe P' which is specified for a value (for DP internal feature-sharing see also Georgi and Salzmann 2010).

Further I assume that probe features (noted as [ $*F:v*$ ] (=valued) or [ $*F:\square*$ ])

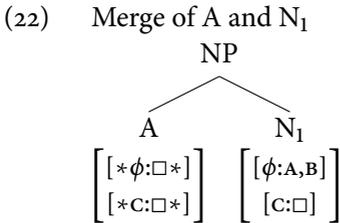
(=unvalued)) as well as subcategorization (Merge-inducing) features must be checked immediately (*Earliness requirement*).

To ensure that the correct semantic interpretation is available, I assume that the basic structure is the one in (21).



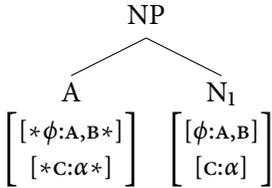
In the following the derivation is shown step by step:

1. A and N<sub>1</sub> are merged (attributive adjectives are adjuncts, see Svenonius 1994, Schoorlemmer 2009). N<sub>1</sub> bears an unvalued case feature and inherent  $\phi$ -features. A is completely unvalued for case and  $\phi$ -features.

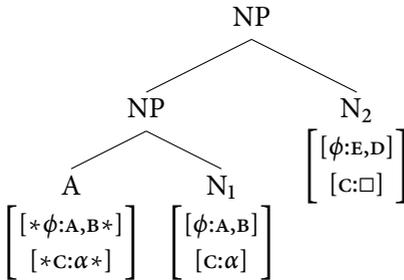


2. Given the Earliness requirement, A and N enter an Agree relation as soon as they are merged. Since N<sub>1</sub> has no valued case feature yet, it cannot value the case-probe on A. Instead, A and N<sub>1</sub> share the unvalued case feature. After  $\phi$ -Agree A and N<sub>1</sub> share the valued  $\phi$ -features of N<sub>1</sub>.<sup>6</sup>

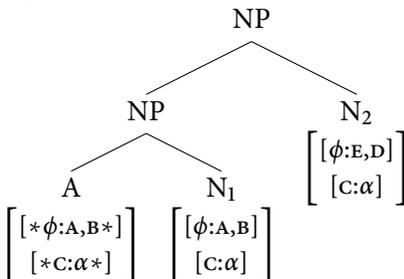
<sup>6</sup>Shared unvalued features are noted with  $\alpha$ , discharged features are underlined. For the sake of convenience, in all graphic illustrations  $\phi$ -features are located on the probe after Agree with the goal which provides these features. Nevertheless, it should be kept in mind that in fact  $\phi$ -probes are not valued in a traditional sense after Agree, but that they *share* the valued features with their goal. The same illustration holds for case features: in fact not every element bears its own case feature, rather there is only *one* which is shared.

(23) Agree of A and N<sub>1</sub>

3. The next step is Merge of N<sub>2</sub> (adjunction). N<sub>2</sub> bears inherent  $\phi$ -features and an unvalued case feature.

(24) Merge of N<sub>2</sub>

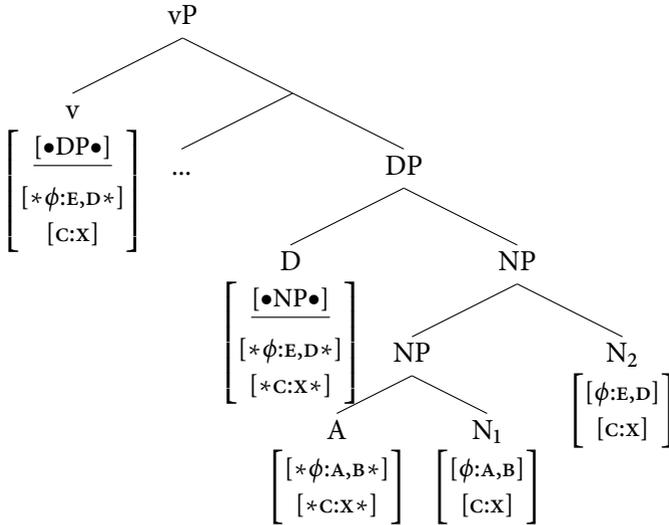
4. N<sub>2</sub> and A enter an Agree relation. Since neither A nor N<sub>2</sub> have a valued case feature yet, no case valuation takes place. Rather, N<sub>2</sub> now shares the unvalued case feature ( $\alpha$ ) with A which additionally is already shared with N<sub>1</sub>. N<sub>2</sub> bears inherent  $\phi$ -features, but since at this point of the derivation there is no unvalued  $\phi$ -probe in the structure, no  $\phi$ -Agree takes place.

(25) Agree of A with N<sub>2</sub>

5. D is merged (D selects the NP). D bears an unvalued case-probe as well



## (27) Merge and Agree of v



The step-by-step derivation illustrates that feature-sharing as proposed for Dutch is not an option to analyze German A-N-N compounds. D, A, N<sub>1</sub> and N<sub>2</sub> all get the same case feature, because they all share it. This is not the right result for German. If e.g. P is the case assigner and if P assigns genitive, one can see that this leads to the wrong prediction that D, A, N<sub>1</sub> and N<sub>2</sub> all bear genitive case (see (28)). For Dutch this is not a problem because Dutch lacks case-Agree (no case marking).

- (28) a. wegen sein-es Gut-en Morgen(\*s)  
 because.of his-M.SG.GEN good-M.SG.GEN morning-M.SG.NOM  
 Tee-s  
 tea.M.SG-GEN  
 ‘because of his good morning tea’
- b. aufgrund ihr-es Brav-en Mädchen(\*s)  
 because.of her-N.SG.GEN good-N.SG.GEN girl.N.SG.NOM  
 Image-s  
 image-N.SG-GEN  
 ‘because of her good girl image’

- c. wegen d-er Rot-en Kreuz(\*es)  
 because.of the-F.SG.GEN red-F.SG.GEN CROSS.N.SG.NOM  
 Schwester  
 nurse.F.SG.GEN  
 ‘because of the Red Cross nurse’

Concerning number, this analysis yields the wrong result as well. If A agreed with  $N_1$ , one would expect that if  $N_1$  is specified for plural, A is specified for plural as well. This is not the case. (29) shows that A rather agrees in number with  $N_2$ .<sup>7</sup>

- (29) a. die Schön-e Ding-e Boutique  
 the nice-SG thing-PL boutique.SG  
 ‘the boutique of nice things’  
 b. \*die Schön-en Ding-e Boutique  
 the nice-PL thing-PL boutique.SG  
 ‘the boutique of nice things’

What could be a possible solution to the problem that the sketched feature-sharing analysis does not predict the correct results for case and number agreement? One possibility to prohibit agreement of A and  $N_1$  would be to assume that  $N_1$  is already sent to spell-out before it enters an Agree relation with A. One would have to assume that APs are phases, and that after completion of the phase by merging the complement, the complement is spelled out immediately and hence not accessible anymore. This way early spell-out of  $N_1$  would lead to the consequence that  $N_1$  does not participate in any feature-sharing process with A,  $N_2$  and D. Whereas A,  $N_2$  and D would receive the same case because of their shared features,  $N_1$  would be spelled out with the default nominative case.

Under this assumption the right empirical predictions are derived ( $N_1$  is always default case-marked, A agrees in number with  $N_2$  rather with  $N_1$ ). The problem which arises is that ‘regular’ DPs (including an AP, but only one N)

<sup>7</sup>Instead of feature-sharing one could assume that case is assigned via *Multiple Agree* (Hiraiwa 2001, Vainikka and Brattico 2014). That means that the case of a functional head can be assigned to more than one element (e.g. to D and N heads or other DP internal elements that inflect for case, see e.g. Assmann et al. 2014). However, under this alternative the problem would remain the same: since those elements that have an unvalued case feature receive a value, D, A,  $N_1$  and  $N_2$  would all get the same case from a v- or a P-head.

cannot be analyzed this way. The assumption that complements of a phase (or at least AP-phases) are always spelled out early makes the wrong prediction that Agree between A and N<sub>1</sub> could never happen.

### 2.3. Feature-sharing revisited: a structural alternative

Under the alternative proposal I want to put forward in this section, the underlying structure of an A-N-N compound is slightly different. For the analysis, I make the following assumptions in addition to those made above about Merge and Agree.

- (i) Adjectives are functional heads that select their complements (NPs, DPs, APs), see Abney (1987).
- (ii) Agree takes place under m-command (Agree may affect a head and its specifier). In case a head can agree with its complement *or* with its specifier, Spec-head Agree is preferred (Chomsky 1986, 1995, Koopmann 2006, Assmann et al. 2012; for a similar idea with the bias inverted see Béjar and Řezáč 2009).

(30) *Specifier head bias* (Assmann et al. 2012: 19)  
Spec-head Agree is preferred to Agree under c-command.

- (iii) Given that subcategorization and probe features are part of a stack on a lexical item, I adopt the assumption that only the highest feature on the feature stack is visible for Agree or Merge operations at any given stage of the derivation. This condition can be formulated as part of the Earliness requirement.

(31) *Earliness* (Müller 2009: 17)

- a. An operation-inducing feature [**•F•**] or [**\*F\***] must be checked immediately.
- b. Only the topmost operation-inducing feature ([**•F•**] or [**\*F\***]) of a lexical item is visible.

- (iv) Following Preminger (2011) I assume that unvalued features do not lead to a crash of the derivation. Rather, features that did not get valued during the derivation are assigned a default value.

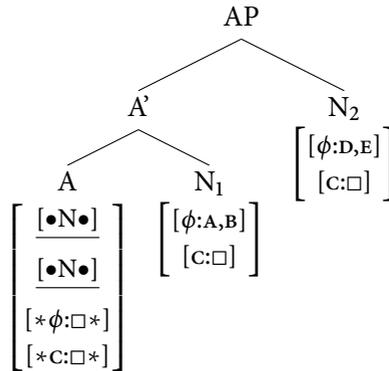
Concrete assumptions I make for A-N-N compounds:

- A subcategorizes both Ns of an A-N-N compound. Nevertheless, A can agree with only one of them.
- Subcategorization (Merge-inducing) features and Agree-inducing features on A are ordered: all Merge-inducing features have to be discharged before any Agree-inducing feature can be discharged.

In the following I present the derivation step by step.

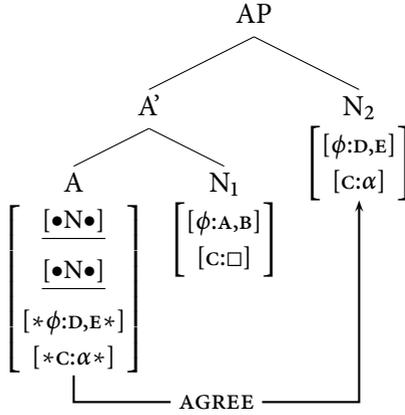
1. A subcategorizes two Ns. First, N<sub>1</sub> is merged as the complement of A. Since features are ordered and all Merge-inducing features have to be discharged before Agree-inducing features, the second step is Merge of N<sub>2</sub> in the specifier of A.

(32)



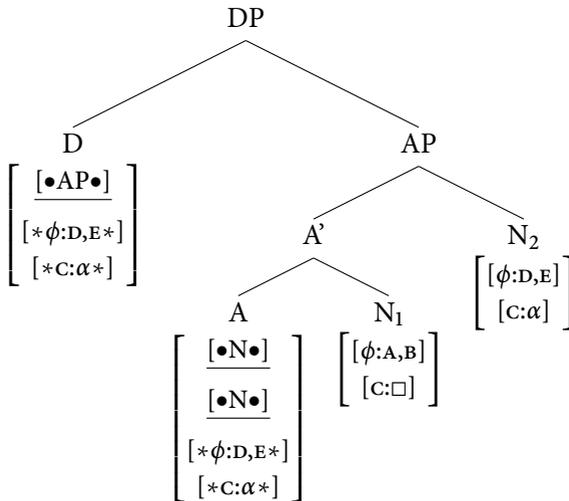
2. At this point of the derivation A could agree with N<sub>1</sub> in its complement or with N<sub>2</sub> in its specifier. Since Spec-head Agree is preferred (cf. (30)) it agrees with N<sub>2</sub>: N<sub>2</sub> and A now share the valued  $\phi$ -features of N<sub>2</sub>. Furthermore, since neither A nor N<sub>2</sub> has a valued case feature they share the unvalued case feature ( $\alpha$ ).

(33)



3. D is merged (D selects the AP). D bears an unvalued case-probe as well as an unvalued  $\phi$ -probe. Agreement of D and A results in  $\phi$ -feature-sharing of D and A as well as in sharing the unvalued case feature ( $\alpha$ ) (which is also shared by N<sub>2</sub>).

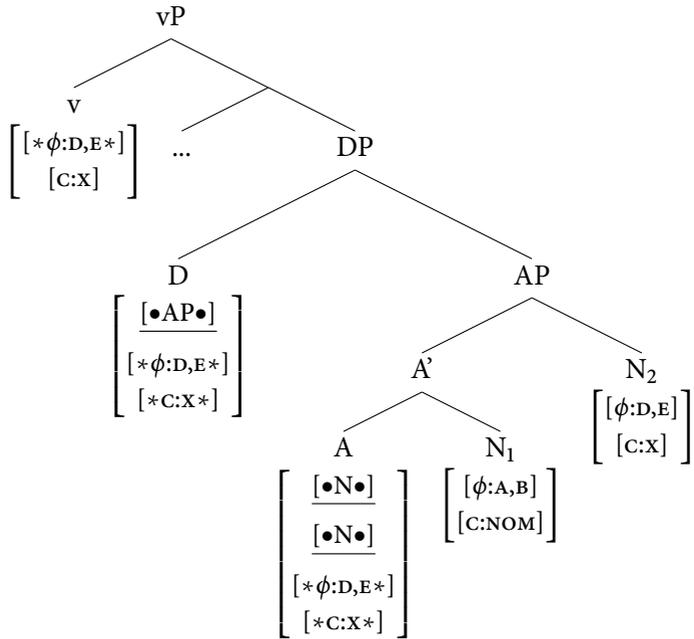
(34)



4. At some later point in the derivation *v* is merged. *v* enters an Agree relation with DP. *v* gets the  $\phi$ -features of D and assigns case *x* to D. Since D, A, and N<sub>2</sub> share this unvalued case feature ( $\alpha$ ), D, A, and N<sub>2</sub> all are valued by little *v* with case *x*. In contrast, N<sub>1</sub> was never in an Agree relation with any other element at any point of the derivation (D, A or N<sub>2</sub>). That

A ignores possible Agree with its complement N<sub>1</sub> and rather prefers to agree with N<sub>2</sub> is due to the Spec-head bias. This ‘skipping’ of N<sub>1</sub> leads to the same effect as to say N<sub>1</sub> is not accessible anymore because it already has been send to spell-out (see 2.2 for problems with this phase-based approach): N<sub>1</sub> never participated in any feature-sharing process, so it is not affected by the case assignment of v. Rather, N<sub>1</sub>’s case feature is valued by default as nominative case.

(35)



The present analysis has empirical as well as theoretical advantages. Empirically, it makes the right predictions: N<sub>1</sub> always bears nominative case, rather than the case which is assigned by a later element in the derivation (v, P, etc.):

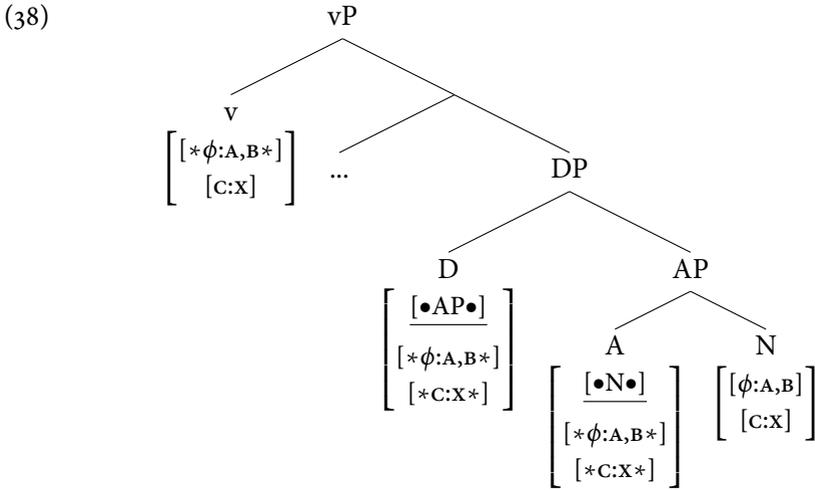
- (36) a. wegen sein-es Gut-en Morgen(\*s)  
 because.of his-M.SG.GEN good-M.SG.GEN morning-M.SG.NOM  
 Tee-s  
 tea.M.SG-GEN  
 ‘because of his good morning tea’

- b. aufgrund ihr-es            Brav-en            Mädchen(\*s)  
 because.of her-N.SG.GEN good-N.SG.GEN girl.N.SG.NOM  
 Image-s  
 image-N.SG-GEN  
 'because of her good girl image'
- c. wegen d-er            Rot-en            Kreuz(\*es)  
 because.of the-F.SG.GEN red-F.SG.GEN cross.N.SG.NOM  
 Schwester  
 nurse.F.SG.GEN  
 'because of the Red Cross nurse'

Furthermore, A and N<sub>2</sub> agree in number (rather than A and N<sub>1</sub>).

- (37) a. die Schön-e Ding-e Boutique  
 the nice-SG thing-PL boutique.SG  
 'the boutique of nice things'
- b. \*die Schön-en Ding-e Boutique  
 the nice-PL thing-PL boutique.SG  
 'the boutique of nice things'

From a theoretical point, the problem that DPs including an AP with only one N would have to be analyzed differently (see 2.2) is avoided. If A is merged with only one N, this N is merged as its complement. In contrast to the phase-based approach sketched in section 2.2, in the presented alternative proposal agreement between A and N is not prohibited. Since spec-head-Agree is only a bias, head-complement-Agree is still possible. If there is no specifier, head-complement-Agree applies. This is exactly the right prediction.



The analysis makes a further interesting prediction: Assuming the existence of A-N<sub>1</sub>-N<sub>2</sub>-N<sub>3</sub> compounds, N<sub>2</sub> and N<sub>3</sub> both should be merged in the specifier of A. Due to locality, in this case A should agree with N<sub>2</sub>. If A-N<sub>1</sub>-N<sub>2</sub>-N<sub>3</sub> compounds really exist remains to be seen. All potential compounds which come to my mind are instances of cases where N<sub>2</sub> and N<sub>3</sub> build a compound themselves ( $[_{DP} \textit{der} [_{AP} \textit{Heile Welt} [_{A'} [_{NP} [_{N} \textit{Stimmungs}][_N \textit{Verbreiter}]]]]]$  ‘the one who creates a perfect world feeling’,  $[_{DP} \textit{die} [_{AP} \textit{Schöne Dinge} [_{A'} [_{NP} [_{N} \textit{Boutique}][_N \textit{Eröffnung}]]]]]$  ‘the opening of the boutique of nice things’).

### 3. Summary

In this paper I have shown that internal inflection in German A-N-N compounds seems to violate Earliness and locality requirements: The adjective agrees with N<sub>2</sub> whereas N<sub>1</sub> bears the unmarked case (nominative). I have argued that a classical feature-sharing analysis, as proposed for Dutch A-N-N compounds, cannot account for the German facts. This is due to the fact that German has case Agree which Dutch lacks; the feature-sharing analysis wrongly predicts that A shares the case feature with N<sub>1</sub>, N<sub>2</sub> and D. Therefore, I proposed an alternative analysis which produces the correct empirical results for German. This alternative also includes feature-sharing, but the crucial point is the ordering of the elementary operations Merge and Agree on the adjective and the bias for Spec-Head-Agree due to which N<sub>1</sub> is skipped when

A searches for a goal for case Agree. Additionally, it can easily account for adjective-noun-agreement in regular DPs.

Concerning A-N-N compounds, there are still some unclarified issues left. Open questions are: What about the exact empirical distribution of internal agreement? If the degree of lexicalization plays a role: why does the adjective in strongly lexicalized expressions sometimes inflect and sometimes not? Do A-N<sub>1</sub>-N<sub>2</sub>-N<sub>3</sub> compounds really exist? After the discussion of some starting points in this paper, a more detailed empirical investigation is required before further conclusions can be drawn.

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# Deriving a typology of resumption

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## Abstract

This paper proposes a novel approach to deriving the distribution of resumptive pronouns across various languages. The focus will be on structures in which an argument is extracted from (embedded) subject and (embedded) object positions by means of relativization. A movement based mechanism will be presented which derives exactly when the extraction leaves behind a gap, and when the result is a resumptive pronoun. Using this mechanism, a crosslinguistic typology of resumptive patterns is established.

## 1. Introduction

The term *resumption* refers to an extraction process which does not leave behind a gap (G) at its foot, but a resumptive pronoun (R). This paper focuses on relativization structures and assumes that the element to be relativized moves from its base position to matrix SpecCP of the relative clause in order to become the relative operator. Note that this work is not concerned with *intrusive* resumption, i.e. the insertion of a pronoun to merely improve an otherwise illicit construction, a performative rescue mechanism which many languages display (cf. Keller and Alexopoulou 2005). In contrast, only cases of *grammatical* resumption will be investigated, where a language has fully accepted Rs into its grammatical repertoire.

In many languages, the base position of a relativized element is most commonly characterized as a gap, like in the English example (1):

- (1) This is the man that I saw \_\_\_\_.

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However, there are a number of languages which allow for the insertion of a resumptive pronoun in this base position. English is not one of these languages (2):

(2) \*This is the man that I saw *him*.

In contrast, each of the languages investigated in this work allows for Rs in at least some extraction positions (Bulgarian: Krapova 2010, Czech: Toman 1998, Hausa: Crysmann 2012, Hebrew: Borer 1984, Shlonsky 1992, Suñer 1998, McCloskey 2006, Adger 2008, Irish: Shlonsky 1992, Suñer 1998, McCloskey 2002, 2006, Lebanese and Palestinian Arabic: Shlonsky 1992, Aoun 2000, Aoun et al. 2001, Polish: Lavine 2003, Spanish: Suñer 1998, Swedish: Engdahl 1985, Boeckx 2003, Tuki: Biloa 1990, Ukrainian: Lavine 2003, Vata: Boeckx 2003 via Koopman 1986, Welsh: Willis 2000, 2011, and Yiddish: Prince 1990). A number of factors influence the behavior of Rs (see below); this paper will focus on their position:

- **Position:** Rs can occur in every position or only in some.
- **Optionality:** Rs can alternate with gaps, be banned or obligatory.
- **Form:** Rs are regular pronouns and can be full, clitic or null.
- **Modality:** Rs can be preferred in spoken language or certain dialects.
- **A'-Type:** Rs occur more often in some A'-dependencies than others.
- **Semantics:** Rs can restrict certain readings as opposed to Gs.

## 2. Resumptive / gap distribution patterns

As for the positioning of Rs, the following relativization examples will illustrate their appearance in subjects (S), embedded subjects (eS), objects (O) and embedded objects (eO). The resumptive elements are printed in bold (3-6):

(3) LEBANESE ARABIC, SUBJECT

tʃaaSaS                      l-walad yalli huwwa xazza?                      l-kteeb  
 punished-3-SG-M the-boy that **he**                      tore-3-SG-M the-book

‘The boy that tore up the book was punished.’                      (Aoun 2000: 15)

## (4) YIDDISH, EMBEDDED SUBJECT

Di froy vos du host gemeynt az zi hot  
 the woman that you have think.PAST.2SG that she have.PRF.3SG  
 mikh gezen  
 me saw.PRT

‘the woman that you thought that she has seen me’

(Itzik Gottesman p.c.)

## (5) HEBREW, OBJECT

ha-ʔiš še- raʔiti ʔoto  
 the-man that-(I) saw him

‘the man that I saw him’

(Shlonsky 1992: 444)

## (6) HAUSA, EMBEDDED OBJECT

gà yârân dà Àli ya radfã minì wai  
 there.are children REL Ali 3.SG.CPL whisper 1.SG.IO COMP  
 ya gan-sù gida-n giyà  
 3.SG.CPL see-3.PL.DO house-L beer

‘There are the children that Ali whispered to me that he saw in the bar’

(Crysmann 2012: 53 / Tuller 1986)

These are the four positions with the most variation in terms of R distribution. Other extraction positions such as prepositional objects, indirect objects, and the entire realm of islands are not taken into consideration in this paper, because most of these can or must harbor a R. The following table (7) abstracts from the gathered language data and displays the distribution patterns of R pronouns in the relevant positions (S, eS, O, eO). Note that some languages allow for R/G optionality in some positions<sup>1</sup>. The patterns reflect a coherent decision for either a R or a G, wherever possible. This is why some languages are categorized as showing more than one pattern: (e.g. Spanish):

<sup>1</sup>It is unclear as of now how true optionality could be handled in any coherent approach.

(7) *Crosslinguistic R/G patterns*<sup>2</sup>

	S	eS	O	eO	
Pattern 1	G	R	R	R	Bu., Ha., He., Ir., PA, Po., Cz., Tu, Uk.
Pattern 2	G	G	G	G	Spanish, Irish, Hebrew
Pattern 3	G	R	G	G	Welsh, Swedish
Pattern 4	R	R	R	R	L. Arabic, Spanish, Yiddish
Pattern 5	R	G	G	G	Vata

Theoretically, a paradigm like this with four positions and a binary choice for each of them (resumptive or gap) should result in 16 possible combinations. In practice, as we can see, only five patterns of R/G distribution occur in the languages investigated here. The rest of the paper will be dedicated to explaining why the limit on patterns is to be expected and how these patterns can be derived.

### 3. A derivational analysis of resumptive pronouns

#### 3.1. How Rs and Gs are born

The first step in deriving the patterns is to show how an individual R comes about in the course of a derivation. The foot of a relativization dependency needs to be connected to its head, the relative operator, in SpecCP. Within a minimalist framework, which centers around phase-based, local operations, the only option to account for this non-local dependency is to invoke Move (see also Boeckx 2003). Besides conforming to minimalist assumptions, this approach also does not treat R and G cases as fundamentally different (e.g. by using base generation, too, cf. Salzmann 2009, Rouveret 2011, among others) and is therefore conceptually attractive. A few core assumptions and their interaction are necessary for the movement account to work.

#### 3.2. $\phi$ P

The structural assumption is that a DP is essentially the complement of a  $\phi$  head which hosts the  $\phi$  features (see Sauerland 2008; for a related but not

<sup>2</sup>Throughout this work, the distribution of resumptives and gaps in these four syntactic positions will be abbreviated as GRRR, GRGG etc.

identical idea cf. Déchaine and Wiltschko 2002). DP carries determiner information and the REL feature needed for relativization.  $\phi$ P is a phase (in the sense of Chomsky 2001), along with vP and CP, while DP is not. In order for a R to materialize after REL-induced movement, DP has to strand its  $\phi$  shell in its base position (cf. Abels 2005). After DP has reached its final target position, the relative operator position, and the derivation is finished, the phonological component can translate these  $\phi$  features into the matching R. If DP does not strand  $\phi$  but instead pied-pipes it along, the result will be a G in base position. Pied-piping is assumed to apply as a last resort operation (cf. Chomsky 1995, Heck 2009, Roeper 2003). Otherwise, for reasons of derivational economy, it is assumed that only the smallest possible units are affected. In case of the REL feature, only the DP which carries it will be extracted, if possible (see below).

### 3.3. Phase extension via Agree

A second assumption concerns the nature of extraction processes. According to the Phase Impenetrability Condition (see Chomsky 2001), in order to strand  $\phi$ , the contained DP has to move via  $\phi$ P's specifier. However, this gives rise to an anti-locality effect, because movement of a phase's complement to the specifier of this phase is too short; phase heads cannot be stranded by their own complements (cf. Abels 2003, 2012, Grohmann 2003). The solution for this dilemma is an extension of  $\phi$ 's phase domain to the next higher phase head's, be it v or C. In den Dikken (2006), it is proposed that domain extension of a phase x can be achieved by actual movement and adjunction of x's head to the higher head. At the same time, Roberts (2010) argues that head movement is an instance of the operation Agree. If one combines both notions, one arrives at a mechanism in which Agree of a higher phase head (v, C) with  $\phi$  will extend  $\phi$ 's domain. Anti-locality is circumvented and subextraction of DP (REL) out of  $\phi$ P, thereby stranding  $\phi$ , is possible. Note that an important assumption pertaining to Agree here is a Spec-head bias (Assmann et al. 2012). This can be construed as a middle ground between Spec-head agreement only (Chomsky 1986), and agreement under c-command only (Chomsky 2001), respectively. A head will agree with a suitable element in its specifier, even if another suitable element is in its complement.

## 3.4. The place of Move

Second, an assumption regarding the order of operations is needed to distinguish between R cases (Agree extends  $\phi$ P, DP moves) and G cases (Agree fails to extend  $\phi$ P, and DP pied-pipes it along). If Agree always took place before Move, there would be no gap cases, contrary to fact. Vice versa, if Move always occurred before Agree, there would be no resumption. In order to be able to derive both R and G, I therefore assume that operations on phase heads are ordered in different ways relative to each other.<sup>3</sup>

## 3.5. How syntactic operations interact

If two (or more) operations are triggered by the same phase head, they cannot apply at the same time in a strictly derivational system<sup>4</sup> One operation has to take place first, possibly influencing the conditions on the following operation(s). Thus, if we only had to deal with Agree and Move on the *v* or C heads, respectively, two possible orders would arise:  $AGR > M$  (Agree before Move) and  $M > AGR$ . However, two orders are not enough to derive all five of the patterns shown in Table (7), because they can maximally result in two different R distribution patterns.

More than two operations are needed. As Georgi (2013, 2014) shows, it is necessary to distinguish between movement steps which are intermediate, successively targeting Specs along the way (Intermediate Move or *IM*), and movement steps which are final, placing an element in its ultimate target site (Final Move or *FM*). Splitting up Move in this way gives us three operations to order, resulting in six possible orderings (e.g.  $FM > AGR > IM$ , etc.). In terms of numbers, these should cover the five attested patterns. However, with respect to the phase extension mechanism, the order of *FM* and *IM* does not matter relative to *AGR*. More precisely:  $FM > IM > AGR$  and  $IM > FM > AGR$  yield the same result, as do  $AGR > FM > IM$  and  $AGR > IM > FM$ . With only four

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<sup>3</sup>*Operations* could also easily be translated into *feature stacks* as a notational variant. Instead of setting a language-specific order of operations in which certain operations on phase heads be triggered, one could also stack the operation-inducing features on phase heads in a specific order. The topmost feature would then correspond to the highest operation in the hierarchy and gets executed first.

<sup>4</sup>It is worth mentioning that, while I have nothing to say about case assignment here, it is independent of operations discussed here. It probably applies first, i.e. prior to any operational hierarchy.



phase head specifiers until it reaches matrix SpecCP and becomes the relative operator.

$$(9) \quad [{}_{vP} \text{ DP}_{REL} [{}_{vP} v_{\phi,REL} \dots [{}_{\phi P} \phi_{(RP)} ]]]$$

↑ MOVE

In (10), a different order is assumed: FM > IM > AGR > SM. This has the effect of triggering REL movement before  $\phi P$  was extended, so that DP (REL) pied-pipes  $\phi P$  along:

$$(10) \quad [{}_{vP} v_{\phi,REL} \dots [{}_{\phi P} \phi \text{ DP}_{REL} ]]$$

↑ MOVE

After  $\phi P$  has moved to the specifier of  $vP$ ,  $v$  can still Agree with it. However, since a moved phrase is an island on independent grounds (Wexler and Culicover 1980), extraction of DP out of  $\phi P$  is impossible, even if the domain of  $\phi P$  is extended to  $vP$  by Agree. Instead,  $\phi P$  will cyclically pied-pipe to matrix SpecCP as a whole, leaving behind no  $\phi$  material, thus no resumptive, but a gap (11):

$$(11) \quad [{}_{vP} [{}_{\phi P} \phi \text{ DP}_{REL} ] [{}_{vP} v_{\phi REL} \dots [ (\text{GAP}) ]]]$$

↑ AGR

In (8, 9), only the  $\phi$ -less DP arrives in SpecCP. In the data, overt inflected relative operators are not attested with resumption, but an invariant C element occurs. Vice versa, when the entire  $\phi P$  is in SpecCP (the gap cases), overt relative pronouns can arise. This finding lends independent to the  $\phi P$ /DP movement distinction proposed here.

## 4. Deriving the R / G patterns

### 4.1. Theoretical vs. actual patterns

This section will illustrate how the four relevant operations derive exactly the five attested R/G distribution patterns, plus one which still has to be attested empirically. Theoretically, 24 orders are possible. In practice, not every minimal change in the order results in a different distribution pattern: the four positions where the variation happens can only give rise to 16 different patterns (a binary choice of R/G for each). Still, not even all 16 patterns are derived by

the 24 possible orders of operation. The reason for this is that the operations interact in a complex, yet principled way. Let's look at the example order in (12):

(12) FM > AGR > SM > IM

Whenever a phase head (v, C) is merged, it will carry out these four operations in this order<sup>6</sup> Additionally, these operations only have once chance to be triggered per cycle; if an operation cannot apply when the order allows it, it cannot apply again later. If an embedded object is to be relativized, the lowest v head would first Agree with  $\phi$ P in object position before REL is moved intermedially (AGR > IM). The result is a R in the embedded object position; further AGR operations on higher phase heads cannot change this.

If we assume the same order but relativize an embedded subject or matrix object, the result is exactly the same. Every REL-induced movement before the final one to matrix SpecCP is intermediate, and Agree is always ordered first and extends  $\phi$ P to vP or CP.

The situation is only different once we relativize the matrix subject, still assuming FM > AGR > SM > IM. Final Move is ordered before Intermediate Move, but, crucially, also before Agree. Thus, before a matrix subject  $\phi$ P phase can be extended to CP, movement will be initiated. The now pied-piped  $\phi$ P leaves a gap in matrix subject position. Since ideally an order is set per language, not per phase head, one and the same order is responsible for a gap in matrix subject position, but a resumptive in every other subject or object position ((13) as e.g. in Bulgarian, Irish, Hebrew etc.):

(13) FM > AGR > SM > IM → GRRR → Pattern 1 in Table (7)

If this order is changed minimally by ordering IM before SM (FM > AGR > IM > SM), the relativization pattern of the respective language doesn't change. This is because Agree still happens before anything else but the final movement step. Inserting the subject later, but after AGR has occurred, has no influence on the extension of the  $\phi$ P (14). Thus:

(14) FM > AGR > SM > IM = FM > AGR > IM > SM → GRRR

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<sup>6</sup>There probably are no FM and SM operations present on intermediate and non-subject phase heads, respectively.

## 4.2. The effects of operations on R positions

Two (or more) orderings can yield the same distribution pattern. This is very systematic, once it is taken into account that each of the four operations fulfills a certain function with respect to the occurrence of resumptives and gaps in the respective positions. The table below lists these functions that interact when put in a certain order (15):

(15) *The syntactic functions of AGR, FM, IM, SM*

- **Agree:** this operation can feed the occurrence of a R, depending on where it is ordered relative to the movement operations.
- **Final Move / Intermediate Move:** FM's position in the operation hierarchy distinguishes the matrix subject position from all other positions for extraction. Both movement operations can be fed by Agree if they follow it, or they can bleed Agree if they precede it.
- **Subject Merge:** the subject is a possible intervener for Agree on  $v$  (spec-head bias). If an object is to be relativized, but the subject is in Spec $v$ P when Agree is triggered, the object  $\phi$ P will not be extended. Thus, SM can influence the occurrence of Rs in object position:
  - Agree before Intermediate Move without an intervening subject (e.g. FM > AGR > IM > SM) yields Rs in object and embedded positions (XRRR)
  - Agree before Intermediate Move with an intervening subject (e.g. FM > SM > AGR > IM) bleeds the formation of Rs in object positions (XRRG)
  - Thus, SM can never be ordered in such a way as to put a G in embedded subject positions but Rs in objects (\*XGRR)

There are a few generalizations to be drawn with respect to Rs from these operations and their interplay:

- 1: Objects and embedded objects cannot pattern differently
- 2: Subjects and embedded subjects can pattern differently

- 3: Rs in embedded objects entail Rs in embedded subjects
- 4: Rs in embedded subjects do not have to entail Rs in objects

For a more detailed illustration of the interactions, let us take a closer look at generalizations 3 and 4. As for 3, if no subject interferes with Agree between  $v$  and the object in its complement, this object will leave behind a resumptive upon extraction. For this to happen, both *SM* and *IM* must not be ordered before *AGR*, as in e.g.  $FM > AGR > IM > SM$ . *SM* would intervene with agreement between  $v$  and the object (spec-head bias), while *IM* would bleed the same agreement relation by moving the object first. If agreement is not bled for objects, it will not be bled for embedded subjects, either.

In the case of generalization 4, if *AGR* is ordered before *IM*, but after *SM* (e.g.  $FM > SM > AGR > IM$ ), movement will not bleed the formation of a R in embedded subject position. However, since the subject intervenes with  $v$ 's agreement with its object, there will be no R in object position. This is why a resumptive in the embedded subject position does not have to entail a resumptive in object positions, while a resumptive in object position entails a resumptive in the embedded subject position (see above).

These generalizations, which are based on the systematic interaction of independently necessary operations, reflect and explain the empirical findings in Table (7).

#### 4.3. All operational orders, possible and impossible patterns

All possible operational orders are listed below (16), together with the G and R distribution they yield in subjects, embedded subjects, objects and embedded objects, respectively. As we can see, different orders can in fact yield the same distribution patterns, because of the ways the operations interact:

- (16) *All possible orders of the four operations Final Move (F), Intermediate Move (I), Agree (A) and Subject Merge (S):*

Orders	Subject	e. Subject	Object	e. Object	Pattern
F > A > S > I	G	R	R	R	1
F > A > I > S	G	R	R	R	1
F > I > A > S	G	G	G	G	2
I > F > A > S	G	G	G	G	2
I > F > S > A	G	R	G	G	3
I > S > F > A	G	R	G	G	3
S > F > A > I	G	R	G	G	3
S > F > I > A	G	R	G	G	3
S > I > F > A	G	R	G	G	3
F > I > S > A	G	R	G	G	3
F > S > I > A	G	R	G	G	3
F > S > A > I	G	R	G	G	3
A > F > I > S	R	R	R	R	4
A > F > S > I	R	R	R	R	4
A > S > F > I	R	R	R	R	4
A > S > I > F	R	R	R	R	4
A > I > F > S	R	R	R	R	4
A > I > S > F	R	R	R	R	4
I > A > S > F	R	G	G	G	5
I > A > F > S	R	G	G	G	5
S > A > F > I	R	R	G	G	6
S > A > I > F	R	R	G	G	6
S > I > A > F	R	R	G	G	6
I > S > A > F	R	R	G	G	6

As this table shows, sometimes up to eight orders of operations yield the same R/G distribution pattern (Pattern 2). Thus, not the theoretically possible amount of 24 patterns arises, but just six. A comparison with the attested patterns (Table 7) reveals that the operations in their respective orders derive five out of the six predicted patterns (Patterns 1-5). The current model also explicitly rules out the remaining 10 patterns of the possible 16.

The following table (17) lists the five predicted and attested resumptive / gap patterns from Table (7) and adds the sixth pattern which still has to be discovered. Additionally, it lists ten more patterns which seem to be logically possible but are ruled out by the analysis. Indeed, patterns 7-16 have not come up in the language data. Patterns 7 and 8 both have an offending G in the embedded subject position, even though the objects are R, which counters generalization 3 in (15). Patterns 9 to 16 include differing objects (\*XXRG or \*XXGR) - violating generalization 1 in (15):

(17) Possible and impossible R/G patterns

Patterns	S	eS	O	eO	Languages
P 1	G	R	R	R	Bu., Ha., He., Ir., PA, Po., Cz., Tu, Uk.
P 2	G	G	G	G	Spanish, Irish, Hebrew
P 3	G	R	G	G	Welsh, Swedish
P 4	R	R	R	R	L. Arabic, Spanish, Yiddish
P 5	R	G	G	G	Vata
P 6	R	R	G	G	<b>X - to be attested</b>
P 7	G	G	R	R	Mandalorian?
P 8	R	G	R	R	Tomanian?
P 9	R	G	R	G	Quenya?
P 10	R	G	G	R	Sindarin?
P 11	G	R	R	G	Klingon?
P 12	G	R	G	R	Syldavian?
P 13	R	R	R	G	Dothraki?
P 14	R	R	G	R	Na'vi?
P 15	G	G	R	G	Arkonidian?
P 16	G	G	G	R	Galach?

By way of illustration, the orders of operation approach correctly predicts and derives Lebanese Arabic (18-21 below, Pattern 4), with a resumptive pronoun possible in all subject and object positions. This is because Pattern 4 is derived from all operational orders which have Agree triggered first on phase heads. Thus, the phase extension mechanism always precedes and feeds any kind of movement, leaving behind a resumptive in any extraction position:



However, the way the operations interact cannot derive this GRGR pattern, and natural language also does not produce it:

- (22) \**Syldavian (English glosses), G R G R*
- a. This is the man that \_\_\_ hit me.
  - b. This is the man that Mary said that **he** hit me.
  - c. This is the man that I hit \_\_\_.
  - d. This is the man that Mary said that I hit **him**.

## 5. Conclusion

The approach to resumption presented here has several benefits to it. First, it is truly crosslinguistic and not concerned with an analysis of resumption as an isolated phenomenon of one language (family). Second, it only relies on Move as the operation which connects the extracted relative DP with its operator position. It does not and, in fact, cannot resort to base generation or other non-local mechanisms, thus adhering to Minimalist demands. No operations or concepts are used which have not been shown to be relevant independently of resumption. The logically possible interactions of these operations yield the desired outcome, a list of possible resumption patterns. At the same time, the theory makes correct predictions about unexpected patterns.

Due to the crosslinguistic nature, the theory cannot account for as many language specific details as one that focuses on only one language (family). Since resumptive pronouns are regular pronouns, each language imposes independent requirements on their form (null, clitic, full) in certain contexts. The same goes for certain semantic effects, where Rs might narrow down reading choices in some languages. However, at this point nothing appears to prevent the current theory from being reconciled with suggestions which have been made for individual languages.

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# Case attraction and matching in resumption in relatives. Evidence for top-down derivation

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## Abstract

Case attraction and matching in resumption pose serious challenges to syntactic theory: in both constructions, the Case of the head noun affects the form of a constituent within the relative clause. This leads to problems for a bottom-up approach since the necessary information – the matrix Case – is not available at the point where the Case of the relative pronoun is determined/the choice between gap and resumptive is made. In a standard system, rather radical and unattractive assumptions need to be made to account for the constructions. We propose an alternative account that rests on three crucial assumptions: (i) Case-Agree between the head noun and the relative operator in SpecC. (ii) Case probes can also be discharged under matching, viz., even if the goal DP has already been involved in Case-checking. (iii) Case features are decomposed. While the patterns as such can be derived in both bottom-up and top-down, we argue that top-down derivation is preferable because of one crucial advantage: The choice between gap and resumptive can be made locally while under bottom-up transderivational Economy is necessary.

## 1. Introduction

There is a near-consensus in Chomskyan Generative Grammar that the direction of the derivation is bottom-up even though in principle top-down should be just as viable. Arguably, most phenomena can be analyzed both ways. However, there is a small number of publications arguing that top-down is not only

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## 2. Problems for bottom-up derivation

### 2.1. Case attraction

In Case attraction, the relative pronoun does not bear the Case governed by the relative clause internal Case-probe, but rather the Case assigned to the head noun of the relative clause. The phenomena is most familiar from the classical languages and earlier stages of German and English (the relative rarity of the phenomena is partly related to the cross-linguistic rarity of relative pronouns). In the following examples from Ancient Greek and Middle High German, the relative pronoun bears genitive, the Case of the head noun, although it should have been assigned accusative/nominative inside the RC, see Bianchi (2000: 58), Pittner (1995: 198):<sup>1</sup>

- (2) a. memneste<sub>gen</sub> toon horkoon hoon [huus]  
 remember.IMP the.GEN oaths.GEN which.GEN which.ACC  
 omomokate<sub>acc</sub>  
 swear.PFV.2P  
 ‘Remember the oaths that you swore.’ *Ancient Greek*
- b. daz er [...] alles des verplac<sub>gen</sub> des [daz]  
 that he all that.GEN abandoned which.GEN [that.NOM]  
 im ze schaden mohte<sub>nom</sub> komen  
 he.DAT to damage might come  
 ‘That he abandoned all that might cause damage to him.’  
*Middle High German*

Apart from the attraction process itself, there are two further properties of the construction that any analysis has to account for:<sup>2</sup> (i) Case attraction is generally optional and (ii) attraction is only possible if the matrix Case is more oblique than the RC-Case, with obliqueness being measured according to the following hierarchy, see Grosu (1994: 122) and Pittner (1995: 200f.):

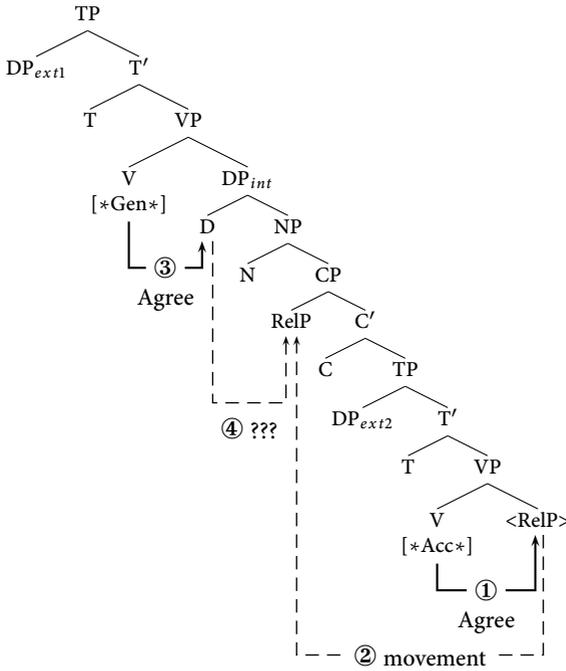
- (3) Gen > Dat > Acc > Nom

<sup>1</sup>For reasons of space, we will restrict ourselves to headed relative clauses. Attraction and matching are, of course, also found in free relative clauses, but seem to show somewhat different properties. They are briefly discussed in the appendix.

<sup>2</sup>In what follows, we abstract away from more fine-grained cross-linguistic differences and various preferences that have been reported in the literature, e.g., that attraction in Ancient Greek is most frequent with accusatives.

A bottom-up derivation of examples such as (2a) might look as follows:<sup>3</sup>

(4) Case attraction bottom-up: MC=Gen; RC=Acc; RelP=Gen



The obvious problem is the following: Given standard assumptions (such as cyclicity), the relative pronoun should have been assigned accusative inside the relative clause when entering an Agree relationship with V ①. The relative pronoun would subsequently move to the left periphery ②, and the external D would be assigned Case by the matrix Case probe ③. However, since the relative pronoun surfaces with genitive, the external D and the relative pronoun communicate somehow ④. This seems to require one of the following strategies: (a) Case assignment in the RC can be suppressed: probing of the Case probe is delayed and since it does not find a matching goal, it is deleted

<sup>3</sup>We will henceforth use this configuration to illustrate attraction. Purely for ease of representation all tree diagrams will be strictly right-branching, even in OV languages. For reasons of space, the projection of the functional head *v* is omitted (in most tree diagrams); consequently, V is the assigner of accusative (and oblique Cases). MC refers to matrix Case, RC refers to relative clause-internal Case, RelP stands for relative pronoun and RelOP stands for relative operator.

by default. (b) the relative pronoun is assigned the matrix Case in addition to the RC-internal Case (Case stacking), see Vogel (2001). To model Case attraction one can assume that the second Case that is assigned is realized (while in the absence of attraction the first one is realized). (c) the Case value of the relative pronoun is overwritten at PF, see Harbert (1983: 270, 272), Bianchi (2000: 68f.), Spyropoulos (2011). (d) Case values are generally assigned at PF, see Alexiadou and Varlokosta (2007), Assmann (2014). Harbert proposes that head noun and relative pronoun receive Case in syntax, but then Case assignment between N and the operator reapplies at PF, overwriting the Case assigned in syntax. Spyropoulos (who analyzes free relatives) essentially makes the same assumption. While there is an Agree relation between D and the operator in syntax for phi-features, Case-features are copied at PF. Bianchi assumes that the Case value assigned inside the relative clause can be erased and the Case value of the external D is assigned to the relative pronoun at PF under government, a form of morphological Case agreement that also affects DP-internal constituents (while D(P) receives its Case in syntax). Alexiadou and Varlokosta assume that a DP is assigned Case by the closest Case assigner at PF. Since this applies postsyntactically, syntactic movement feeds new Case assignment relations. After movement of the operator to the left periphery in the syntax, it is closer to the matrix probe than to the RC-internal probe with the result that the operator is assigned the matrix Case. In Assmann (2014), who analyzes free relatives, both the external D and the relative operator are assigned Case independently. There is an additional Agree-like operation between D and the operator that checks whether their Case values are compatible.

All solutions are in conflict with well-established assumptions: Solution (a) requires look-ahead as Case suppression must be limited to attraction configurations (governed by the hierarchy in (3)) which, however, cannot be detected within the relative clause;<sup>4</sup> furthermore, it violates the Earliness Principle (Pesetsky 1989) which demands that an operation applies as soon as its context

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<sup>4</sup>To avoid the look-ahead problem, one could claim instead that the Case probe on the verb is simply optional. Most derivations without a Case probe would then crash because a DP ends up without Case, but in Case attraction configurations, such a derivation would converge because the relative pronoun can receive Case from the matrix verb. While feasible, we believe that this solution is unsatisfactory because it is not a general property of (finite) verbs that their Case probe is optional. Furthermore, it is unclear how such a solution could capture the hierarchy effect in (3).

is met. Solutions (b) and (c) are in conflict with a strict version of the Activity Condition (Chomsky 2000) according to which a DP is no longer visible for (Case-)Agree if it has already been involved in an Agree operation valuing its Case feature. Furthermore, under Case stacking it is unclear how the hierarchy in (3) can be captured. One would have to stipulate that the second Case that is assigned has to be more oblique than the first, which is not very insightful. As for overwriting, it may create problems for recoverability (at least when dative is overwritten by genitive). Solutions (c) and (d) move the problem to a different component to avoid a counter-cyclic operation between D and the operator. In Alexiadou and Varlokosta's approach it remains completely unclear what happens to the RC-internal Case-probe. Previous approaches largely remain silent on these issues. Nevertheless, it is obvious that some modification of the standard assumptions is necessary to capture Case attraction.

## 2.2. Matching in resumption

Before we can introduce the phenomenon, some background on resumption is required: in many languages of the world, oblique relations (oblique Cases, complements of prepositions) are subject to strict recoverability conditions, see, e.g., Bayer et al. (2001) on German. Languages without relative pronouns often use resumptive pronouns in the relativization of such relations. The following pair illustrates this with examples from Swiss German, where subjects and direct objects require gaps while in the relativization of indirect objects (datives) a resumptive is necessary (see Weber 1987, van Riemsdijk 1989 van Riemsdijk 2008, Salzmann 2006a, Salzmann 2013):<sup>5</sup>

- (5) a. Ich suech<sub>acc</sub> de Bueb, wo (\*er) immer z spaat chunt<sub>nom</sub>.  
 I search the.ACC boy C (he) always too late come.3S  
 'I'm looking for the boy who is always late.' SU
- b. Ich hilf<sub>dat</sub> em Bueb, won i (\*en) geseht<sub>acc</sub> han.  
 I help the.DAT boy C I (him) yesterday seen have.1S  
 'I help the boy who I saw yesterday.' DO

<sup>5</sup>Dative is the only oblique Case, genitive has been lost in this variety. Other oblique relations involve prepositions which given that Swiss German prohibits preposition stranding require resumption as well. The resumptives are identical to weak personal pronouns and unless governed by prepositions are fronted to the Wackernagel position. See the above-mentioned sources for more empirical details.

- c. Das isch<sub>nom</sub> de Bueb, wo mer \*(em) es Buech ggë<sub>dat</sub>  
 this is the.NOM boy C we (he.DAT) a book given  
 händ.  
 have.1P  
 ‘This is the boy who we gave a book to.’ IO

This is a frequent pattern in the languages of the world and therefore not particularly surprising. However, what is much less known is that resumption is affected by matching: As has already been pointed out in traditional descriptions, see Dalcher (1963: 127), Hodler (1969: 247), the resumptive is omitted if the head noun also bears dative (see Salzmann 2006a: 348-355):

- (6) Lüte, [ won es \_/ \*ene guet geit<sub>dat</sub> ], darf me nid  
 people.DAT C it they.DAT good goes may one not  
 ergrübled Sachen uftische<sub>dat</sub>.  
 disturbing things confront with  
 ‘One shouldn’t confront people who are doing well with negative things.’  
*Bernese*

For Swiss German, this implies that we have to account for the following three scenarios:

- (7) Distribution of resumptives in Swiss German

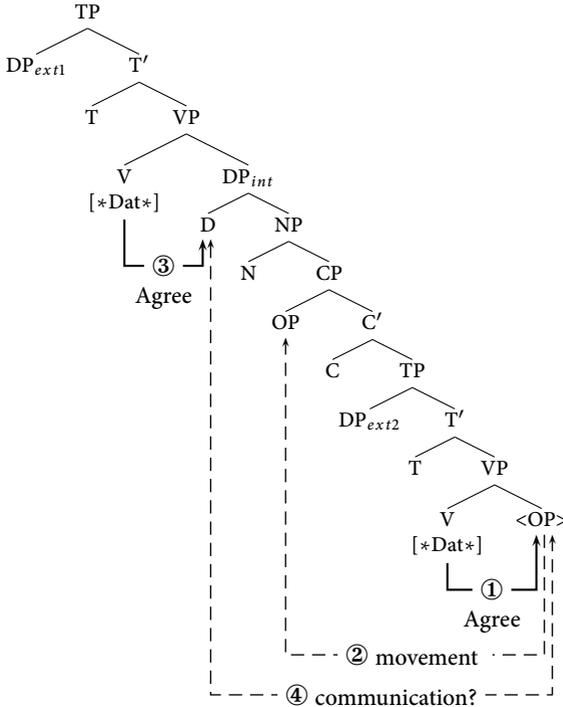
MC-Case	RC-Case	realization
Nom/Acc/Dat	Nom/Acc	gap
Nom/Acc	Dat	resumptive
Dat	Dat	gap

In the first scenario with a non-oblique Case assigned inside the relative clause, the result is always a gap, irrespective of the Case assigned in the matrix clause. In the second scenario with a dative assigned relative clause-internally and non-dative externally, a resumptive is necessary. In the last scenario, the dative resumptive is omitted because the head noun also bears dative. The matching effect in resumption is not a peculiarity of Swiss German, but has also been described for Hebrew, see Cole (1976), Greek, see Joseph (1980), and Croatian, see Gračanin-Yuksek (2013).<sup>6</sup>

<sup>6</sup>In Croatian, the matching effect with resumptives only occurs with direct objects but not with oblique relations. We have no account for this difference. Hebrew and Swiss German

The challenges posed by matching in resumption are the following. Consider the simplified derivation in (8):

- (8) Matching in resumption bottom-up: MC=Dat; RC=Dat → gap



Given standard assumptions, the operator would be assigned dative when undergoing Agree with V inside the relative clause ①. It would then move on to the left periphery ②. Finally, the matrix Case probe would assign Case to the external D ③. However, this last step affects the shape of the dative object inside the relative clause, suggesting some sort of communication ④. In other words, the major challenge is the fact that the choice between gap/resumptive would have to be made when the verb in the RC is merged with the IO. However, the necessary information to make the right choice – the Case of the head

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also allow for deletion of preposition+resumptive if the head noun is governed by the same preposition. In what follows, we will abstract from this, not the least because PP-matching – as in free relatives – is subject to much stricter conditions; usually, matching is only felicitous if the predicates are identical.

noun – is not yet available. Note that this problem arises in every theory of resumption (i.e. spell-out, e.g., Pesetsky 1998, base-generation, e.g., McCloskey 1990, and clitic doubling approaches, e.g., Boeckx 2003, if the choice is to be made locally). The head noun and the relative operator must communicate: the RC-internal Case value would have to be passed into the matrix clause (e.g. through cyclic Agree), be compared with the Case of the head noun, but then either (a) the information has to be passed down into the relative clause again or (b) one postulates complex chains whose realization is determined at the interfaces as in Salzmann (2006*b*). However, solution (a) is counter-cyclic and violates locality constraints, i.e., the Phase Impenetrability Condition (Chomsky 2001): there are two phase-boundaries (CP, vP) between the external N and the embedded object position. Solution (b) is very non-local and thus in conflict with the trend of the last 20 years towards local modeling of syntactic dependencies.<sup>7, 8</sup>

### 3. A top-down analysis

The previous section has shown that Case attraction and matching in resumption pose problems for bottom-up derivation. We will now show that top-down derivation provides a straightforward solution because the crucial information, the Case of the head noun, is available early in the derivation.

#### 3.1. Assumptions for top-down derivation

We largely follow Richards (1999), Phillips (2003) and Guillot (2006): (i) the structure is built up incrementally from top to bottom. (ii) Constituents are base-generated in their surface position. (iii) Constituents are moved downwards because of theta-features (arguments), semantic features (adjuncts) or selectional features (verbs).

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<sup>7</sup>A further argument against the chain-based analysis comes from the fact that no matching effect obtains if the theta-position is within an island, see (49) below.

<sup>8</sup>At first sight, the head-raising analysis (Kayne 1994) seems to provide a solution to matching in resumption (as suggested by a conference abstract reviewer): Since the head noun is generated together with the relative operator, the Case of the head noun is potentially available early in the derivation. One could then stipulate that a dative operator is realized as zero if its NP-complement bears dative, but as a resumptive if the complement bears non-dative. While descriptively correct, this amounts to a reformulation of the observation and does not seem to follow from independently established principles of grammar.

Additionally, (iv) the usual locality restrictions hold (leading to successive-cyclic movement), and we adopt the following standard principles:

- (9) Case Filter (Chomsky 1981)  
The Case feature of every DP must be checked.
- (10) Activity Condition (adapted from Chomsky 2000)  
Only DPs with an unchecked Case feature are visible for Case-checking.

Finally, we assume the Earliness Principle (Pesetsky 1989) and the Strict Cycle Condition (Chomsky 1973).

More important for the analysis are the following assumptions about Case-Agree: (i) Agree involves checking, i.e. DPs start out with pre-specified Case values: this is necessary to explain how an XP with a certain Case can appear in the left periphery (e.g., when it undergoes A'-movement): if the Case value were not determined until the XP reaches its Case-position, one would have to resort to non-local chains to ensure the correct Case on the top copy. (ii) The inherent Case feature of a DP [uCase] needs to be checked. It probes upwards and is checked if there is a corresponding c-commanding probe bearing [\*Case\*].<sup>9</sup> (iii) Probes need to be discharged by Agree with corresponding features on a c-commanded element. (iv) Phi Agree is a consequence of Case-Agree. (v) There are two ways of discharging probe features:

- (11) *checking*:  
Agree between a DP with an *unchecked* Case feature [uCase] and a probe [\*Case\*]. It requires identity of features, i.e. it is only possible if the goal has the same features as the probe.
- (12) *matching*:<sup>10</sup>  
Agree between a DP with a *checked* Case feature and a probe. It does not require identity of features, viz. it is possible if the probe has a *subset* of the features of the goal (see below on Case decomposition).<sup>11</sup>

<sup>9</sup>This assumption is necessary to avoid failing Agree operations (or delay of Agree) in Case the goal-DP is base-generated above the Case probe.

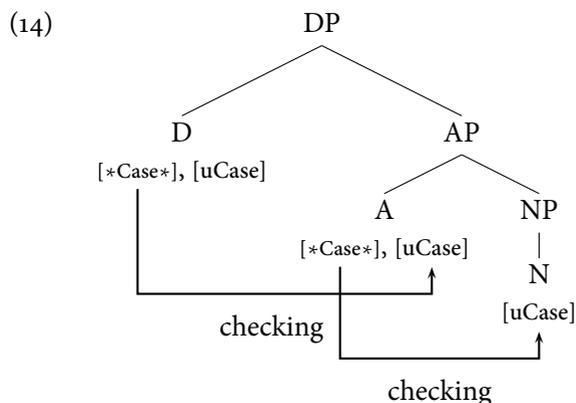
<sup>10</sup>For independent motivation for the concept of matching, see Anagnostopoulou (2005), Richards (2008) on PCC-effects.

<sup>11</sup>This is a slight departure from the Activity Condition which we consider unavoidable to account for Case attraction. As we will demonstrate below, it can be adequately restricted.

(vi) As for concord within DP, we assume that all heads above N have an inherent Case feature, viz. [uCase], that needs to be checked, and a Case-probe with an identical value that checks another Case-feature and needs to be discharged, viz. [\*Case\*].<sup>12</sup>

(13)  $D_{[uCase],[*Case*]}$

This doubling of features is necessary to account for the fact that a DP is still active (and thus visible for Agree to a probe like v/T/P) after D has agreed with N (or A). Within a normal DP, the following operations thus take place (we use a simplified DP-structure just consisting of D, A and N where A takes the noun as its complement):



To ensure communication between the matrix clause and the relative clause, we assume an additional Agree operation between the head noun and the relative pronoun/operator (see also Spyropoulos 2011). Such an Agree relationship may be needed anyway to account for agreement in person and number as in the following example where the participle registers the phi-features of the head noun (via the operator):<sup>13</sup>

<sup>12</sup>The same holds for phi-features, which we omit here. This doubling of features is not a peculiarity of top-down derivation but a general property of checking approaches to concord within DP, see Georgi and Salzmann (2011: 2083, fn.25).

<sup>13</sup>We adopt the head-external analysis of relative clauses but assume that RCs are merged as complements of N (all of what follows is also compatible with a matching analysis, see Salzmann 2006a). Instead of duplicating the lexical entries for every N, we assume a general rule that optionally assigns to an N a structure building feature for the relative clause and a probe feature for agreement with the operator.

- (15) la chanson OP que j' ai écrite t<sub>OP</sub>  
 the song.F.S Op C I have written.F.S  
 'the song I wrote'

*French*

To account for Case attraction, we propose that N additionally has a Case probe (in what follows, we omit the phi-probe for ease of representation):<sup>14, 15</sup>

- (16) N<sub>[uCase],[\*Case\*]</sub>

To capture the variation in the availability of attraction, Case-Agree between N and the operator can be

- (17) a. obligatory (Swiss German)  
 b. optional (languages with Case attraction)  
 c. prohibited (Modern German)

Finally, to account for the hierarchy effect in (3), we make the following assumptions about Case features: (i) Cases are decomposed: traditional Case-labels are replaced by bundles of (more abstract) privative Case-features. (ii) the more marked/oblique a Case is, the more features it is composed of, see Béjar and Řezáč (2009) for person and Assmann (2013) for Case. The markedness/obliqueness hierarchy is as follows:

- (18) Gen > Dat > Acc > Nom

The individual Cases then receive the following abstract specifications:

<sup>14</sup>While agreement in phi-features between N and the operator could also result from anaphoric agreement, Case attraction has to be ensured by a grammatical operation.

<sup>15</sup>The intuition that the head noun and the relative operator have to communicate somehow can be found in several places in the literature, but the precise properties of the relationship are hardly ever made explicit. Rather, the generalization is only rephrased in prose but not technically implemented. Representative examples are Harbert (1983: 246) who proposes that “that case is first assigned to NP [...] and is transmitted by attraction from that head to the relative pronoun in COMP, subject to a hierarchical restriction ...” and Gračanin-Yukse (2013: 43, fn. 18) according to whom “...attraction involves an operation in which the case features of the internal head are copied onto the external head” but admits that “the details of this process remain mysterious”.

## (19) Case-decomposition

nom	$\alpha$			
acc	$\alpha$	$\beta$		
dat	$\alpha$	$\beta$	$\gamma$	
gen	$\alpha$	$\beta$	$\gamma$	$\delta$

Importantly, this feature decomposition holds for both probes and goals. For ease of representation, we will use the traditional labels in the rest of this article, but it should always be borne in mind that they actually refer to feature bundles.

## 3.2. Derivations

## 3.2.1. Case attraction

Two components are at the heart of our analysis of Case attraction: first, the Agree relationship between the head noun N and the relative pronoun/operator ensures that the matrix Case is passed down into the relative clause. Second, the possibility of Case checking under matching ensures that the derivation still converges even though the goal of the relative clause-internal probe, viz., the relative pronoun, has already undergone Case checking. The fact that matching is only possible if the probe has a subset of the features of the goal derives the hierarchy effect which restricts Case attraction (recall (3)).<sup>16</sup> That matching requires a subset and not, for instance, a superset is not a stipulation but rather follows from the fact that this is the only way to discharge all Case-probe features. Once the Cases are decomposed, there is an obvious similarity to multiple phi-feature checking in participial constructions, e.g., as in the following French example (Chomsky 2000):

- (20) elle<sub>i</sub> est détruit-e      t<sub>i</sub>  
 she is destroyed-F.S  
 'She is destroyed.'

*French*

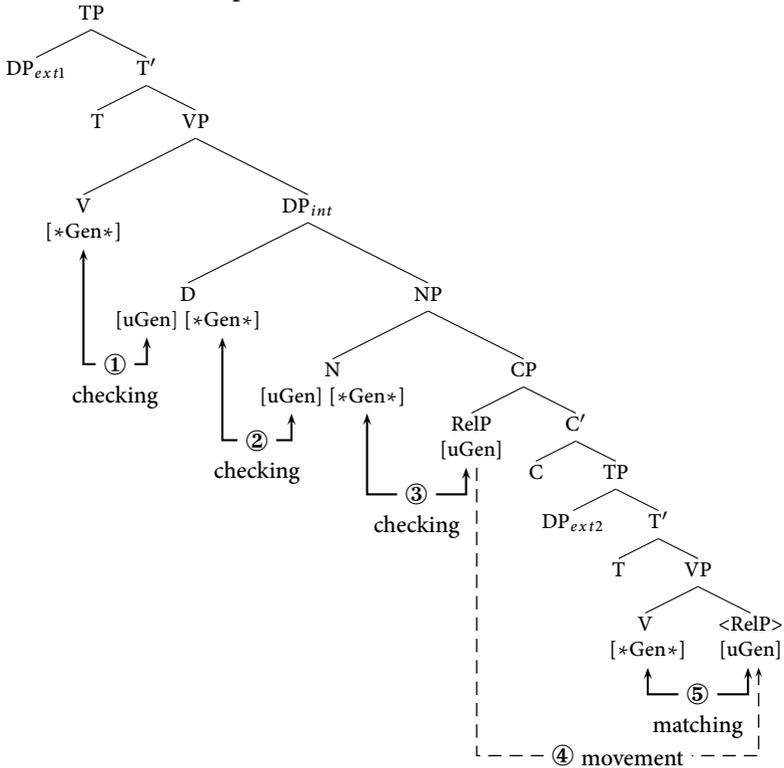
As in Case attraction, the goal enters two Agree operations that involve the same type of feature, in this case Agree in phi-features: the subject enters phi-feature Agree with both the participle and T. According to the standard account, this double role of the subject is possible because Agree with the

<sup>16</sup>See Assmann (2013, 2014) for the role of subset relationships in non-matching free relatives.

participle does not involve all phi-features (only number/gender, but not person). Given Case decomposition, the same obtains in Case attraction: While the Agree operation with the matrix probe involves all features, the Agree operation with the embedded Case probe only involves a subset of the goal's features, an instance of matching in our system.

We will now go through the three relevant scenarios: In the first scenario, both Case probes assign the same Case. In the second scenario, the Case assigned by the matrix Case-probe is more oblique than that of the relative clause-internal one (allowing for attraction). The third scenario is the reverse situation: the relative clause-internal Case probe is more oblique than the one of the matrix clause. The derivation for the first scenario looks as follows (for ease of representation, unless needed, vP-projections and thus the base-position of subjects and intermediate landing sites of the relative pronoun are omitted):

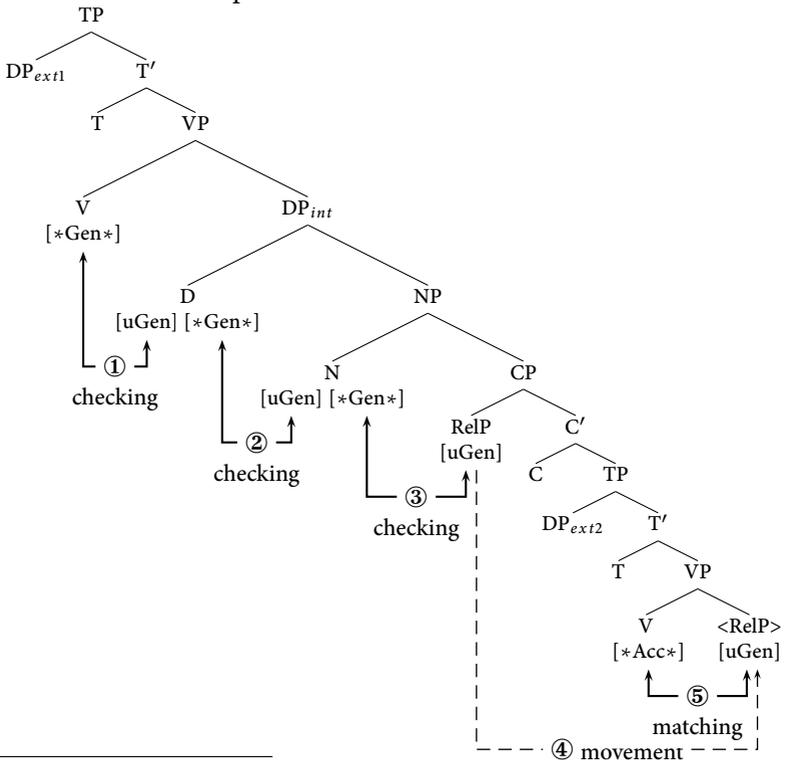
(21) Case attraction – top-down 1: MC=Gen; RC=Gen → RelP=Gen



In this scenario, all Case probes and goals are specified for genitive. First, the matrix Case-probe undergoes checking with the external D ①. Then D checks Case with N ② (DP-internal concord). Then, N checks Case with the relative pronoun ③. The relative pronoun then moves to its theta-position (with stopovers in intermediate positions not indicated above) ④. Although it has its Case feature already checked, it is still available for Agree under matching. Matching is felicitous because the relative clause-internal Case-probe has a subset of the features of the goal (identity of features also constitutes a subset). The Case features of the probe can thus be discharged and the derivation converges ⑤.<sup>17</sup>

In the second scenario, the Case-probes differ and the relative operator bears Case features which match the matrix Case but not the embedded Case. Furthermore, the matrix Case is more oblique than the embedded Case. The derivation proceeds as follows:

(22) Case attraction – top-down 2: MC=Gen; RC=Acc → RelP=Gen

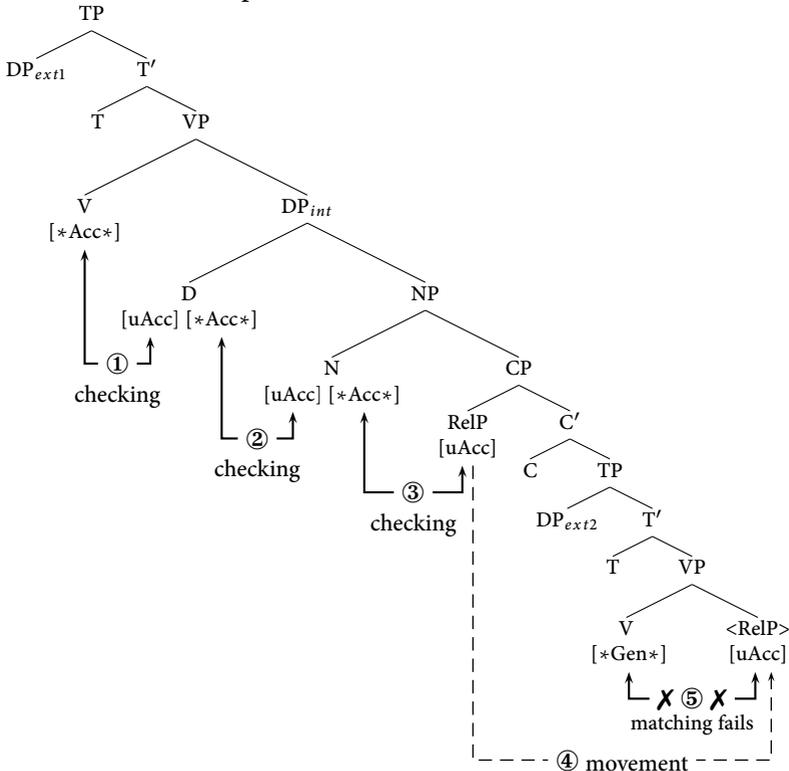


<sup>17</sup>See the resumptive derivation in (30) for a more precise description of Case checking.

First, the matrix verb checks Case with the external D ①. Then, D checks Case with N ②. Since the relative pronoun matches the Case of N, Case checking is possible ③. The relative pronoun then moves to its theta-position ④. The crucial step is the last one: although the relative pronoun has already undergone Case-checking and bears a different Case than the relative clause-internal probe, the Case-probe can be discharged because its features constitute a subset of those of the relative pronoun ( $[\alpha, \beta]$  vs.  $[\alpha, \beta, \gamma, \delta]$ ), i.e. matching is successful ⑤. If the relative pronoun were pre-specified for the RC-internal Case, i.e. for accusative, the derivation would crash because N could not check Case with the operator: checking requires feature identity, but N would have a superset of the Case features of the operator. Hence, attraction must apply in this scenario if there is Case-Agree relation between N and the operator (Agree is optional, however, since attraction is optional).

In the third scenario, the Case-probes differ as well, but this time, the embedded Case probe is more oblique than the one in the matrix clause. The derivation proceeds as follows:

(23) Case attraction – top-down 3: MC=Acc; RC=Gen → crash



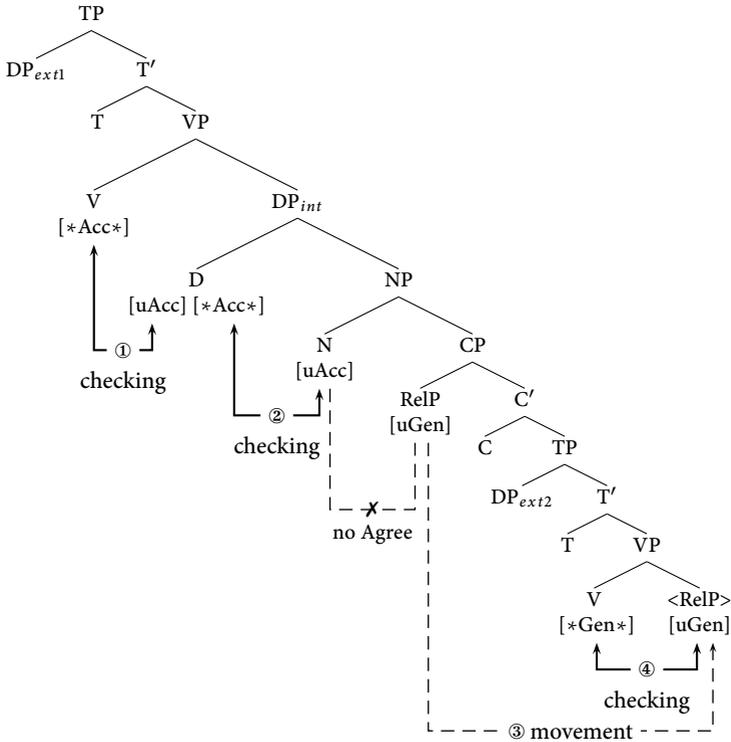
First, the matrix verb checks Case with D ①. Then D checks Case with N ②. Thereafter, N checks Case with the relative pronoun ③, which subsequently moves to its theta-position ④. However, discharge of the embedded Case probe fails because it has a superset of the features of the relative pronoun ( $[\alpha, \beta, \gamma, \delta]$  vs.  $[\alpha, \beta]$ ). As a consequence, the derivation crashes. Since matching requires a subset relation, Case attraction is ruled out as a matter of principle if the matrix Case is less oblique than the embedded Case.

The only grammatical solution in scenario three is the absence of attraction. The relative pronoun instead surfaces with the embedded Case. Absence of attraction is needed in two further constellations: since attraction is generally optional in the languages where it is in principle available, there must also be a derivation without attraction even if the matrix Case is more oblique than the embedded Case. Finally, one also has to account for languages like Modern German which do not have any attraction at all. The solution is very straightforward: There is no Case-Agree between N and the relative pronoun. While the Case-probe is never present in Modern German, it is optional on N in languages with attraction.

In scenario 3, the converging derivation involves an N without a Case-probe and a RelP which bears the same Case as the embedded Case-probe, see (24).

The first steps are the same as in attraction: The matrix probe checks Case with D ① and D checks Case with N ②. But then, there is no Case-Agree between N and the relative pronoun. This allows the operator to have a Case different from the matrix Case probe. If there were Case-Agree between N and a relative pronoun bearing a Case different from N, the derivation would crash as checking requires identity of features. The relative pronoun then moves into its theta-position ③ where it undergoes Case-checking (not matching) with the embedded Case-probe ④.

(24) No Case-Agree between N and RelP (no attraction) – top-down 4:  
 MC=Acc; RC=Gen → RelP=Gen



To summarize the results so far: two factors make Case attraction possible: (a) N enters an Agree relation with the relative pronoun. This implies that they have to be specified for the same Case given that checking requires identity of features. (b) Since discharge of probe-features is possible under matching, the derivation converges although the relative pronoun has already been involved in a checking operation and furthermore differs in Case-features from the Case-probe. Since matching requires a subset relation, the hierarchy-effect in (3) follows automatically. Note that the possibility of discharge under matching is tightly constrained: it is only available if the goal-DP has already undergone Case-checking. This rules out, for instance, the checking of a nominative T by an accusative DP in a simple sentence (e.g., with an intransitive verb).

The strength of our argument for top-down derivation depends on whether the problems we described at the outset are unidirectional. If, however, we

find the reverse case where the relative clause-internal context determines the form of an element in the matrix clause, this will be an advantage for bottom-up so that we end up with a tie. There is one construction, the so-called *attractio inversa*, that seems to instantiate exactly what we have ruled out so far: in this construction, the embedded Case seems to be imposed on the head noun, which consequently differs in Case from the matrix Case probe. Here are two examples from Ancient Greek and Middle High German respectively, where the head noun bears accusative although it seems to be the subject of the sentence, see Bianchi (2000: 60, 67):

- (25) a. den schilt den er vür bot<sub>acc</sub> der wart<sub>nom</sub>  
 the.ACC shield.ACC which.ACC he held that.NOM was  
 schiere zeslagen  
 quickly shattered  
 ‘The shield he held was quickly shattered.’

*Middle High German*

- b. ton andra touton hon palai zēteis<sub>acc</sub> ... houtos  
 the man.ACC this.ACC who.ACC long search.2S ... this.NOM  
 estin<sub>nom</sub> enthade  
 is here  
 ‘The man you have been searching for a long time, he is here.’

*Ancient Greek*

However, there is good reason to believe that a different structure is involved (as pointed out, e.g., in Pittner 1995, Bianchi 2000, van Riemsdijk 2006): in most examples involving inverse attraction, there is a demonstrative/resumptive pronoun (with the expected matrix Case) occupying the subject position. This suggests that the construction rather represents a correlative or left-dislocation structure (for potential counter-examples see Grosu 1994: 127).<sup>18</sup>

Given our assumptions, *attractio inversa* without a correlative/dislocation structure simply cannot be derived because it would require a matrix probe with a feature set different from that of the external D; but since the external D has not been involved in prior Case-Agree, its Case features are still unchecked

<sup>18</sup>Something will have to be said about the Case of the head noun, but since dislocated elements are generally freer in their Case properties, an operation different from Agree will be responsible.

so that discharge of the matrix Case-probe is only possible under checking. To ensure convergence, checking requires identity of Case-features, but since probe and goal differ in Case features in *attractio inversa*, the derivation will crash.

### 3.2.2. Matching in resumption

Recall first the three scenarios we have to account for:

#### (26) Distribution of resumptives in Swiss German

MC-Case	RC-Case	realization
Dat	Nom/Acc	gap
Nom/Acc	Dat	resumptive
Dat	Dat	gap

We propose to reinterpret these generalizations in terms of Case attraction even though there is no overt evidence for attraction since the relative operator is zero.<sup>19</sup> In the first scenario, the matrix Case is more oblique than the embedded Case, which is compatible with the hierarchy in (3): the embedded Case-probe is discharged under matching. In the second scenario, however, the reverse situation obtains and we argue that resumption is a means to rescue a derivation that is otherwise doomed to crash: the resumptive checks the embedded Case-probe which the relative operator cannot as it has fewer features than the probe. The third scenario is a subcase of attraction: discharge under matching is also possible if the Case features assigned in the MC and the RC are identical (both probes assign nominative, accusative or dative). Note that nominative-accusative mismatches result in gaps in Swiss German, even if they go against the hierarchy in (3), i.e. with the matrix Case being nominative and the embedded Case being accusative (see (5a)). We propose that this is due to a slight difference in the Case hierarchy: nominative and accusative do not occupy different positions but rather represent the same type of Case, viz. unmarked Case:

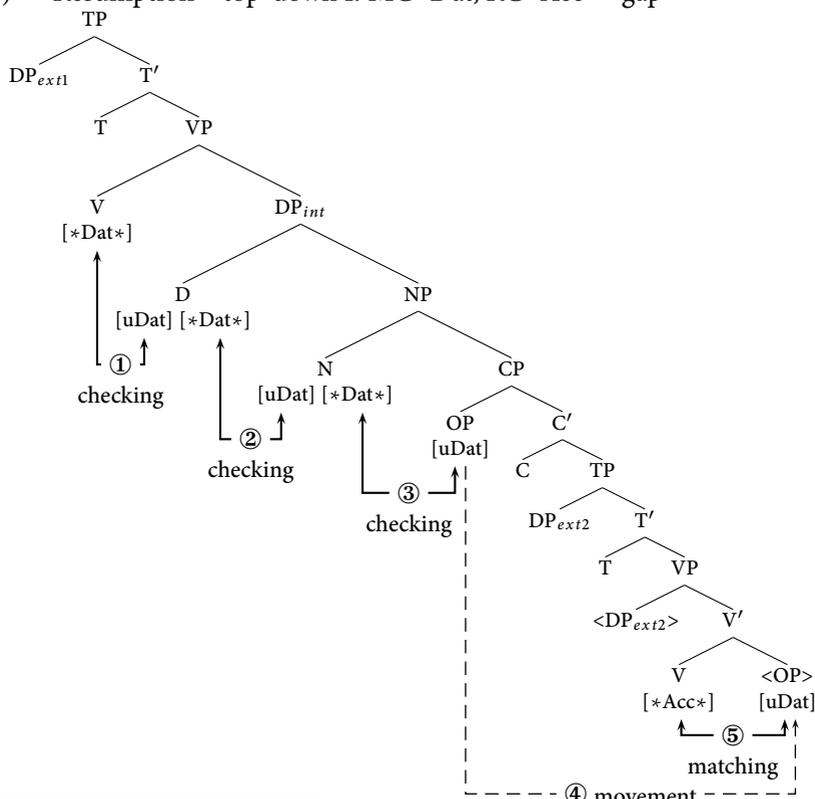
#### (27) Dat > unmarked (Nom, Acc)

<sup>19</sup>See Gračanin-Yuksek (2013) for a related idea: according to her, inverse attraction is at work in Croatian resumptive matching, but in fact she assumes an identity criterion that is more reminiscent of matching.

More precisely, we assume that they have the same number of Case features (this again holds for both probes and goals), and given the hierarchy a subset of the features of the dative. The classification is not just a stipulation based on the behavior in relative clauses but is grounded in Swiss German morphology: nominative and accusative are not morphologically distinguished except in personal pronouns (basically as in English).<sup>20</sup> Apparent nominative-accusative mismatches thus actually represent instances of scenario 3 (identity of the Cases in MC and RC).

We are now ready to go through the three scenarios. The derivation for the first looks as follows:

(28) Resumption – top-down 1: MC=Dat; RC=Acc → gap

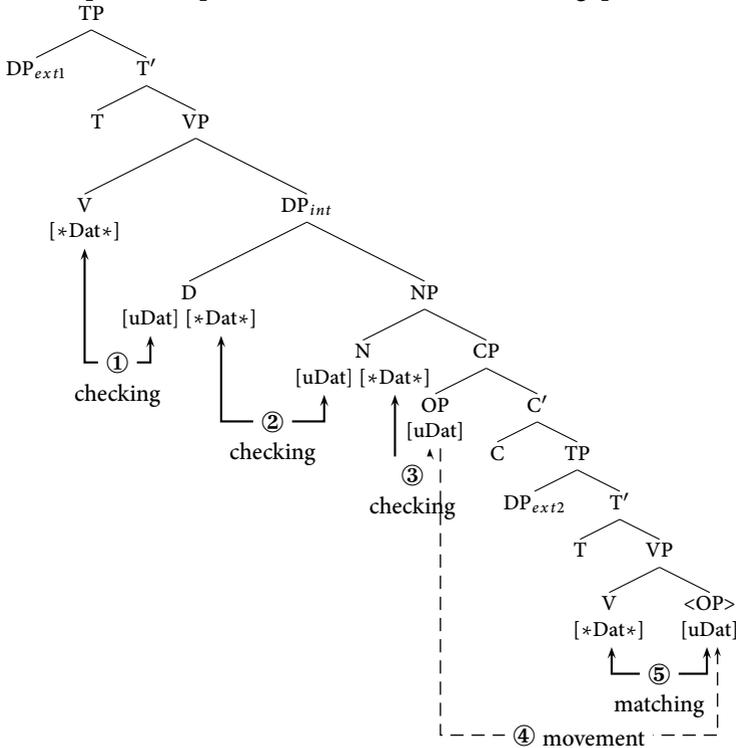


<sup>20</sup>Nouns do not show any Case distinctions anymore in this variety, only adjectives and determiners/pronouns do. To account for the personal pronoun paradigm, we propose that the personal pronoun exponents are sensitive to the category of the head that checks Case on the DP, i.e. v vs. T (see Pesetsky and Torrego 2001). For concreteness' sake, we assume that checking leaves a diacritic on the checked goal which the vocabulary items can refer to.

In this scenario, the derivation proceeds exactly as in Case attraction, see (22): the matrix verb checks Case with D ①, D checks Case with N ②, and N checks Case with the operator ③. The operator subsequently moves to its theta-position ④ where it checks Case with the embedded Case probe. Although the operator has already been involved in Case checking and bears a Case different from the embedded Case-probe, the derivation converges because discharge is possible under matching: the embedded Case-probe has a subset of the features of the goal ⑤.

The third scenario is straightforward as it is essentially a variant of the first: there is discharge under matching so that no resumptive is necessary. It proceeds as follows:

(29) Resumption – top-down 3: MC=Dat; RC=Dat → gap

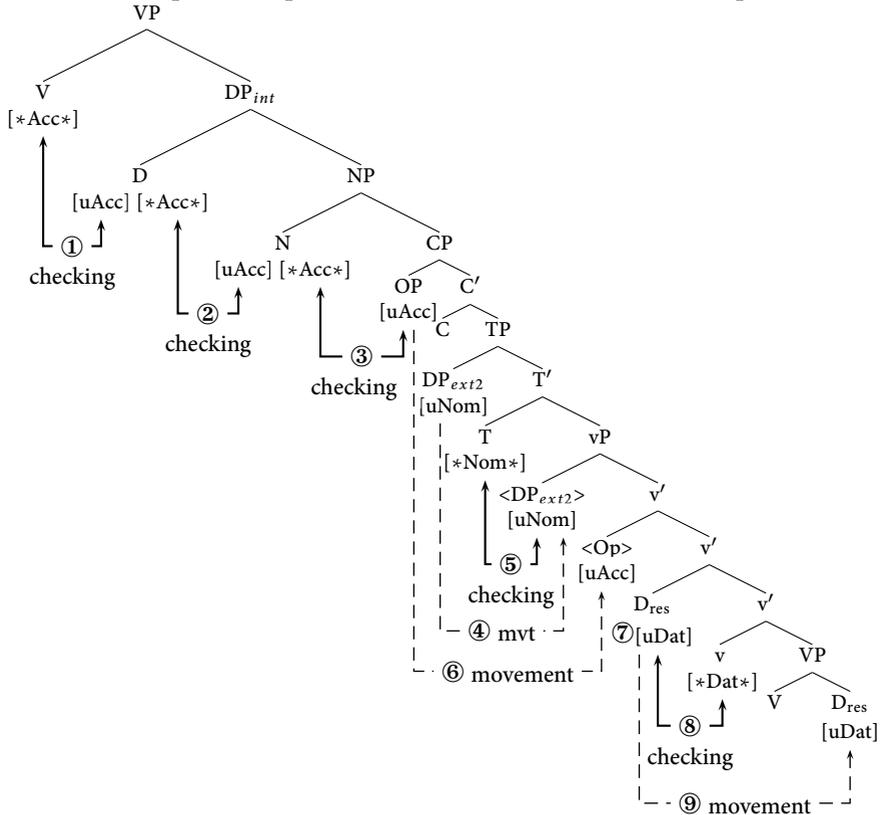


As in previous derivations, the matrix verb checks Case with D ①, D checks Case with N ②, and N checks Case with the relative operator ③. The relative operator subsequently moves to its theta-position ④. Since it has the same features as the embedded Case probe, discharge under matching is possible

⑤ and the derivation converges. Consequently, no resumptive is necessary here.<sup>21</sup> When both matrix and embedded verb assign a non-oblique Case, the same matching derivation obtains.

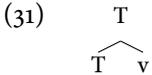
The second scenario corresponds to the configuration where Case attraction is blocked as the matrix Case is less oblique than the embedded Case, see (23). While a derivation with a Case-probe on N crashes in languages with attraction in this configuration, resumption provides a way out. The derivation proceeds as follows:

(30) Resumption – top-down 2: MC=Acc; RC=Dat → resumptive

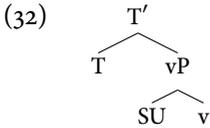


<sup>21</sup> As discussed in Salzmann (2013) there is both dialectal and inter-speaker variation concerning the robustness of dative resumptives: in some dialects, gap relatives are the only possibility, and even in varieties with datives resumptives, many speakers seem to allow for both options. Given our assumptions, gap relatives in dative relativization can be accounted for if there is no Case-Agree between N and the operator: rather, the operator can be specified for dative and check the embedded Case probe.

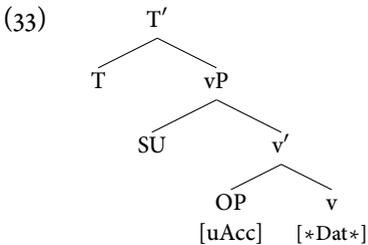
The first steps are again the same as in Case attraction: the matrix verb checks Case with D ①, D checks Case with N ②, and N checks Case with the relative operator ③. We now need to have a closer look at the derivation in the embedded clause. We begin at the point when T and the subject have been merged. We will assume that T's selectional features must be satisfied first (Schneider 1999), as a consequence of which *v* is merged as a sister of T:



Thereafter, *v*'s structure building features are discharged one after the other. First, the subject is lowered and becomes a sister of *v* ④ (as in Phillips 2003, the constituency thus changes during the derivation):



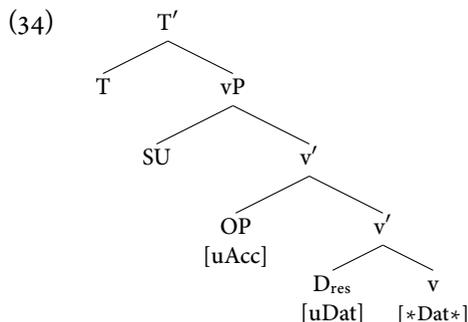
The subject and T check Case so that the Case probe on T is discharged and the subject is deactivated ⑤. Note that it cannot subsequently enter a matching relationship with *v* as it has a subset of *v*'s features. Then, the relative operator is moved downwards and becomes a sister of *v* ⑥:<sup>22</sup>



This is the configuration where the operator normally checks Case with the embedded probe (note that they c-command each other). Crucially, in this

<sup>22</sup>Note that the ordering between subject movement and operator movement does not have to be stipulated. If the operator were moved first, it could Agree with T so that the Case probe on T could be discharged under matching. But then, the subject's Case features could not be checked as its features are not identical to that of *v* (which is necessary for checking). Consequently, that derivation would crash.

scenario, however, the operator cannot check the embedded probe as it has a subset of *v*'s features. If nothing happens – as in Case attraction – the derivation is doomed to crash. In languages with resumption, however, resumptives can be inserted as repairs.<sup>23</sup> This is what happens at this point: a resumptive specified for dative is merged into the structure ⑦:



The resumptive and *v* then check Case, the embedded Case probe is discharged and the resumptive is deactivated ⑧.<sup>24, 25</sup> Then, after *V* has been introduced, the resumptive is moved downwards to check *V*'s theta-feature ⑨.<sup>26</sup> Finally, the agreement in phi-features between operator and resumptive results from binding.<sup>27</sup>

<sup>23</sup>To avoid an Inclusiveness violation, we assume that the resumptive is optionally part of the numeration. See section 5 on how to avoid over-/underinsertion of the resumptive.

<sup>24</sup>Note that resumption is thus related to Case. This accounts for the fact that one does not find adverbial resumptives cross-linguistically, see Boeckx (2003: 37f.). To what extent resumptives related to location and time (e.g. 'there', 'then') which can sometimes be found check Case remains to be determined, though.

<sup>25</sup>The fact that the resumptive is introduced higher than the theta-position can be used to account for its surface position in many languages (recall that under top-down, the base-merge position of an element corresponds to its surface position): Being weak pronouns/clitics, they often do not occupy the theta-position. Strong resumptives and epithets, on the other hand, are introduced in the VP-cycle, accounting for their occurrence in the theta-position.

<sup>26</sup>Although one cannot see this on the surface, given minimality, movement of the resumptive is more plausible than movement of the operator.

<sup>27</sup>One could imagine that the operator actually moves into the projection of the resumptive so that a clitic doubling structure arises, see Boeckx (2003). However, given that the analysis of resumption in islands in section 5 below is incompatible with a Big-DP-structure (because the operator does not reach the theta-position), a uniform analysis requires the absence of a Big-DP structure here as well. In other words, we adopt a variant of the base-generation analysis.

What we have just postulated covertly for Swiss German, i.e. Case attraction between the head noun and the operator, can be found overtly in free relative clauses in Modern Greek: in the following example the relative pronoun bears (via external D) the Case of the matrix verb while the oblique Case of the RC-internal probe is checked by a resumptive clitic (Alexiadou and Varlokosta 2007: 229):

- (35) *tha voithiso<sub>acc</sub> opjon tu dosis<sub>gen</sub> to onoma mu*  
 FUT help.1S **who.ACC** 3S.M.GEN give.2S the name my  
 'I help whoever you give my name.' *Greek*

To summarize matching in resumption: essentially, headed relative clauses in Swiss German involve obligatory Case attraction. In configurations where the matrix Case is as oblique (scenario 3) or more oblique (scenario 1) than the embedded Case, the embedded Case probe can be discharged under matching. In the reverse situation, discharge under matching is impossible and resumption functions as a last resort, guaranteeing the discharge of the embedded Case probe. Note that this requires that Case-Agree between N and the relative operator be obligatory (unlike in languages with Case attraction). If it were optional, it should be possible to derive scenario 2 without a resumptive by simply merging a relative operator specified for dative, but this is not what one observes.<sup>28</sup>

<sup>28</sup>Postulating attraction in Swiss German resumptive configurations makes a prediction that does not seem to be borne out: given that the relative operator bears the matrix Case, e.g., dative, one would expect secondary predicates related to the operator to agree with it in Case as is the general rule in the language. However, the secondary predicate bears the Case required by the embedded Case probe. In the following example corresponding to scenario 1, the secondary predicate bears unmarked Case although the relative operator bears dative according to our analysis:

- (i) *Ich hilf<sub>dat</sub> em Maa, wo mer als eerschte / \*eerschem bringt<sub>acc</sub>.*  
 I help.1S the.DAT man C we as first.S.NOM-ACC first.S.DAT bring.1P  
 'I will help the man who one brings first.'

In scenario 2, the secondary predicate agrees with the resumptive, not with the relative operator, which according to our analysis bears unmarked Case:

- (ii) *Ich suech<sub>acc</sub> de Maa, wo mer em als \*eerschte / eerschem ghulffe<sub>dat</sub>*  
 I search.1S the man C we he.DAT as first.S.NOM-ACC first.S.DAT helped  
 händ.  
 have.P  
 'I am looking for the man who we helped first.'

#### 4. A bottom-up alternative

As the reader will have noticed, by introducing the possibility of feature discharge under matching, our system has become more powerful. It therefore needs to be investigated whether the criticism leveled against bottom-up approaches at the beginning still holds. In fact, as we will see, the patterns in Case attraction and resumptive matching can be derived under bottom-up as well if the possibility of matching is adopted. Recourse to the unattractive devices (overwriting etc.) criticized above is unnecessary. However, we will show that there remains one rather serious conceptual argument against bottom-up so that in our view a top-down approach is still preferable. We will first introduce our assumptions about feature checking for bottom-up derivation before going through the derivations.

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Interestingly, though, Case attraction in Modern Greek behaves the same (we are grateful to Marika Lekakou for providing the following examples, see also Spyropoulos 2011: 35f.): predicative elements do not agree with the attracted relative pronoun but rather bear the Case of the embedded Case probe. The following examples illustrate this for scenarios 1 and 2 (*o idios*, literally ‘same’, is an intensifier akin to *himself*):

- (iii) a. *tha dosume<sub>gen</sub> opju erthi<sub>nom</sub> o idjos / \*tu idju ena vivlio*  
 fut give.IP who.GEN come.3S the same.NOM the same.GEN a book.ACC  
 ‘We will give a book to whoever comes in person (lit. himself).’
- b. *tha voithiso<sub>acc</sub> hopjon tu dosis<sub>gen</sub> to onoma mu \*ton idion /*  
 fut help.1S who.ACC 3S.M.GEN give.2S the name my the same.ACC  
*tu idiu*  
 the same.GEN  
 ‘I will help whoever you give my name himself.’

This shows that the behavior of secondary predicates does not falsify our attraction analysis for Swiss German. To account for the agreement in scenario 1, we propose that the predicative element matches its Case against the features of its subject that were last involved in Case-Agree. This will be a subset of the relative pronoun’s features. For this to work, one has to assume that Agree operations leave some sort of diacritic on the features involved (in violation of Inclusiveness). In scenario 2, the predicate agrees with the closer resumptive rather than the relative pronoun. Without going into details, we assume that Case agreement between the predicative adjective and its subject results from the predicate probing upwards (as the attentive reader will have noticed, this implies that this is another probe that features matching as its subject will have undergone Case checking before the predicate is introduced; for reasons unclear to us, matching requires identity of features here). As a final note, languages differ with respect to the behavior of predicative elements under attraction: according to Quicoli (1982: 164ff.), the predicate has to agree with the relative operator in Case attraction in Ancient Greek. We leave an account of this variation for future research.

We adopt the same principles as above, but adapted to bottom-up derivation. Probes probe downward as is standard. As for Case-Agree, we also assume that it involves checking and that there are two ways of discharging probe features. Furthermore, Cases are decomposed as in (19). Checking and matching are defined as follows:

(36) *checking:*

Agree between a DP with an *unchecked* Case feature [uCase] and a probe [ $*\text{Case}^*$ ]. It does not require identity of features, viz. it is possible if the probe has a *subset* of the features of the goal (see below on Case decomposition).

(37) *matching:*

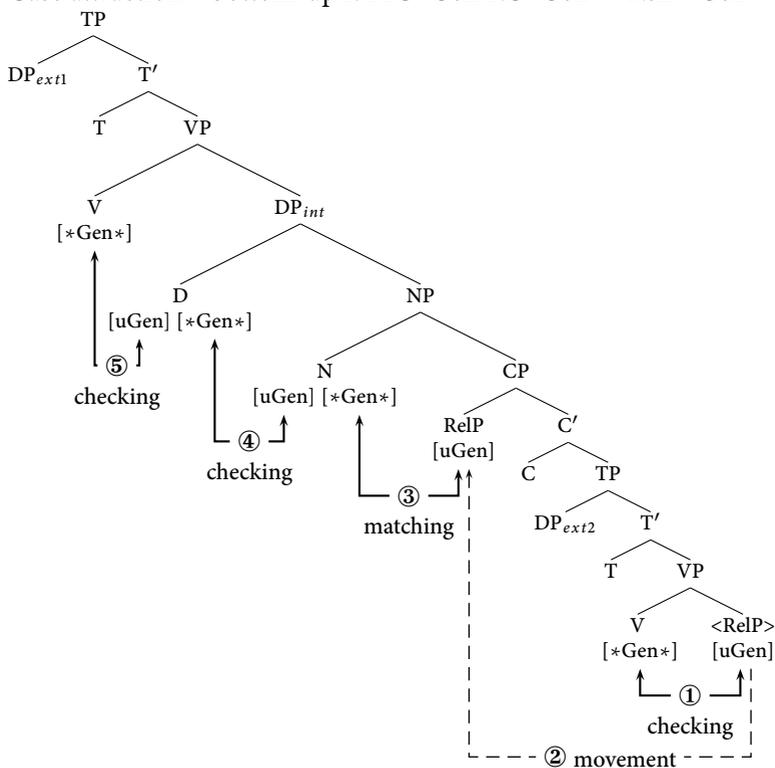
Agree between a DP with a *checked* Case feature and a probe. It requires identity of features, i.e. it is only possible if the goal has the same features as the probe (see below on Case decomposition).

As before, a goal DP can only be deactivated if all its features are involved in checking. What is different from top-down, though, is that a probe can also be deactivated under checking if it has a subset of the goal's features (while under top-down this was only possible if it had the same features, recall the definition in (11)). It is this property that makes Case attraction possible: the relative operator starts out with more features than the relative clause-internal probe. We will now go through the derivations for both Case attraction and matching in resumption.

#### 4.1. Case attraction

We will start with the simplest case, a configuration where both predicates assign the same Case. The derivation proceeds as follows:

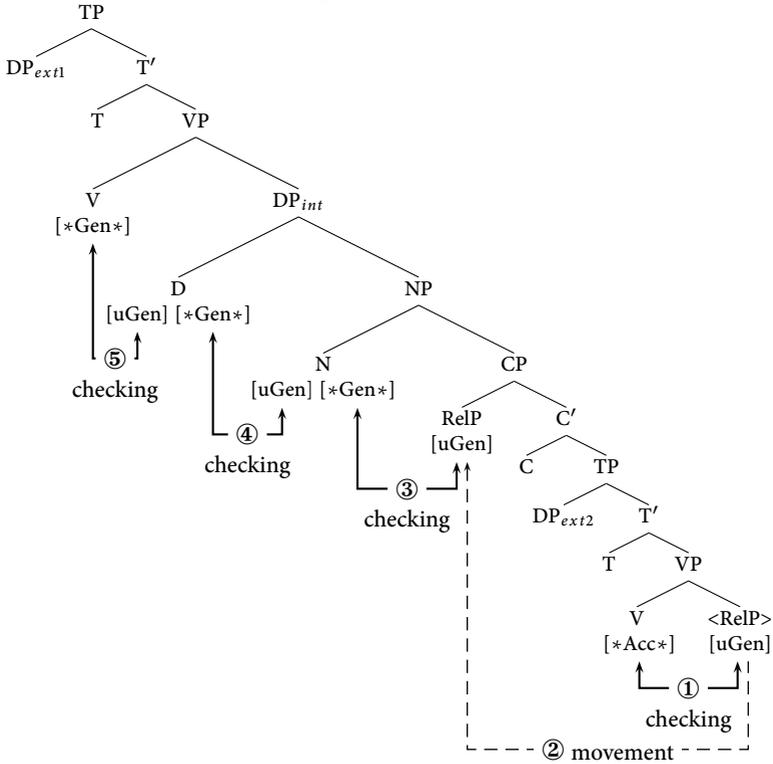
(38) Case attraction – bottom-up 1: MC=Gen RC=Gen → RelP=Gen



The relative operator is merged in its theta-position and undergoes Case-checking with the relative clause-internal probe. Since they have the same features, the probe can be discharged and the relative pronoun is deactivated for further checking ①. The relative pronoun then moves to the left periphery (arguably with stopovers in intermediate phase edges) ②. Since it has already been involved in checking, matching is the only possibility to discharge the Case-probe of N. Since N and the relative pronoun have the same features, matching is successful and the Case-probe of N is discharged ③. Finally, there is Case checking between N and D ④ and D and the matrix verb ⑤. The derivation thus converges.

The second scenario, which instantiates attraction is more interesting. The derivation proceeds as follows:

(39) Case attraction – bottom-up 2: MC=Gen; RC=Acc → RelP=Gen



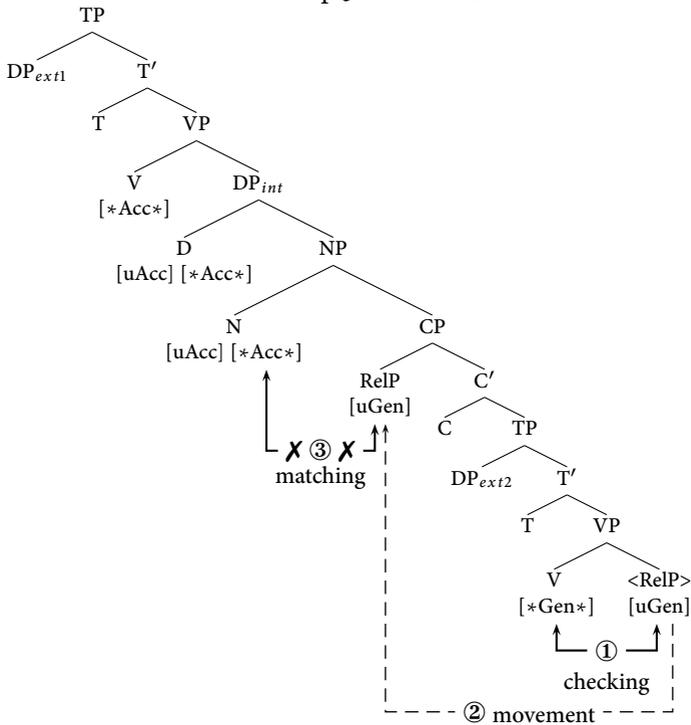
Here, the crucial step is the first one: There is Case checking between the relative pronoun and embedded Case probe. The Case probe is discharged since all its features are involved in checking. The relative pronoun, however, is still active as it has more features than the Case probe ①. The pronoun then moves to the left periphery ②. Since it is still active, Agree with N involves checking. Since N has the same features as the relative pronoun, the Case probe on N can be discharged and the relative operator is deactivated ③.<sup>29</sup> Finally, there is Case checking between N and D ④ and D and the matrix verb ⑤. The derivation thus converges.

<sup>29</sup>Given that checking is involved, the Case probe could in principle also be discharged if it had fewer features than the relative pronoun, but then the pronoun would remain with unchecked features, leading to a crash of the derivation. This rules out derivations where the relative pronoun matches neither of the Case probes.

An alternative derivation with the relative pronoun being specified for accusative, i.e., the internal Case, would crash: although the embedded Case probe could be discharged, problems arise when N agrees with the relative pronoun: since N has more Case features than the relative operator (genitive vs. accusative), matching fails because it requires feature identity, leading to a crash.

The third scenario involves a configuration where the matrix Case is less oblique than the embedded Case. Recall that attraction is impossible here. The derivation proceeds as follows:

(40) Case attraction – bottom-up 3: MC=Acc; RC=Gen → crash



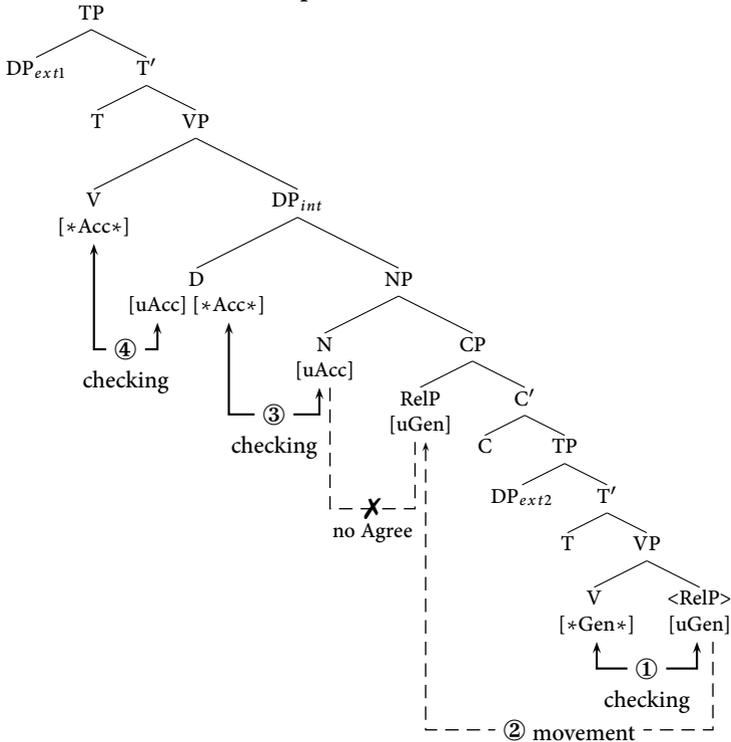
The relative pronoun is merged in its theta-position and undergoes Case checking with the embedded Case probe. Since they have the same features, the Case-probe is discharged and the relative pronoun is deactivated ①. The relative pronoun then moves to the left periphery ②. The problem obtains

when N agrees with the relative pronoun. Given that the relative pronoun has already been involved in Case checking, matching is the only possibility for feature discharge. However, since N has fewer features than the relative operator, matching is not possible ③ and the derivation crashes. The identity condition on matching may seem unattractive and unnecessary here since without it one could derive non-attraction cases in the presence of a Case probe on N (and thus could keep N's feature content constant). However, in the discussion on resumption below we will see that the identity condition is crucial to prevent overgeneration.

Note that a derivation with the relative pronoun being specified for accusative, the matrix Case, would crash as well because probe features of the embedded verb would remain unchecked.

As under top-down, the converging derivation involves no Case-Agree between N and the relative pronoun:

(41) No attraction – bottom-up 4: MC=Acc; RC=Gen → RelP=Gen

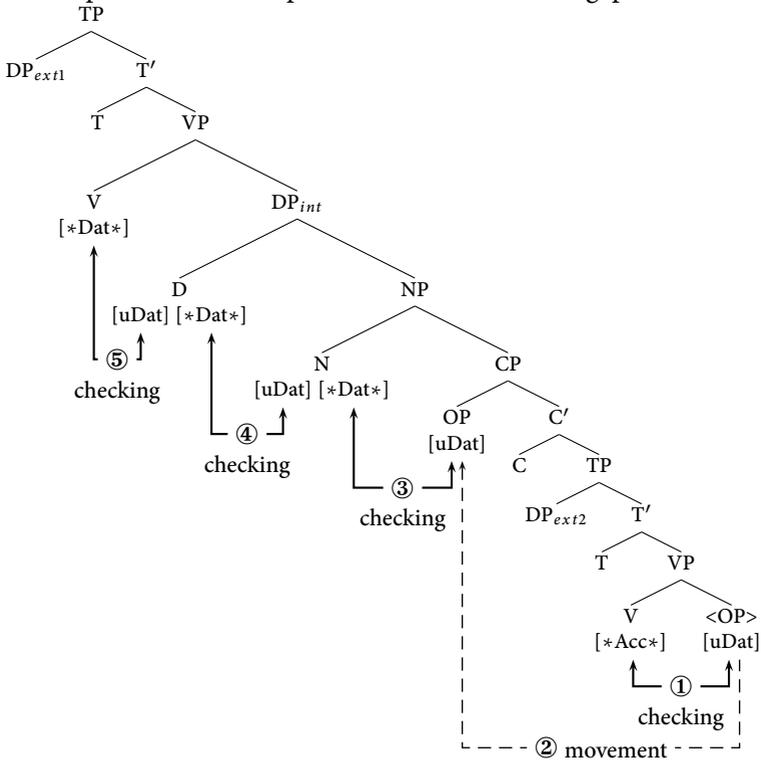


The relative pronoun and the embedded Case probe undergo checking. The Case probe is discharged and the relative pronoun is deactivated ①. The pronoun subsequently moves to the left periphery ②. Finally, N checks Case with D ③ and D with the matrix verb ④. ⑤.

#### 4.2. Matching in resumption

We will begin with the attraction scenario where the matrix Case is more oblique than the embedded Case, viz., dative vs. unmarked. Such relative clauses feature gaps. The derivation proceeds as follows:

(42) Resumption – bottom-up 1: MC=Dat; RC=Acc → gap



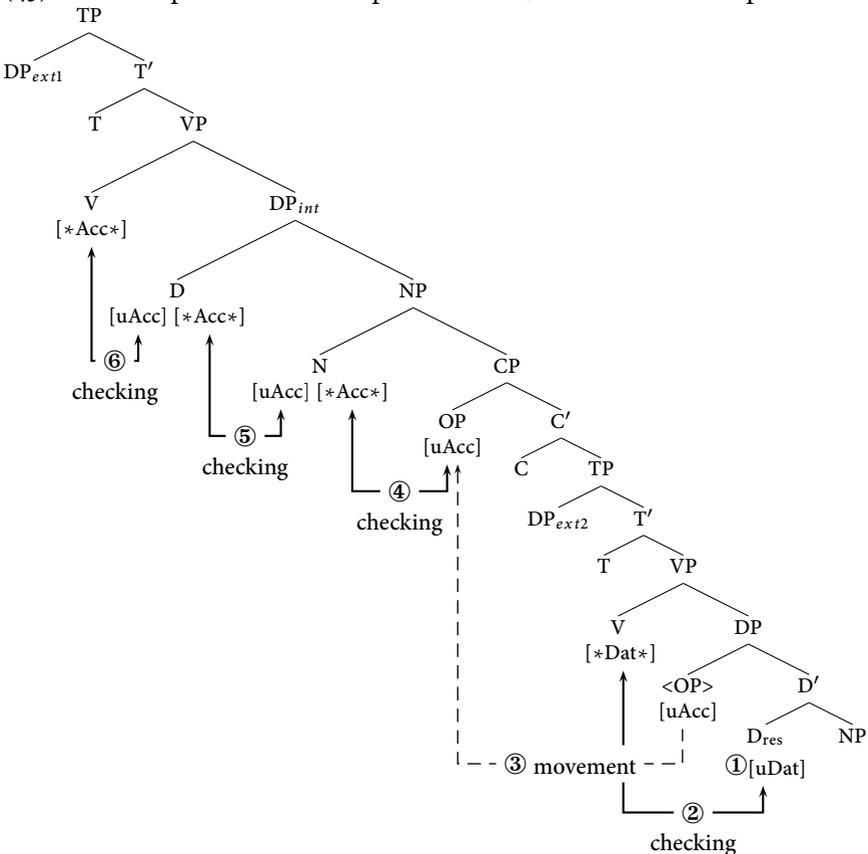
As in the attraction derivation, what makes the gap derivation possible is the fact that the relative operator bears more Case features than the embedded Case probe (dative vs. accusative). The operator and the embedded probe

thus undergo checking, the Case probe is discharged while the operator stays active ①. The operator then moves on to the left periphery ②. Subsequently, it undergoes checking with N and is deactivated as both have the same features ③. Finally, N checks Case with D ④ and D with the matrix verb ⑤, and the derivation converges.

Note that a derivation where the operator bears unmarked Case and thus the same features as the Case probe would crash: the embedded Case probe could be discharged through checking and the operator would be deactivated. As a consequence, only matching is possible with N. However, since N would have more features than the operator, matching would fail, leading to a crash.

The derivation with a dative resumptive is more complex:

(43) Resumption – bottom-up 2: MC=Acc; RC=Dat → resumptive

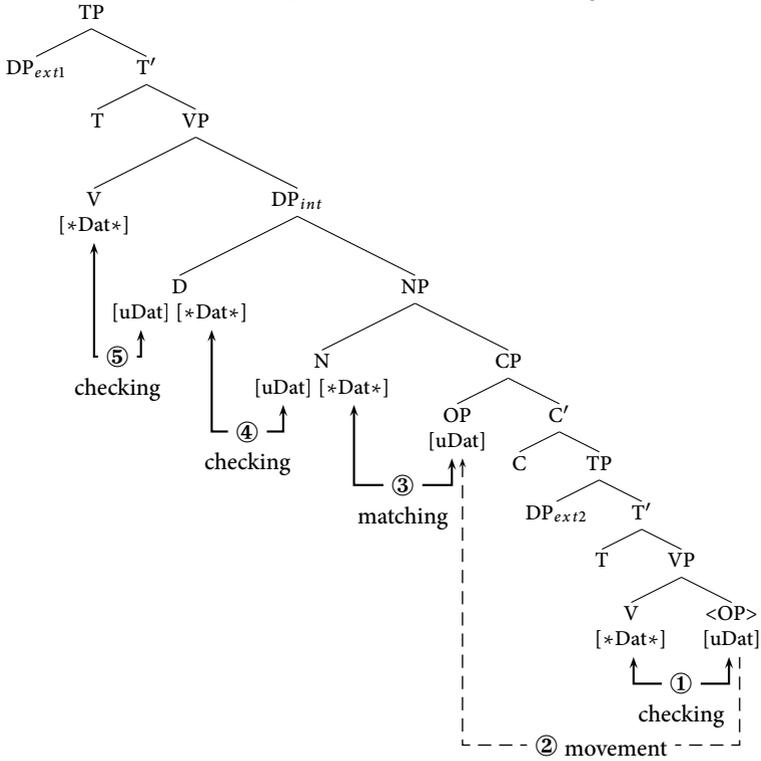


Given that we have been assuming that attraction is obligatory in Swiss German, the relative operator must be specified for unmarked Case (rendered as accusative for ease of representation in the tree diagram). As a consequence, it cannot check the embedded Case probe. If nothing happens, the derivation crashes. The alternative involves a resumptive pronoun specified for dative. It is merged in the theta-position ① and checks the embedded Case probe ②. The operator is merged as a specifier (or as a complement) of the resumptive and is specified for accusative. It moves to the left periphery ③. Alternatively, it is base-generated there, see the discussion on resumptives in islands in section 5 below. Since it has not been involved in Agree, it is still active. Consequently, it undergoes checking with N ④. Then, N checks Case with D ⑤, D with the matrix verb ⑥, and the derivation converges.

Note that an alternative derivation with the operator being specified as dative crashes: although it could check the embedded dative probe, problems obtain when it enters an Agree relationship with N: since N has fewer features, matching is not possible as it requires, by definition, identity of features. If matching were possible with a subset relationship, a gap derivation should converge for the relativization of datives, contrary to fact. It is this fact that motivates the identity requirement on matching.

The last scenario to discuss is the matching configuration. The derivation proceeds as follows:

(44) Resumption – bottom-up 3: MC=Dat; RC=Dat → gap



First, the operator checks the embedded Case probe and is deactivated ①. After moving to the left periphery ②, it undergoes matching with N (since its features have all been checked). Since N and the operator have the same features, matching is successful ③. Thereafter, N checks Case with D ④, D with the matrix verb ⑤, and the derivation converges.

4.3. Comparing top-down and bottom-up

The previous subsections have shown that a bottom-up approach can derive the patterns observed in Case attraction and matching in resumption as well if certain amendments are made to the theory of Case checking: first, Case checking is possible even if the goal has more features than the probe and second, feature discharge is also possible under matching. The first property

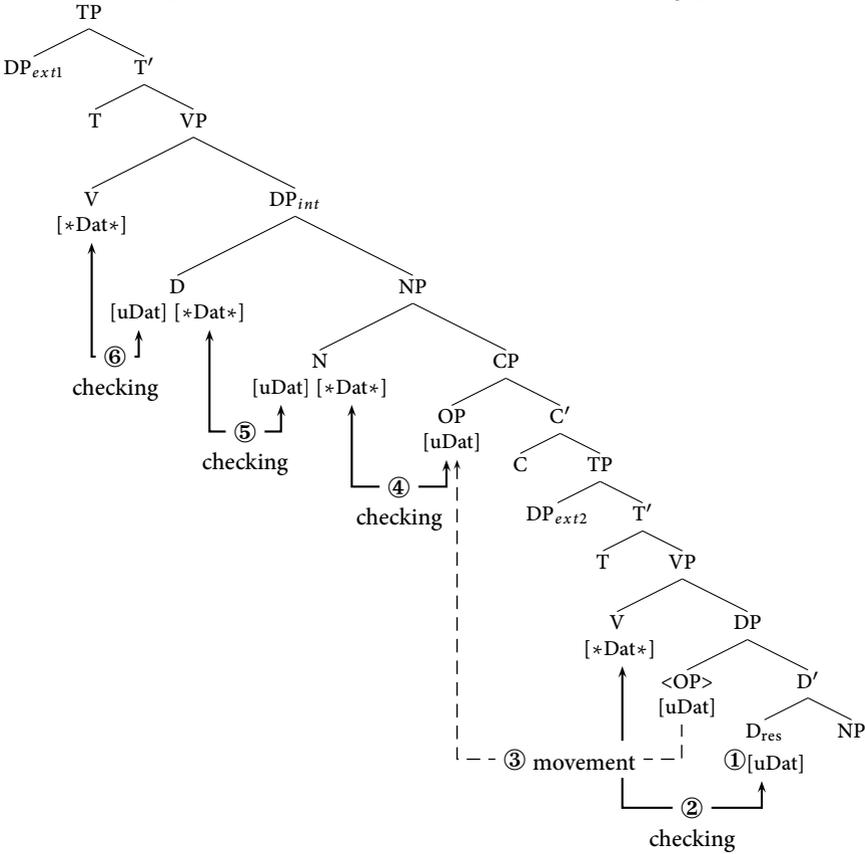
allows for Case mismatches, the second enables a DP to be involved in two Case-Agree operations.

Both approaches have to make one stipulation that seems unattractive: under top-down, Case-checking is only possible if probe and goal have the same features and all of those features participate in Agree. Under bottom-up, the same holds for matching. This stipulation is crucial to rule out gap derivations in the relativization of indirect objects, i.e. when the matrix Case is unmarked while the embedded Case is dative (and thus goes against the hierarchy in (3)). Under top-down, checking between N and the operator must be blocked in this Case, and the same goes for matching between N and the operator under bottom-up. Both assumptions seem to be equally unattractive, but as far as we can tell unavoidable given the workings of our system. It seems thus, that contrary to our claim at the outset, there is no reason to prefer top-down derivation over bottom-up derivation. In the following last section, however, we will argue that the top-down perspective does have an important advantage, namely when it comes to the choice between gaps and resumptives in configurations where only the gap derivation is grammatical.

## 5. Implications for resumption

We need to come back to the matching configuration in resumption. When discussing the bottom-up derivation in (44), we simply merged an operator specified for dative, which then checked the embedded Case-probe and underwent matching with N. However, we have not yet ruled out a derivation where we first merge a dative resumptive with an operator specified for dative in its specifier (or as its complement) ①. Since the resumptive is the head of the Big DP, it checks the embedded Case-probe ②. The operator is still active, moves to the left periphery ③ (or is base-generated there) and undergoes checking with N ④. Finally, N checks Case with D ⑤ and D with v ⑥. Nothing seems to rule out this derivation:

(45) Resumption – bottom-up 3: MC=Dat; RC=Dat → gap



The same holds for matching derivations with subjects and direct objects where gaps are obligatory. Similar converging derivations with resumptives seem to be possible as well. One cannot simply say that merging an operator is always preferred over merging a resumptive because that would rule out resumptive derivations altogether, both for scenario 2 and for configurations where the extraction site is within an island. In the latter, even subjects and direct objects require resumption:<sup>30</sup>

<sup>30</sup>Note that the complementizer appears as *won* in this example. *n*-insertion occurs systematically in Swiss German before unstressed vowels.

- (46) Das isch<sub>nom</sub> de Maa, won i s Buech, won \*(er) kchauft hät<sub>nom</sub>,  
 this is the man C I the book C he bought has  
 blöd find.  
 stupid find  
 ‘This is the man such that I dislike the book he bought.’

This implies that one has to allow for the optionality between merging an operator and a resumptive. But then, one ends up with two converging derivations one of which has to be blocked by other means. Intuitively, resumption is superfluous in these cases. This is a classic case of transderivational Economy: two derivations converge but only one of them is selected as grammatical because it has a better Economy profile.<sup>31</sup> Whatever constraint prefers gap-over resumptive-derivations (see Salzmann 2013 for discussion), a bottom-up derivation cannot do without transderivational Economy and is thus in conflict with recent trends in Generative Grammar towards local modeling in syntax, as pointed out at the beginning of this paper.<sup>32</sup>

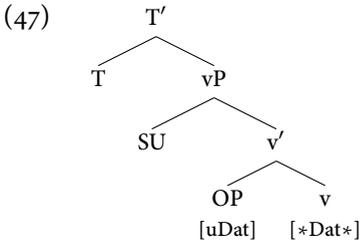
Crucially, we believe that top-down derivation can do without transderivational Economy. Instead, the choice between gap and resumptive can be made locally. We repeat the crucial steps from above:

After T has merged with v ① and the subject has moved downwards ②, the operator is merged as a sister of v ③:

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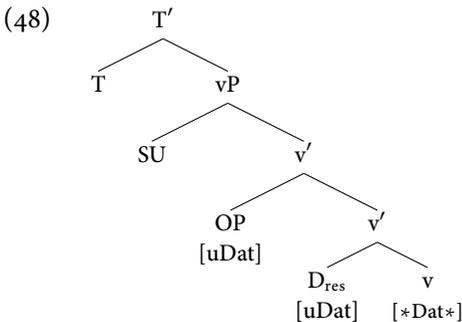
<sup>31</sup>For resumptive and gap derivations to compete, they have to belong to the same Reference Set, which is normally based on identical numerations. As discussed in Salzmann (2013), this is far from obvious in the case at hand. It was argued instead in that work that the Reference Set should be based on identical LFs.

<sup>32</sup>Transderivational Economy could be avoided under bottom-up if the resumptive derivation were to crash in matching configurations. However, it is not obvious to us what should cause the crash. In Müller (2014) resumptive derivations crash outside of islands because of an unchecked feature on the moving element. While this generally derives the complementarity between gaps and resumptives, this cannot be applied to the matching configuration because the resumptive derivation would be necessary to escape the dative island (if datives are reanalyzed as PPs, which constitute islands in German). The rest of the derivation, e.g. the Case of the head noun, can no longer influence the choice made at the beginning of the derivation. The approach thus wrongly predicts dative resumptives to be obligatory in all contexts.



In this configuration, it can be locally determined whether resumption is necessary or not. If the Case probe has a subset of the features of the operator, matching is successful and the Case probe can be discharged so that the derivation converges. This accounts for scenarios one and three.

A resumptive is thus not necessary. Suppose that a resumptive is inserted nevertheless:



Since the resumptive bears [uCase], it has to undergo checking. But since there is no active Case probe anymore, its features will remain unchecked and the derivation crashes. We thus need no comparison of derivations. All that is needed is a local Economy Principle that prefers downward movement of the operator over Merge of the resumptive, viz. Move over Merge.<sup>33</sup> In scenario two, discharge under matching is not possible because the operator has fewer features than the embedded Case probe. If a resumptive is subsequently merged, it can check the embedded Case probe and the derivation converges. Importantly, insertion of the resumptive is in principle optional, but only if

<sup>33</sup>Move over Merge under top-down derivation leads to the same result as Merge over Move (Chomsky 2001) under bottom-up derivation: The moved element is in a structurally higher position than the base-generated element. The reverse preference simply results from the reverse direction of the derivation.

the operator has fewer features than the embedded Case probe does such a derivation converge. Again, no comparison of derivations is necessary.

There is another configuration where only the resumptive derivation converges, namely when the ‘extraction site’ is within an island as in (46) above. What is different in this case is that we assume that the operator is stuck above the island and thus cannot reach its theta-position: given the standard locality constraints on movement, the operator only moves as far as it can. The resumptive is inserted in the appropriate moment, in case of object relativization after the introduction of *v*. Move over Merge does not apply here as the operator is stuck above the island. Note that this implies that resumption inside islands does not involve movement (at least not all the way down to the theta-position). Independent evidence for this assumption comes from matching: if the indirect object is within an island, a resumptive is necessary even if the head noun bears dative as well (the same holds for matching in Croatian resumptive relatives, see Gračanin-Yuksek 2013: 32f.):

- (49) Ich han **em** Bueb, wo du kän Lehrer känsch, < won \*(**em**)  
 I have the.DAT boy C you no teacher know.2S C he.DAT  
 vil zuetrou<sub>dat</sub> >, es Komplimänt gmacht<sub>dat</sub>.  
 much consider capable a compliment made  
 lit.: ‘I made the boy such that I don’t know a single teacher who con-  
 siders him capable of much a compliment.’ *Swiss German*

If there were movement into the island as assumed in movement-based approaches to resumption such as e.g. Boeckx (2003), Müller (2014) (see Salzmann 2013 for an overview), the necessity of resumption would come as a surprise.

We can thus conclude that top-down derivation does have one crucial advantage over bottom-up derivation: the choice between resumptive and gap can be made locally; there is always just one converging derivation so that no transderivational Economy is needed. All we need to account for the Swiss German pattern is a local Economy constraint favoring Move over Merge.

This is a significant improvement over previous accounts such as Aoun et al. (2001) or Salzmann (2013).<sup>34, 35</sup>

A final, unrelated advantage of the Case attraction approach to resumption is that it provides a motivation for the unbalanced distribution of resumptives across  $\bar{A}$ -constructions: Resumptives are most frequently found in relative clauses (and in constructions based on RCs such as clefts) but are somewhat rare in *wh*-movement (Salzmann 2011). The reason for this is that in relativization the operator can undergo Case checking with the head noun so that it is licensed even if it does not undergo Case-Agree with the RC-internal probe (which is discharged by the resumptive). In *wh*-movement, however, since there is no head noun, the operator can only check Case (and thus be licensed) with its predicate so that no Case-probe feature remains that would require the insertion of a resumptive. Conversely, if the resumptive checked the Case feature, the *wh*-phrase could not be licensed.

To summarize, although a bottom-up derivation of the resumptive pattern in Swiss German is feasible, we believe to have shown that top-down derivation has two crucial advantages: It dispenses with transderivational Economy for the choice between gap/resumptive and accounts for the unbalanced distribution of resumptives across  $\bar{A}$ -constructions.

## 6. Conclusion

Case attraction and matching in resumption both pose interesting challenges for syntactic theory: in both constructions, the Case of the head noun affects

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<sup>34</sup>Swiss German is particularly interesting because of the complementary distribution of gaps and resumptives. It is this property that creates the Economy problem. Things are different in languages like Irish where resumptives and gaps are in free variation in positions from where movement is in principle possible (except in the matrix subject position where only gaps are grammatical), see Salzmann (2013) for an overview. In such languages, one does not need a constraint favoring Move over Merge. Rather, the choice between the two is optional, leading to optionality between gaps and resumptives. The same holds for Croatian where resumptives are optional in matching configuration, see Gračanin-Yuksek (2013: 29, 39).

<sup>35</sup>Note that in derivations with the resumptive inside an island, the operator does not reach a theta-position. We will assume that it is thematically licensed through binding of the resumptive (which, as pointed out above, also guarantees the agreement in phi-features). Given this, questions arise w.r.t. the trigger of downward movement as theta-features can no longer be made responsible. Arguably, downward movement of operators can also be triggered for semantic reasons, i.e., to create a variable, but for reasons of space, we have to leave an exploration of this problem for further research.

the form of a constituent within the relative clause. This leads to problems for a bottom-up approach since the necessary information – the matrix Case – is not available at the point where the Case of the relative pronoun is determined/the choice between gap and resumptive is made. In a standard system, rather radical and unattractive assumptions need to be made to account for the constructions. We have presented an alternative that derives the properties of the constructions in a straightforward way. The major ingredients of the analysis are the following: (i) there is Case-Agree between the head noun (N) and the relative operator in SpecC. This passes the matrix Case into the relative clause. (ii) Case probes can also be discharged under matching, viz., even if the goal DP has already been involved in Case-checking. This slight modification of Activity allows the relative pronoun/operator to Agree with two Case probes. But in contrast to previous approaches that make use of Case stacking and overwriting, the operator is never assigned two different Cases during the derivation. (iii) Case features are decomposed. Together with explicit restrictions on checking/matching, this derives the generalization that attraction is limited to configurations where the matrix Case is more oblique than the embedded Case. From a technical point of view, attraction is thus rather similar to multiple phi-agreement in participial constructions and thus loses much of its ‘exotic’ touch.

We set out to provide an argument in favor of top-down derivation based on the two constructions. However, as shown in section 4, with the revised assumptions about Case Agree, the same results can be achieved equally straightforwardly under bottom-up. There remains one crucial advantage of top-down, however: the choice between resumptive and gap can be made locally while under bottom-up recourse to transderivational Economy is necessary. Given this, top-down derivation represents a serious alternative and deserves further study.

## 7. Appendix

### Free relative clauses

So far we have focused on headed relative clauses, but of course, attraction and matching phenomena are also found in free relative clauses. Although we cannot do justice to the rich literature on this topic, we would like to briefly discuss a number of (mis-)match patterns and their implications for our analy-

sis. The following table, adapted from Vogel (2001), lists a number of patterns that may be representative of the variation space (although there are certainly more patterns to be found):

## (50) Typology of Case resolution (from Vogel 2001)

conflict	Icel	GerA	GerB	GerC	Roman/Goth	Greek
m=NOM;r=ACC	M	–	R	R	R	M
m=NOM;r=OBL	M	–	R	R	R	Res
m=ACC;r=OBL	M	–	R	R	R	Res
m=ACC;r=NOM	M	–	R	–	M	M
m=OBL;r=NOM	M	–	R	–	M	M
m=OBL;r=ACC	M	–	R	–	M	M

M refers to the matrix Case and R to the embedded Case. The first three lines contain configurations where the matrix Case is less oblique than the embedded Case while lines 4–6 represent the reverse situation. To relate the data to our proposal, we will make the following assumptions about free relatives: we adopt the Comp-account (Groos and van Riemsdijk 1981) with the relative pronoun in SpecC and an empty D-position. Furthermore, we assume Case-Agree between D and the relative operator. However, unlike Spyropoulos (2011) and Assmann (2013), we assume that it takes place in syntax. To derive the cross-linguistic differences, one can either decompose the Cases differently or one can assume different conditions on matching.

The pattern in Romanian/Gothic is relatively straightforward: attraction only occurs if the matrix Case is more oblique than the embedded Case. This is the same pattern as in Case attraction discussed above.<sup>36</sup> The Greek pattern is identical to the Swiss German facts: there is obligatory attraction, but if the embedded Case is more oblique than the matrix Case, a resumptive is inserted to check the embedded Case. Additionally, since matrix nominative can attract internal accusative, we need to assume that – as in Swiss German – nominative an accusative have the same feature set (even though there are

<sup>36</sup>There is one complication: attraction seems to be obligatory when possible in free relatives while it is optional in headed relatives. If Case-Agree between D and the relative pronoun were simply optional (which is necessary to derive the non-attraction cases), one would expect attraction to be optional as well.

robust morphological differences).<sup>37</sup> The three German patterns are an attempt to classify the variation that is found in this area and thus represent an idealization of the complex empirical situation. German B is straightforward: this is the same pattern as in headed relatives and can be accounted for if there is no Case-Agree between N and the relative pronoun. German A requires strict matching. This can be derived if matching (under top-down derivation)/checking (under bottom-up) requires identity of features, see Assmann (2013). Note that since a different head is involved (D vs. N), this does not predict similar effects in headed relative clauses. German C at first sight suggests the absence of Case-Agree between D and the operator, but then one would expect configurations with the matrix Case being more oblique than the embedded Case to be possible, contrary to fact. This pattern thus remains unaccounted for under our assumptions (see Assmann 2014 for a solution). Perhaps the most serious challenge is posed by Icelandic where it is always the matrix Case that is realized, even if this goes against the Case hierarchy. This is clearly in conflict with our predictions.

To summarize: While many of the patterns found in free relatives can be accommodated given our assumptions about attraction, some of them differ in systematic ways so that a different account for them is needed. Whether these differences are due to special properties of free relatives or language-particular properties is a question we intend to pursue in future work.

### Syncretism

It is well-known that syncretisms affect the matching possibilities in free relatives. For instance, even for German speakers that require strict matching, nom-acc mismatches are tolerated if the *wh*-pronoun *was* is used which is syncretic for nominative/accusative. The role of syncretisms is less prominent in the literature on Case attraction but it seems reasonable to assume that they have to be taken into account as well (see e.g., Grosu 1994: 126). The same goes for matching in resumption, see Salzmann (2006a: 353ff.) for Swiss German and Gračanin-Yuksek (2013: 29f.) for Croatian. The effects of syncretisms have been taken as evidence in favor of a PF-approach, see, e.g., Assmann (2014). Such effects do not yet follow under our approach. For instance, in a variety with obligatory Case-Agree between N and the opera-

<sup>37</sup>Things are slightly more complex once inherent Cases, especially inherent accusatives, are taken into account. We abstract from these complications here.

tor and a context where the matrix verb assigns nominative and the embedded verb accusative, one would expect a crash since the operator would bear the matrix Case and thus a subset of the features of the RC-probe. It seems, thus, that the operator behaves as if it bore both Cases. The obvious solution given our syntactic approach is that the features of the *wh*-phrase are modified during the derivation by means of enrichment (see Müller 2007 for this concept applying post-syntactically). Concretely, a *wh*-phrase bearing nominative would be enriched with another Case feature (leading to the representation of the accusative) after Case checking with N. The context restriction on enrichment (enrichment only with neuter *wh*-pronouns) would guarantee that enrichment is limited to syncretic contexts. This would basically be the analogue of the post-syntactic impoverishment rules adopted for the same purpose in Assmann (2014). Alternative options such as pre-syntactic morphology are conceivable as well, but we prefer to leave this for future research as the influence of syncretisms on syntax is a very general challenge and thus beyond the scope of our investigation.

As a final note, while syncretisms seem to favor post-syntactic approaches, the reverse is true of relative clause extraposition: As shown by examples like, e.g., (2b), extraposition does not affect attraction/matching. This is expected under a syntactic approach because Case-Agree between N and the operator takes place at a point where the RC is in-situ (viz., given top-down, after extraposition has been undone). Under a post-syntactic approach, one either has to stipulate that the PF-Agree operation applies to the pre-movement configuration (Assmann 2013) or that extraposition applies after PF-Agree. We thank Anke Assmann (p.c.) for discussion of these issues.

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# On inherent complement verbs in Kwa

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## Abstract

Several analyses have been proposed for the “inherent complement verbs” (ICVs) of the Kwa languages. In this paper, I propose that given the morphosyntactic and semantic properties of both the verb and its complement, it makes sense to treat such verbs like light verbs (Butt 2010), with a more functional role. Following Langer (2005), I argue that the verb only *c*-selects its “inherent complement”(IC). The IC is thus only a syntactic argument but not a semantic argument of its verb. Accordingly, I base-generate the ICV in Little *v* (Hale and Keyser 1993), different from lexical verbs which are base-generated in (Big) *V*. This structural representation is not only conceptually motivated, in the sense that the verb is semantically weak, but also, that empirically, the focus properties of an ICV construction suggest that the IC incorporates into a phonetically empty *V*.

## 1. Introduction

This paper discusses the morphosyntactic and semantic properties of *inherent complement verbs* (ICVs). ICVs are described as “...verbs the citation form of which includes a nominal element which may or may not be cognate with the verb.” (Nwachukwu 1984: 109). This description is a common characteristic of many verbs in a number of Kwa (Niger-Congo) languages. The following are examples from Ga, Igbo and Ewe and Akan. Note that in these citations, the verbs are in **bold** and their complements, conventionally referred to as the “inherent complement” (IC) are in *italics* with their meaning in brackets.

- (1) Ga (Korsah 2011)
- a. **wo** *h ɔ* (pregnancy) ‘to impregnate’
  - b. **wo** *ɲaa* (advice) ‘to advise’

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- c. **jo foi** (speed) ‘to run’
- (2) *Igbo* (Nwachukwu 1985)
- a. **tụ ujo** (fear) ‘to be afraid’  
 b. **tụ ntụ** (lie) ‘to tell a lie’  
 c. **fụ ufụ** (pain) ‘be painful’
- (3) *Ewe* (Essegbey 1999)
- a. **fú tsi** (water) ‘to swim’  
 b. **fú kó** (fist) ‘to knock’  
 c. **fú du** (race) ‘to run’<sup>1</sup>
- (4) *Akan*
- a. **hyε ebufúw** (anger) ‘to make angry’  
 b. **hyε nkóm** (prophecy) ‘to prophesy’  
 c. **tu amriká** (speed) ‘to run’

In all the examples above, the verbs need to be cited with their ICs lest they might be meaningless, vague or have a meaning that is totally different from what they mean when they combine with a particular IC (for example in Akan, *hyε* (4b), when cited without an IC, means ‘to wear’). Thus discussing such verbs in Igbo, Nwachukwu remarks that “...the root (i.e. the verb) and its nominal complement form one semantic unit, and any dictionary entry which excludes the complement is so ambiguous as to be meaningless.” (1987: 40). I would thus gloss the verbs as “ICV” to avert the challenge of glossing just the verb.<sup>2</sup>

(1-4) also suggest that the meaning of the [verb+noun] combination is non-compositional or at best semi-compositional, and seems to largely depend on the IC. This situation is clearer and more interesting when ICVs occur in constructions. Consider *jo foi* ‘to run’ in (5a) and *wo ηaa* ‘to advise’ in (5b) for instance, and compare (5) with (6).

- (5) a. Kwei **jo** foi.  
 K. ICV race.IC  
 ‘Kwei ran.’

<sup>1</sup>Essegbey prefers the gloss “course” for this IC

<sup>2</sup>See also Essegbey (1999). But Anyanwu (2012) prefers to gloss the verbs same as their complements. This may be due to the fact that when the two units are put together, their meaning seems to derive from the complement.

- b. Kwei **wo** awulá l'ε ηaa.  
 K. ICV lady DEF advice.IC  
 'Kwei advised the lady.' (Ga)
- (6) a. Kwei η**ma** wolo.  
 K. write book  
 'Kwei authored a book'
- b. Kwei **há** awulá lé saa.  
 K. give lady DEF mat  
 'Kwei gave the lady a mat.' (Ga)

I will refer to non-ICVs like (6) as “Full Lexical Verbs” (FLVs), and refer to constructions like (5) i.e. those in which ICVs occur, as *ICV constructions*. Unlike those that involve ICVs, constructions that involve FLVs, tend to be compositional i.e. there is usually a one-to-one matching up between the syntax and the semantics. This is more obvious when one tries to literally translate constructions with an FLV and those with ICVs into other languages. For instance, while the lexical constituents of (6b) are literally present in the English glossing, the situation is different with (5b) where the verb *wo* does not seem to show in the English equivalent.

Quite a number of researchers have looked at ICVs or made reference to them in various Kwa languages. These include, among others, Nwachukwu (1985), Anyanwu (2012) for Igbo, Avolonto (1995) for Fongbe, Osam (1996) for Akan<sup>3</sup>, Essegbey (1999) for Ewe, Aboh and Dyakonova (2009) for Gungbe, and Korsah (2011) for Ga. The main issues discussed in these works include: (i) whether the verb has any meaning contribution in the [Verb-Noun] complex (like FLVs do given the fact that their composite meaning seems to come from the complement, (ii) whether the inherent complement is an argument of the verb (like the arguments of FLVs), and (iii) what is the right argument structure analysis of ICV constructions? Related to the last question is how to represent them structurally given the syntax-semantics mismatches they exhibit.

In this paper, I will argue that ICVs need to be given an analysis similar to *light verbs* (LV) in other languages (see Wittenberg et al. 2014, Butt 2010, Folli et al. 2004, Langer 2004, Grimshaw and Mester 1988)<sup>4</sup>. (7b) exemplifies a construction in which a light verb has been used.

<sup>3</sup>Osam (1996) uses the term “discontinuous verb”

<sup>4</sup>There are also terms like *support verbs*, *Funktionsverb* (function verb), *operator verbs* etc. which refer to a very similar phenomenon (Langer 2004).

- (7) a. Government **gave** a loan to young businesses.  
 b. Government **gave** priority to young businesses.

In (7b), it can be argued that *gave* and *priority* function together as a single predicate i.e. *gave priority*, unlike (7a) where only *gave* is the predicate.

I argue that ICVs behave more like functional heads than lexical heads and therefore contrary to Anyanwu (2012), they ought to be base-generated in Little *v*. This is possible because of four main reasons: (i) they tend to have vague meanings (Essegbey 1999) or are possibly meaningless without their ICs, (ii) they are unable to solely assign theta roles to their nominal complements, and (iii) their ICs do not behave like internal arguments of FLVs; whenever they are focused, they behave like nouns that have been incorporated into verbs. In terms of their argument structure, I will argue that the ICV does not select their ICs as semantic arguments, it only select the syntactic category within which its IC occur. This is possible if we assume a two-layer approach to dealing with argument structure of constructions (following Hale and Keyser 1993, Langer 2005): the *c*(ategorical)-selection layer and the *s*(emantic)-selection layer. I will argue that in the case of FLV, there is correspondence between the two layers. However, for the verbs in ICV constructions, there exists only the *c*-selection layer. I will also show that the IC does not allow certain syntactic operations that are typically possible for arguments of FLVs such as Wh-questioning. Most of the examples in this paper will be based largely on data from Ga and occasionally, from Igbo (Anyanwu 2012, Nwachukwu 1987), and Ewe (Essegbey 1999).

The remainder of this paper is structured as follows: In section 2, I will describe the kind of verbs and nominals that occur in ICV constructions. In section 3, I will discuss some morphosyntactic properties that are typical of such constructions. Section 4 will focus on issues related to the argument structure of ICV constructions and propose how they are to be understood and represented. Section 5 gives a summary and the conclusion.

## 2. The nature of ICVs and ICs

As the examples in (1-4) show, though an ICV and its IC are usually cited together, they are composed of two morphological unit, and exhibit separate semantic properties.

2.1. The verb

There have been debates in the literature, as to whether the verbs in ICV constructions contribute any meaning. This is legitimate, given the fact that it appears to be vacuous. Thus Anyanwu (2012) for instance would gloss the verb same as a semantic cognate of its IC (as in (8)).

- (8) a. Eze **mgbara** ama  
 Eze PR.betray.past betrayal.IC  
 ‘Eze betrayed (someone).’ (Igbo)

However, Essegbey (1999) argues that the verb is meaningful except that it is vague. According to him, the behaviour of ICV is characteristic of verbs in the languages in which they occur. With specific reference to Ewe, he concludes that the verbs are in a cline, with some verbs having more specified meaning and others, less specified meaning. This correlates to whether a verb can occur with a more or less specific-meaning complement: the less specific the meaning of the verb, the more likely it is to co-occur with a more specific-meaning complement (as in (9)).<sup>5</sup>

- (9) *FLVs*:  
**More specific meaning** —————→ *Less specific complement*  
*ICVs*:  
*Less specific meaning* —————→ **More specific complement**

By more/less specific-meaning complements, he refers to instances like (10) where a FLV may occur with a complement meaning “person” or “thing” (10c) which is quite generic as compared to the complements of ICVs which tend to be more specific to a particular verb. In (10), because of the nature of the verb and its complement, the complement may be replaced by other other complements, e.g. (10b). Interestingly, ICVs do not occur with such generic-meaning complements (see (11)).

- (10) a. Atríidií **gbe** abifáo lé.  
 Malaria kill baby DEF.  
 ‘Malaria killed the baby (The child died of malaria).’

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<sup>5</sup>This is my adaptation of Essegbey’s representation.

b. Atríidií **gbe** nuu lé.  
Malaria kill man DEF.  
'Malaria killed the man (The man died of malaria).'

c. Atríidií **gbe-ɔ** mɔ  
Malaria kill-HAB man  
'Malaria is a killer.' (Ga)

(11) \*Kwei **jo** níí.

K. ICV thing (Ga)

Another evidence for the fact that the ICV may not be totally meaningless comes from the [ICV+IC] meaning of ICVs with similar ICs. If the verbs were semantically empty, we would expect that such ICVs would not have varied meanings i.e. all the meaning would come from the "meaningful" IC. However, this is not the case in (12) and (13).

(12) a. **ɲmɛ gbe** (way) 'to allow'

b. **kpá gbe** (way) 'to expect'

(13) a. **kpá naa** (outer part/ mouth) 'count (to know quantity)'

b. **to naa** (outer part/ mouth) 'to arrange (in an orderly manner)'

Interestingly, most ICVs have homophonous FLV counterparts.<sup>6</sup> Thus for *wo* in (14), there is a FLV homophone i.e. *wo* "to wear" (15).

- (14)
- mlá** (law) "legislate"
  - móɲ** (prison) "to imprison"
  - gbéí** (name) "to name"
  - ékaaɲ** (encouragement) "to encourage"
  - ɲaa** (advice) "to advise"
  - hó** (pregnancy) "to impregnate"
- wo*

<sup>6</sup> At least for Ga, the only exception I am aware of is *shé* in *shé gbéyei* 'to be afraid'.

The main difference is that the FLV homophones can occur with different complements and keep their core meanings (15a-b) whereas ICVs usually occur with particular complements in order to arrive at a particular meaning (14). The consequence is that whenever such homophonous verbs occur in constructions “without” a complement as in (15c) (where the complement *aspáatré* has been pronominalized), they tend to be interpreted as FLV.

- (15) a. Dede **wo** abifáó lé atadé.  
Dede wear baby DEF dress  
‘Dede dressed the baby.’
- b. Dede **wo** abifáó lé aspáatré.  
Dede wear baby DEF shoe  
‘Dede caused the baby to wear a pair of shoes.’
- c. Dede kɛ-∅ **wo** abifáó lé.  
Dede take-3SG wear/\*ICV baby DEF  
‘Dede caused the baby to wear it.’
- d. Kwei **wo** Dede hó.  
Kwei ICV(\*wear) Dede pregnancy.IC  
‘Kwei impregnated Dede.’ (Ga)

Also related to the issue of the meaning of the verb but more linked to its morphological properties, is the view in the literature e.g. Avolonto (1995), that the verb may be a verbalizer like *-ize* in (16), suggesting that it is because the IC lacks the features to function as a verb, that is why the ICV may be useful. This view suggests that the verb is semantically empty. But as has been shown above (12), this may not be entirely factual. What is factual however is that the verb carries the inflections that are associated with FLVs in these languages. (17) shows the marking of tense, aspect and negation inflections respectively on ICVs.

- (16) item— item-*ize*
- (17) a. Kwei baá-**jo** foi.  
K. FUT-ICV race.IC  
‘Kwei will run (away).’
- b. Kwei é-**wo** awulá lé ŋaa.  
K. PERF-ICV lady DEF advice.IC  
‘Kwei has advised the lady.’

- c. Kwei **shé-ée** awulá lé gbéyei.  
 K. ICV-NEG lady DEF fear.IC  
 'Kwei is not afraid of the lady.' (Ga)

## 2.2. The inherent complement

The inherent complement also exhibits some interesting properties that ultimately affect its status when compared with complements of FLV as possible arguments of their respective verbs. It is usually a nominal element.<sup>7</sup> The ICs tend to refer to abstract/non-tangible concepts. In Ga, just as in many other languages, such nominals are usually non-count nouns (18b), even when they occur with FLV. The IC also does not usually occur with determiners (18a).

- (18) a. ?Kwei baá-**jo** foi lé.  
 K. FUT-ICV race.IC DEF  
 'Kwei will run (away).'
- b. ?Kwei é-**wo** awulá lé ŋaa-í.  
 K. PERF-ICV lady DEF advice.IC-PL  
 'Kwei has advised the lady.' (Ga)

There are other properties of the IC which are more relevant for the debate on its status in the argument structure of the ICV constructions. These include word order, nominalization/compound formation, pronominalization, question formation and focus properties. Some of these properties have been claimed to make the ICV even more similar in form and structure to FLVs. I discuss these in the next section.

## 2.3. Summary

We have noticed the following about the ICV and its IC in this section: (i) The verb does not have any meaning independent of the IC. (ii) The IC is usually a nominal that denotes non-concrete nouns, and structurally non-complex.

<sup>7</sup>There are a number of ICs that may be described as postposition e.g. *shishi* 'beneath' in *je shishi* 'to start' (see Korsah 2011) but following Osam et al. (2011), I assume that they are nominal elements.

### 3. Other morphosyntactic features of ICV constructions

#### 3.1. Word order

Let us compare the word order of the constructions in (19) which contain FLVs with the ICV constructions in (20).

- (19) a. Dede ye omó.  
Dede eat rice  
'Dede ate rice.'
- b. Dede ke Kwei shiká.  
Dede gift Kwei money  
'Dede gifted Kwei money.' (Ga)
- (20) a. Kwei baá-jo foi.  
K. FUT-ICV race.IC  
'Kwei will run (away).'
- b. Kwei shé awulá lé gbéyei.  
K. ICV lady DEF fear.IC  
'Kwei feared (is afraid of) the lady.' (Ga)

In either example, there seems to be the linear order: SVO for the (a) examples or SVO<sub>I</sub>O<sub>D</sub> for the (b) ones. Examples like (20b) show that an ICV and its complement are not a frozen morphological unit in the language; they can be separated by other morphological units in at least the syntax.

Essegbey (1999) argues that the nominal complement in the (a) examples i.e. *omó* and *foi*, and the second nominal complement in the (b) examples i.e. *shiká* and *gbéyei* are equally arguments of their respective verbs. According to him, this is supported by the fact that when the verbs (whether ICVs or FLVs) are nominalized<sup>8</sup>, what appears to be argument of the verb is easily preposed to the verb (21). Accordingly, if the complement of the ICV in (20a) is subject to the same morphosyntactic process and leading to a similar result as the complement of an FLV (19a), then either constituent must have the same status i.e. they arguments of their respective verbs.

- (21) a. Dede sumɔ-ɔ omó-yé-lí.  
Dede like-HAB rice-eat-NOM  
'Dede likes rice-eating.'

<sup>8</sup>I gloss the nominalizer as NOM

- b. Dede sumɔ-ɔ **foi-je-e**  
 Dede like-HAB race-ICV-NOM  
 ‘Dede likes running.’ (Ga)

However, it is important to mention that while either complement may undergo similar morphosyntactic processes, it does not necessarily mean that they are of equal status in argument structure. The “nominalized” forms in (21a-b) may as well be instances of synthetic compound formation. For the constructions involving ICVs in particular, as (22b) shows, the IC may be non-referential as compared to the complement of FLV in (22a).

- (22) a. Dede sumɔ-ɔ **omó<sub>i</sub>-yé-lí** shi ηmɛɛɛ ɛ e-yé-ko  
 Dede like-HAB rice-eat-NOM but today TOP 3SG-eat-NEG  
**éko<sub>i</sub>**.  
 one  
 ‘Dede likes rice<sub>i</sub>-eating but as for today, she’s not had any<sub>i</sub> to eat.’
- b. ?Dede sumɔ-ɔ **foi<sub>i</sub>-je-e** shi ηmɛɛɛ ɛ  
 Dede like-HAB race-ICV-NOM but today TOP  
**é-jó-ko éko<sub>i</sub>**.  
 3SG-ICV-NEG one  
 ‘Dede likes running but as for today, she hasn’t run (any).’ (Ga)

Given (22), one may argue that the seemingly nominalized [ICV+IC] is more of a compound than a phrase and thus the relationship between the two constituents as in (22b), is not that of a predicate *jo* and its argument *foi*.

### 3.2. Pronominalization of the IC

Another property of the IC which borders on its argumenthood can be observed with pronominalization. In many Kwa languages, the IC cannot be pronominalized like the internal arguments of FLVs. Take Ga for instance where an inanimate argument of a verb in general is not realized as overt pronoun (24b). However, for some nominal arguments pronominalization is possible (see e.g. (23)).<sup>9</sup>

<sup>9</sup>This is a common characteristics of many Kwa languages. (Usually, such arguments are “affected” by what the predicate expresses. Verbs like *break*, *tear*, *destroy* behave this way (see Nwachukwu 1987: 64).

- (23) a. Dede **ku** tso lé.  
 D. break stick DEF  
 ‘Dede broke the stick.’  
 b. Dede **ku** \*(lɛ).  
 D. break 3SG.Acc  
 ‘Dede broke it.’ (Ga)

- (24) a. Dede **télé** tso lé.  
 D. carry stick DEF  
 ‘Dede carried the stick.’  
 b. Dede **télé** \*(lɛ).  
 D. carry 3SG.Acc  
 ‘Dede carried it.’ (Ga)

As far as Ga is concerned, the IC cannot be realized as an overt pronoun. We can compare (25) and (26) which show homophonous verbs: one FLV *fa* and the other, an ICV *fa gbɛ*.

- (25) a. Dede **fa** tso lé.  
 D. uproot stick DEF  
 ‘Dede uprooted the stick.’  
 b. Dede **fa** (lɛ).  
 D. uproot 3SG.Acc  
 ‘Dede uprooted it.’ (Ga)

- (26) a. Dede **fa** gbɛ.  
 D. ICV way  
 ‘Dede traveled.’  
 b. \*Dede **fa**.  
 D. ICV  
 ‘Dede traveled.’ (Ga)

This behaviour of the ICV may be due to two main reasons i.e. either because it is abstract/inanimate (as we observed in section 2.2) or it is because the it is not actually an argument of its verb, in the same sense as arguments of FLV. There is evidence to support either view. First, apparently, the IC in Igbo cannot be pronominalized either (27) though other inanimate complements (of FLV) may be realized as pronouns (28) (Anyanwu 2012).

- (27) a. Obí **nvuru** ónú  
O. PR.fast mouth.IC  
'Obi fasted.'
- b. Obí **nvuru** (\*yá).  
O. PR.fast 3SG  
'Obi fasted.' (Igbo)
- (28) a. Adhá **nvuru** eketé  
A. PR.carry basket  
'Adha carried a basket.'
- b. Adhá **nvuru** yá  
A. PR.carry it  
'Adha carried it.' (Igbo)

Contrary to what obtains with ICs in Ga and Igbo (and Akan), is the data from Ewe as reported by Essegbey (1999) (29). In Ewe, the IC can have a pronominal form, just as nominal complements of FLVs. In fact, according to (Essegbey 2002: 79), the pronoun form of the IC is the preferred option when an ICV is repeated in a subordinate clause as shown in (30b).

- (29) a. Kofi fú du.  
K. ICV course  
'Kofi ran.'
- b. Kofi fú-i.  
K. ICV-3SG.Acc  
'Kofi ran it.' (Ewe)
- (30) a. ?Núfíá lá nɔ anyí háfí suku-ví-á-wó nɔ  
teacher DEF sit ground before school-child-DEF-PL ICV  
anyí.  
ground.IC  
'The teacher sat down before the school children sat down.'
- b. Núfíá lá nɔ anyí<sub>i</sub> háfí suku-ví-á-wó nɔ-e<sub>i</sub>.  
teacher DEF sit ground.IV before school-child-DEF-PL sit-3SG  
'The teacher sat down before the school children did.' (Ewe)

This observation of mixed pronominal properties with respect to the IC will be crucial for the argument structure analysis that will be proposed in the next section. Note from the Ewe examples that the pronoun form is also an indication

of the case and *phi* features of the pronominalized constituent. According to Essegbey (1999), this is an indication that the IC is an argument of its verb. However, given the fact that there is generally not a one-to-one mapping between case features (which may be due to the structure) and semantic/theta roles (which is typically assigned to arguments by a predicate), it may not straightforwardly hold that the IC is an argument of its verb.

- (31) a. Expletives: **It** is raining.  
 b. Unaccusatives: **The door** is broken.  
 c. Passives: **The boy** was bitten (by the dog).

In (31), the structural positions of the subjects enable them to bear nominative case. However, by (standard) assumption, the expletive *It* bears no theta role. And while the subjects of passives and unaccusative constructions tend to have nominative case, different from the case they bear in their base-generated positions, both the underlying and surface realizations show that they are assigned Theme theta roles by their respective verbs. We thus could not tie theta role assignment to case features.

### 3.3. Focus in ICV constructions

The verb of an ICV construction cannot be focused. Interestingly, when its IC is focused, it does not behave like a focused nominal complement [(like that of an FLV). It behaves like a focused predicate. Consider (32).

- (32) a. **Tso lé ni Dede télé.**  
 stick DEF FOC D. carry  
 ‘Dede carried the stick (as opposed to say, *the bucket*).’  
 b. **Télé-mɔ ni Dede télé tso lé**  
 carry-NOM FOC D. carry stick DEF  
 ‘Dede carried the stick (as opposed to say, *breaking it*).’ (Ga)

In Ga, typically, any constituent in any given construction may be focused. A focused constituent is moved to the left periphery of the clause followed by the focus particle *ni* as in (32). We observe in (32b) that verb focus leads to predicate doubling, with the higher copy being nominalized (see also Aboh and Dyakonova 2009). Now let us consider how focusing works in

ICV constructions. Here we are particularly interested in verb focus and object/nominal complement focus.

- (33) a. Kwei **jo** foi.  
 K. ICV race.IC  
 'Kwei ran.'
- b. \*/?Je-e ni Kwei **jo** foi  
 ICV-NOM FOC K. ICV race.IC  
 'Kwei ran (as opposed to say, he *sat*).'
- c. Foi ni Kwei **je**  
 race.IC FOC K. ICV  
 'Kwei RAN (as opposed to say, he *sat*).' (Ga)

We observe in (33b-c) that there is significant disparity between syntactic focus and semantic focus as far ICVs are concerned. While it is infelicitous to focus the ICV, unlike a FLV e.g. (32b), focusing its IC results in a predicate focus instead. This suggests the existence of a closer relationship between the IC and its verb. Based on this, we would assume that the IC incorporates (in terms of Baker 1988) into into a verb before the movement operation takes place. However, this verb in question will be assumed to be an empty V head, not the ICV.

### 3.4. The IC and question formation

Another feature that sets ICVs apart from lexical verbs is the inability for their complements to be marked with a question feature.

- (34) a. Dede **télé** tso lé.  
 D. carry stick DEF  
 'Dede carried the stick.'
- b. Dede **télé** méni?  
 D. carry what  
 'Dede carried what?'
- c. Méni ni Dede **télé**?  
 what FOC D. carry  
 'What did Dede carry?' (Ga)

Unlike the objects of FLVs (34), the IC can neither be marked with a question feature in-situ nor be extracted to the left periphery for focus wh-question formation. Compare (34) with (35) where ICVs are involved.

- (35) a. Kwei **jo** foi.  
           K. ICV race.IC  
           ‘Kwei ran (away).’  
       b. \*Kwei **jo** méni?  
           K. ICV what  
       c. \*Méni ni Kwei **jo**?  
           what FOC K. ICV

(Ga)

Korsah (2011) shows that in order to derive a question from such ICVs, an interrogative expression with a more generic-meaning such as (36) may be used. This is applicable to any ICV construction. Thus while (35a) may be used to answer the questions in (36) in particular, (36) may also be used as an appropriate questions for all other forms of VP including those headed by FLVs such as ...*tele* ‘carry’ in (34).

- (36) a. Kwei **feé** méni?  
           K. do what  
           ‘Kwei did what?’  
       b. Méni ni Kwei **feé**?  
           what FOC Kwei do  
           ‘What did Kwei do?’

(Ga)

Now what does this mean? Given (36), that verbs with a more generic meaning can replace ICVs, is an indication that ICVs may be as vague/less specified as reported by Essegbey (1999), and for the purposes of the present discussion, most likely semantically light. As far as the IC is concerned, its inability to be marked with a question feature may be an indication that it is not an argument of its verb assuming that the question feature is marked on complements of the verb which are arguments.

### 3.5. Summary

The discussion in this section has shown that: (i) ICV constructions and those involving FLV tend to show similar basic word order pattern i.e. SVO and SVOO. (ii) The IC may be realized as an overt pronoun as in Ewe, or possibly not realized at all. (iii) Unlike FLVs, the ICV cannot be focused. However, when the IC is focused, it behaves like a focused VP. (iv) The IC cannot be marked with a question feature, be it in-situ or ex-situ. These observations have consequences for the argument structure analysis of the ICV constructions which we discuss in the next section.

## 4. Argument structure of ICV constructions: The analysis

In this section, I will put forward two main proposals: (i) that argument structure of constructions that involve ICVs should be handled like that of *Light verbs* (following Hale and Keyser 1993, Langer 2005) and (ii) that accordingly, the IC should be base-generated in *little v* in the syntax and not in (Big) V.

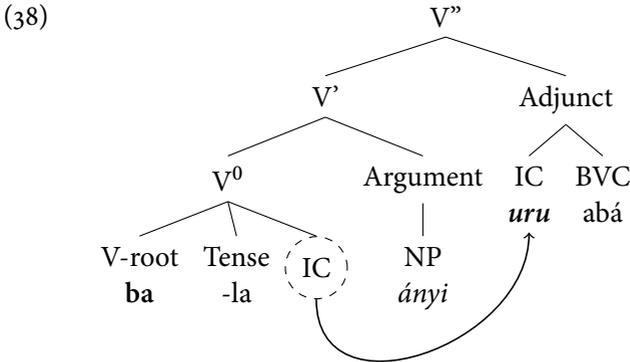
### 4.1. The argument structure of ICV constructions

The debate about the right argument structure analysis for ICVs has been raging on for over two and a half decades now. One of the earliest attempts was by Nwachukwu (1987) who analyzed the IC as an adjunct, given the fact that it is easily displaced when the ICV licenses an internal argument (37).<sup>10</sup>

- (37) a. Ọ **ba-lá** uru abá.  
           it V-Perf useful(IC) BVC  
           ‘It has certainly become useful.’
- b. Ọ **bal-á** ányí uru abá.  
           it V-Perf us useful(IC) BVC  
           ‘It has certainly become useful to us.’ (Igbo)

He treats this displacement as movement (*Move IC* he calls it) of the IC rightward as represented (38). According to Nwachukwu, this behaviour of the IC explains why it does not bear thematic role i.e. it of the same syntactic status as adjuncts.

<sup>10</sup>In Igbo linguistics, the BVC (37) refers to a verbal particle that usually accompanies a verb Nwachukwu (see 1987: 40)



We may liken Igbo data (37) to (39) where the IC in (39a) is displaced at the instance of another nominal complement (39b).

- (39) a. Kwei shé gbéyei.  
 K. ICV fear.IC  
 ‘Kwei feared (Kwei became afraid).’  
 b. Kwei shé awulá lé gbéyei.  
 K. ICV lady DEF fear.IC  
 ‘Kwei feared (is afraid of) the lady.’ (Ga)

Nwachukwu’s view is problematic for one fundamental reason; some adjuncts might have theta roles e.g. the agentive argument of a passive construction introduced with a *by-phrase* (40). However, the issue with the non-theta role assignment to the IC per se may be plausible.

- (40) John was bitten by **the dog**.

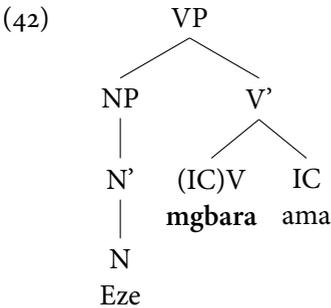
On Nwachukwu’s representation in particular, (Anyanwu 2012: 1564) remarks that:

Contrary to Nwachukwu’s (1987) view, we want to state here that an inherent complement and its inherent complement verb do not form an  $X^0$  category. The inherent complement and its inherent complement verb constitute a single semantic unit, not a syntactic one. Thus, an inherent complement is not licensed as a constituent under a V-node, but as a constituent within a VP. As a constituent within a VP, its obligatoriness is not of syntactic relevance but of semantic relevance to the inherent complement verb which functions as its head within a VP. More evidence that the inherent complement is only of semantic relevance to

the inherent complement verb comes from the fact that the inherent complement cannot be case checked; neither can it be theta-marked.

Anyanwu's claim about case assignment may not be factual given the Ewe data. Also, though he does not make any categorical statement about the representation of the verb in the structure, his representation (42) (Anyanwu 2012: 1567) of the ICV suggests a structural treatment that may be likened to FLVs. This might be a misrepresentation of the structural relations expressed by an ICV and its IC.

- (41) Eze **mgbara** Obi ama.  
 Eze.pr betray.past Obi betrayal.IC  
 'Eze betrayed Obi.' (Igbo)



As exemplified in (42), Anyanwu does not also represent the IC with any standard syntactic category either. I would treat the IC as an NP, given the fact that it usually does not appear to be complex e.g. it does not occur with a determiner in Ga.

#### 4.2. A brief detour to *Light Verbs*

Given the relationship between the verb and its complement in an ICV constructions, I propose that such constructions be treated like *Light Verbs* (LVs). (43a-b) show how LVs may occur in Urdu (Butt 2010), and Persian (Folli et al. 2004).

- (43) a. naadyaa=ne kahaanii yaad k-ii.  
 Nadya.F.SG=ERG story.F.SG memory.F do-PERF.F.SG  
 'Nadya remembered the story.' (Urdu)

- b. tim-e mâ unâ-ro shekast **dâd**.  
 team-EZ we they-râ defeat gave  
 ‘Our team defeated them.’ (Persian)

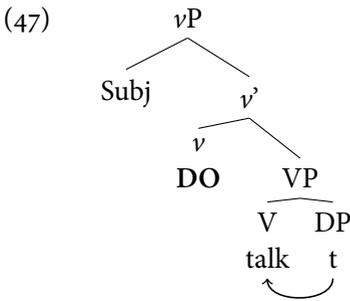
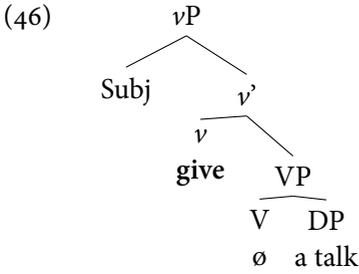
In (43), the noun *yaad*, and the verb *kii* seem to combine to function as the single predicative element of the construction. We see also that the verb carries the inflection while the meaning of what the predicate expresses is closest to the noun. For English, we can cite the following verbs as LVs, when they take any of the DPs in boldface as complements:

- (44) a. **have**: *a rest, a read, a think*  
 b. **take**: *a drive, a guess, a walk, a plunge, a tour, a break*  
 c. **give**: *a sigh, a shout, a shiver, a pull, a kiss, a lecture*  
 d. **make**: *a decision*

In many languages, LVs tend to be functional. For instance in Persian, the LV determines the agentivity, the duration and whether a construction is an event or a state (Folli et al. 2004). The verb also indicates the tense, FLVs do. Yet the verb is usually semantically vacuous, leaving the burden of meaning in a given construction to its complement. An interesting observation about the structure of an LV constructions for the present discussion, is the fact that LVs tend to have FLV counterparts as in (45c). Also, the nominal complement is usually a non-concrete deverbal noun (45b).

- (45) a. John *gave* a talk this morning.  
 b. Jonn *talked* this morning.  
 c. John *gave* Tom a pencil.

Data like (45) provide evidence in support of Hale and Keyser’s (1993) approach to analyzing how denominal verbs may be derived. According to them, even instances where FLVs are used, a light verb like *DO* (47) may be present except that it may not be phonetically realized.



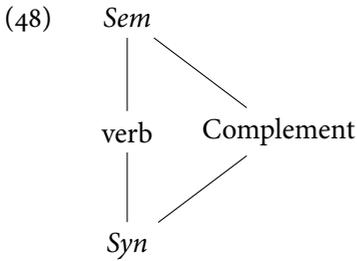
It is apparent that LVs and ICVs may have many characteristics in common, at least based on the semantics of either verb.

Accordingly, I assume that their behaviour shows an instance of a complex lexical entry for the verb.

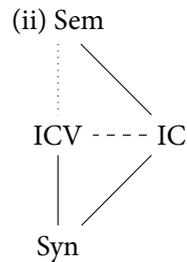
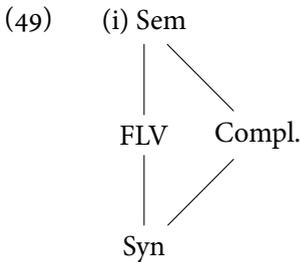
### 4.3. Argument structure of ICV constructions

In order to understand the argument structure of ICV constructions, I assume the notions of c(ategorial)-selection and s(emantic)-selection e.g. Pesetsky (1982), (see also Langer 2005). But I will designate these properties about predicates as *Syn=c-selection* and *Sem=s-selection*.

1. There is a two-level lexical entry for every verb (whether it is an FLV or an ICV): one level deals with the syntax (*Syn*) and the other deals with the semantics (*Sem*).
2. There is full match up between the syntax of a construction and its semantics when *Syn* and *Sem* are both accessible to the elements in the argument structure (in this case, the verb and its complement) (48).



Given the above assumptions, I would claim that what typically happens in ICV constructions is that, there is only a *partial* match between the verb and *Sem*. I have indicated this in (49ii) with a dotted line. The verb though is syntactically represented and morphologically spelled-out, lacks the needed semantics. In such cases therefore, only the meaning of the IC is realized in the argument structure. This explains why the meaning of what the predicate expresses is always closest to the IC. Accordingly, the ICV cannot assign theta role to its nominal complement since theta roles are assigned to semantic arguments (which would be found in *Sem*).



The IC is a non-semantic argument of the verb though its case and phi features can be fully checked in *Syn*. Note also that it would be problematic to assert that the verb is totally delinked from *Sem* since as we saw in not all the meaning of the predicate in an ICV construction might be from the IC.

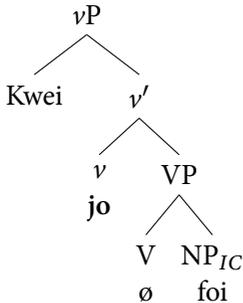
The dashed line linking the ICV and the IC in (49ii) is a way of indicating the verb phrase reflexes on the (nominal) IC in certain syntactic operations such as focus constructions where focused ICs behave like focused predicates.

With (49ii), we are able to explain the following: First, why the verb is almost always semantically vacuous. Second, why the meaning of the [ICV+IC] usually depends of the IC. Third, why the IC is not an argument of its verb in the same

sense as the argument of FLVs. Fourth, why the IC does not permit certain syntactic processes that are typical of arguments. Fifth, why the IC might show case and phi features. Accordingly, I assume the structure in (51) for ICVs.

- (50) Kwei **jo** foi.  
 K. ICV race.IC  
 'Kwei ran (away).' (Ga)

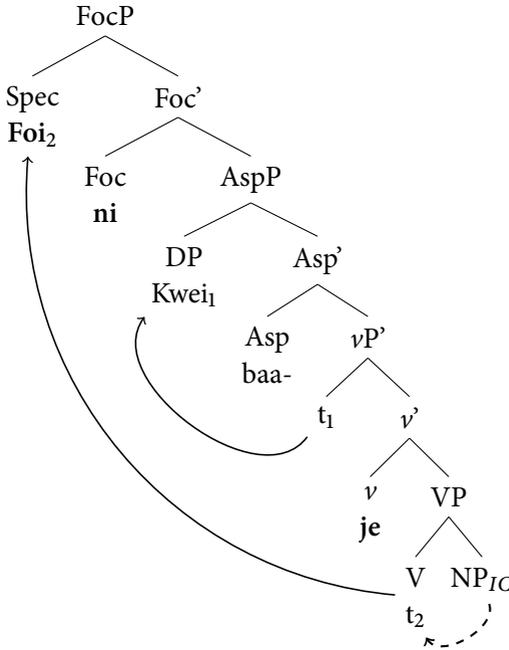
- (51) Structure for ICVs:



In (51), *jo* is mainly relevant in order to license VP in which the IC occurs, and checking case and phi features on NP (as evident in Ewe). Generating the verb in *v* as opposed to V has a number of conceptual and empirical advantages. First, the verb can still check the case on NP (as in Ewe) without needing to be in V. Thus there is no need to postulate a movement from V to *v* (as in the case of intransitive verbs). Second, a phonetically empty V is necessary whenever the IC needs to be focused (52).

- (52) Foi ni Kwei baa-**je**.  
 race FOC K. FUT-ICV  
 'Kwei will RUN (as apposed to say, *sit*).' (Ga)

(53) Incorporation and subsequent movement to SpecFoc:



In (53), the IC incorporates (Baker 1988) into the empty V before moving to SpecFoc. The main evidence of this comes from the fact that focused ICs behave like focused VPs.

### 5. Summary and Conclusion

In this paper, we have looked at inherent complement verbs in Kwa, the syntax-semantic equivalent of light verbs in Indo-European languages. We have seen that the ICV does not seem to have any meaning that is independent of its IC though they do not form one morphological unit. In addition, the IC, though nominal and shows case and phi features, is usually not complex. In order to account for these observations, we assumed, (in terms of Pesetsky 1982, Langer 2005), that ICV constructions seem to indicate a two-level complex entry for verbs in the language: c-selectional component, and s-selectional component. It is when the two levels converge i.e. c-selectional properties match with s-selectional properties, that we get a direct mapping between

structure and the semantics. This works perfectly for FLVs. For ICVs however, only the c-selectional component is fully available. The s-selection component is only *partially* available. This means that the verb gets a meaning that is highly deficient, making it incapable of assigning theta roles to its otherwise nominal arguments. In terms of its representation in the syntax, we proposed that the ICV be base-generated at *Little v*. The strongest evidence comes from the focus properties of the IC. As far as this paper is concerned, *inherent complement verbs* and *light verbs* and associated terms, are just different labels for similar phenomena in language.

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# *For, zu and feature inheritance*

Petr Biskup\*

## **Abstract**

This paper discusses consequences of the feature inheritance proposal for the clausal left periphery. It argues that the German *zu* is an infinitival complementizer, as the English *for* or the French *de* and that the difference in grammaticality between German *wh*-infinitives with *zu* and English *wh*-infinitives with *to* can be accounted for in terms of feature inheritance. It is argued that in contrast to main/matrix clauses, CP of the embedded clause has no specifier position. This is based on the fact that all features of the embedded C are inherited by T. This derives effects of the Doubly Filled COMP Filter and makes an interesting prediction for movement. The paper also presents a novel analysis of ECM constructions and provides a new argument for feature inheritance.

## **1. Introduction**

According to Chomsky (2007, 2008),  $\varphi$ -features and tense features are not inherent to T; they are inherited from C (for the rationale, see Richards 2007, 2011). Chomsky (2013) extends feature inheritance to all features of C (e.g. to the Q feature).

Chomsky (2013) also proposes that in the case of the syntactic object {XP, YP}, there are two ways in which the element can be labeled. Either the syntactic object is modified so that there is only one visible head (i.e. one of the phrases is moved) or X and Y share some prominent feature, which is then taken as the label of the syntactic object. Thus, according to Chomsky (2013: 47), in example (1a), the *wh*-phrase subject is in its criterial position as sister-of-QP and “its Q-feature agrees with the head of the sister phrase QP, so it therefore need not – in fact cannot – raise any further (and  $\alpha$  is labeled Q)”, as shown in (1b).

- (1) a. They asked [if-Q [ $\alpha$  [how many mechanics] [T-Q fixed the cars]]]  
b. \*How many mechanics did they ask if fixed the cars?

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\*For data and helpful discussions, I would like to thank Sandra Döring, Fabian Heck, Kristina Krchňavá and Andrew Murphy. Special thanks go to Martin Salzmann for his detailed and insightful comments.

It is obvious that the subject “need not” raise, given that the resulting phrase can be labeled (as QP) and so be properly interpreted at the interfaces. Chomsky is not very specific about why the *wh*-phrase subject “cannot” raise but given his discussion of the *that*-trace effect, it seems that the movement is also blocked by the possibility of agree and labeling (given feature sharing). Note, however, that if the subject moves, its copy will be invisible to minimal search and  $\alpha$  can also be labeled (as TP). This paper will elaborate on this issue. More generally, it is concerned with restrictions on merger in the clausal left periphery.

The overall outline of the paper is as follows. In section 2, it is argued that the German verbal marker *zu* is an infinitival complementizer like the English *for*, French *de* or Italian *di*. Section 3 discusses the difference between main and embedded clauses. It shows that given feature inheritance and the architecture of embedded clauses, the embedded C cannot have specifiers, which gives rise Doubly Filled COMP Filter effects. Section 4 is concerned with successive-cyclic movement. It is argued that the moving element moves through specifiers of phase complements. That section also discusses the *that*-trace effect and the difference between subject and object extraction. Section 5 analyzes ECM constructions and argues that ECM data support the view that *zu* is an infinitival complementizer. Section 6 summarizes the major conclusions of the paper.

## 2. Infinitival complementizers

The reasoning from the preceding section can be extended to infinitival *for-to* clauses like in (2). Since *her* stops in SpecTP (in fact, Spec $\Phi$ P, as we will see below), there must be some feature that is shared by both *her* and T. Since *her* bears  $\varphi$ -features, the case feature and possibly the categorial feature, the optimal candidate for the label is  $\varphi$ -features because the projected phrase does not behave like a noun and in Chomsky’s system case is not a feature of probes (the probe just “determines” the case value). As to features on T, T is [ $-\text{fin}$ ] since the *for*-complement is infinitival and  $\varphi$ -complete because it is selected by C (Chomsky 2000, 2001, 2008). In the feature inheritance proposal, T inherits these features from C *for*.<sup>1</sup> Thus, the shared  $\varphi$ -features are taken as the label of

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<sup>1</sup>Given the  $\varphi$ -features agree (sharing) between T and *her*, accusative on *her* can be analyzed as a reflection of this agree operation (if the accusative case value is also inherited), as in the case of nominative in finite clauses. This means that also in *for-to* constructions non-finite T assigns

the projection (2a), hence the structure can be properly interpreted, and the subject *her* cannot move further, as shown in (2b) and (2c).<sup>2</sup>

- (2) a. John asked [<sub>C</sub> for [<sub>φP</sub> her to accompany you]].  
 b. \*John asked her for t to accompany you.  
 c. \*Her John asked for t to accompany you.

In a parallel fashion, we can also exclude German infinitival interrogatives containing *zu*; compare (2b) and (3).

- (3) \*Ich weiß nicht, was zu tun.  
 I know not what to do

I propose that the ungrammaticality of (3) results from movement of the whP *was* across C *zu*, similarly to the movement of *her* across *for* in (2b). Given that all features of C should be inherited, the Q-feature of the embedded interrogative C is transmitted to the lower head, where it raises *was* to the specifier position (of QP). Then, however, there is no reason for movement of *was* to CP.

This means that *zu* spells out the infinitival complementizer, for instance, as the English *for*, the French *de* and the Italian *di*. Thus, (3) is parallel to the French and Italian data in (4b) and (5b), respectively.

- (4) a. Je lui ai dit où aller.  
 I him have told where go.INF  
 b. \*Je lui ai dit où d'aller.  
 I him have told where de.go.INF  
 'I told him where to go.' (Kayne 1981: 350)

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case (which has been proposed for control constructions, where PRO receives null case; see Chomsky and Lasnik 1993).

In addition, if this inheritance analysis is correct, it provides an argument for the presence of the tense feature and  $\varphi$ -features on Ps (see Bowern and Aygen-Tosun 2000, Pesetsky and Torrego 2004, 2006, Baker 2008, Biskup 2009, Lohndal 2009*b*, van Gelderen 2011, Biskup and Putnam 2012); see also languages with tensed prepositions like Titan and Māori and languages with P agreement as Abaza, Abkhaz, Hungarian, Irish, Iwaidjan languages, Jacalteco, Tsakhur, Welsh.

<sup>2</sup>In an approach treating cases like tense features, e.g. Pesetsky and Torrego (2001), the projection could also be labeled as TP.

- (5) a. Gli ho detto dove andare.  
 him have told where go.INF  
 b. \*Gli ho detto dove di andare.  
 him have told where di go.INF  
 ‘I told him where to go.’ (Kayne 1981: 351)

Kayne (1981) argues persuasively that *de* and *di* are infinitival complementizers. A comparison of the French and Italian *de*, *di* with the German *zu* shows that *zu* behaves like its French and Italian counterparts in most respects. For instance, if the wh-infinitive does not contain *zu*, the sentence is grammatical; compare (6) with (3).<sup>3</sup>

- (6) Ich weiß nicht, was tun.  
 I know not what do  
 ‘I do not know what to do.’

Like French and Italian, German does not have the English *believe*-type of ECM constructions; only the control pattern (PRO plus the overt complementizer) can be used in this case. If the ECM construction is possible, as with the verb *see*, then the presence of the complementizer leads to ungrammaticality (for the analysis of ECM constructions, see section 5).

As the French and Italian *de*, *di*, *zu* also occurs in various control constructions. Where *zu* differs from its French and Italian counterparts are the raising constructions of the *seem*-type. Whereas in French and Italian these constructions are grammatical only without *de*, *di*, in German the constructions are grammatical only with *zu*. Note, however, that the raising status of *scheinen* ‘seem’ has been questioned in the literature (Reis 1982).<sup>4</sup> It is also worth noting that *zu* - like *de*, *di* - belongs to the category of prepositions and that there is a close relation between prepositions and complementizers (e.g. Emonds 1985, Kayne 2004, Pesetsky and Torrego 2006, Tortora 2008). Thus, in what follows, I take *zu* to represent the infinitival complementizer, in line with Reis (1973), Leys (1985) and Wilder (1988).

Let us consider the position of *was* in (3). Although German complementizers take their complement to the right, (3) cannot be taken to show that *was* occurs in SpecCP because *zu* behaves like a bound morpheme and must co-occur with

<sup>3</sup>The wh-infinitive construction is constrained to a certain extent; not all verbs can appear in it.

<sup>4</sup>French also has “raising” verbs (in sense of Perlmutter 1970) with the overt complementizer; see Kayne (1981: 353, n.9).

the (rightmost) verb, which is usually analyzed as staying in situ in embedded clauses. For instance, (7a) shows that *zu* intervenes between the (prefixed) verb and its object and (7b) that *zu* is sandwiched between the verb and the particle.

- (7) a. Er bat sie, morgen zwei Bücher zu lesen/ver-kaufen.  
 he asked her tomorrow two books to read/ver-sell  
 ‘He asked her to read/sell two books tomorrow.’  
 b. Er hofft, sie morgen wieder-zu-sehen.  
 he hopes her tomorrow again-to-see  
 ‘He hopes to see her tomorrow.’

For this reason, it has been proposed that *zu* lowers in German; see e.g. von Stechow and Sternefeld (1988), Sternefeld (1990), Salzmann (2013). In the same vein, I will assume here that *zu* – representing the head C, which takes its complement to the right – is moved to the (rightmost) verb in the PF component. As to the difference between the position of *zu* (and the accent pattern) in prefix verbs (7a) and particle verbs (7b), I follow Biskup et al. (2011), who argue that verbal prefixes are incorporated prepositions – in contrast to particles (prepositions), which do not incorporate – therefore *zu* cannot be inserted between the prefix and the verb later in the derivation.

Although we do not have a direct evidence for the SpecCP position of whPs in German wh-infinitives, there is indirect evidence that the whP in sentences like (3) occurs in SpecCP. Firstly, there are parallel French and Italian data, like (4b) and (5b). Also the English counterpart in (8) shows that when the whP unambiguously occurs in SpecCP, the result is ungrammatical.

- (8) \*I don’t know what that to do.

Secondly, we know independently that German or English embedded clauses can be CPs – they have a complementizer – and that if the complementizer and SpecCP are filled (with a whP), the sentence is ungrammatical; see, for instance, (9) and (10).<sup>5</sup> Consequently, since (3) has the complementizer *zu* with the whP and is ungrammatical, it suggests that *was* occurs in SpecCP. Moreover, if the whP (*et*)*was* occurs lower in the structure, as in (11a), (11b), the sentence is grammatical.

<sup>5</sup>I will show in section 3 how the Doubly Filled COMP Filter effects are derived.

- (9) \*Ich weiß nicht, was ob/dass sie gelesen hat.  
I know not what whether/that she read has
- (10) \*I asked what for John to do. (Bresnan 1972: 30)
- (11) a. Ich beschloss, was zu tun sei.  
I decided what to do be  
'I decided what is necessary to do.'
- b. Ich beschloss, (et)was zu tun.  
I decided what to do  
'I decided to do something.'
- c. \*Ich beschloss, [<sub>CP</sub> was [o [<sub>IP</sub> PRO t zu tun]]].  
I decided what to do  
(von Stechow and Sternefeld 1988: 384)

The English counterpart of the grammatical (6) can be found in (12).

- (12) I don't know what to do.

Since the infinitival marker *to* represents T in English, the word order in (12) is compatible with the analysis according to which *what* occurs in SpecTP (in fact SpecQP, and PRO occupies SpecΦP, given the feature sharing approach to labeling; in the earlier minimalist approach, they would be multiple specifiers of T). The same holds for the grammatical German sentence without *zu* in (6). Given the feature inheritance proposal, the Q-feature inherited from C raises *was* and *what* to the specifier of the complement of C. Given the Q-feature agree, the resulting phrase is labeled as QP and can be properly interpreted at the interfaces. Thus, the whPs do not need to move further. And crucially, the whPs cannot move to CP because C has no feature any more that could raise them.

### 3. Main versus embedded clauses

It is a well-known fact that there are differences between main and embedded clauses. For instance, inversion in English interrogatives is restricted to the main clause (with the exception of a few dialects, see e.g. McCloskey 1992, Adger 2003); consider (13). If it is correct that the subject occupies SpecTP in English, then SpecCP is filled with the whP, as shown (with the standard notation) in (13a). In contrast, in embedded clauses, there is no inversion

and the word order is also compatible with the whP occurring in SpecTP (SpecQP). This is exactly what the feature inheritance approach proposes. Since the Q-feature is also inherited and C has no features any more that could move the whP, *what* stops in SpecQP, as shown in (13b).

- (13) a. [<sub>CP</sub> What will [<sub>TP</sub> you do]]?  
 b. I know [<sub>CP</sub> C [<sub>QP</sub> what [<sub>φP</sub> you will do]]].  
 c. \*I know what will you do.

More generally, data like these suggest that SpecCP is not realized in embedded clauses; see also (2b), (4b), (5b), (8), (9) and (10). The following German data support this generalization.<sup>6</sup> Given the standard V2 analysis of German main clauses, SpecCP is realized there, as shown in (14).

- (14) a. [<sub>CP</sub> Er [<sub>C'</sub> hat es gemacht ]].  
           he     has it done  
           ‘He did it’  
 b. [<sub>CP</sub> Was [<sub>C'</sub> hat er gemacht ]]?  
           what     has he done  
           ‘What did he do?’

In contrast, embedded clauses can receive an analysis under which SpecCP is not realized and the whP occurs in the lower projection because of feature inheritance, as shown in (15a). Embedded whPs in SpecCP never co-occur with V2 (see Müller 1995 and references therein); compare (15b) with (14b).<sup>7</sup>

<sup>6</sup>But see Bayer (1984) for the exceptional behaviour of Bavarian.

<sup>7</sup>Certain types of predicates allow V2-embedding like in (i) (see e.g. Helbig and Buscha 1994, Reis 1997, Meinunger 2006, Truckenbrodt 2006). These constructions behave ambiguously with respect to their main/embedded status. In my analysis, the embedded clause will have the internal structure of main clauses.

- (i) Ich weiß, er hat Recht.  
 I know he has right  
 ‘I know he is right.’

In the case of symmetric V2 languages such as Icelandic and Yiddish, the situation is different since in these languages, V2 applies in both main and embedded clauses. The current proposal prefers analyses like Holmberg and Platzack (1995), where the embedded V2 is the result of V-to-I movement.

- (15) a. Ich weiß, [<sub>CP</sub> C [<sub>QP</sub> was [<sub>φP</sub> er [<sub>vP</sub> gemacht hat ]]]].  
 I know what he done has
- b. \*Ich weiß, was hat er gemacht.  
 I know what has he done  
 'I know what he did.'

To sum up, although embedded clauses can be CPs, the SpecCP is not realized because all features of C pass down to the lower head and there are no remaining features on C that could induce merger to SpecCP. This also holds for the edge feature of C.

This approach also excludes cases of external merge to SpecCP; consider the contrast in (16). It has been argued that adverbs like the reason *why* cannot move and merge high in the clausal structure (e.g. Starke 2001). According to my proposal, *why* externally merges in SpecCP in (16a). In contrast, *where* is externally or internally merged in SpecTP.

- (16) a. \*I don't know why to study.  
 b. I don't know where to study.

The difference between main and embedded clauses derives from the fact that in the main clause there must be a phase head selecting CP. The presence of this head – let us call it Main – is necessary because also elements of the main/matrix CP need to be sent to the interfaces (recall that in Chomsky's model 2000 *et seq.*, only the complement of the phase head is transferred). Since Main is a phase head, its features are inherited by C. Since it also applies to the edge feature of Main, C inherits it and consequently can have a specifier like in (13a) and (14).<sup>8</sup> In addition to the edge feature, Main could also have some left-periphery features (see Rizzi 1997), which are not inherent to embedded clauses; note that main and embedded clauses differ, for instance, in the illocutionary force.

This proposal provides us with a new argument for feature inheritance. If Main bears features triggering movement or merger to Spec, then there must exist feature inheritance; otherwise some parts of the derivation would not be transferred. In fact, only the presence of the edge feature on Main – which is necessary for every merge operation (see Chomsky 2008) – makes

<sup>8</sup>The proposal could also be formulated in terms of the EPP-feature or in terms of Rizzi's (1997) features.

feature inheritance indispensable because the feature can induce several merge operations.

The majority of the ungrammatical data in the preceding discussion were excluded by the Doubly Filled COMP Filter in earlier stages of generative grammar. In the current proposal, effects of the Doubly Filled COMP Filter derive from feature inheritance. Since all features – including the edge feature – of the embedded C are passed down to the head of its complement, there are no features on the complementizer that could trigger merger to SpecCP.

#### 4. Movement

When syntactic objects cannot move to the embedded SpecCP, then how does successive-cyclic movement work? Given feature inheritance and the discussion above, elements must move to the specifier position of phase complements, not to the edge of phase heads. This is supported by findings by Kiss (1987), Rudin (1988), Brody (1995), Bošković (1997, 2002), Richards (1997, 2001), Miyagawa (2001), Meyer (2004), Sturgeon (2006), Preminger (2010), who argue that in languages like Czech, Hebrew, Hungarian, Japanese, Polish, Russian, Serbo-Croatian, *wh*-movement can target TP or a projection lower than CP.

In English, there is a difference in grammaticality between argument extraction from infinitive *wh*-islands and tensed *wh*-islands; compare (17) and (18) (Safir 2004: 168).

- (17) a. Who<sub>*j*</sub> were you wondering what<sub>*i*</sub> to give t<sub>*j*</sub> t<sub>*i*</sub>?  
 b. What<sub>*i*</sub> was Astrid asking how<sub>*j*</sub> to serve t<sub>*i*</sub> t<sub>*j*</sub>?  
 c. Which animal<sub>*i*</sub> did she tell you how<sub>*j*</sub> to feed t<sub>*i*</sub> t<sub>*j*</sub>?
- (18) a. ??Who were you wondering what you gave?  
 b. ??What was Astrid asking how she should serve?  
 c. ?Which animal did she tell you how you should feed?

According to Safir (2004), movement to the matrix clauses in (17) proceeds by adjunction to TP in the embedded clause. In contrast, in the tensed clauses in (18), adjunction to TP is blocked for some reason and movement proceeds through the embedded SpecCP, which leads to a relativized minimality problem.

This can be reinterpreted in my analysis as follows. If it is correct that movement in (18) cannot proceed through SpecTP and goes through the embedded SpecCP, then, given feature inheritance (i.e., the impossibility of

merger to the embedded SpecCP), the data are expected to be degraded. In contrast, the movement through the embedded SpecTP in (17) is grammatical because it is in accordance with feature inheritance.

Thus, using the standard notation, successive-cyclic movement proceeds through SpecTP, then SpecVP, SpecTP etc. Only in the main clause the final step goes to SpecCP, given the presence of the phase head Main. In embedded clauses movement stops in SpecTP.<sup>9</sup> Concerning locality, such movement steps should not pose a problem because Chomsky's model allows feature inheritance and long distance relations like Icelandic quirky constructions with agreement between T and the nominative object in situ at the same time.

Chomsky (2013) discusses the ECP-difference between the ungrammatical subject extraction in (1b) and the grammatical movement of the object in (19) but he is not explicit about how the object movement in (19) works (Chomsky 2013: 41).

(19) How many cars did they ask if the mechanics fixed?

Here is my proposal. The object receives its case from V (given the  $v$ -V relation and feature inheritance) and moves to SpecTP since all feature of C *if* are inherited by T, as discussed above. There its Q-feature agrees with the inherited Q-feature on T, analogously to the agreeing wh-subject in (1a). Since *how many cars* moves further, its copy is invisible to minimal search and  $\alpha$  is labeled as TP, in contrast to QP in the case of the wh-subject. I assume that the object is raised to SpecVP by the edge feature, not to Spec $v$ P, given the general feature inheritance. After that, the object raises to the matrix SpecTP, where its Q-feature agrees with the Q-feature of T inherited from C. In the final step, the edge feature on C – inherited from Main – moves the object to SpecCP.

At this point, the question arises why the subject cannot move from SpecTP/SpecQP in (1b), when the object can in (19). Recall that both arguments bear the Q-feature that agrees with the inherited Q-feature on T. Thus, it cannot be just the possibility of the agree operation and the shared-feature labeling that blocks the subject movement.

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<sup>9</sup>In the literature, there can be found various diagnostics of successive-cyclic movement, reconstruction for binding in English, partial wh-movement in German, Frisian and several other languages, subject inversion in French and European Spanish, agreeing complementizers in Irish etc. Some of them could challenge the presented analysis because they seem to prefer the SpecCP escape hatch, like floating quantifiers in West Ulster English. Because of lack of space, I will not discuss them here.

Here the Activity Condition applies. I assume that an element becomes inactive (invisible to further computation) after movement to the specifier position of its case licenser (cf. Chomsky 2000, 2001, Richards 2001, Boeckx 2008, Lohndal 2011, among others). It is obvious that in (1b) the subject becomes inactive after movement to SpecQP because it is the specifier position of its case licenser. In contrast, the object can move the whole way up in cases like (19) because it was externally merged with its case licenser.

The Activity Condition also bans movement of the embedded subject in the case of *for-to* constructions like in (2). There is a certain redundancy in the system because sentences like (2b) are excluded not only by the Activation Condition but also by the impossibility of the subject to merge in the embedded SpecCP, given the feature inheritance proposal. It is not possible to avoid this redundancy because we need both a ban on movement of elements from the derived case position and a general ban on merger to the embedded SpecCP.

The Activity Condition also derives subject-object extraction asymmetries with *that*-complements, however, what about the *that*-trace effect? Consider the contrast in (20). Example (20a) is ungrammatical because the subject became inactive after movement to the embedded SpecTP and for (20b) one might expect the same (Chomsky 2013: 47).

- (20) a. \*How many mechanics did they say that fixed the cars?  
 b. How many mechanics did they say fixed the cars?

The proposal in Chomsky (2013) is again based on feature sharing (and criterial freezing). If that is deleted, as in (20b), the embedded C lacks the general feature F, which is responsible for agreement with  $\varphi$ -features of the subject. Consequently, since there is no agree relation between the embedded T and the subject, criterial freezing does not apply. An immediate question arises as to how the moved subject receives case in sentences like (20b). Recall also that Chomsky's approach – as it stands – has a problem with the subject-object extraction asymmetry in the case of embedded questions, which I overcame with the Activation Condition.<sup>10</sup>

In order to maintain the standard case assignment under the assumption of the Activation Condition, the *wh*-subject in sentences like (20b) must move

<sup>10</sup>There are also other approaches to the *that*-trace effect in the recent literature, e.g., Rizzi and Shlonsky (2007), Boeckx (2008), Lohndal (2009a, 2011), Bayer and Salzmann (2013), Epstein et al. (2013).

from its base position, that is, skip the specifier position of its case licenser. It should receive nominative *in situ* as a reflection of the agree operation between its  $\varphi$ -features and the inherited  $\varphi$ -features on T and then it should move directly to the matrix clause. If the movement to SpecTP is dependent on the presence of the EPP-feature on T – that is, if the edge feature alone is not sufficient –, then the EPP-feature must be absent from the embedded T in (20b). This can be achieved if the null C selects T without the EPP-feature, in contrast to *that* in (20a), which selects T with the EPP-feature, making the moved subject inactive.<sup>11</sup> In this way, we derive the effects of Chomsky’s proposal, but in addition, we maintain the standard case assignment.

## 5. ECM constructions

In this section, I show that ECM data support the view that *zu* is an infinitival complementizer. German ECM constructions are grammatical only without *zu*, as shown in (21).

- (21) a. Er sah ihn liegen.  
           he saw him lie  
       b. \*Er sah ihn zu liegen.  
           he saw him to lie  
           ‘He saw him to lie.’

If *zu* is a complementizer, as argued in section 2, then the data in (21) neatly fits with the standard approaches to ECM complements, which analyze them as IPs (TPs). The example with *zu* in (21b) is ungrammatical because the complement is too big. What does that mean in the present approach?

Recall that *zu* is present in German control constructions and that non-finite T can also assign case, as discussed for control and *for-to* constructions in section 2.<sup>12</sup> In control complements, T is  $\varphi$ -complete, hence the subject PRO receives null case. Given feature inheritance,  $\varphi$ -features of T are inherited from C, that is, from *zu*. Thus, the presence of *zu* is responsible for case.

<sup>11</sup>T can also have its own features but if the selectional relation is undesirable, the EPP-feature could also be inherited from C.

<sup>12</sup>There are also coherent control constructions in German, which contain *zu* – i.e., the embedded clause is CP according to my analysis – but also show certain transparency phenomena. For a proposal how to analyze these constructions, see e.g. Grewendorf and Sabel (1994).

It is obvious now how it works in ECM constructions. In cases where T is selected by C, that is by *zu*, like in (21b), T inherits  $\varphi$ -features and assigns case to the subject. The problem is that the matrix V is also a probe. More precisely, when the embedded subject receives null case and moves to SpecTP/SpecCP, it becomes inactive, as discussed in the preceding section. Consequently,  $\varphi$ -features of V remain unvalued, which will cause the derivation to crash.

If one restricts null case only to PRO, then under the standard assumption that case and agreement are two sides of the same coin,  $\varphi$ -features of the embedded T remain unvalued in (21b) and the derivation will crash as well.

If case were dissociated from agreement and the embedded subject *ihn* agreed with the embedded T without receiving case in (21b), the Inverse Case Filter would be violated.

As we know, because of feature inheritance, T can assign case only if it is selected by C. Therefore in (21a), where *zu* is missing, the infinitival complement is just TP, the embedded T has no probing  $\varphi$ -features, cannot enter into an agree relation and cannot assign case. For this reason, the pronoun *ihn* can agree only with the matrix V and can receive only the matrix case, hence the sentence is grammatical.

## 6. Conclusion

In this paper, I examined wh-infinitives and argued that the German *zu* is an infinitival complementizer, like, for instance, the English *for* and French *de*. I proposed that the difference in grammaticality between German wh-infinitives with *zu* and English wh-infinitives with *to* can be accounted for in terms of feature inheritance. I discussed differences between main and embedded clauses and argued that C of the embedded clause does not have a specifier position. This derives from the fact that only the main/matrix clause must have the head Main and from the fact that all features of the embedded C are passed down to the head of its complement. Thus, since there are no features on the embedded C that could trigger merger to SpecCP, feature inheritance derives effects of the Doubly Filled COMP Filter. In addition, the current proposal provides us with a new argument for feature inheritance. We also saw that the proposal makes an interesting prediction with respect to movement. Specifically, given feature inheritance, elements move through the specifier position of phase complements and not through the edge of phase heads. I also

presented a new analysis of *zu* ECM constructions and showed that ECM data support the view that the verbal marker *zu* is an infinitival complementizer.

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# Closest conjunct agreement in Serbo-Croatian: a rule ordering account

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## Abstract

In this paper, we argue that the ‘closest’ aspect of so-called *Closest Conjunct Agreement* is in fact illusory. What may, at first glance, seem like linearly-conditioned agreement can instead be analyzed as varying orders of the operations Agree and Merge inside the conjunct phrase. Thus what may give the impression of agreement with a single conjunct is in fact agreement with a conjunct phrase which has inherited the features of only one of its conjuncts. Furthermore, the assumption that a given order of operations inside the conjunct phrase is repeated at later cycles of the derivation makes correct predictions about the possibility for each pattern to occur either pre- or postverbally. Thus, we arrive at a principled analysis of conjunct agreement, which avoids many of the problems associated with recent analyses.

## 1. Introduction

Closest Conjunct Agreement (CCA) poses a problem for standard theories of Agree as it seems to be sensitive to linear proximity rather than c-command. Some recent works either complicate the Agree mechanism to avoid violating Minimality (Bošković 2009) or to make reference to linearity (Bhatt and Walkow 2013, Marušić et al. to appear). Based on new empirical data, we propose that all observed patterns of conjunct agreement in Serbo-Croatian (SC) can be derived in syntax from the order in which the basic operations Agree, Merge and Move apply at &P, and subsequently, TP.

Patterns of CCA also raise questions as to how  $\phi$ -features of the conjuncts are processed, the locus of agreement (whether it is performed in syntax or it is post-syntactic) and the exact mechanism of agreement. We will focus

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on three types of conjunct agreement: *Resolved Agreement (RA)* (full agreement with both conjuncts, where the verb either agrees with both conjuncts if their features match, or shows default agreement) and *Closest Conjunct Agreement (CCA)*, which involves two subtypes: *First Conjunct Agreement (FCA)* (agreement with the first conjunct in a postverbal subject), and *Last Conjunct Agreement (LCA)* (agreement with the last conjunct in a preverbal subject).

We propose that the above patterns can be captured under an account based on the interaction of the basic syntactic operations of Merge, Move and Agree. We assume that the conjunct phrase is a phrase headed by a coordinating conjunction (henceforth &), and that it has a hierarchical structure where the higher NP asymmetrically c-commands the lower one:

- (1) [<sub>&P</sub> NP<sub>1</sub> [<sub>&'</sub> & NP<sub>2</sub> ]]

Furthermore, we propose that, as well as triggering External Merge of both its argument NPs, the & head bears a gender probe and can carry out Agree with either both, one or none of the NPs.

Using the basic syntactic operations Merge, Move, and Agree, we show that all patterns of conjunct agreement can be derived on the basis of the order in which these operations apply at the &P level, and subsequently, at the level of TP. The operations available to discharge the features on & are MOVE, MERGE, and both Upward (Spec-Head) Agree  $\uparrow$ AGR $\uparrow$  and standard Downward Agree  $\downarrow$ AGR $\downarrow$  to discharge its features.<sup>1</sup> Since the application of an operation such as Spec-Head Agree ( $\uparrow$ AGR $\uparrow$ ) can only happen if a specifier is present, and the operation MERGE provides this, these two operations can potentially interact. In a derivation where MERGE precedes  $\uparrow$ AGR $\uparrow$ , the necessary environment for  $\uparrow$ AGR $\uparrow$  to apply will be created (thus MERGE feeds  $\uparrow$ AGR $\uparrow$ ). If  $\uparrow$ AGR $\uparrow$  applies before MERGE, however, it applies 'too early' to be fed by MERGE and is therefore *counterfed* (Kiparsky 1973). Resolved agreement is the result of MERGE feeding both Agree operations, as it is ordered before both of them. LCA results from counterfeeding of  $\uparrow$ AGR $\uparrow$  by MERGE, which causes the &-head to Agree only with the lower conjunct and project its features further to &P. FCA results from counterfeeding of  $\downarrow$ AGR $\downarrow$  by MERGE, which causes the &-head to Agree only with the higher conjunct and project its features.

<sup>1</sup>In our analysis, we will use the notations in small capital letters to denote formal operations available on &, and on T. When talking about the same operations in general and with reference to previous literature, the standard notation with the initial capital letter will be retained.

Additionally, we will show that FCA can result from counterfeeding of both Agree operations, by which &P does not receive any  $\phi$ -features, and T targets the structurally higher conjunct for agreement. Thus, what may seem like agreement with a single conjunct, is in fact agreement with an entire conjunct phrase, which has partially inherited features of only one conjunct.

Furthermore, it is argued that the order in which operations apply within the &P has to be maintained at TP (*Uniform Order of Operations* hypothesis). We assume that MOVE applies optionally and only if it has an effect on outcome (Chomsky 1995) and with the condition that it applies before MERGE (*Move over Merge*). Consequently, any derivation in which MOVE bleeds or counterfeeds either  $\uparrow$ AGR $\uparrow$  or  $\downarrow$ AGR $\downarrow$  will not converge because T will not be able to find a goal in its search domain to value its  $\phi$ -features. Crucially, these assumptions allow us to derive not only attested patterns of CCA in Serbo-Croatian, but also a new pattern of *Highest Conjunct Agreement* as well as allowing us to successfully rule out the unattested pattern of postverbal LCA (or *Lowest Conjunct Agreement*).

In Section 2, we will discuss the basic patterns of conjunct agreement in Serbo-Croatian. Section 3 outlines some previous approaches to the same issue, offering the insight into the literature and different accounts that have tried to capture the same phenomenon. Our analysis of the Serbo-Croatian data is presented in Section 4 together with some implications for data from Hindi, and Section 5 provides some concluding remarks.

## 2. Patterns of conjunct agreement in Serbo-Croatian

In order to determine the possible patterns of CCA in Serbo-Croatian, we present data obtained in an informal survey on the productive patterns of conjunct agreement in this language. The survey was completed by 60 native speakers, all university students. They were asked to complete a production task in which they were required to fill in the missing participle endings and auxiliary slots in sentences with conjoined subjects.

In this paper, we will focus on gender agreement with conjoined NPs<sup>2</sup>, while number agreement is left for further research. We will discuss the fol-

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<sup>2</sup>Following Bošković (2005 and subsequent work), we assume that Serbo-Croatian does not project a DP. Yet, the issue of NP/DP in this language is still a matter of debate (see Progovac 1998 for arguments in favour of a DP analysis).

lowing basic patterns of agreement: Resolved Agreement (RA) (full agreement with both conjuncts, where the verb either agrees with both conjuncts if their features match, or shows default agreement), Closest Conjunct Agreement (CCA), which involves two subtypes: First Conjunct Agreement (FCA) (agreement with the first conjunct in a postverbal subject), and Last Conjunct Agreement (LCA) (agreement with the first conjunct in a preverbal subject).<sup>3</sup> Each pattern is presented in turn below, although the main focus of this paper will rest on the derivation of Closest Conjunct Agreement.

### 2.1. Resolved agreement

Resolved Agreement is manifested as either agreement with the same gender values when conjuncts match in gender (i.e. masculine or feminine agreement with two masculine or feminine conjuncts), or as masculine agreement when gender features on conjuncts do not match. As the examples below illustrate (2)-(5), in RA, different combinations of features on NPs yield the following results: M+M=M, F+F=F, M+F=M, and F+N=M.

- (2) [<sub>&P</sub> Otac i sin] su gledali utakmicu.  
 father.MSG and son.MSG are watch.PRT.MPL game  
 ‘Father and son watched the game.’ (M+M=M)
- (3) [<sub>&P</sub> Sve majke i kćerke] su išle / \*išli po  
 all mother.FPL and daughter.FPL are go.PRT.FPL \*go.PRT.MPL in  
 prodavnicama.  
 shops  
 ‘All mothers and daughters went to the shops.’ (F+F=F)
- (4) [<sub>&P</sub> Dečaci i devojčice] su zajedno pošli / \*pošle  
 boy.MPL and girl.FPL are together start.PRT.MPL \*start.PRT.FPL  
 u školu.  
 in school  
 ‘Boys and girls started going to school together.’ (M+F=M)

<sup>3</sup>For a more detailed overview of all the patterns of conjunct agreement recorded in Serbo-Croatian, we refer the reader to Puškar (2013).

- (5) [&P Okolnosti i vremena] su bili teški za  
 circumstance.FPL and time.NPL are be.PRT.MPL difficult.MPL for  
 sve stanovnike.  
 all inhabitants  
 'The circumstances and times were hard for all the inhabitants.'

(F+N=M)

## 2.2. Last conjunct agreement

Last Conjunct Agreement is the pattern of CCA in which the verb agrees with the second/last conjunct in a preverbal subject, presented in (6)–(7).

- (6) [&P Sva odela i sve haljine] su juče prodate.  
 all suit.NPL and all dress.FPL are yesterday sell.PRT.FPL  
 'All suits and all dresses were sold yesterday.'
- (7) [&P Okolnosti i vremena] su bila teška za  
 circumstance.FPL and time.NPL are be.PRT.NPL difficult.NPL for  
 sve stanovnike.  
 all inhabitants  
 'The circumstances and times were hard for all the inhabitants.'

However, there are no attested examples of postverbal Last Conjunct Agreement or *Lowest Conjunct Agreement*:

- (8) \*Juče su prodate [&P sva odela i sve haljine].  
 yesterday are sell.PRT.FPL all suits.NPL and all dresses.FPL  
 'All suits and all dresses were sold yesterday.'

## 2.3. First conjunct agreement

First Conjunct Agreement is the pattern of CCA in which the verb agrees with the first conjunct in a postverbal subject conjunct phrase, exemplified here as (9).

- (9) Po dvorištu su razdragano kljucale [<sub>&P</sub> kokoške i  
 across yard are cheerfully peck.PRT.FPL hen.FPL and  
 pilad].  
 chicken.NPL  
 'Hens and chicken pecked cheerfully in the yard.'

One marginal but attested pattern that was recorded in a small number in the survey is the pattern of preverbal FCA (i.e. *Highest Conjunct Agreement*). In this case, the verb agrees with the highest conjunct, i.e. with the first conjunct in a preverbal &P (10).

- (10) [<sub>&P</sub> Krave i telad] su mirno pasle po polju.  
 COW.FPL and calf.NPL are peacefully graze.PRT.FPL across field  
 'Cows and calves grazed peacefully in the field.'

Before we proceed with the analysis of the above data, we will consider some of the more prevalent analyses of conjunct agreement proposed in the literature so far.

### 3. Previous accounts

The issue of conjunct agreement has been extensively studied in a number of different languages, which has resulted in different approaches and accounts over the years. Different patterns in head-initial languages have been discussed for the following languages: Arabic (Aoun et al. 1994, 1999), Polish (Citko 2004), Slovenian (Marušič et al. 2007, to appear), Russian and (Serbo-)Croatian (Bošković 2009, 2010, Willer-Gold and Franks 2013). On the other hand, conjunct agreement in head-final languages was discussed for Hindi and Tsez by Benmamoun et al. (2010) and Hindi-Urdu by Bhatt and Walkow (2013). Most of the accounts above are syntactic in nature, and only a few of them propose that a part of the agreement process is carried out post-syntactically, as we discuss below. Accounts relying on post-syntactic Agree commonly claim that resolved agreement is the result of both conjuncts being included in the process of agreement. Resolved agreement is considered to be the result of agreement with the whole &P, which 'calculates' or 'resolves' the features of its NPs according to resolution rules (cf. Corbett 1991). CCA is then the result of agreement with only one of the NPs/DPs, whose features are copied onto the verb. If this is indeed the case, what these accounts fail to

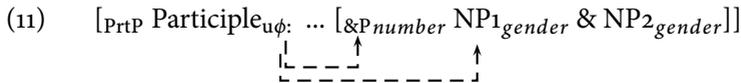
make explicit is the mechanism according to which &P inherits the features of its conjuncts. Moreover, they still have to make additional assumptions about linearization, and how the verb is able to target the linearly closer conjunct for post-syntactic agreement. All these assumptions can be dispensed with if agreement is placed entirely in syntax, as we show below.

3.1. Syntactic agree: Bošković (2009)

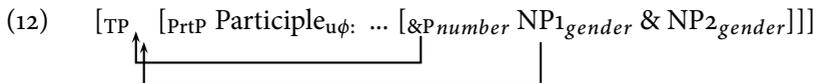
One of the recent syntactic accounts that deals with conjunct agreement on the basis of data from Serbo-Croatian is outlined in Bošković (2009), and it was extended to Russian in Bošković (2010). According to Bošković (2009), FCA and LCA are the result of a unique process which relies on the Chomskyan 3-stage operation Agree: Probe (where the probe searches for features), Match (which determines whether the goal has the kind of category the probe is looking for) and Value (the process of giving value to unvalued features). Bošković (2009) uses this approach to derive both FCA and LCA.

An important starting assumption is that the participle is a single  $\phi$ -probe, which probes for number and gender features of the noun together (as proposed in (Bejar 2003) for  $\phi$ -probes in general). Another assumption is that features on lexical items are characterised as valued/unvalued and interpretable/uninterpretable in the spirit of Pesetsky and Torrego (2007). The process of Last Conjunct Agreement proposed in this account proceeds following the steps in (11) – (14).

*Step 1:* The probe establishes a Match relation with &P for number and NP1 for gender (it enters into Multiple Agree; Hiraiwa 2001, Pesetsky and Torrego 2007).



*Step 2:* If the probe has an EPP feature, pied-piping of the subject is required. Valuers undergo pied-piping, and here pied-piping of the subject fails due to ambiguity of the target for movement (either &P or NP1 can be moved as Serbo-Croatian allows for violations of Coordinate Structure Constraint according to the paper).



*Step 3:* Another cycle of Agree is instantiated to prevent a crash, resulting in targeting NP<sub>2</sub>, because NP<sub>1</sub> was deactivated after first Agree (its uninterpretable gender feature was deleted after Match).

- (13) [TP [PrtP Participle<sub>uφ</sub>: ... [&P<sub>number</sub> NP<sub>1gender</sub> & NP<sub>2gender</sub>]]]
- 

*Step 4:* As NP<sub>2</sub> is now the valuator, and it cannot be extracted, the only option is to move the whole &P to subject position, which results in the LCA pattern.

- (14) [TP [PrtP Participle<sub>uφ</sub>: ... [&P<sub>number</sub> NP<sub>1gender</sub> & NP<sub>2gender</sub>]]]
- 

First Conjoint Agreement is essentially the same process, the only difference between the two is that there is no pied-piping, as the verb does not have an EPP feature. Without pied-piping, there is no conflict between the two valuators in the first place, and the gender features on the verb can be provided by NP<sub>1</sub>.

To summarise the analysis above, let us observe the examples in (15) and (16).

- (15) [&P Sva odela i sve haljine] su juče prodate.  
 all suits.NPL and all dresses.FPL are yesterday sell.PRT.FPL  
 ‘All suits and all dresses were sold yesterday.’
- (16) Juče su prodata [&P sva odela i sve haljine].  
 yesterday are sell.PRT.NPL all suits.NPL and all dresses.FPL  
 ‘All suits and all dresses were sold yesterday.’

In the sentence (15) above, it is assumed that the participle has an EPP feature at the beginning of the derivation. It first probes for number and gender while the &P is in its base position. It Matches the plural number on the &P, as well as Matching the neuter gender on NP<sub>1</sub> (*sva odela* ‘all suits’), without receiving the value yet. Since now the system has the option of moving both the &P and NP<sub>1</sub>, this leads to a conflict, which results in non-valuation of the verb’s features. Secondary Agree initiates the search for  $\phi$ -features again, and now probes past NP<sub>1</sub> (which has been deactivated after the first cycle of Agree), and targets the NP<sub>2</sub> (*haljine* ‘dresses’). Since NP<sub>2</sub> cannot be extracted, and only the &P can be moved, after the valuation of the verb’s features, the whole &P is pied-piped to the subject position.

In the example with FCA (16), it is assumed that the participle does not have an EPP feature. After it probes for number and gender features, it Matches the plural number on the &P, as well as Matching the neuter gender on NP<sub>1</sub> (*sva odela* 'all suits'). Since there is no EPP feature, no conflict arises as to which of the elements should be moved, and thus the participle's features will be valued by the two Matched elements.

Bošković (2009) provides a uniform non-language specific account incorporating conjunct agreement into an existing mechanism. However, there are some issues that require further attention as regards both number and gender agreement. For start, the account assumes that the only difference between FCA and LCA is in whether pied-piping happens or not, and it predicts that FCA always happens postverbally, and LCA happens preverbally. However, new data from Serbo-Croatian that we presented in the previous section (repeated here as (17)), and data from Slovenian (see Marušič et al. to appear), show that this prediction is wrong, as FCA can also happen preverbally.

- (17) [&P Krave i telad] su mirno pasle po polju.  
           cow.FPL and calf.NPL are peacefully graze.PRT.FPL across field  
           'Cows and calves grazed peacefully in the field.'

The difference between FCA and LCA thus cannot be tied to pied-piping only. He incorrectly predicts that FCA is tied to lack of &P-movement. Examples such as (17) show that this cannot be the whole story. Moreover, Bošković (2009) has to assume optionality of having an EPP feature for Serbo-Croatian, which further conditions the resulting type of conjunct agreement, while it is not clear to what extent the EPP is motivated in Serbo-Croatian. We will show that different patterns of conjunct agreement can be derived without having the existence of an EPP as a prerequisite for agreement. Rather, we will show that the reverse holds – whether or not the conjunct phrase moves depends on how agreement is carried out at an early stage in the derivation.

Concerning gender agreement, Bošković (2009) records some cases of FCA/LCA parallelism breakdown if the conjunct that does not determine the agreement is masculine. According to him, in the cases where NP<sub>1</sub> is masculine, FCA is possible, but LCA is not. This is explained by the fact that masculine on the first conjunct, as the default feature, blocks agreement with the second conjunct, and forces default agreement of the whole conjunct phrase. Judging by the results of our survey presented in Section 2, it can be noted that

the problem with Bošković (2009) analysis is that, for some speakers, LCA seems to be possible even when the first conjunct is masculine. An example is given in (18).

- (18) Računari i mašine su upravljale fabrikom, te je  
 computers.MPL and machines.FPL are run.PRT.FPL factory so is  
 dosta radnika otpušteno.  
 a.lot.of workers fired  
 'Computers and machines ran the factory, so a lot of workers were  
 fired.'

According to the previous account, LCA when NP<sub>1</sub> is masculine should be ruled out. As we have seen, this is a problematic result. As we will show, LCA is not dependent on the feature composition of the conjuncts, but it depends on more general mechanisms of basic syntactic operations.

The final problem with Bošković's (2009) account is the mechanics by which LCA is derived. In order for this pattern to be derived, Secondary Agree has to be assumed as a way to save the derivation. Secondary Agree is assumed to be another instance of Agree which is triggered after the pied-piping conflict between the &P and NP<sub>1</sub> as valutors of verb's features. Essentially, it is assumed that NP<sub>1</sub> is deactivated after the first instance of Agree, i.e. its interpretable  $\phi$ -features have been deleted after Match. This is why the verb cannot "see" it, and it cannot Match its features any more. Consequently, the verb probes past the NP<sub>1</sub>, to target NP<sub>2</sub>. In current Minimalist terms, targeting the structurally lower conjunct should be strictly disallowed as a Minimality violation. In general, LCA is the pattern of conjunct agreement that is the greatest challenge for any account trying to tackle it, as in this pattern we have something that always looks as a Minimality violation on the surface, as the verb agrees with the structurally lower element. While previous accounts either have to complicate the Agree mechanism (as the one presented in this section), or to refer to linearity (as the accounts in the following section), what we will show is that Minimality violations do not even arise as an issue when different patterns are derived with different ordering of operations Agree, Merge and Move.

## 3.2. Post-syntactic Agree

3.2.1. *Marušič, Nevins and Badecker (to appear)*

Two of the most prominent recent accounts on conjunct agreement that argue that at least one part of the agreement process is carried out post-syntactically are Marušič et al. (to appear) and Bhatt and Walkow (2013). Marušič et al. (to appear) carried out experiments on conjunct agreement in Slovenian, based on which they were able to identify three grammars of conjunct agreement: agreement with the closest conjunct, agreement with the highest conjunct, and agreement with the entire &P. They illustrate all three types of agreement with an example repeated here in (19), respectively.

- (19) [<sub>&P</sub> Krave in teleta] so odšla / odšle / odšli na  
           COW.FPL and calf.NPL are go.PRT.NPL go.PRT.FPL go.PRT.MPL ON  
           pašo.  
           graze  
           'Cows and calves went grazing.' (Slovenian)

Marušič et al. (to appear) identify three main strategies that speakers of Slovenian use for different types of agreement. According to their account, the &P computes its own number features via an operation that takes the values of number features of individual conjuncts, after which the features are projected on &P and available for agreement with the verb. In contrast, &P cannot compute and project gender features, and is thus never specified for gender. Default masculine agreement is the result of a grammar in which the verbal probe agrees only with the &P, which is hierarchically the highest target, without looking inside and reaching any of its constituents (in their terms, this grammar has a 'no peeking' preference, where it is more important not to look into a complex phrase than to have default values). The probe finds a value for number, but since &P is not specified for gender, default gender value is inserted.<sup>4</sup> Other kinds of grammars try to avoid default values, and thus allow the probe to look inside the &P in search for gender features, and to find values on the closest conjunct. The closest conjunct can either be the hierarchically higher conjunct, or the one that is linearly closer to the probe,

<sup>4</sup>There is a variation to this kind of agreement with no peeking preference in the situation where one of the conjuncts, or both of them, are underspecified for number (e.g. NPs with 5 and up numerals), where default values are inserted for both number and gender.

depending on the timing of the copying of features from the goal to the probe and flattening of the structure of &P during linearisation.

Marušič et al. (to appear) assume that the operation Agree is carried out in two steps: Agree-Link, which only establishes probe-goal relations in syntax, and the subsequent Agree-Copy, which actually copies the values of features from the goal to the probe. Their claim is that agreement with the highest conjunct is the result of Agree-Copy happening before flattening of structure of &P, while NP<sub>1</sub> is still structurally and hierarchically in a higher position than NP<sub>2</sub>, and is thus the most available goal. Agreement with the linearly closer conjunct (agreement with NP<sub>2</sub> when the subject is preverbal, and agreement with NP<sub>1</sub> when the subject is postverbal) is the result of Agree-Copy happening after flattening of the structure of &P, which is a linearisation process by which &P is transformed from a hierarchically ordered structure into a set of linearised terminals. In that case, the NP from which the probe copies the value is the one that is linearly closer to the verb, and thus the most available one.

Even though the account captures the data from Slovenian nicely, an issue that arises is the nature of the process of linearisation. In Closest Conjunct Agreement, it seems that all the information about the hierarchical structure of the &P is not available for the verb any more, it can only "see" the closest conjunct, and copy the value from it. The question is how is the reference to hierarchical order restricted in this kind of agreement, and conversely, how is the reference to linear order restricted in the case of highest conjunct agreement. One option to solve this problem could be to simply somehow restrict Slovenian Closest Conjunct Agreement from referring to hierarchical order once linear order is present, perhaps by some kind of version of an earliness principle. Thus, if the speaker at the moment of a given production was going to use hierarchical structure, there is no need to wait until linearization happens to choose the Agree-Copy controller (Andrew Nevins, pers. comm.). Yet, the nature of flattening and linearisation, and the amount of information on hierarchical structure at each point within these processes still requires further research. We argue that there is no need to refer to linear structure at all, as the choice of the element whose features are copied onto the verb happens already during the standard syntactic Agree.

3.2.2. *Bhatt and Walkow (2013)*

Bhatt and Walkow (2013) propose an account similar to Marušič et al. (to appear) to capture the differences between subject and object conjunct agreement in Hindi-Urdu. Subject conjunct agreement always results in default plural number agreement, and default masculine gender, except when two feminine nouns are conjoined, in which case feminine agreement is also an option. Object agreement typically yields patterns of Closest Conjunct Agreement. Additionally, Hindi-Urdu shows patterns of bidirectional agreement, where in sentences with complex verbal structures the auxiliary can agree with one conjunct, and the participle with the other, when the conjunct phrase is in between the two. It is important to note that CCA in Hindi-Urdu is true agreement with a single conjunct in both gender and number.

One of the main assumptions in Bhatt and Walkow (2013) is that Agree is separated in two steps – Match and valuation. Valuation can happen either in syntax or post-syntactically. Additionally, they assume that probes and goals with unvalued features are active, thus unvalued case features make DPs active, and T is active due to its unvalued  $\phi$ -features. Receiving the values for the unvalued features deactivates them. The explanation for Resolved Agreement with subjects in this account is that in this case T targets only the &P, without looking inside and reaching one of the conjuncts.  $\phi$ -features are available on the &P as the result of computation of number and gender features of the conjuncts. The account, however, does not discuss the exact mechanism of feature resolution, as it is an issue that is orthogonal to the discussion in the paper. They assume that  $\phi$ -features on the &P are linked via the resolution rules to the features of the conjuncts. The process of CCA with conjoined objects is a bit more complicated, and involves the steps in (20).

(20) *Object CCA in Hindi-Urdu*

- v first agrees with the object &P, and assigns case to it, by which &P is deactivated.
- T probes past the ergative subject, to the &P object.
- Since the &P is deactivated, it cannot value T's  $\phi$ -features.
- Assuming that even though it has been deactivated, &P is still visible for Match, T can establish a Match relation with the &P, which will later serve as a search space for the valuation of T's

features at PF (as the features of &P are linked to the features of its conjuncts by resolution rules).

- The Matched features of the conjuncts will be used later to determine the valuator for T's features after linearisation, post-syntactically.

Under this account, objects are visible for Matching, but not for valuation in narrow syntax. Valuation happens at PF, where features for the T probe are provided by the linearly closest conjunct. Linear proximity is defined on the basis of an algorithm presented and discussed in Bhatt and Walkow (2013), based on Kayne (1994 and subsequent work). It relies on c-command relations of the elements involved in agreement, and it derives the CCA pattern, predicting that the probe will always agree with the linearly closer conjunct. It would be very difficult to account for the Highest Conjunct Agreement in Slovenian and Serbo-Croatian using this algorithm without additional stipulations. Furthermore, a potential problem with the crucial assumption that &P does not compute the gender of its conjuncts is raised by 'resolved agreement' with conjoined subjects.

Bhatt and Walkow (2013) give a short comparison of Hindi-Urdu and Serbo-Croatian based on the data in Bošković (2009). They claim that in both languages, CCA is actually a repair strategy that applies when T's features cannot be valued by &P. In Serbo-Croatian, T's  $\phi$ -features cannot be valued by the &P because it does not compute gender, which is why the probe looks for features on the conjuncts, and CCA is the strategy that this language uses to save the derivation. Similarly in Hindi-Urdu, T's features cannot be valued, but for a different reason, because the object &P has previously been deactivated, and cannot serve as a valuator any more. Postsyntactic CCA is a strategy to save the derivation in this case. Crucially, Bhatt and Walkow assume that Agree does not fail if T does not find a valuator in syntax. Match is an intermediate step, which allows for the derivation to be saved later, at PF. In what follows, we adopt a different approach and view patterns of CCA as logical combinations of the operations Merge, Move and Agree. Agreement on T is a direct consequence of agreement with &P, in that the whole derivation has to reflect the order of operations Merge and Agree that apply on &P. This way of agreement will allow us to account both for the resolution of gender features on &P (a fact that Bhatt and Walkow do not capture in the paper), and the resulting agreement on T.

## 4. Analysis

### 4.1. Theoretical assumptions

#### 4.1.1. Architecture of the system

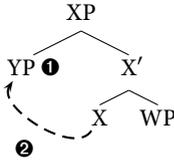
We assume a local, derivational model of syntax where all operations are feature-driven. A head bears a set of operation-triggering features, e.g. [ $\bullet N \bullet$ ] for Merge. Since ‘indeterminacies in rule application’ (Müller 2009) arise, i.e. there is a stage at the derivation at which two different operations could in principle both equally apply, it is necessary to postulate a mechanism for determining which operation takes precedence over another. One option is to order the features on a stack and assume that the order in which operations are carried out is determined by the order in which this stack is comprised (e.g. Heck and Müller 2007, Müller 2011). This, of course, raises the important question of how the order of this stack is determined (assuming it is not entirely free). Instead, we adopt a slightly different approach in assuming that features can be checked by four basic syntactic operations: *External Merge* (MERGE), *Internal Merge* (MOVE), *Downward (Head-Complement) Agree* ( $\downarrow$ AGR $\downarrow$ ) and *Upward (Spec-Head) Agree*<sup>5</sup> ( $\uparrow$ AGR $\uparrow$ ).<sup>6</sup> We argue that these operations can, in principle, apply in any order to discharge the feature on a given head. Doing so, however, will have (sometimes negative) consequences. For example, if we want a head X to agree with a phrase YP in its specifier, then we have the operations MERGE and  $\uparrow$ AGR $\uparrow$ . If MERGE applies first to check [ $\bullet N \bullet$ ] and is then followed by  $\uparrow$ AGR $\uparrow$  to discharge a case probe feature [ $\ast$ CASE $\ast$ ], for example, this will result in an order where MERGE feeds  $\uparrow$ AGR $\uparrow$ :

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<sup>5</sup>We also assume the *Spec-Head Bias* (see Müller 2009, Assmann et al. to appear), which states that Agree with the specifier is preferred to Agree under c-command. Furthermore, assuming a local, derivational syntax, Upward Agree can only ever be Spec-Head Agree since there will be no other higher structure present at the point at which  $\uparrow$ AGR $\uparrow$  applies – thus  $\uparrow$ AGR $\uparrow$  is always trivially Spec-Head Agree. Syntactic objects introduced by higher heads will come too late to undergo this type of Agree in that cycle.

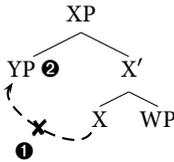
<sup>6</sup>The operations under this architecture are still ‘feature-driven’ but in slightly different sense. an operation such as movement is not triggered by an individual feature (e.g.  $\bullet N \bullet$ ) but the battery of operations that we propose present possible ways to check these features. For example, if a head such as *v* has a feature triggering (External) Merge and a probe feature assigning accusative case, these are an unordered set of features. The operations we assume are just ways to check these features. Application of MERGE will check the  $\bullet N \bullet$  feature. If there is no such feature, its application is vacuous (but it still applies in some sense).

(21) MERGE > ↑AGR↑:

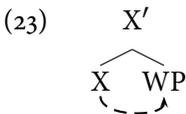


If the reverse order (↑AGR↑ > MERGE) were to apply, then ↑AGR↑ would not find a goal since there is no DP in the specifier yet.

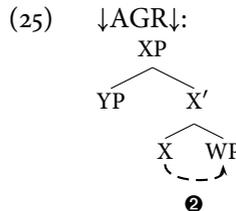
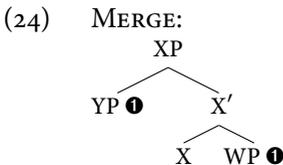
(22) ↑AGR↑ > MERGE:



This would therefore be an instance of *counterfeeding* of ↑AGR↑ as it would have applied if the order had been the reverse. Finally, it is important to note that this architecture requires a slightly weaker definition of cyclicity. Under the assumption of Strict Cyclicity, an operation such as ↓AGR↓ would apply at the X' cycle, before MERGE of the specifier:



Under our approach, the application of MERGE will discharge *all* c-selectional features simultaneously. This means that if a head merges both a complement and a specifier and MERGE precedes ↓AGR↓, for example, then both arguments are first merged (24) and then ↓AGR↓ applies (25). Therefore, the notion of a cyclicity here is that each projection (XP) is a cyclic domain (cf. McCawley 1988).



#### 4.1.2. *Uniform order of application*

In the previous section, we proposed that the order of operations is in principle free (yet, some orders will lead to a crash). Additionally, we argue that the order of application of operations is maintained throughout. We pursue an argument similar to Assmann et al. (to appear), who argue that the order Merge > Agree at vP, which is responsible for deriving ergative patterns of argument encoding, is maintained at TP, thereby deriving the impossibility of A-bar movement of ergatives.

Accordingly, we also assume that whichever order of operations is decided on for a particular head (or phase under the assumption that every phrase is a phase Müller (2011)), this order must be maintained for the every other application of operations in the derivation. We summarize this as follows:

(26) *Uniform order of application:*

If the order of operations  $\alpha > \beta > \gamma$  holds at a given stage of the derivation  $s$ , then there can be no stage of the derivation  $s_{n+1}$  which does not conform to this order.

For our purposes, it will mean whichever order of operations applies at the &P level, the same order of operations must hold at TP, for example.

#### 4.1.3. *Move over Merge*

An additional assumption is that the relative order of the operations MOVE and MERGE is constrained by the following condition:

(27) *Move over Merge:*

In any given order of operations, the following must hold: MOVE > MERGE.

A preference for Move over Merge has also been suggested by Chomsky (2013) appealing to Minimal Search (Chomsky 2008) and the idea that more basic operations precede more complex ones (Sanders 1974, Koutsoudas et al. 1974). Chomsky argues that Internal Merge (Move) ‘is simpler, since it requires vastly less search than EM (which must access the workspace of already generated objects and the lexicon)’ (2013: 41). Furthermore, Shima (2000: 376) has argued that Move should be preferred over Merge as ‘it is more economical to look only at an already formed structure than to look at, not only an existing

structure, but also lexical items in the numeration, or at an independent syntactic object'. See Deal (2009) for a further argument in favour of Move over Merge based on economy considerations.

Furthermore, the condition on MOVE defined in (28) also holds, which is a combination of the *Earliness Principle* and the claim by Chomsky (1995) that certain operations apply if they 'have an effect on outcome'.

(28) *Earliness condition on Move:*

MOVE applies as early as possible and only if it has a (positive) effect on outcome (assuming (27) also holds).

Thus, MOVE is an optional operation, but if it does apply, it must precede MERGE.

#### 4.1.4. *Fallibility of Agree*

Another important assumption for the analysis to follow can be summarized as follows:

(29) *Fallibility of  $\phi$ -agreement:*

The derivation crashes as soon as T cannot find a goal for  $\phi$ -agreement.

Crucially, we assume that this is not necessarily the case for gender agreement outside of T. In order to be able to model opaque interactions such as counterfeeding as shown in (22), it is necessary that certain operations can underapply. Our analysis rests on the fact that Agree operations on & such as  $\uparrow$ AGR $\uparrow$  and  $\downarrow$ AGR $\downarrow$  can fail to apply in certain cases. In order to achieve this, we have to assume that failure of the gender probe on & to find a goal does not lead to crash. We believe there are, perhaps, a couple of reasons for this assumption. First of all, gender agreement in a conjunction cannot be viewed as a 'one chance operation' since in the default case (Resolved Agreement), it is assumed that the gender probe will get a value from each conjunct. As such, features like these, which allow multiple values, can afford to have Agree with one of the conjuncts fail since there is the chance that a later Agree relation will provide a value. This seems different from  $\phi$ -agreement on T as we do not have agreement with both subject and object in Serbo-Croatian. As such, we can view the  $\phi$ -probe on T as an obligatorily 'single-value' feature and therefore it cannot afford to allow agreement to be fallible since this would incorrectly result

in object agreement should subject agreement fail. This kind of feature has to find a goal (the subject) on its first try.

An empirical argument for the fallibility of gender agreement outside of T comes from the fact that gender agreement on participles in Romance is only ever present as a reflex of movement. Consider the French examples in (30), where only movement leads to gender agreement on the participle.

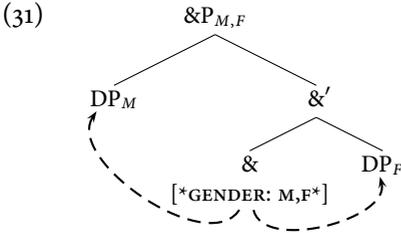
(30) *Participle agreement in French* (Kayne 1989):

- a. Paul a repaint / \*repaint-es les chaises  
 Paul has repainted repainted-FEM.PL the chairs.FEM.PL  
 ‘Paul has repainted the chairs.’
- b. Je me demande [<sub>CP</sub> [ combien de tables]<sub>k</sub> Paul a  
 I me ask how.many of tables.FEM.PL Paul has  
 \*repaint / repaint-es t<sub>k</sub> ]  
 repainted repainted-FEM.PL  
 ‘I wonder how many tables Paul has repainted.’

Implementing the analysis of Kayne (1989) and following Georgi (2014), this agreement is the result of an Upward Agree relation of v. This is fed only in cases where a DP has to move to the phase edge to undergo further movement. This successive-cyclic movement feeds gender agreement. In cases without movement, gender agreement is not fed and therefore it applies vacuously (i.e. it does not find a suitable goal). We therefore make the same assumption about the &-head in Serbo-Croatian, namely that, with the exception of T, it is possible for Agree to fail to find a goal.

#### 4.2. Deriving conjunct agreement

Now, we turn to our analysis of the patterns of conjunct agreement in Serbo-Croatian. An important assumption is that the &-head bears a separate probe for gender and number (cf. Bejar 2003) and can carry out Agree with its arguments. Thus, it is possible for the gender probe on &P [*\*gender:□\**] to have multiple values, which are projected to the root node as in (31):



As noted above, we assume that order in which basic operations apply is in principle free (but only some will result in licit derivations). The different orders of operations on & will result in the & obtaining different values for its gender feature. The orders deriving the patterns discussed in Section 2 are given below:

(32) *Possible orderings of operations for conjunct agreement:*

(MOVE)	>	MERGE	>	↑AGR↑	>	↓AGR↓	→	Resolved Agreement
(MOVE)	>	MERGE	>	↓AGR↓	>	↑AGR↑	→	Resolved Agreement
(MOVE)	>	↑AGR↑	>	MERGE	>	↓AGR↓	→	LCA
(MOVE)	>	↓AGR↓	>	MERGE	>	↑AGR↑	→	FCA (postverbal)
(MOVE)	>	↓AGR↓	>	↑AGR↑	>	MERGE	→	FCA (postverbal)
(MOVE)	>	↑AGR↑	>	↓AGR↓	>	MERGE	→	FCA (preverbal)

In some cases, e.g. LCA, the fact that ↑AGR↑ applies before MERGE means that ↑AGR↑ is counterfeited by MERGE and & will not agree with the highest conjunct. The patterns above will each be discussed in detail below. The welcome results of the assumption in (26) such as ruling out LCA postverbally (Lowest Conjunct Agreement (52)) will also be shown. In the following sections, we will demonstrate the main patterns of conjunct agreement (RA, LCA, FCA) on the basis of the example (6) repeated below. The patterns we will analyse are the following:

- (33) [<sub>&P</sub> Sve haljine i sva odela] su juče prodata /  
 all dress.FPL and all suit.NPL are yesterday sell.PRT.NPL  
 prodati / ?prodate.  
 sell.PRT.MPL sell.PRT.FPL  
 'All dresses and all suits were sold yesterday.'

- (34) Juče su prodate / prodati / \*prodata [<sub>&P</sub> sve  
 yesterday are sell.PRT.FPL sell.PRT.MPL sell.PRT.NPL all  
 haljine i sva odela].  
 dress.FPL and all suit.NPL  
 'All dresses and all suits were sold yesterday.'

Example (33) shows that if the conjunct phrase occurs preverbally, the agreement options are (i) agreement with the linearly closest conjunct (LCA), (ii) default masculine agreement (RA) and, for some speakers, (iii) agreement with the first conjunct (Highest Conjunct Agreement) (c.f. patterns of agreement in Slovenian (19), that our account is able to derive). With postverbal conjunct phrase (34), the verb can agree with the closest conjunct (FCA), show default agreement (RA) but, importantly, it cannot show agreement with the last conjunct (Lowest Conjunct Agreement). In the following, we show how the order of operations inside &P determines both the gender value of &P and whether it occurs pre- or postverbally.

#### 4.2.1. Resolved agreement

Recall that Resolved Agreement (RA) is manifested as either agreement with the same gender values when conjuncts match in gender (i.e. masculine or feminine agreement with two masculine or feminine conjuncts), or as masculine agreement when gender features on conjuncts do not match. Examples (2)-(5) showed that RA may yield different patterns of agreement.<sup>7</sup> Here, we concentrate on examples (33) and (34) above. In these examples, we see that RA (default masculine) is available both pre- and postverbally. Therefore, we want to derive the fact that the values of both conjuncts are computed (in order to 'resolve' them with default agreement) and that movement to Spec-TP appears to be optional.

We can capture this by assuming that Resolved Agreement is the result of MERGE preceding, and therefore feeding, the operations  $\uparrow\text{AGR}\uparrow$ , and  $\downarrow\text{AGR}\downarrow$ . The relative order of  $\uparrow\text{AGR}\uparrow$  and  $\downarrow\text{AGR}\downarrow$  does not play a role at &P, and thus both orders in (35) result in RA:

<sup>7</sup>It should be noted here that two feminine conjuncts do not trigger default agreement if they are animate. Still, feminine inanimate conjuncts can trigger default agreement, and so can neuter conjuncts, either animate or inanimate. We consider the default masculine agreement in these cases to be the result of RA. If the values do not match, they are then resolved via the process of Impoverishment resulting in gender neutralization (default masculine agreement).

(35) *Orders for Resolved Agreement:*

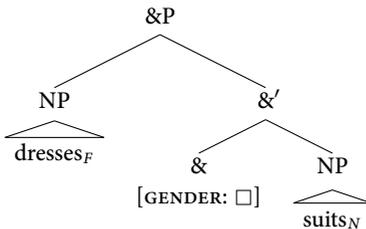
- a. (MOVE) > MERGE > ↑AGR↑ > ↓AGR↓  
 b. (MOVE) > MERGE > ↓AGR↓ > ↑AGR↑

Let us first illustrate a derivation involving the order in (35a) with the example in (33), repeated here as (36).

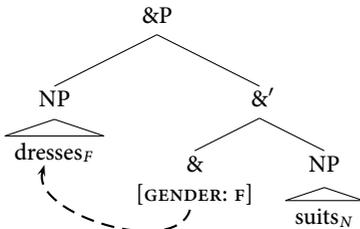
- (36) [<sub>&P</sub> Sve haljine i sva odela] su juče prodata /  
 all dress.FPL and all suit.NPL are yesterday sell.PRT.NPL  
 prodati / ?prodate.  
 sell.PRT.MPL sell.PRT.FPL  
 'All dresses and all suits were sold yesterday.'

As MOVE applies vacuously at the &P, the first operation which applies is MERGE where the &-head merges its two argument NPs (37). Next, ↑AGR↑ applies and the conjunction copies the gender value from the higher NP (38). Subsequently, ↓AGR↓ applies (39) and the conjunction copies the value from the lower NP. After Agree has taken place, the features of the conjuncts are present at &P and available for agreement with T. Since the values (N+F) do not match, they are resolved to masculine.

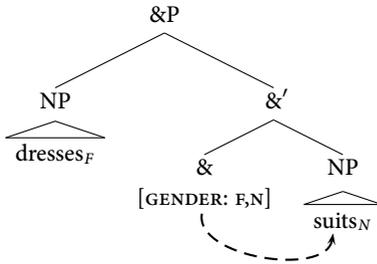
(37) MERGE:



(38) ↑AGR↑:

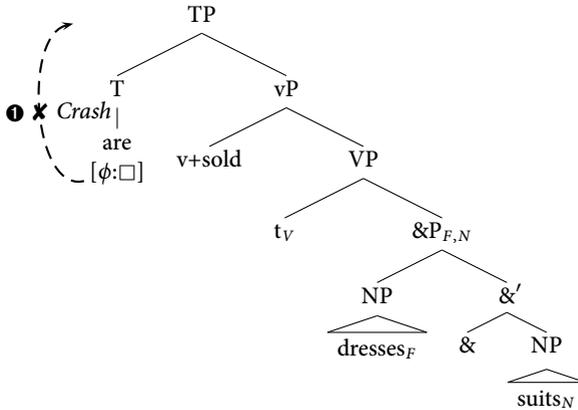


(39) ↓AGR↓:



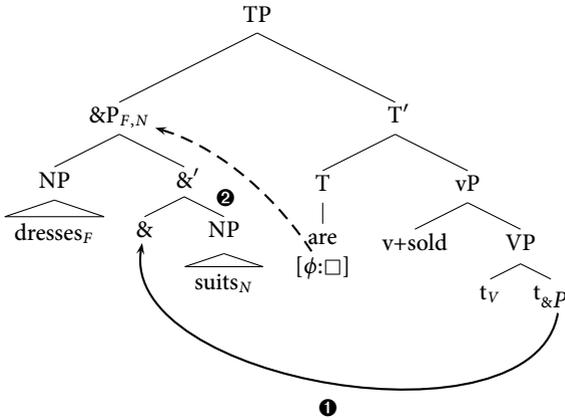
Now, assuming that order of operations in (35a) has to be maintained at TP, MOVE will apply only if it does not have a negative effect on outcome, i.e. as long it does not lead to a crash. Since MERGE applies vacuously at TP (since there is nothing in the numeration left to merge), the next operation to apply is ↑AGR↑. If MOVE does not apply, then ↑AGR↑ will probe upwards and not find a goal (since nothing has been merged in Spec-TP). Following our assumptions about the fallibility of  $\phi$ -agreement on T, this will lead to a crash:

(40) (MERGE) > ↑AGR↑ > ↓AGR↓:



If MOVE does apply, it will *feed* ↑AGR↑ and avoid a crash:

(41) MOVE > (MERGE) > ↑AGR↑ > ↓AGR↓:

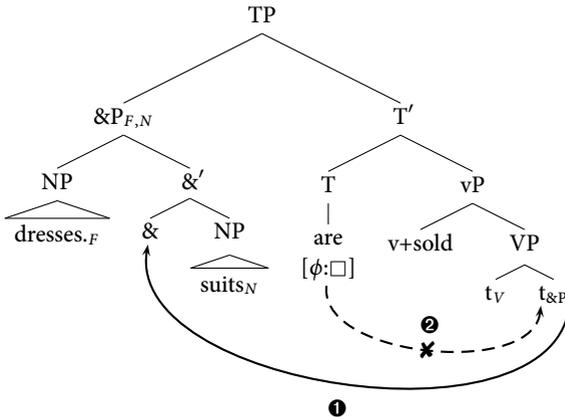


Thus, the order in (35a) derives resolved agreement in a preverbal position since the order of operations at &P (↑AGR↑ > ↓AGR↓) forces movement of the conjunct phrase at TP.

The second order of operations in (35b) at &P level will give the exact same outcome as in (37)-(39), with the difference that ↓AGR↓ applies before ↑AGR↑. Since both of these options follow MERGE, their order is irrelevant – & will find both values and project them to &P.

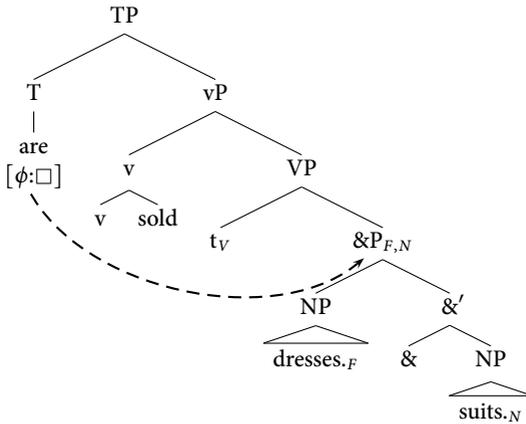
At TP, the relative of order of ↑AGR↑ and ↓AGR↓ does matter since the fallibility of φ-agreement on T requires that it find a goal with its first operation. Since this order provides ↓AGR↓ as the first operation to apply after vacuous application of MERGE, MOVE cannot apply as doing so would bleed ↓AGR↓:

(42) MOVE > (MERGE) > ↓AGR↓ > ↑AGR↑:



Thus, the application of MOVE with this order is blocked. The only way to avoid a crash at TP with this order of &P operations is to leave the conjunct phrase *in situ* and T agrees with &P via  $\downarrow\text{AGR}\downarrow > \uparrow\text{AGR}\uparrow$  in this position:

(43) (MERGE) >  $\downarrow\text{AGR}\downarrow > \uparrow\text{AGR}\uparrow$ :



What we see is that both of these orders derive the possibility for RA to occur both pre- and postverbally. The order immediately following MERGE at &P determines whether MOVE must apply at TP. In the following sections, we will see this idea in action again in the analysis of Closest Conjunct Agreement.

4.2.2. Last conjunct agreement

An important point about the Closest Conjunct Agreement phenomena discussed in this and subsequent sections is that the nature of ‘closest’ is entirely illusory. What we in fact have in almost every case, and certainly with LCA, is actually agreement with an entire conjunct phrase which has only inherited the features of one of its conjuncts, in this case, the final NP.

Last Conjunct Agreement (LCA) is a pattern of CCA in which the verb agrees with the second/last conjunct when the &P is in a preverbal position. Recall from the examples (33) and (34) (repeated below) that LCA is only acceptable when the conjunct phrase is in preverbal position. It is entirely ungrammatical if the &P is postverbal.

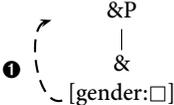
- (44) [<sub>&P</sub> Sve haljine i sva odela] su juče prodata /  
 all dress.FPL and all suit.NPL are yesterday sell.PRT.NPL  
 prodati / ?prodate.  
 sell.PRT.MPL sell.PRT.FPL  
 'All dresses and all suits were sold yesterday.'
- (45) Juče su prodate / prodati / \*prodata [<sub>&P</sub> sve  
 yesterday are sell.PRT.FPL sell.PRT.MPL sell.PRT.NPL all  
 haljine i sva odela].  
 dress.FPL and all suit.NPL  
 'All dresses and all suits were sold yesterday.'

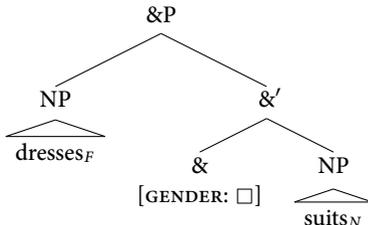
Following the logic above, we can capture this by assuming that LCA is derived from an order of operations at &P where  $\uparrow\text{AGR}\uparrow$  precedes  $\downarrow\text{AGR}\downarrow$ , since movement to Spec-TP is enforced. The pattern in question is given in (46) below.

- (46) (MOVE) >  $\uparrow\text{AGR}\uparrow$  > MERGE >  $\downarrow\text{AGR}\downarrow$

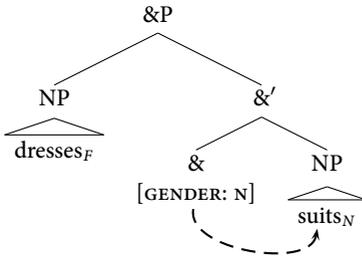
Here, MERGE applies after  $\uparrow\text{AGR}\uparrow$ , thereby counterfeeding it. The derivation proceeds as follows: MOVE applies vacuously at the &P level and  $\uparrow\text{AGR}\uparrow$  applies before MERGE. Since there is still no goal that this operation can target, it will not find a goal (47) and thus applies vacuously. The next operation is Merge of the NPs (MERGE) (48). Finally,  $\downarrow\text{AGR}\downarrow$  applies and the &-head receives the gender value of only the lowest conjunct (49).

As a result, the &P node bears the features of only the second conjunct.

- (47)  $\uparrow\text{AGR}\uparrow$ :
- 

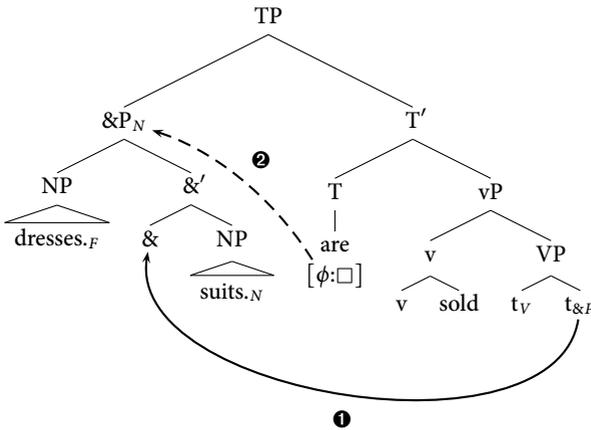
- (48) MERGE:
- 

(49) ↓AGR↓:

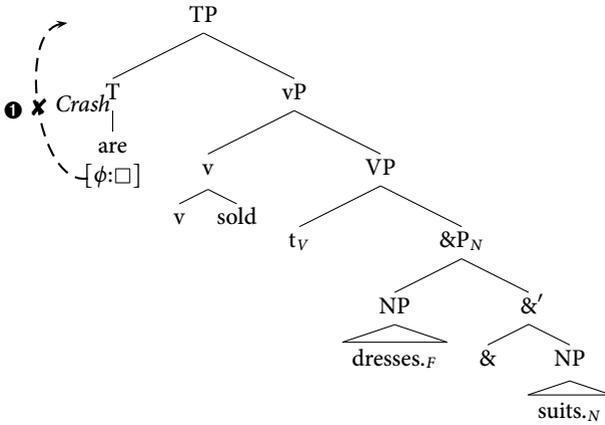


At the TP level, the previous order of operations must be maintained. There are again two possible scenarios depending on whether MOVE applies or not. If MOVE takes place, it will feed the next operation ↑AGR↑ and Agree will apply (50):

(50) MOVE > ↑AGR↑ > (MERGE) > ↓AGR↓:



If MOVE does not apply thereby leaving the &P in its postverbal base position, then ↑AGR↑ will probe upwards but not find a goal (i.e. it will be counterfed by MOVE). Following our assumptions about the  $\phi$ -probe on T, the derivation crashes as soon as T cannot find a goal.

(51)  $\uparrow\text{AGR}\uparrow > (\text{MERGE}) > \downarrow\text{AGR}\downarrow$ :

This means that MOVE *has* to apply at the TP level with the order deriving LCA inside the &P (46), there is no optionality. As such, this means that we rule out cases of LCA postverbally since movement to Spec-TP (i.e. feeding of  $\uparrow\text{AGR}\uparrow$ ) is the only way to avoid a crash. This has the welcome consequence of excluding postverbal LCA or what we called *Lowest Conjunct Agreement* repeated below in (52):

(52) *Lowest conjunct agreement*:

\*Juče su prodata [<sub>&P</sub> sve haljije i sva odela].  
 yesterday are sell.PRT.NPL all dress.FPL and all suit.NPL

‘All suits and all dresses were sold yesterday.’

The crucial point of this analysis is that LCA is agreement with the *entire* conjunct phrase that has only acquired the features of the second conjunct.

#### 4.2.3. First conjunct agreement

First Conjunct Agreement (FCA) is the pattern of CCA in which the verb agrees with the first conjunct in a postverbal subject conjunct phrase.

We saw in (52) that it is not possible for the conjunct phrase to appear postverbally under the order leading to &P having the features of only the last conjunct. Recall from the example under discussion (repeated again below) that in preverbal position, FCA is marginal/accepted by some speakers,

whereas the canonical case of FCA (also cross-linguistically) is in a postverbal position. In (54) it looks like the verb is agreeing with linearly closest conjunct (the first).

- (53) [<sub>&P</sub> Sve haljine i sva odela] su juče prodata /  
 all dress.FPL and all suit.NPL are yesterday sell.PRT.NPL  
 prodati / ?prodate.  
 sell.PRT.MPL sell.PRT.FPL  
 ‘All dresses and all suits were sold yesterday.’
- (54) Juče su prodate / prodati / \*prodata [<sub>&P</sub> sve  
 yesterday are sell.PRT.FPL sell.PRT.MPL sell.PRT.NPL all  
 haljine i sva odela].  
 dress.FPL and all suit.NPL  
 ‘All dresses and all suits were sold yesterday.’

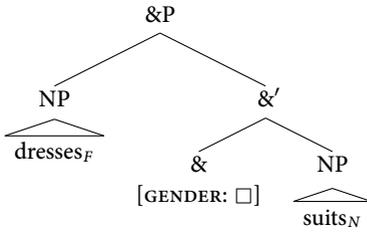
We will see that there is a number of possible orders that can derive FCA. One such order involves counterfeeding of  $\downarrow\text{AGR}\downarrow$  in (55).

- (55) (MOVE) >  $\downarrow\text{AGR}\downarrow$  > MERGE >  $\uparrow\text{AGR}\uparrow$

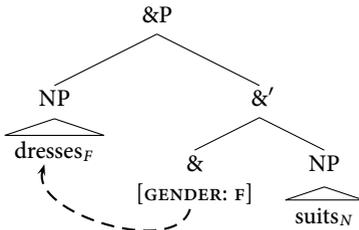
The idea is the same as with previous cases, since  $\downarrow\text{AGR}\downarrow$  applies ‘too early’ its application is counterfed and thus vacuous – & will not agree with the last conjunct because it is not yet present in the structure. The derivation is as follows: MOVE does not apply and  $\downarrow\text{AGR}\downarrow$  is counterfed by MERGE (56). MERGE introduces the two NP arguments (57). Finally,  $\uparrow\text{AGR}\uparrow$  applies agreeing with the higher NP in its specifier, and only the features of the higher NP are projected to the &P (58). What we have is a conjunct phrase that bears only the gender feature of the first conjunct.

- (56)  $\downarrow\text{AGR}\downarrow$ :  
     &P  
     |  
     &  
 [GENDER: □]
- 

(57) MERGE:

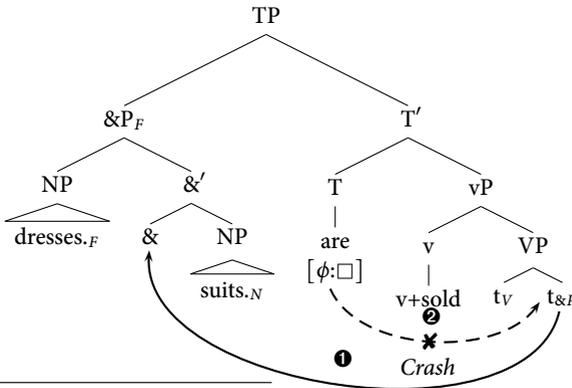


(58)  $\uparrow$ AGR $\uparrow$ :



The same operations apply at TP level again, yielding two possible options depending on whether MOVE applies. Since  $\downarrow$ AGR $\downarrow$  applies early in this case (and is thus counterfed), MOVE applying before  $\downarrow$ AGR $\downarrow$  will result in bleeding of  $\downarrow$ AGR $\downarrow$ .<sup>8</sup> The derivation will crash, as moving the &P to Spec-TP bleeds the subsequent  $\downarrow$ AGR $\downarrow$  operation, which will not find a goal in its c-command domain, as illustrated in (59).

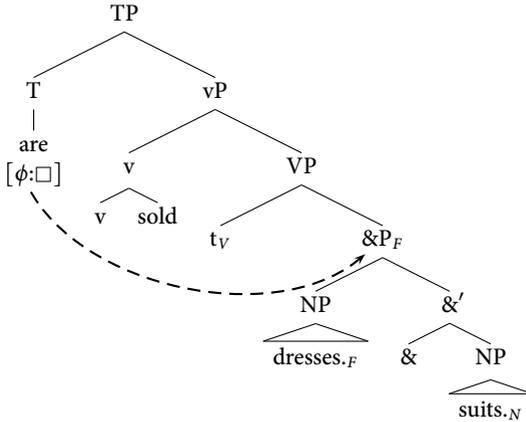
(59) MOVE >  $\downarrow$ AGR $\downarrow$  > (MERGE) >  $\uparrow$ AGR $\uparrow$ :



<sup>8</sup>In general, one may wonder why  $\downarrow$ AGR $\downarrow$  cannot target the object if the subject has moved to Spec-TP. The result would be object agreement (in the case of a transitive verb) rather than a crash. Assuming a phase-based model of syntax where (at least) vP is a phase, only elements in the edge of vP would be accessible to T and therefore object agreement would be ruled out.

The other option where MOVE does not apply, however, will converge as  $\downarrow\text{AGR}\downarrow$  is not bled by MOVE. Here,  $\downarrow\text{AGR}\downarrow$  will agree with the &P bearing features of the first conjunct (60):

(60)  $\downarrow\text{AGR}\downarrow > (\text{MERGE}) > \uparrow\text{AGR}\uparrow$ :



The pattern outlined in this section derives FCA as a result of T agreeing with the whole &P, which has inherited the features of its highest conjunct. As with LCA, we argue that the impression that it is agreeing with the linearly closest conjunct is an illusion. In the following section, we discuss the two remaining orderings of operations that can also derive FCA both postverbally and preverbally.

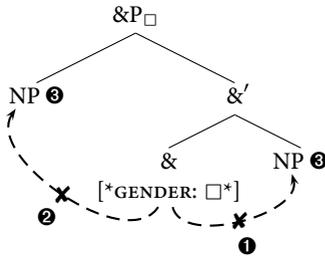
#### 4.2.4. Counterfeeding of Agree – two additional patterns of FCA

As noted previously in (32), there are two possible orderings of operations in which both operations  $\uparrow\text{AGR}\uparrow$  and  $\downarrow\text{AGR}\downarrow$  are counterfed by MERGE, repeated here in (61).

- (61) a. (MOVE) >  $\downarrow\text{AGR}\downarrow$  >  $\uparrow\text{AGR}\uparrow$  > MERGE  
 b. (MOVE) >  $\uparrow\text{AGR}\uparrow$  >  $\downarrow\text{AGR}\downarrow$  > MERGE

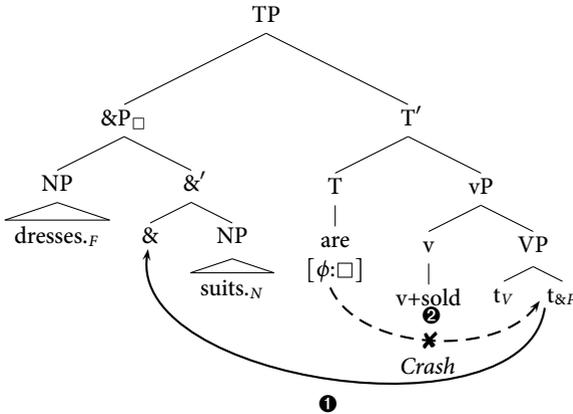
These orders result in both Agree operations being counterfed since they both apply before MERGE. As a result, the &P will not receive a value and thus &P will remain underspecified for gender features (indicated by  $\square$  in (62)).

(62)



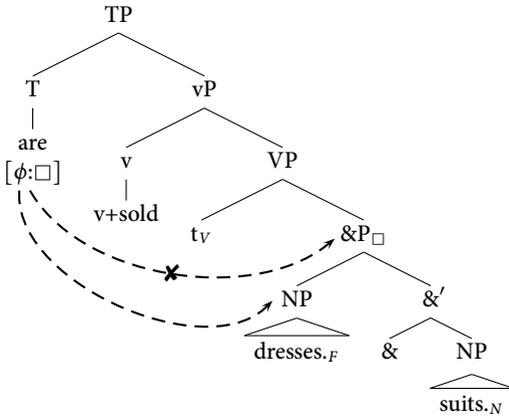
At TP, the order of operations in (61a) will again result in postverbal FCA. If MOVE applies, it will bleed  $\downarrow\text{AGR}\downarrow$ , as T will not find a goal leading to a crash:

(63) MOVE >  $\downarrow\text{AGR}\downarrow$  >  $\uparrow\text{AGR}\uparrow$  > (MERGE):



If MOVE does not apply, then the next operation  $\downarrow\text{AGR}\downarrow$  finds the &P. In this case, the root node of &P is not a legitimate goal for Agree since it does not have a valued gender feature. Instead, the closest goal for T is the structurally higher first conjunct in Spec-&P and T agrees with this:

(64)  $\downarrow\text{AGR}\downarrow > \uparrow\text{AGR}\uparrow > (\text{MERGE})$ :

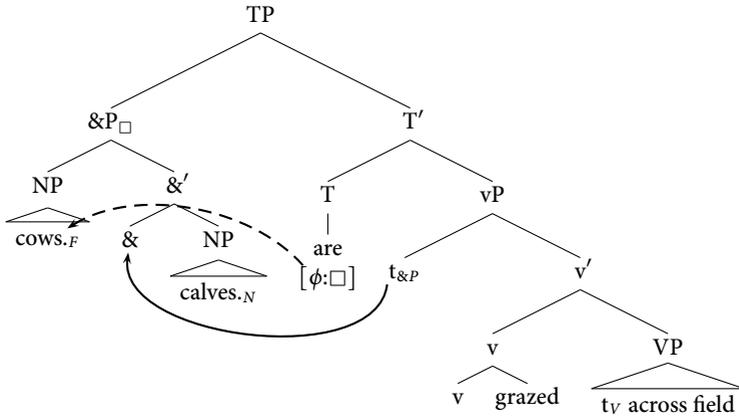


The order of operations in (61b) results in the rare pattern of preverbal FCA, or Highest Conjunct Agreement (65).

(65) [<sub>&P</sub> Krave i telad] su mirno pasle po  
           cows.FPL and calves.NPL are peacefully graze.PRT.FPL across  
 polju.  
 field  
 ‘Cows and calves grazed peacefully in the field.’

At &P level, counterfeeding of both Agree operations will leave the &P unspecified for gender features. Subsequently, at TP, the derivation will only converge if MOVE applies. If it does not apply,  $\uparrow\text{AGR}\uparrow$  will not find a goal. Thus, in the order where MOVE applies, movement of the &P feeds  $\uparrow\text{AGR}\uparrow$ . Since &P has not been valued for gender, however, the &P node does not constitute a goal for the Agree relation. As was assumed for FCA in (64),  $\uparrow\text{AGR}\uparrow$  can also ‘look inside’ the &P and find the structurally higher, first conjunct:

(66) MOVE &gt; ↑AGR↑&gt; ↓AGR↓&gt; (MERGE):



Preverbal FCA was an attested pattern for some speakers in our survey, yet it is somewhat rare. Its rarity in comparison to postverbal FCA might be attributed to the fact that there is one very specific order of operations (in (66)), which derives it, whereas postverbal FCA can be derived by multiple orders.

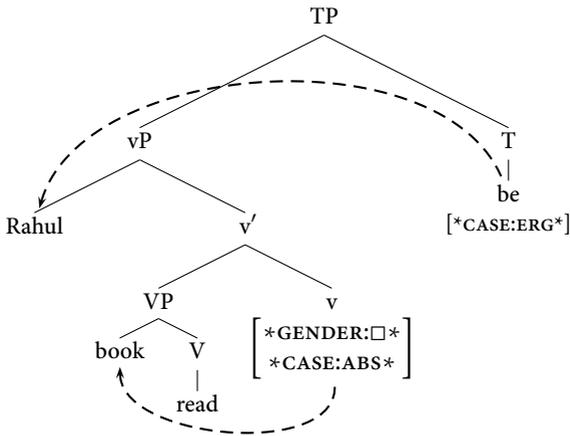
#### 4.3. Cross-linguistic implications: LCA *in situ* in Hindi

The question at this point is whether the analysis developed here for Serbo-Croatian can be extended to cases of conjunct agreement in typologically-distinct languages such as Hindi-Urdu (Bhatt and Walkow 2013). In this section, we will show that the mechanism of conjunct agreement presented here can deal with the data presented in Bhatt and Walkow (2013). We will see that Closest Conjunct Agreement in a head-final language such as Hindi is actually LCA *in situ* (an order which was ungrammatical in Serbo-Croatian). We will show how this can be derived from typological differences between Hindi-Urdu and SC. Bhatt & Walkow show that gender agreement in Hindi is with the non-overtly case-marked DP (or absolutive marked DP) (67).

- (67) a. Rahul-ne    kitab par.h-ii    thii  
 Rahul.M-ERG book.F read-PFV.F be.PST.F.SG  
 'Rahul had read the book.'
- b. Ram-ko    ek ghazal likhn-ii    hai  
 Ram.M-DAT a ghazal.F write.INF-F be.PRS.SG  
 'Ram has to write a ghazal.'

Recall from the discussion in Section 3.2.2 that the assumption that *v* assigns absolutive case to the object &P was crucial for ensuring its deactivation and therefore unavailability for Agree. If we adopt the assumption that *v* assigns absolutive case<sup>9</sup>, then it seems that there is a link between this case and gender agreement. Let us take this as an indication that these operations are in fact carried out by the same head. This means that in Hindi, *v* is responsible for both gender agreement and absolutive assignment. Thus, the derivation of (67a) would look as follows:

(68)



Bhatt and Walkow (2013) show that there is an asymmetry between conjoined subjects and objects. Conjoined subjects only allow for resolved agreement (69), whereas conjoined objects tend to result in Closest Conjunct Agreement (70):

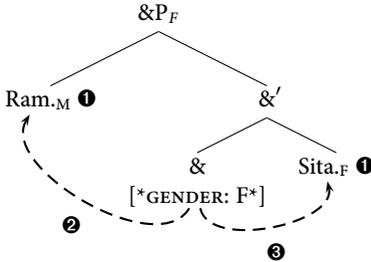
(69) [&P Ram aur Sita] gaa {rahe hāī / \*rahii hai}  
 Ram.M and Sita.F sing PROG.MPL be.PRS.PL \*PROG.F be.PRS.SG  
 ‘Sita and Ramesh are singing.’

(70) Main-ne [&P ek chaataa aur ek saaRii] (aaj)  
 I-ERG an umbrella.MASC.SG and a saaree.FEM.SG today  
 khariid-ii.  
 buy-PERF.FEM.SG  
 ‘I bought an umbrella and a saree.’ (Kachru 1980: 147)

<sup>9</sup>Note that this is contrary to Müller (2009) who, following Murasugi (1992), assumes that *v* assigns ergative case.

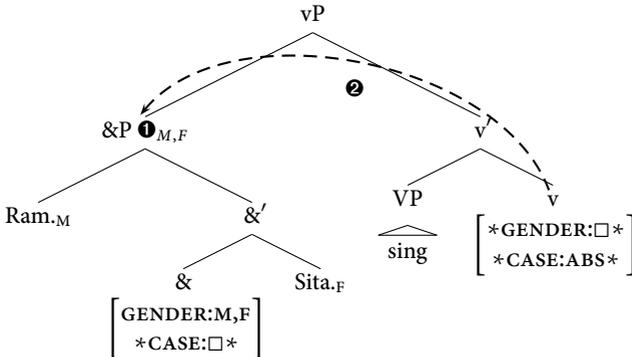
We can account for these data as follows: If we want to derive the apparent link between gender agreement and absolutive assignment in Hindi, then we should place both operations on  $v$ .<sup>10</sup> Recall from the previous section that Resolved Agreement is derived by both Agree operations following MERGE. Thus, the order of operations for the &P in (69) will be as follows:

- (71) (MOVE) > MERGE >  $\uparrow$ AGR $\uparrow$  >  $\downarrow$ AGR $\downarrow$ :



Now, this order of operations must be repeated at all later cycles following (26). The cycle of interest is  $v$ P rather than TP. MOVE applies vacuously since there is nothing to move. Next, MERGE applies on  $v$  merging the external argument &P. Subsequently,  $\uparrow$ AGR $\uparrow$  applies assigning absolutive case to the conjunction (note the absence of *-ne* ergative marking) and also agrees with the entire &P in gender. The clashing M and F features are resolved as in Serbo-Croatian to default masculine:

- (72) (MOVE) > MERGE >  $\uparrow$ AGR $\uparrow$  >  $\downarrow$ AGR $\downarrow$ :



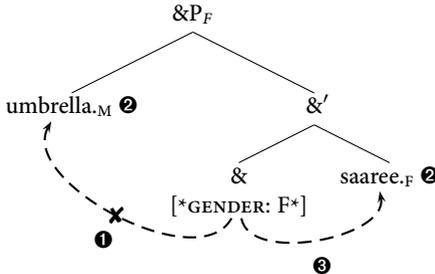
<sup>10</sup>The possibility for separate agreement of the participle and the auxiliary suggests that T may also probe for gender separately in certain cases. In the more standard cases discussed, let us assume that T agrees with  $v$  to inherit the gender value it finds.

For the example (70) where we have agreement with the linearly closest conjunct, we will analyse this as LCA *in situ*. Recall that the order deriving LCA has  $\uparrow\text{AGR}\uparrow$  apply before MERGE and thereby be counterfed:

- (73) Order deriving LCA:  
 (MOVE) >  $\uparrow\text{AGR}\uparrow$  > MERGE >  $\downarrow\text{AGR}\downarrow$

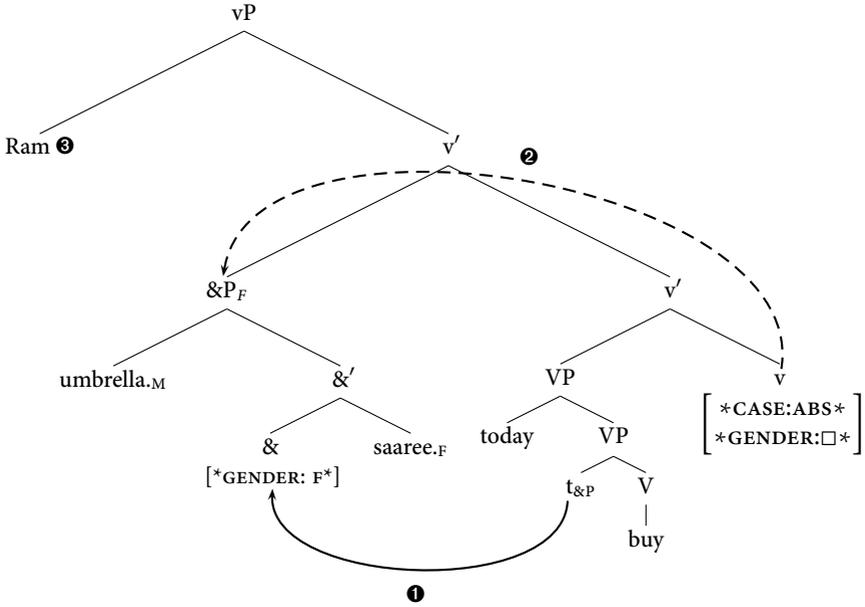
This order of operations will result in the &P projecting the features of only the second conjunct.

- (74) (MOVE) >  $\uparrow\text{AGR}\uparrow$  > MERGE >  $\downarrow\text{AGR}\downarrow$ :



Crucially, at the *vP* level, the fact that  $\uparrow\text{AGR}\uparrow$  applies first means that movement of the object &P to Spec-*vP* will be enforced to avoid a crash. Evidence that &P is in fact higher than the canonical object position (sister of *V*) is shown by the fact that an adverb can occur between the object &P and the verb in (70). Therefore, MOVE applies first feeding  $\uparrow\text{AGR}\uparrow$  and thus gender agreement and absolutive assignment to the object &P. The following operation is MERGE which introduces the external argument *Ram*.

(75) (MOVE) > ↑AGR↑ > MERGE > ↓AGR↓:



The relative orderings of ↑AGR↑ and MERGE ensure that it is the moved object with which v agrees as the ↑AGR↑ applies before MERGE. When T is merged, it will assign ergative to the external argument *Ram*. We see here that the general mechanism outlined in this paper can be extended to other cases of CCA in other languages with promising results. The typological differences between the locus of gender agreement (e.g. T vs. v) may be a contributing factor to why CCA takes somewhat different forms in Hindi and Serbo-Croatian and furthermore why LCA *in situ* is possible in Hindi but not in Serbo-Croatian.

### 5. Conclusion

In this paper, we have argued that the notion of ‘closest’ in Closest Conjoint Agreement is illusory. What may look like linearly conditioned agreement on the surface can in fact be handled with a relatively standard approach to Agree (assuming both Upward and Downward Agree as possibilities). What we then need to derive the various patterns of conjoint agreement is to assume variability in the order of application of basic syntactic operations. Do-

ing so entails entertaining some degree of fallibility of operations in order for them to be successively ‘counterfed’. The advantage of this approach is that one can retain the basic assumption that &P computes its own gender values. This assumption was abandoned in approaches such as Bošković (2009) and Bhatt and Walkow (2013) but seems necessary for Resolved Agreement. Thus, in accounting for Closest Conjunct Agreement, one loses the explanation of the more readily available option of Resolved Agreement (a.k.a. default agreement). Our approach does not suffer from this drawback since the standard case is the most transparent (in the sense of Kiparsky 1973) as both operations apply. Cases of Closest Conjunct Agreement (LCA and FCA) are derived from one (or both) of the Agree operations applying ‘too early’ and thus being counterfed by MERGE. They are ‘opaque’ in the sense that it is not clear from looking at the surface representation why a certain Agree operation failed to apply – this is to do with the derivational history.

The assumption that the basic order of operations is fixed throughout the derivation makes interesting predictions with regard to the optionality of movement. The availability of certain types of agreement (FCA vs. LCA) depends on the position of the conjunct phrase (postverbal vs. preverbal). It is this fact that gives the impression that this is a linear phenomenon. We have shown that whether the &P moves (and becomes preverbal) or remains *in situ* follows from the order of operations computing the gender at the &P level. If an operation applies early at &P and is thus counterfed (e.g.  $\uparrow\text{AGR}\uparrow$  in the case of LCA), then this operation will also apply early at TP requiring MOVE to apply before it and thus move the &P to Spec-TP and avoid a crash.

The main benefit of this approach is that it is possible to derive all the patterns in question from the factorial typology of four basic syntactic operations. Furthermore, there is no order which does not lead to an attested pattern. Additionally, the assumption of *Uniform Order of Operations* (26) leads to correctly ruling out LCA postverbally in Serbo-Croatian. As a result, it is not necessary to stipulate mechanisms of deactivation (Bošković 2009, Bhatt and Walkow 2013) in order to circumvent Minimality (for LCA) or further complicate the Agree mechanism (i.e. extend it into the postsyntactic component) in order to be able to make reference to linear order. It is not that our analysis is without somewhat non-standard assumptions. The fallibility of syntactic operations such as Agree is not yet widely assumed (cf. Preminger 2011, 2014), however we believe that recent work has shown that variability in the order of syntactic operations can be successful in deriving variation in languages

(cf. Müller's 2009 analysis of argument encoding). Furthermore, maintaining the order of syntactic operations has been shown to make correct predictions with regard to wh-movement in ergative languages (Assmann et al. to appear). The challenge for an approach such as the present one is how it can extend to head-final languages such as Hindi. In Section 4.3, we have shown that the mechanism is flexible enough to handle this kind of typological diversity. As the empirical domain surrounding conjunct agreement becomes clearer (e.g. with regard to the agreement possibilities with more than two conjuncts), one will require a system powerful enough to handle a degree of variability across languages. However, the main message of this paper should be that once one scratches below the surface, phenomena which at first blush seemed to require either complicated, non-standard syntactic mechanisms or complex post-syntactic PF machinery, can in fact be sufficiently, if not better, handled in syntax proper.

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# A minimalist analysis of the implicational *and*-construction in German

Philipp Weisser\*

## Abstract

In this article, I discuss the so-called implicational *and*-construction and show how it can be derived under Minimalist assumptions. The major challenge is to find a way to account for the subordinate *and* the coordinate properties of this construction at the same time. The crucial idea behind the analysis is that the asymmetric syntax of coordination enables the transformation of a subordinate structure into a coordinate one by means of movement. The analysis, which pursues the same idea as the ones in Weisser (2014, to appear), shows that the same mechanism that is applied to a whole range of phenomena in different languages can also be applied to cases of asymmetric coordination in German.

## 1. Introduction

In this short article, I will discuss the syntactic properties of the so-called *implicational and-construction* (IAC) in German. This construction has first been discussed in Reis (1993) from a theoretical, generative perspective and even though the discussion of this construction has some very far-reaching implications for the topic of clausal relations, it has largely been neglected in the subsequent literature.

IACs consist of two clauses coordinated by the conjunction *and*. The interesting characteristic of this construction is that the relation that holds between the two clauses is usually taken to be predicate-argument relation. In other words, the second clause is understood as a complement clause of the first one. The IAC in (1a) alternates with what is called the implicational infinitive construction (IIC) (1b) which expresses the exact same proposition.

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- (1) a. Hans war so nett und besuchte sie.  
       Hans was so nice and visited her
- b. Hans war so nett, sie zu besuchen.  
       Hans was so nice her to visit  
       ‘Hans was nice enough to visit her.’

(Reis 1993: 204)

The puzzle that IACs pose for the theory of grammar is twofold. First, the construction poses a challenge for theories of pragmatics which assume a strong (if not universal) correlation between the main clause or subordinate clause status of a clause and the salience of the respective clauses in discourse. Second, the construction is also challenging from a syntactic point of view since it exhibits properties of a subordinate clause and properties of a coordinate clause at the same. Under standard syntactic theories, all of which assume a relatively strict dichotomy between subordinate constructions and coordinate ones, the syntactic behavior of IACs is unexpected.

The first one of these challenges has been extensively discussed in Reis (1993). I will thus be concerned with the second problem, which, as far as I can see, has not yet received a satisfactory solution.

The discussion will proceed as follows. In the next section, I will illustrate the syntactic properties of IACs and show that the construction seems to be in between subordination and coordination to a certain extent. In Section 3, I will very briefly discuss the theoretical implications of this finding and, subsequently, propose an analysis that solves the theoretical problem and captures the major properties of IACs. Section 4 concludes.

## 2. Syntactic properties of IACs

In this section, I will illustrate some syntactic properties of IACs. I will start out with some general properties and then turn to properties which may help to answer the question whether the second clause in an IAC is a subordinate or a coordinate clause.

The size of both conjuncts in IACs does not vary. In all examples, the two conjuncts share the *Vorfeld* (prefield) but nothing else (see (2)). In  $V_1$  contexts, as in imperatives, the prefield is empty and hence, no syntactic material is shared (see (3)).

- (2) a. Peter [<sub>C<sub>1</sub></sub> tat ihr den Gefallen] und [<sub>C<sub>2</sub></sub> goss die Blumen].  
 Peter did her the favor and watered the flowers  
 ‘Peter did her the favor of watering the flowers.’
- b. Hans [<sub>C<sub>1</sub></sub> wagt es endlich] und [<sub>C<sub>2</sub></sub> verlässt Petra].  
 Hans dares it finally and leaves Petra  
 ‘Hans finally dares to leave Petra.’
- (3) [<sub>C<sub>1</sub></sub> Sei so nett] und [<sub>C<sub>2</sub></sub> hau ab]!  
 Be so nice and leave PRT  
 ‘Be so kind as to get lost.’

However, as with the IIC counterpart, subjects in IACs must be shared regardless of whether they are in the prefield or not. An IAC with two different subjects is impossible (4). If another element occupies the prefield and the subject is found in the middle field, the construction resembles an SLF-construction (4b).<sup>1</sup>

- (4) a. #Gestern [<sub>C<sub>1</sub></sub> tat ich ihr den Gefallen] und [<sub>C<sub>2</sub></sub> er goss die  
 Yesterday did I her the favor and he watered the  
 Blumen].  
 flowers.
- b. Gestern [<sub>C<sub>1</sub></sub> tat ich ihr den Gefallen] und [<sub>C<sub>2</sub></sub> goss die  
 Yesterday did I her the favor and watered the  
 Blumen].  
 flowers.  
 ‘Yesterday I did her the favor of watering the flowers.’

Similarly, tense and modal features must be shared. Unlike regular coordination of this size, the two conjuncts must be of the same tense (5a) and the same clause type (5b).

- (5) a. #Ich [<sub>C<sub>1</sub></sub> war so blöd] und [<sub>C<sub>2</sub></sub> gieße die Blumen]  
 I was.PAST so stupid and water.PRES the flowers.
- b. \*Sei so nett und haust ab.  
 Be.IMP so nice and leave.DECL PRT

<sup>1</sup>The term SLF-construction goes back to Höhle (1990) and is an abbreviation for *Subject lacking in F-structure construction*. In these constructions, the subject of two coordinate clauses can be shared even though it is located in the middle field of the first conjunct.

Now we turn to the question of whether the relation between the two clauses in IACs is subordinate or coordinate. On the surface, the construction looks like a coordinate one but the semantics it conveys suggests a subordinate relation. Hence, it seems promising to apply some of the standard tests to distinguish clausal relations in German. We start out with the classical constituent tests. Subordinate clauses in German can occur in the prefield and can also be center-embedded under certain conditions. As observed by Reis (1993), with the second clause of an IAC, movement to the prefield or center-embedding in the middle field of the first conjunct is ungrammatical. The following examples contrast the IAC (in the (a)-examples) with the correspondent IIC (in the (b)-examples). We see that, whereas IICs allow for movement to the prefield or center-embedding, IACs do not.

- (6) a. Hans [<sub>C1</sub> tat ihr den Gefallen] und [<sub>C2</sub> goss die Blumen].  
 Hans did her the favor and watered the flowers
- b. Hans [<sub>C1</sub> tat ihr den Gefallen] [<sub>C2</sub> die Blumen zu gießen].  
 Hans did her the favor the flowers to water  
 ‘Hans did her the favor of watering the flowers.’
- (7) a. \*Den Gefallen und goss die Blumen tat Hans ihr  
 The favor and watered the flowers did Hans her  
 gern.  
 with.pleasure
- b. Den Gefallen, die Blumen zu gießen tat Hans ihr gern.  
 The favor the flowers to water did Hans her with.pleasure  
 ‘The favor of watering the flowers, Hans did her with great pleasure.’
- (8) a. \*Hans hat ihr den Gefallen und goss die Blumen  
 Hans has her the favor and watered the flowers  
 gern getan.  
 with.pleasure done
- b. Hans hat ihr den Gefallen, die Blumen zu gießen, gern  
 Hans has her the favor the flowers to water with.pleasure  
 getan.  
 done

This suggests a coordinate relation between the two clauses. Also, we find that ellipsis operations that are typical for coordination constructions can be applied to IACs. Gapping as well as backward ellipsis are both grammatical with IACs.

- (9) a. Würdest du so nett sein und <würdest> hier mal putzen?  
Would you be so nice and <would> here once clean  
b. Wenn Peter mal so nett sein <würde> und hier putzen  
If.only Peter once so nice be <would> and here clean.up  
würde.  
would.  
'If only Peter would be so kind as to clean up here.'

(Reis 1993: 215)

These properties strongly suggest a coordinate relation between these two clauses. The ordering restrictions as well as the possibility of Gapping for example would be totally unexpected under a subordinate analysis of IACs. The following minimal pair shows that gapping is much better in IACs than in IICs.<sup>2</sup>

- (10) a. ?Er würde sich nie die Blöße <geben> und mir ein  
He would self never the nakedness <give> and me a  
Geschenk geben.  
present give  
'He would never show the weakness as to give me a present.'  
b. \*Er würde sich nie die Blöße <geben>, mir ein Geschenk  
He would self never the nakedness <give>, me a present  
zu geben.  
to give

Thus, Reis (1993) arrives at the conclusion that IACs are really syntactically coordinate. However, as she notes, with respect to extraction, IACs seem to behave differently. Extraction from coordinate structures is constrained by Ross' (1967) Coordinate Structure Constraint, which prohibits asymmetric extraction from out of only one conjunct of a coordinate structure. Nevertheless,

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<sup>2</sup>The fact that (10a) is slightly degraded is due to the fact that gapping deletes part of an idiom. It is uncontroversially still much better than (10b) where gapping was applied to subordinate IIC construction.

with IACs, asymmetric extraction seems to be quite well-formed. We find asymmetric extraction from out of the left conjunct as in (11) but also from out of the right one as in (12).

- (11) a. Ich frage mich wem<sub>i</sub> Peter t<sub>i</sub> den Gefallen tat und abhaute.  
I ask myself whom Peter the favor did and left.  
b. [Zu wem]<sub>i</sub> war Peter so t<sub>i</sub> nett und goss die Blumen?  
To whom was Peter so nice and watered the flowers
- (12) a. [Für wen]<sub>i</sub> war Peter so nett und goss die Blumen t<sub>i</sub>?  
For whom was Peter so nice and watered the flowers  
b. Ich frage mich [zu welchem Treffen]<sub>i</sub> Peter uns den Gefallen  
I ask myself to which meeting Peter us the favor  
tut und t<sub>i</sub> kommt?  
does and comes

This suggests a subordinate relation since, with IICs, the asymmetric extraction is well-formed from both clauses as well.

- (13) a. [Zu wem]<sub>i</sub> war Peter so t<sub>i</sub> nett, die Blumen zu gießen?  
To whom was Peter so nice the flowers to water  
b. [Für wen]<sub>i</sub> war Peter so nett, die Blumen t<sub>i</sub> zu gießen?  
To whom was Peter so nice the flowers to water

The second argument for a subordinate relation comes from binding effects. Binding of anaphors and variable pronouns presupposes c-command. However, under a coordination analysis, elements in one conjunct can never c-command elements contained in the other conjunct. With a subordinate structure, c-command (and, hence, binding) is possible. In (14), we see that, in regular coordination, variable binding of an element in the second conjunct by an element in the first one is impossible. The predicate of the first conjunct in (14) does not allow for an IAC construction. Hence, the coordination in (14) is not an IAC. In this case, binding is not possible. In (15), however, we see that variable binding is possible with IICs (15a) and, crucially, it is also possible with IACs (15b).

- (14) \*Sie backte jedem<sub>i</sub> einen Kuchen und half seiner Mutter<sub>i</sub> bei  
 She baked everyone a cake and helped his mother with  
 der Steuererklärung.  
 the tax.declaration.
- (15) a. Sie tat jedem<sub>i</sub> den Gefallen, seiner<sub>i</sub> Mutter eine Email zu  
 She did everyone the favor his mother an email to  
 schicken.  
 send
- b. Sie tat jedem<sub>i</sub> den Gefallen und schickte seiner<sub>i</sub> Mutter  
 She did everyone the favor and send his mother  
 eine Email.  
 an email

This, again strongly suggests a subordinate relation. The table below subsumes our dilemma. On the one hand, tests like gapping, the constituent order or simply the lexical material suggest that what we are dealing with here is an instance of coordination. On the other hand, data from extraction or binding indicate a subordinate relation between the two clauses.

(16) Results of the clausal relations tests

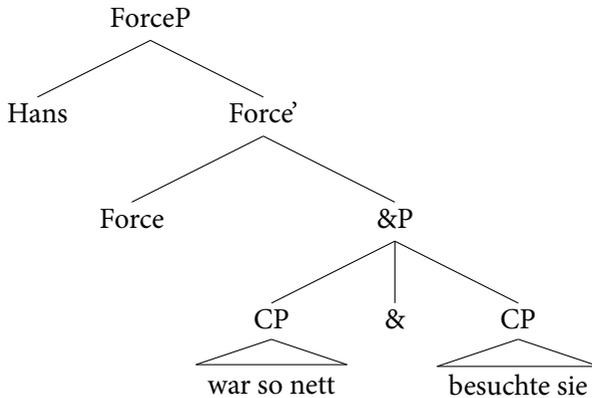
	Subordination	Coordination
Lexical Material		+
Gapping		+
Center Embedding		+
Extraction	+	
Binding	+	

### 3. A different approach

The findings of the previous sections are problematic for all theories that assume a strict dichotomy of clausal relations. In frameworks like the Minimalist Program, the standard assumption is that there are only two types of clausal relations: subordination relations and coordination relations. Since these two types (or, rather, the syntactic structures they are associated with) are assumed

to be discrete and exhaustive, mixed patterns like the ones above are totally unexpected. The syntactic properties of IACs are thus definitely problematic for these frameworks. I will, in the following, propose an analysis that can derive the mixed properties of IACs and still adheres to the (theoretical) dichotomy of clausal relations. Before I can do so, I will briefly lay out some of the basic syntactic assumptions I follow. I adopt the standard assumptions of Minimalism about the categories in the clausal spine. The functional heads responsible for the syntactic structure building in German are C-T-v-V (see Chomsky (1995) et seq.). However, instead of assuming a uniform C-head whose specifier is spelled out as the German prefield, I adopt a split-C approach in which some functional head other than C projects above C and selects for a specifier.<sup>3</sup> We may call this head Force<sup>0</sup> for the time being.<sup>4</sup> The prefield is then located in SpecForce. C, however, never has a specifier. This assumption has the advantage that IACs can uniformly be analysed as CP coordination. Pretheoretically, an example like (1a) is thus abstractly represented by the tree in (17).

(17)



<sup>3</sup>For discussion and complications of the Split CP-approach, see Rizzi (1997) et seq. For an application of the Split CP-approach to German see Mohr (2005).

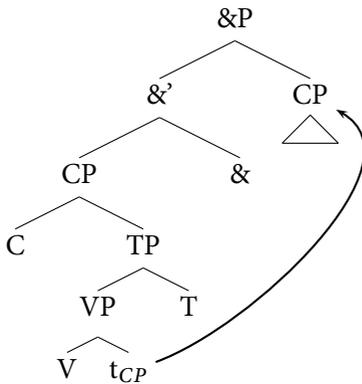
It is to be emphasized that the analysis I propose is not incompatible with the standard view of German clause structure where the prefield is located in SpecCP. To make these analyses compatible, one would simply have to assume that German has the possibility of C'-coordination (which is probably another standard assumption) and C'-adjunction.

<sup>4</sup>The exact notion of this head is really important for the purposes here. It may also be that the head that provides the relevant specifier is Top<sup>0</sup> or Foc<sup>0</sup> or something else. In that case, a split CP-account would probably assume an additional ForceP that does not provide for a specifier.

This syntactic structure, however, does not help to derive the dilemma we found in the previous section. It must be refined. We have seen that IACs are somehow both coordinate and subordinate. In Weisser (2014, to appear), I argue that this dilemma can be solved under a derivational approach to syntax. The core idea is that the asymmetric coordination structure proposed in Munn (1987), Zoerner (1995), Johannessen (1998) and much subsequent literature allows for a derivation in which a clause is base-generated as a subordinate clause but, later on, is promoted to the specifier of a coordination phrase. Thus, the relation between these two clauses is a subordinate one at the beginning of the derivation and a coordinate one at the end.

With the case of IACs, we observe that, semantically, the relation between the first and the second clause is a predicate-argument relation. The crucial assumption is that this semantic asymmetry has a direct syntactic correlate. A clause that has the semantic properties of the complement clause is syntactically base-generated as a complement clause.<sup>5</sup> Thus, the second clause of an IAC is base-generated as a sister of V low in the tree but, throughout the derivation it may, however, be promoted to a conjunct position.

(18) *A Derivation of IACs:*



Importantly, in the case at hand, the specifier of the coordination phrase that is generated by this movement step is linearized to the right of its head. This, however, is not a syntactic matter. By standard assumption, the linearization

<sup>5</sup>Given that the second conjunct of an IAC is an argument, this derivation is even enforced by Baker's (1988) UTAH, which requires arguments with the thematical relationship to be base-generated in the same position regardless of where they appear on the surface.

in general is not part of the syntax but of the post-syntactic module. Thus, in the case of the IACs, in the syntax, the complement clause is simply moved to Spec&P. In the course of the postsyntactic linearization process, the standard rule of linearization in German (i.e. *Specifiers to the Left*) will be overwritten by the semantic or pragmatic meta-principles that have an impact on the linearization of coordination phrases. One of these principles is the Temporal Iconicity Principle, which requires events in coordination to be linearized in the same order as the events in real time.<sup>6</sup> I assume that some version of this principle may also apply here.

This derivation accounts for the complete range of syntactic properties of IACs we observed in the preceding section. The coordinate properties all follow from output-related processes such as vocabulary insertion or linearization. The order of the conjuncts is fixed since the postsyntactic linearization algorithm refers to the syntactic output structure, not to previous stages of the derivation. The same holds for vocabulary insertion. There is a coordination head present in the structure given by the syntactic output. Hence, the lexical material we find with IACs is the same as with regular coordination.<sup>7</sup>

The subordinate properties of IACs follow from operations that apply early on in the derivation. Let us take a look at binding first. It has been known since Belletti and Rizzi (1988) that the c-command relation that is required for binding of variables and anaphors need not be present in the output structure. Binding may apply early in the derivation, regardless of whether subsequent movement processes destroy the required c-command relation. This is exactly what we find with IACs. In the base position of an IAC, a variable pronoun is c-commanded by its host in the matrix clause. Hence, it may be bound. The fact that subsequent movement of the whole IAC to Spec&P destroys the c-command relation does not affect the binding relation.<sup>8</sup> In other words, the movement of the complement to Spec&P counterbleeds the binding relation.

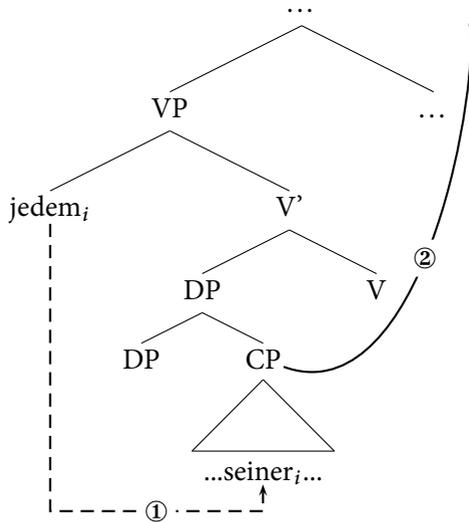
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<sup>6</sup>See Weisser (2014) for further arguments for and instances of this overwriting process.

<sup>7</sup>I do not have anything to say about the applicability of Gapping though. Given that the output structure of the derivation is a coordinate one, subsequent Gapping processes are expected to apply. Hence, a postsyntactic phonological deletion account to Gapping as in Hartmann (2000) is compatible with the approach pursued here. Syntactic approaches to Gapping as in Johnson (1996, 2009) however, are not. However, it must be emphasized that, as far as I can see, these approaches can hardly account for Gapping in German CP-coordination anyway.

<sup>8</sup>A different implementation of binding that is also compatible with the analysis I present is that binding applies postsyntactically on LF and the syntactic movement process dislocating the CP to Spec&P is reconstructed for the purpose of binding.

(19)



The binding relation (indicated by the dashed line) is established (step ①) *before* movement of the CP into a higher position in the tree (step ②). Hence, c-command is given and the configuration is grammatical.

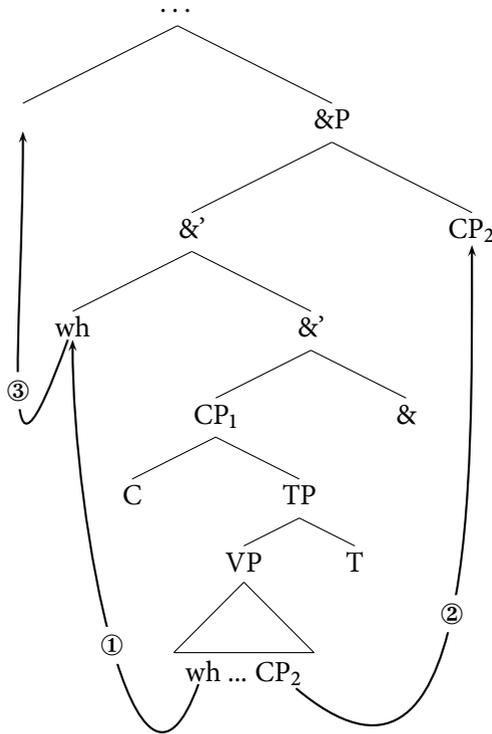
The extraction property of IACs can be explained under the proposed analysis as well. If extraction from out of the matrix clause (or the complement clause) precedes movement of the second conjunct of an IAC to Spec&P, then it avoids the Coordinate Structure Constraint. For the sake of concreteness, I have restated Ross' version of the CSC in more theoretical terms.

(20) *Coordinate Structure Constraint* (updated):

In a structure [<sub>&P</sub> A [<sub>&'</sub> & B ]], movement (out) of either A or B is prohibited.

Given this definition, it is clear why asymmetric extraction from IACs can avoid a violation of the CSC. The CSC prohibits extraction from full coordinate structures. If extraction precedes movement of the second conjunct, then no coordinate structure is present yet and the CSC does not apply. The derivation is given in (21).

(21)



The crucial point of the derivation is when the matrix CP has been merged with the coordination head. Then, as a first step, the *wh*-element is extracted to an intermediate specifier of the coordination head.<sup>9</sup> After that the complement clause moves to Spec&P creating a coordinate structure. From now on, extraction from each conjunct is prohibited. But, crucially, at that point of the derivation, the *wh*-element has already been moved out of the conjuncts. Thus, it may subsequently move further up in the tree (step ③).<sup>10</sup>

It should be noted that the same derivation also applies in simple IAC constructions when it comes to filling the prefield. An element out of the first clause moves to the prefield position (SpecForceP), which is located above the coordination. This is completely unproblematic.

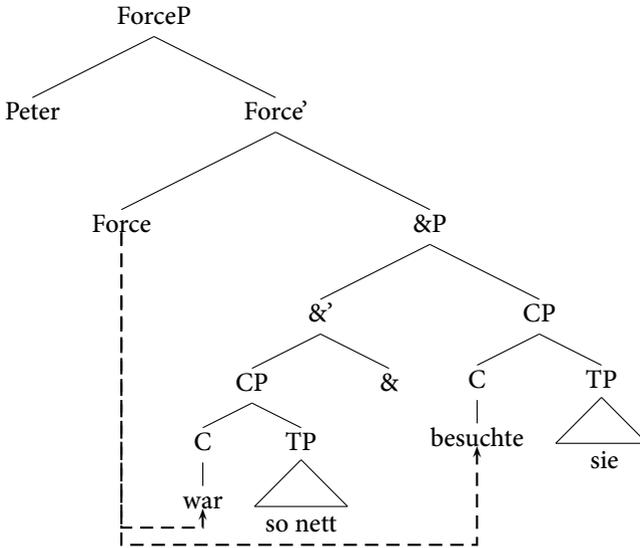
<sup>9</sup>This is basically equivalent to saying that &P is a phase – see Reich (2007) for the same assumption.

<sup>10</sup>Given such a derivational view of the CSC, the same derivation must, of course, be prohibited with symmetric (i.e. base-generated) coordination. As shown in Weisser (2014), this can be done by invoking the Merge-over-Move Principle introduced by Chomsky (1995, 2000).

Before I conclude, I want to briefly address two questions about the analysis above. The first one concerns the identification of the two subjects in this construction. As with regular infinitive constructions, the subjects of both conjuncts of an IAC must be identical. I would like to assume that no new assumptions have to be made to derive this requirement. In its base position, the subject position of the second clause is identified with the subject of the matrix clause. Depending on the different theories of control, this may be accomplished by means of movement or binding of an empty PRO in subject position. As we have seen above, both movement and binding are grammatical with IACs. Hence, any theory that can derive the subject identity in IICs can account for IACs as well.

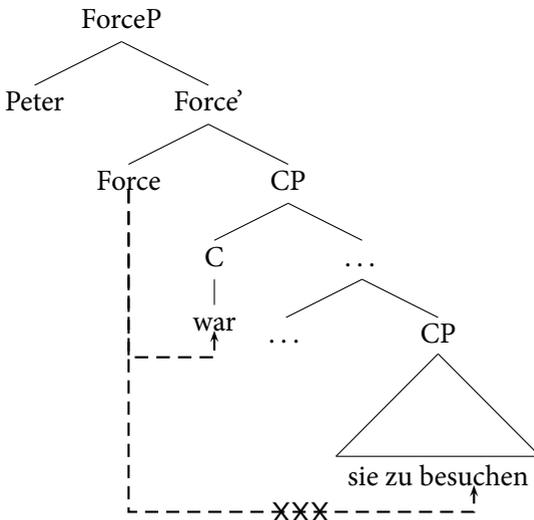
The second question is why the second conjunct of an IAC contains a finite verb whereas the complement clause of an IIC (and hence an IAC in its base position) are nonfinite. I would like to argue that the difference in finiteness can be attributed to whether or not the second clause is local enough to inherit the relevant features from the highest functional projection. Under the standard account to feature inheritance (Chomsky (2001)), the functional heads which are the locus of finiteness features in a clause locally inherit these features by the functional phase heads higher up in the tree. If we apply this assumption to the split CP-structure we adopted in section 3, we could say that the finiteness of a clause is determined by whether or not it is close enough to Force<sup>0</sup> to inherit the relevant finiteness features. In the case of an IAC, the inheritance relation can be established because it is the exact same distance as with regular, base-generated CP-coordination. This is shown in (22).

(22) Local Inheritance in the case of IACs:



However, in the case of IICs, the relation would be extremely non-local crossing a number of functional categories (indicated by the dots in the tree below). In this case, the inheritance relation cannot be established. This does not result in ungrammaticality. Rather, the subordinate complement clause is realized as nonfinite.

(23) Non-Local Inheritance in the case of IICs:



The inheritance account correctly predicts that the complement clause is realized as nonfinite if it stays in situ and is realized as finite if it moves to Spec&P. Also, this account has the positive side effect that the first and the second conjunct in IACs always share the same values with respect to tense and mood – a prediction that, as we have seen in Section 2, is confirmed by Reis (1993). The reason for this is that the relevant features in both conjuncts are always inherited by the same head. Thus, they must be identical.

#### 4. Conclusion

In this article, I have discussed the so-called implicational and-construction and showed how it can be derived under Minimalist assumptions. The major challenge was to find a way to implement the subordinate and the coordinate properties of this construction at the same time. The crucial idea behind the analysis was that the asymmetric syntax of coordination enables the transformation of a subordinate structure into a coordinate one by means of movement. The analysis thus pursues the same idea as the ones in Weisser (2014, to appear) and shows that the same mechanism that is applied to a whole range of phenomena in different languages can also be applied to cases of asymmetric coordination in German.

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# Revisiting the anaphor agreement effect: a new pattern from Tamil

Sandhya Sundaesan \*

## Abstract

This paper presents new data pertaining to the Anaphor Agreement Effect (originally noted in Rizzi 1990, showing that anaphors in many languages seem to be unable to trigger “normal”, i.e.  $\phi$ -covarying agreement) from a hitherto underresearched non-Indo-European language, namely Tamil of the Dravidian family. On the one hand, this data will be seen to further support the AAE as a robust crosslinguistic generalization. On the other hand, it will be shown to yield new insight into the theoretical principles underlying this descriptive one, and to question the possible loci for parametric variation – by virtue of employing a hitherto unreported strategy to obey the AAE. Specifically, it will be argued that the verbal agreement triggered in the scope of the anaphor is triggered, not by the anaphor itself, but by a different DP in the local phase.

## 1. Introduction

The “Anaphor Agreement Effect (AAE)”, originally due to Rizzi (1990), is a descriptive generalization that underscores the oft-noted (Taraldsen 1978, Borer 1989, and subsequent) uneasy relationship between a pro-form and  $\phi$ -agreement. Put simply, it states that an anaphor may not trigger regular  $\phi$ -covarying agreement. There are many logical strategies that a language might pursue to avoid a violation of the AAE. The anaphor may simply never occur in an agreement-triggering position, for instance. Alternatively, an anaphor may occur in such a position but the agreement triggered in its scope may be non  $\phi$ -covarying in one of many ways: for instance, it may be default agreement, or a special agreement form that occurs only in the scope of an anaphor. All of these logical possibilities are empirically attested, as I will show.

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\* Thanks to Gillian Ramchand and Tom McFadden for discussing the ideas in this paper with me on various occasions, and also to the audiences at the Pronouns Tübingen workshop in Tübingen, at the Agreement workshop in Recife, Brazil and in Olomouc, Czech Republic, where versions of this paper were presented, for feedback and fruitful discussion. Any substantive errors are due to me alone.

However, there is another logical possibility that has hitherto not been reported on in the (admittedly rather sparse) literature on the topic: the anaphor might occur in the standard position associated with triggering (normal,  $\phi$ -covarying) agreement, but this agreement could, in this case, be triggered by a different element in the local phase. It is the goal of this paper to introduce and motivate the presence of this strategy in the Dravidian language, Tamil. In addition to expanding on the parametrized strategies for avoiding an AAE violation, this also emphasizes the robustness of the AAE as a potentially universal grammatical generalization.

## 2. A brief history of the AAE and its empirical motivations

The original formulation of the AAE was motivated by minimal pairs like (1) and (2) in Italian:

- (1) A loro import-a solo di se-stessi.  
to them matters-3SG only of them-selves  
'They<sub>i</sub> only matter to themselves<sub>i</sub>.'
- (2) \* A loro interest-ano solo se-stessi.  
to them interest-3PL only them-selves.NOM  
'They<sub>i</sub> only interest themselves<sub>i</sub>.' (intended)

In (1), neither the subject nor the object is nominative: the verb thus surfaces with default 3SG agreement. In (2), the nominative object would normally trigger  $\phi$ -covarying agreement on the verb: however, (2) is ungrammatical. Notably, the nominative object in this sentence is the anaphor *se-stessi*. Furthermore, sentences like (2) become marginally acceptable if the agreement on the verb is replaced with default (non-)agreement:

- (3) ? A loro interest-a solo se-stessi.  
to them interest-3SG only them-selves.NOM  
'They<sub>i</sub> only interest themselves<sub>i</sub>.'

Additionally, the same patterns as in (1)-(2) obtain if the 3rd-person *se* is replaced with 2nd-person *voi*, yielding a bound 2nd-person form:

- (4) A voi import-a solo di voi-stessi.  
to you matters-3SG only of you-selves  
'You<sub>i</sub> only matter to yourselves<sub>i</sub>.'

- (5) \* A voi interest-are solo voi-stessi.  
 to you interest-3PL only you-selves.NOM  
 ‘Only yourselves interest you.’ (intended)

In addition to corroborating the patterns in (1)-(2), the sentences in (3)-(5) show that the problem with the ungrammatical sentences above has to do with agreement, not with some paradigmatic gap having to do with the absence of nominative anaphors in the morphology (as has been claimed for Icelandic, for instance, by Maling 1984, among others).

On the strength of such data, Rizzi concludes, therefore, that “there is a fundamental incompatibility between the property of being an anaphor and the property of being construed with agreement” (Rizzi 1990: 28).

### 2.1. Empirically-attested ways to obey the AAE

Although much work still needs to be done on the subject, the robustness of the AAE as a descriptive generalization has since been tested and confirmed (Woolford 1999, Haegeman 2004, Deal 2010, Tucker 2011, among others) across a wide variety of languages with subject as well as object agreement and mixed agreement systems. What emerges is an interesting typology of parametrized strategies that, as mentioned earlier, instantiate the various logical ways to obey the maxim that an anaphor may not trigger normal  $\phi$ -covarying verbal agreement.

#### 2.1.1. Logical option 1: No $\phi$ -covarying agreement

One way to obey the AAE would be to ensure that  $\phi$ -covarying agreement doesn’t obtain, rendering the question of whether the anaphor occurs in agreement-triggering position or not irrelevant. But there are many logical ways to be non- $\phi$ -covarying: the agreement may involve a frozen default marking or it may be a special “anaphoric agreement” form – i.e. one that is not part of the regular  $\phi$ -paradigm but is triggered only in the scope of an anaphor in agreement-position. Alternatively, the agreement may simply not obtain: e.g. by manipulating the finiteness properties of the clause, or of the argument-structural properties of the predicate in question. All of these possibilities are empirically attested.

Predicate-detransitivizing is one way to prevent agreement from obtaining in the first place. Inuit is a language that employs this strategy. In this language,

the verb is (portmanteau-)marked for both subject and object agreement (6). But when the direct object is an anaphor, object marking on the verb is no longer licit (7) (examples taken from Tucker 2011: 14, formatting mine), just as predicted by the AAE:

- (6) Angutip arnaq taku-vaa.  
 man.ERG woman.ABS see.IND.3SG.SUBJ-3SG.OBJ  
 ‘The man sees the woman.’
- (7) \* Hansiup<sub>i</sub> immi<sub>{i,\*j}</sub> asap-puq.  
 Hansi.ERG himself.ABS wash.IND.3SG.SUBJ-3SG.OBJ  
 ‘Hansi<sub>i</sub> washed himself<sub>{i,\*j}</sub>.’ (intended)

But (7) can be redeemed by suppressing (the overt forms) both the object and the agreement triggered by this object, yielding a “detransitivized” predicate that agrees with the (non-anaphoric) subject alone, thereby avoiding a violation of the AAE. This is illustrated in (8):<sup>1</sup>

- (8) Asap-puq.  
 wash.IND-3SG  
 ‘He<sub>i</sub> washed himself<sub>{i,\*j}</sub>.’

We have already seen an instance of the default agreement strategy in the Italian examples in (2) and (5). Such a strategy is also attested in Inuit and Albanian. In Inuit (9), the anaphoric object is marked with oblique case, and the verb surfaces with default agreement:

- (9) Angut<sub>i</sub> immi-nut<sub>{i,\*j}</sub> taku-vuq  
 man himself-DAT see.IND-3SG  
 ‘The man<sub>i</sub> sees himself<sub>{i,\*j}</sub>.’

In Albanian, a language with a nominative-accusative case system, the anaphor occurs in the nominative. But the agreement triggered in the scope of this anaphor is nevertheless invariant ((10) is reformatted from Massey 1990: 135). Evidence for the invariance of the agreement comes from scrambled minimal variant in (11), taken from Woolford (1999) – the agreement marking on the verb remains invariant at 3SG, even when the nominative object is in the first-person:

<sup>1</sup>The pronominal subject is presumably *pro*-dropped.

- (10) Drites  $i_i$  dhimset vetja $_{\{i,*j\}}$ .  
 Drita.DAT=3SG.DAT pity.3SG.PAST.NACT ANAPH.NOM  
 ‘Drita $_i$  pities herself $_{\{i,*j\}}$ .’
- (11) Vetja $_{\{i,*j\}}$ me $_i$  dhimset.  
 ANAPH.NOM=1SG.DAT pity.3SG.PRS.NACT  
 ‘I $_i$  pity myself $_{\{i,*j\}}$ .’

Finally, the anaphoric agreement strategy is attested in Swahili, an object agreement language (Woolford 1999) – the contrasting agreement markers are highlighted in boldface:

- (12) Ahmed a-na-**ji**/\***m**-penda mwenyewe.  
 Ahmed 3SBJ-PRS-REFL/\*3OBJ-love himself  
 ‘Ahmed $_i$  loves himself $_i$ .’ (emphatic)
- (13) Ahmed a-na-**m**/\***ji**-penda Halima  
 Ahmed 3SBJ-PRS-3OBJ-love Halima.  
 ‘Ahmed loves Halima.’

Crucially, the special *ji* marking on the verb in (12) does not  $\phi$ -covary, nor is it attested elsewhere in the agreement paradigm of the language. Baker (2008: pp. 150-151) provides parallel examples from the Bantu language Chichewa, adapted below (formatting mine):

- (14) Ndi-na-**i**/\***dzi**-khal-its-a *pro[-anaph]* y-a-i-kali.  
 1S-PAST-4O-BECOME-CAUS-FV (them) CL4-ASSOC-CL4-fierce  
 ‘I made them (e.g. lions) fierce.’
- (15) Ndi-na-**dzi**/\***i**-khal-its-a *pro[+anaph]* w-a-m-kali.  
 1S-PAST-REFL-BECOME-CAUS-FV (myself) CL1-ASSOC-CL1-fierce  
 ‘I made myself fierce.’

In (14), the causativized ‘become’ verb shows overt agreement both with the subject and the non-coreferent *pro* object. In the minimally varying (15), the verb again agrees with the subject, but the usual object agreement marking is replaced by a special reflexive form, namely the infix *-dzi-*.

### 2.1.2. Logical option 2: anaphor not in agreement-triggering position

A different logical way to obey the AAE would, of course, be to ensure that the anaphor doesn’t occur in the argument position responsible for triggering

verbal agreement. Simply put, this means that, in a language with subject agreement, the anaphor should be prevented from occurring as the subject and, in a language with object agreement, from occurring as object.

Here again, there are different ways to bring about this negative state of affairs. The anaphor could simply never show up in (or inside) the agreement-triggering position. This is a very common state of affairs attested in many languages. In English, as in many other languages with nominative-accusative case systems,  $\phi$ -covarying agreement on the verb is triggered by a nominative DP. As might be expected given the AAE, such languages simply lack nominative anaphors, leading to the idea (Maling 1984, among others), that the lack of nominative anaphora is the result of an unexplained paradigmatic gap. However, the presence of nominative anaphors in many languages shows that the problem is not the nominative marking per se, but the agreement-triggering capability often associated with it.

A different strategy is to “protect” the anaphor from triggering agreement by embedding it inside another DP in agreement- position. Since the structural conditions required for the anaphor to trigger agreement on the verb don’t exist, the verb surfaces with default agreement instead. The mechanisms of this are likely closely related to those involved in the default agreement strategy described above, given prior analyses of oblique case-marking on a DP as being essentially equivalent to structurally embedding that DP (see Řezáč 2008: in particular, for a detailed analysis along these lines). Hindi seems to be such a language (Tucker 2011):

- (16) \* Atif-ko<sub>i</sub> [<sub>DP</sub> apne aap<sub>i</sub>] pasand hai.  
 Atif-DAT ANAPH.MASC.PL like be.3MSG  
 ‘Atif<sub>i</sub> likes himself<sub>i</sub>.’ (intended)
- (17) Atif-ko<sub>i</sub> [<sub>DP</sub> apne<sub>{i,\*j}</sub>] ri[ʈedaar] pasand hãĩ.  
 Atif-DAT ANAPH.GEN.MASC.PL relatives[NOM] like be.3MPL  
 ‘Atif<sub>i</sub> likes his<sub>{i,\*j}</sub> (male) relatives.’

In both the sentences above, the anaphoric possessor *apne* is embedded inside a larger DP. Rajesh Bhatt (p.c.) mentions that *apne aap* in (16) is a complex reflexive of sorts, with *aap* also being a kind of reflexive element. However, what is key to the grammaticality patterns is that the verbal agreement in (17) seems to be due to the anaphor directly, whereas in (16), it reflects the features of the possessee object as a whole. In other words, despite appearing to be embedded inside another DP in both cases, it is “protected” from triggering

agreement only in (16), and not in (17), yielding grammaticality in the former and ungrammaticality in the latter. This suggests, once again, that as long as the anaphor is structurally prevented from itself triggering agreement on the verb, the AAE will not be violated and the resulting structure may be licit.

Similar protected anaphora behavior has been discussed for Selayerese (a Malayo-Polynesian language, Tucker 2011), Modern Greek (Woolford 1999) and DP-internal possessors in West Flemish (Haegeman 2004).

## 2.2. Languages without overt agreement

It is valid to ask how languages that lack agreement-marking altogether fare with respect to the AAE. If we assume either that the AAE is a condition on the morphological representation of agreement rather than on agreement itself, or that languages without agreement-marking also lack agreement underlyingly, we predict that such languages should freely allow anaphors in all argument positions. In other words, any restriction on the distribution of anaphors in such languages should be independent of the AAE.

This prediction appears to be confirmed. Languages with nominative-accusative case systems lacking in overt agreement – like Khmer, Vietnamese, Thai, Chinese and Malayalam – allow nominative anaphors in subject (as well as object) position. The following Khmer example from Huffman (1970) via Woolford 1999: (formatting mine) illustrates this:

- (18) Mit [teəŋ-pii neəq]<sub>i</sub> kit thaə kluən<sub>{i,\*j}</sub> ciə kounsəh.  
 friend both person think that self be student  
 ‘[The two friends]<sub>i</sub> resonated that they(self)<sub>{i,\*j}</sub> are students.’

Similar behavior is also observed in languages with ergative-absolutive case systems that lack overt marking for object agreement. In such languages, the anaphor may licitly occur in object position without incurring a violation of the AAE. The following example from the Papua New Guinea language, Enga, illustrates this (Lang 1973, Woolford 1999):

- (19) Baa-mé tánge pi-ly-á-mo.  
 he-ERG self hit-PRES-3SG.SUBJ-AUGMENT  
 ‘He<sub>i</sub> is hitting himself<sub>{i,\*j}</sub>.’

Of course, this is just the tip of the iceberg. Further investigation must be undertaken on a wider sampling of languages without overt agreement to

test their behavior with respect to the AAE. If it can be shown that some of the languages that lack overt agreement nevertheless do obey the AAE (note, incidentally, that this will not necessarily be a straightforward task), this would be important potential evidence that the AAE operates at the level of abstract underlying agreement, rather than at that of surface agreement-marking.

Based on the knowledge garnered on the topic thus far, however, we may, for now, formulate the AAE as follows (taken from Tucker 2011: p. 30, ex. 40):

- (20) “Anaphors do not occur in syntactic positions construed with covarying  $\phi$ -morphology.”

### 3. Enter Dravidian

The Dravidian languages have been singled out in the literature for their recalcitrant behavior with respect to the AAE. Kayne (1994: 54) first observed that Dravidian languages are potentially problematic for Rizzi’s AAE, noting that in a subject-agreement Dravidian language like Tamil, a nominative marked anaphor may occur in (embedded) subject position. Kayne’s claim has been contested in Woolford (1999) on the grounds that the agreement triggered under the nominative anaphor is either invariant default agreement marking a gerundival clause (21) or is a clearly mismatched (thus also not co-varying) 1SG agreement, as in (22):<sup>2</sup>

- (21) [Seetha var-r-ad-aagæ] Murugeesan so-nn-aarũ.  
ANAPH.NOM.SG come-PRES-3NSG-NMLZ Murugeesan say-PST-3MSG  
‘Murugeesan spoke [of Seetha’s coming].’
- (22) Murukeesan<sub>i</sub> [CP taan<sub>{i,\*j}</sub> var-r-een-nnũ]  
Murugesan.NOM ANAPH.NOM come.PRS-1SG-COMP  
so-nn-aarũ.  
say-PST-3MSG  
‘Murugesan<sub>i</sub> said [that he<sub>{i,\*j}</sub> would come].’

Woolford’s account has since been contested by Selvanathan and Kim (2008), who point out that structures like (21) and (22) don’t exhaust the possibilities for agreement under *ta(a)n* in Tamil. For a core group of speakers, sentences like that in (23) are licit as well – the verbal agreement under *ta(a)n* is 3MSG,

<sup>2</sup>Crucially, the Dravidian anaphor *ta(a)n* cannot take 1st- or 2nd-person antecedents, which makes it difficult to argue that this agreement is triggered by the anaphor directly.

makes it harder to dismiss the idea that the agreement is triggered directly by *ta(a)n*, in violation of the AAE:

- (23) Murukeesan<sub>i</sub> [taan<sub>{i,\*j}</sub> varu-gir-aar-ünnü] so-nn-aarü.  
 Murugesan.NOM ANAPH.NOM come-PRES-3MSG-COMP say-PST-3MSG  
 ‘Murugesan<sub>i</sub> said [that he<sub>{i,\*j}</sub> would come].’

Below, I take a closer look at the Dravidian sentences with a view toward determining whether they really are problematic for the AAE. On the basis of this investigation, conducted on the Dravidian language Tamil, I will conclude that such structures do not, in fact, constitute counter-examples to the AAE, but obey it. However, Tamil employs a new logical possibility to avoid its violation. Specifically, the agreement triggered in the scope of the (nominative) anaphor is  $\phi$ -covarying, but is not triggered directly by the anaphor itself. Rather, it is triggered by a different element in the local phase. Tamil (and potentially other languages, as I briefly discuss below) thus instantiates a different strategy for preserving the AAE from those discussed earlier.

#### 4. “Anaphoric agreement” in Tamil

Tamil uniformly manifests subject agreement on the verb:

- (24) [Nii paris-æ tookkapoo-gir-aaj-ünnü] Raman  
 you[NOM] prize-ACC lose.go- PRS-2SG-COMP Raman  
 namb-in-aan.  
 believe-PST-3MSG  
 ‘Raman<sub>j</sub> believed [<sub>CP</sub> that you would lose the prize].’

The Tamil anaphor *ta(a)n* may occur in both object and (agreement-triggering) subject position. When *ta(a)n* is the object, the AAE is trivially satisfied, since an object position is not an agreement-triggering position in Tamil. When it is a subject, *ta(a)n* may occur as a (null-)marked nominative or as a “quirky” dative. In the latter instance, the verb surfaces with default agreement, which is 3NSG:

- (25) Raman<sub>i</sub> [<sub>CP</sub> tan-akkü<sub>{i,\*j}</sub> romba pasi-tt-ad-ü-nnũ]  
 Raman ANAPH-DAT very much hunger-PST-3NSG-COMP  
 namb-in-aan.  
 believe-PST-3MSG  
 ‘Raman<sub>i</sub> believed [<sub>CP</sub> he<sub>{i,\*j}</sub> was very hungry].’

The structure in (25) thus also satisfies the AAE since the agreement triggered in the scope of the anaphor is not  $\phi$ -varying. The real issue is thus the nature of agreement triggered under the nominative anaphor. This agreement, as it turns out, is very revealing and is the focus of the rest of this discussion.

We have, of course, already seen an example of this – in (23), the agreement on the clausemate embedded verb of *ta(a)n* is 3MSG. What we will see now is that this agreement is not frozen, but  $\phi$ -covarying. What is intriguing, however, is that this agreement seems to covary, not with *ta(a)n* itself, but with the antecedent of *ta(a)n*:

- (26) Mia<sub>i</sub> [<sub>CP</sub> Sri<sub>j</sub> [<sub>CP</sub> taan<sub>{i,\*j}</sub> too-pp-aa[-ünnũ]  
 Mia.NOM Sri.NOM ANAPH.SG.NOM lose-FUT-3FSG-COMP  
 nene-tt-aan-nũ] paar-tt-aa].  
 think-PST-3MSG-COMP see-PST-3FSG  
 ‘Mia<sub>i</sub> saw [<sub>CP</sub> that Sri<sub>j</sub> thought [<sub>CP</sub> that she<sub>i</sub>/\*he<sub>j</sub> would lose]].’
- (27) Mia<sub>i</sub> [<sub>CP</sub> Sri<sub>j</sub> [<sub>CP</sub> taan<sub>{j,\*i}</sub> too-pp-aan-ünnũ]  
 Mia.NOM Sri.NOM ANAPH.SG.NOM lose-FUT-3MSG-COMP  
 nene-tt-aan-nũ] paar-tt-aa].  
 think-PST-3MSG-COMP see-PST-3FSG  
 ‘Mia<sub>i</sub> saw [<sub>CP</sub> that Sri<sub>j</sub> thought [<sub>CP</sub> that he<sub>j</sub>/\*she<sub>i</sub> would lose]].’
- (28) Koḷændæ<sub>i</sub> naḷandadæ-patti joosi-čč-adũ.  
 child[SG.NOM] happening-ACC-about reflect-PST-3NSG.  
 Taan<sub>i</sub> een kaṣṭappat[<sub>t</sub>-iru-kk-adũ]  
 ANAPH[NOM] why suffer-PRF-PRS-3NSG  
 ‘[The child]<sub>i</sub> reflected about what had happened. Why had it<sub>{i,\*j}</sub> suffered so?’

When the intended antecedent is 3FSG *Maya* (26), the agreement under *ta(a)n* is also 3FSG. But in the minimally varying (27), the agreement under *ta(a)n* is 3MSG, with the only possible antecedent being *Raman*. Finally, in (28), *ta(a)n* refers “logophorically” to the extra-sentential attitude-holder *Seetha*, but the

agreement under *ta(a)n* must still reflect the  $\phi$ -features of this antecedent: if *Seetha* were replaced by 3MSG *Raman*, the agreement-marking would be 3MSG *-aan* instead. This yields the following descriptive generalization:

- (29) The verbal agreement tracks the antecedent of the anaphor *ta(a)n*.

#### 4.1. Unviable analytic options

There are (at least) three possible ways to interpret the generalization in (29) above. Here, I show why two of them are unviable.

The first option, given that Tamil is elsewhere a uniformly subject-agreement language (see again (24)), would be to propose that the source of agreement under *ta(a)n* is *ta(a)n* itself. In this case, structures like (26)-(28) would constitute an exception to the AAE. Thus, such an analytic option is to be dispreferred on grounds of theoretical economy (pending independent empirical evidence to the contrary). Since the agreement triggered under *ta(a)n* may vary, this would be tantamount to proposing, with no independent evidence to support it, that *ta(a)n* has three different sets of  $\phi$ -features in each of the examples above: i.e. that there are three underlyingly distinct anaphors that all happen to be pronounced “*ta(a)n*”. If we additionally take structures like (22) into account, where the verbal agreement triggered under *ta(a)n* is actually 1SG, we would be forced to posit a fourth variant of *ta(a)n* – one which is a 1st-person indexical. Finally, under such an approach, the fact that the features on the verb track those of *ta(a)n*’s antecedent would either have to be treated as coincidence or explained separately.

The second analytical option would be to claim that the agreement on the verb under *ta(a)n* is triggered by the anaphor’s antecedent – e.g. via long-distance agreement (potentially via *ta(a)n*) or some other sort of feature-percolation mechanism. But there are (at least) two independent reasons to reject this option. The first piece of counter-evidence comes from structures like (22) (discussed earlier) and (30) below. These are special structures involving the clausal complement of a speech predicate. The anaphor *ta(a)n* is the nominative subject of this complement; but the agreement triggered under it is 1SG:

- (30) [<sub>CP</sub> Sai<sub>i</sub> [<sub>CP</sub> taan<sub>{i,\*j}</sub>      ɕej-pp-een-nnũ] so-nn-aan-nnũ]  
       Sai            ANAPH[NOM]<sub>i</sub> win-FUT-1SG-COMP say-PST-3MSG-COMP  
       Sri<sub>j</sub> nene-čč-aan.  
       Sri thought-PST-3MSG  
       ‘Sri<sub>j</sub> thought [<sub>CP</sub> that Sai<sub>i</sub> said [<sub>CP</sub> that he<sub>{i,\*j}</sub> would win].’

The agreement pattern in these sentences seems superficially dissimilar to those seen in (26)-(28), where the verbal agreement simply matches the  $\phi$ -features of the antecedent of *ta(a)n*. But if we look closer, we see that the sentences in (30) and (22) also obey the antecedent tracking generalization described in (29). The 1SG agreement only obtains when the antecedent is the AGENT of a speech-predicate; if the antecedent were *Krishnan*, antecedent-matching 3MSG agreement would obtain instead. Additional evidence supporting this conclusion comes from number marking on the verb. When the agent of the speech predicate (which also serves as the antecedent of the anaphor) is plural, the agreement on the verb under *ta(a)n* is 1PL not 1SG:

- (31) Pasaŋ-ga<sub>i</sub> [<sub>CP</sub> taaiŋ-ga<sub>{i,\*j}</sub>      ɕej-pp-oom/\*aanga]-ũnnũ]  
       boy-PL.NOM [    ANAPH-PL.NOM<sub>i</sub> win-FUT-1PL/\*3MPL-COMP]  
       so-nn-aaŋ-ga<sub>i</sub>.  
       say-PST-3M-PL  
       ‘The boys said [<sub>CP</sub> that they<sub>{i,\*j}</sub> would win].’

All this shows that the agreement is sensitive to the identity of the anaphor’s antecedent even in cases where its  $\phi$ -features don’t match those of the antecedent. Sundaesan (2012) argues that the 1st-person agreement under *ta(a)n* instantiates Kaplanian indexical shift for 1st-person (Kaplan 1989, Schlenker 2003) – where the 1st-person refers to the Speaker of the context introduced by the speech predicate in the sentence, and not to the Speaker of the utterance context. In other words, the lack of antecedent  $\phi$ -matching in structures like (30) and (31) is not because the agreement doesn’t track the antecedent – but because the evaluation context against which  $\phi$ -features are evaluated is different in the embedded and matrix clauses in these sentences.

Regardless of how the agreement patterns here are to be derived, however, it is clear that we can no longer easily maintain the idea that the agreement features are copied directly from the antecedent (via long-distance feature-transmission or some other similar mechanism). Further evidence against this view comes from structures involving logophoric dependencies, like that in (28): it is

difficult to see how feature-transmission from the antecedent would work inter-sententially.

To sum up, the discussion above shows that the verbal agreement that obtains under *ta(a)n* in the Tamil structures above is triggered neither by *ta(a)n* nor by its antecedent. The source of agreement on the clausemate verb of *ta(a)n* in these structures must thus be something else.

#### 4.2. A viable option: a mediating *pro*

Given the two logical options we have just eliminated, and assuming that agreement is instantiated as a narrow-syntactic Agree operation<sup>3</sup> between a Probe and a Goal in the Minimalist sense, the relevant state of affairs may be summarized as follows:

**Assumption:**  $\phi$ -feature agreement is locally implemented in the Narrow Syntax. I.e. verbal agreement (realized on the T head) is triggered by an element that is (phase-)local to T.

**Observation I:**  $\phi$ -feature agreement on T under nominative subject *ta(a)n* is not directly triggered by *ta(a)n*.

**Observation II:**  $\phi$ -feature agreement on T under nominative subject *ta(a)n* is not directly triggered by the antecedent of *ta(a)n* (which is not local to the T head, in any case).

**Observation III:** But  $\phi$ -feature agreement on T nevertheless tracks the antecedent of *ta(a)n*.

This in turn leads us to the following conclusions. There must be a *third* element ( $\neq$  antecedent, and  $\neq$  the anaphor), local to both *ta(a)n* and the T head, which triggers  $\phi$ -agreement on T. This element must, of course, have valued  $\phi$ -features at the point at which it checks those on T: we might thus envision it as a kind of (null) pronoun or *pro*. The antecedent-tracking effect of agreement would follow naturally from the assumption that this *pro* and the antecedent must corefer. If the  $\phi$ -features of the antecedent and of *pro* are computed against the same evaluation context (the default scenario), coreference would entail

<sup>3</sup>That said, for the purposes of the current discussion, it wouldn't make a great deal of difference if  $\phi$ -Agree were to be construed as a post-syntactic phenomenon, in the sense of Bobaljik (2008). What is relevant here is that Agree be subject to phase-locality.

$\phi$ -matching. By extension, the verbal agreement triggered by *pro* would also match the  $\phi$ -features of the antecedent, yielding the antecedent-tracking effect observed in (26)-(28). But in cases where these evaluation contexts differ – as in the examples in (22), (30), and (31) – the  $\phi$ -features would not match, even under coreference, precisely because the contexts against which  $\phi$ -values are computed differ. Rather, the *pro* in such cases would be a shifted 1st-person indexical denoting the same entity as the antecedent; it would thus trigger 1st-person agreement on the T head.

An important question that this raises is why the *pro* is present in the first place (after all, triggering agreement could not be its sole reason for being). What I propose (Sundaesan 2012) in line with prior work (Koopman and Sportiche 1989) is that this silent pronoun plays a central role in mediating long-distance anaphoric dependencies in languages with perspectival anaphoric systems like Tamil (and also others, like Icelandic and Italian). In such languages, the antecedent of the anaphor always denotes an individual who holds a mental and/or spatio-temporal perspective toward some minimal predication containing the anaphor. As such, I propose that this null pronoun is also associated with a perspectival feature which allows it to pick out a perspective-holder at LF, which serves as the antecedent. In other words, this perspectival pronoun mediates the relationship between the anaphor and its antecedent at LF; triggering agreement on the T head under *ta(a)n* is incidental. Following analogous data and discussion in Sells (1987), Koopman and Sportiche (1989), Bianchi (2003), Speas (2004), Baker (2008), among others, on logophoric operators in the clausal left-periphery in other languages (motivated, among others, by the observation that many CPs containing logophors are marked with special complementizers) – I propose that this perspectival pronoun is the specifier of a perspectival phrase (PerspP) in the left periphery of the local clause containing the anaphor. In ongoing work (Sundaesan and Pearson 2014), I take an even stronger position, arguing that this perspectival pronoun occurs in several predications (*v*Ps involving change-of-state and psych verbs, temporal and spatial PPs and CPs, as well as the so-called “taste predicates” (Stephenson 2010: among others)) and manipulates the syntactico-semantics of

spatial, temporal and mental perspectival relations (including, but not limited to, anaphora) in these.<sup>4</sup>

### 4.3. Formally deriving anaphoric agreement in Tamil

We can now see how the two types of antecedent-tracking agreement patterns in Tamil – the first involving  $\phi$ -matching and the second involving 1st-person agreement – may be formally derived. Consider again the  $\phi$ -matching sentence in (26), repeated below:

- (32) Mia<sub>i</sub> [CP Sri<sub>j</sub> [CP taan<sub>{i,\*j}</sub> too-pp-aa[-ünnü]  
 Mia.NOM Sri.NOM ANAPH.SG.NOM lose-FUT-3FSG-COMP  
 nene-tt-aan-nü] paar-tt-aa].  
 think-PST-3MSG-COMP see-PST-3FSG  
 ‘Mia<sub>i</sub> saw [CP that Sri<sub>j</sub> thought [CP that she<sub>i</sub>/\*he<sub>j</sub> would lose]]’

In the current model, the antecedent is associated with the anaphor, and the *pro* operator that binds it, only at LF, and the Agree operations in the syntax (or post-syntax) are assumed to function under phase-locality. This means that, as far as the syntax is concerned, the only relevant piece of structure is the local phase (CP) containing the anaphor and *pro*. The derivation is fairly straightforward. Given the current model, the various players in the Agree relationship are born with the following features:<sup>5</sup>

<i>pro</i> in [Spec, PerspP]	Anaphor ( <i>ta(a)n</i> )	T
[DEP: <i>x</i> , $\phi$ : 3fsg]	[DEP: $\_$ , $\phi$ : $\_$ ]	[ $\phi$ : $\_$ ]

The derivation proceeds bottom-up as follows:<sup>6</sup>

1. MERGE( $\nu$ P, T)  $\rightarrow$  T’
2. MERGE(DP<sub>*ta(a)n*</sub>, T’)  $\rightarrow$  TP
3. AGREE(T [ $\phi$ :  $\_$ ], DP<sub>*ta(a)n*</sub> [ $\phi$ :  $\_$ ])  $\rightarrow$  {T [ $\phi$ :  $\_i$ ], DP<sub>*ta(a)n*</sub> [ $\phi$ :  $\_i$ ]}

<sup>4</sup>Incidentally, the independent motivation for the presence of a perspectival pronominal operator in the left-periphery of certain maximal projections is another argument against the idea that the verbal agreement triggered under the anaphor *ta(a)n* is directly due to *ta(a)n* itself.

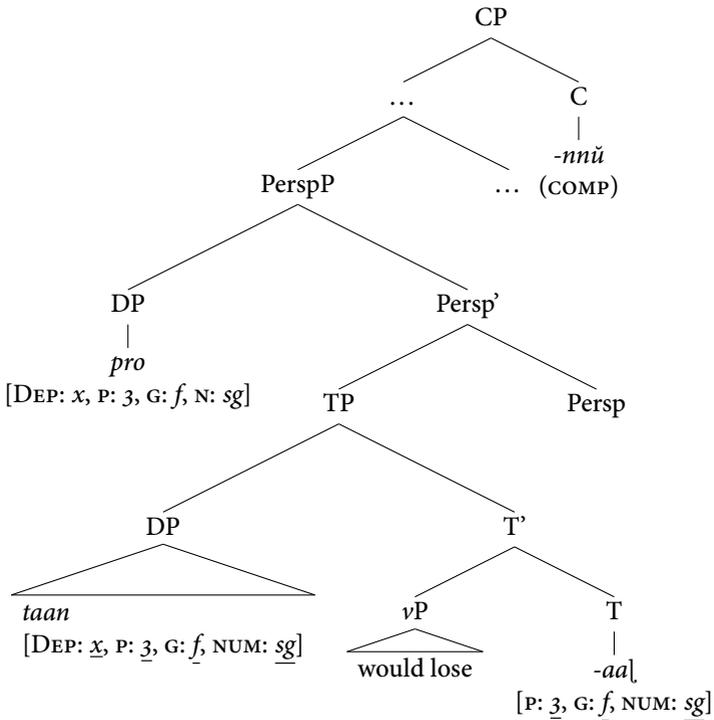
<sup>5</sup>In addition to the features listed below, I assume that both *ta(a)n* and the perspectival pronoun are endowed with a categorial D feature and case features. These are not included here for reasons of perspicuity.

<sup>6</sup>Intermediate bar-levels of projection are assumed for expository purposes only.

4. MERGE(Persp, TP) → Persp'
5. MERGE(DP<sub>pro</sub>, Persp') → PerspP
6. AGREE({T [ $\phi$ :  $\_i$ ], DP<sub>ta(a)n</sub> [ $\phi$ :  $\_i$ ], DP<sub>pro</sub> [ $\phi$ : 3fsg]) → {T [ $\phi$ : 3fsg], DP<sub>ta(a)n</sub> [ $\phi$ : 3fsg]}
7. AGREE(DP<sub>ta(a)n</sub> [DEP:  $\_$ ], DP<sub>pro</sub> [DEP:  $x$ ]) → DP<sub>ta(a)n</sub> [DEP:  $x$ ]

Step 3 involves an Agree relation between two sets of unvalued  $\phi$ -features, on T and the anaphoric subject DP, respectively. Following Pesetsky and Torrego (2007), I assume that this yields feature sharing for  $\phi$ -features on T and DP such that these essentially function as a joint probe to get these features valued. I indicate this notationally by the coindexation of the values that  $\phi$ -Agree will result in. The tree structure for this CP after Agree and before Spell-Out, thus looks like this:<sup>7</sup>

(33)



<sup>7</sup>In the trees shown here, inherited/valued features are notationally distinguished from inherent ones by means of underlining on the former. This is only a visual mnemonic for purposes of explication and should not be treated as a higher-order feature.

At LF, the matching DEP-values on  $DP_{ta(a)n}$  and  $DP_{pro}$  trigger binding of the former by the latter (the latter being construed as the binder since it asymmetrically c-commands the former): the two DPs now refer to the same entity. The assignment function then maps these elements to a salient perspective-holder in the evaluation context; the antecedent DP denoting this perspective-holder must also bear 3FSG features. Thus, in (33),  $DP_{ta(a)n}$  and  $DP_{pro}$  are both assigned to refer to the female entity Mia, and not to the male one Sri. Thus, the antecedent *Mia*,  $DP_{ta(a)n}$ ,  $DP_{pro}$  as well as the  $\phi$ -features on T are all set to 3FSG – explaining the antecedent  $\phi$ -matching effect observed earlier.

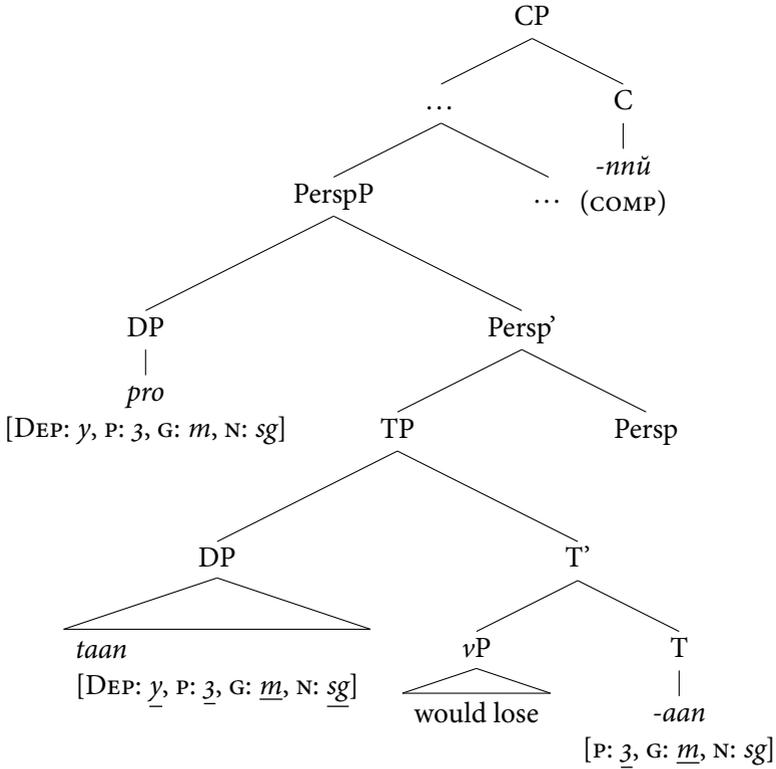
The derivation of the minimally varying sentence in (27), repeated below, is very similar, yielding the following structure post-Agree and pre-SpellOut:

- (34)  $Mia_i$  [<sub>CP</sub>  $Sri_j$  [<sub>CP</sub>  $taan_{\{j,*i\}}$  too-pp-aan-ünnü]  
 Mia.NOM Sri.NOM ANAPH.SG.NOM lose-FUT-3MSG-COMP  
 nene-tt-aan-nü] paar-tt-aa].  
 think-PST-3MSG-COMP see-PST-3FSG  
 ‘ $Mia_i$  saw [<sub>CP</sub> that  $Sri_j$  thought [<sub>CP</sub> that he<sub>j</sub>/\*she<sub>i</sub> would lose]].’

The only difference between this and the structure in (33) has to do with the  $\phi$ -feature values on *pro*.<sup>8</sup> As illustrated below, the perspectival pronoun in (27) is born with 3MSG  $\phi$ -values: it thus values the features on T and *ta(a)n* as 3MSG (yielding 3MSG rather than 3FSG agreement under *ta(a)n*). At LF, *ta(a)n* and *pro* are both mapped onto a male (rather than female) perspective-holder, represented by the 3MSG DP *Sri*. Both the differences in agreement and antecedent-values between (32) and (34), and the similarity with respect to antecedent-tracking effect of agreement in both, are thus straightforwardly captured:

<sup>8</sup>It is assumed that there are no restrictions on the  $\phi$ -features that *pro* may be born with. The syntax essentially overgenerates, and ill-formed structures – such as, for instance, a 3FSG *pro* and *ta(a)n* denoting a male perspective-holder – are filtered out at LF.

(35)



To complete the paradigm, let us now look at the special structures involving 1st-person verbal agreement under *ta(a)n*. The structure below is a simpler version of (30):

- (36) Sai<sub>i</sub> [<sub>CP</sub> taan<sub>{i,\*j}</sub>    ɕej-pp-een-nnũ]    so-nn-aan.  
 Sai    ANAPH[NOM]<sub>i</sub> win-FUT-1SG-COMP say-PST-3MSG-COMP  
 ‘Sai<sub>i</sub> said [<sub>CP</sub> that he<sub>{i,\*j}</sub> would win].’

The syntactic derivation for (36) proceeds as follows:

1. MERGE(*vP*, T) → T'
2. MERGE(DP<sub>ta(a)n</sub>, T') → TP
3. AGREE(T [ $\phi$ :  $\_$ ], DP<sub>ta(a)n</sub> [ $\phi$ :  $\_$ ]) → {T [ $\phi$ :  $\_i$ ], DP<sub>ta(a)n</sub> [ $\phi$ :  $\_i$ ]}
4. MERGE(Persp, TP) → Persp'
5. MERGE(DP<sub>pro</sub>, Persp') → PerspP

6. AGREE( $\{T [\phi: \_i], DP_{ta(a)n} [\phi: \_i]\}, DP_{pro} [\phi: 1sg]$ )  $\rightarrow$   
 $\{T [\phi: 1sg], DP_{ta(a)n} [\phi: 1sg]\}$
7. AGREE( $DP_{ta(a)n} [DEP: \_], DP_{pro} [DEP: y]$ )  $\rightarrow DP_{ta(a)n} [DEP: y]$

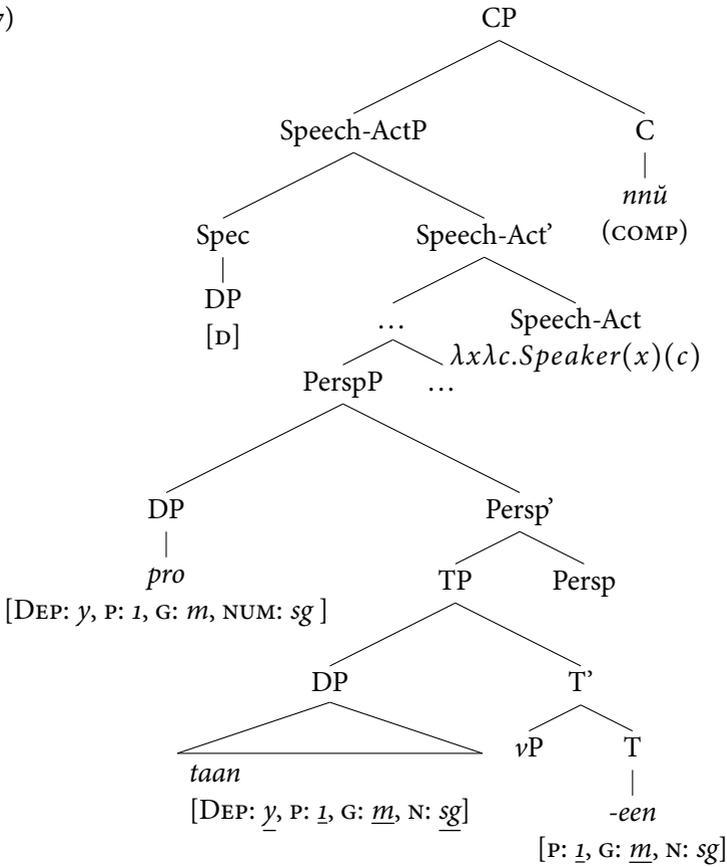
An important difference between (36) and a sentence like (32) is that the perspectival pronoun in [Spec, PerspP] is born with 1SG features. There is no special rule that ensures this as mentioned earlier: the syntax simply overgenerates and ill-formed structures are filtered out at the interfaces.  $DP_{ta(a)n}$  and T are thus both valued as 1SG.

A further difference in (36) is that the evaluation context of the embedded CP is not the utterance-context but the “context” pertaining to the speech-event denoted by the matrix speech verb; this is an available option since the speech-verb selects a CP with a SpeechActP in the left-periphery (see Sundaresan 2012 for discussion). Thus, 1st-person on *pro* doesn’t denote the speaker of the utterance context, but the speaker invoked by the speech-verb – namely Sai. This speaker is also a perspective-holder with respect to the embedded CP, thus qualifies at LF, to serve as the antecedent of *ta(a)n*. Notice, incidentally, that the root CP is evaluated against the utterance-context: thus the matrix subject denoting the male agent of the speech-verb, triggers 3MSG agreement on the matrix verb. The tree-structure for the syntactically relevant part of the derivation – namely the embedded CP – is depicted below, post-Agree and before SpellOut:<sup>9</sup>

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<sup>9</sup>The SpeechActP, selected by the speech-verb, sets the evaluation context to be that associated with the speech-verb. For further details and discussion of the nature of SpeechActP and the representation of this context, see Sundaresan (2012).

(37)



There is, of course, nothing in the syntax that prevents the *pro* in (37) from being 3rd-person – and by extension, also *ta(a)n* and agreement on embedded T. But this 3rd-person feature will again be evaluated against the context associated with the speech-verb, not against the utterance context. It will thus necessarily denote an individual *other* than the agent of the speech-predicate, Sai. In other words, Sai could not function as the antecedent of *ta(a)n*; since there is no other salient antecedent in the structure, the sentence will crash at LF. But if there is another salient perspective-holder in the structure – as in (38) below, the problem will be obviated:

- (38) [<sub>CP</sub> Sai<sub>i</sub> [<sub>CP</sub> taan<sub>{j,\*i}</sub>      ɕej-pp-aan-nnũ]  
       Sai            ANAPH[NOM]<sub>i</sub> win-FUT-3MSG-COMP  
       so-nn-aan-nnũ]      Sri<sub>j</sub> nene-čč-aan.  
       say-PST-3MSG-COMP Sri    thought-PST-3MSG  
       ‘Sri<sub>j</sub> thought [<sub>CP</sub> that Sai<sub>i</sub> said [<sub>CP</sub> that he<sub>{j,\*i}</sub> would win].’

In (30), we assume that *pro* in the innermost CP is born with 3MSG features: it values *ta(a)n* and T with these same features. At LF, *pro* and *ta(a)n* cannot refer to Sai – for the reasons given above. But there is another salient perspective-holder which is evaluated as 3MSG in the context associated with the speech-verb (and incidentally, also relative to the utterance context): this is the entity denoted by the matrix subject *Sri*. Thus *pro* and *ta(a)n* are mapped onto this entity with the result that *Sri* is construed as the antecedent of *ta(a)n* in (38).

## 5. Tamil anaphoric agreement and the AAE

The discussion above shows that Tamil does not employ any of the parametric strategies used by other languages to avoid a violation of the AAE – described in Section 2.1. The Tamil anaphor is not “protected” from triggering agreement, as illustrated for Hindi; the verbal agreement triggered under the nominative subject anaphor *ta(a)n* is not a frozen, default form, as observed for Italian, Inuit, and Albanian; nor is it a special morphological form that obtains only in the scope of anaphors – as observed for Swahili and Chichewa.

But Tamil nevertheless does have a strategy to avoid an AAE violation in the structures discussed above. The agreement triggered under nominative subject *ta(a)n* is  $\phi$ -covarying. But it is ultimately triggered, not by *ta(a)n* (even though the latter is in the standard agreement-triggering position for this language, namely the structural subject position) but by some other element in the local domain of T. This element, I have argued, is the perspectival *pro* is the specifier of a Perspectival Phrase in the left periphery of the clause containing *ta(a)n*. In the account developed here, the anaphor also participates in  $\phi$ -agreement; but it crucially is not a *source* of  $\phi$ -agreement on T: rather T and the anaphor jointly function as probes for  $\phi$ -valuation. The Tamil strategy for avoiding an AAE violation is thus to ensure that the agreement is triggered by some other element in the local domain of the probing head.

Our original formulation of the AAE, based on the discussion of parametric strategies in Section 2.1 was that in (20), repeated below:

- (39) “Anaphors do not occur in syntactic positions construed with covarying  $\phi$ -morphology.”

The Tamil data investigated here suggests that this must be modified as in (40) below:

- (40) **Anaphor Agreement Effect (updated):** Anaphors typically do not occur in syntactic positions construed with covarying  $\phi$ -morphology. If an anaphor *does* occur in this position, there must be some other element in the local domain that can instead serve as the source of agreement, both for the verb and the anaphor.

### 5.1. How rare is the Tamil strategy?

A valid question to ask, at this juncture, is how unique this strategy is crosslinguistically and, relatedly, what about Tamil allows it to “get away” with it.

The answer is that it may not actually be such a rare strategy as it seems. For instance, the Niger Congo language Donna Sɔ seems to manifest a phenomenon that looks a lot like the special 1st-person agreement seen in Tamil speech complements (the example below is taken and reformatted from Curnow 2002):

- (41) Oumar [<sub>CP</sub> inyemɛ jɛmbɔ paza bolum] miñ tagi.  
 Oumar [ ANAPH[SBJ] sack.DEF drop left.1SG] 1SG.OBJ informed  
 ‘Oumar<sub>i</sub> told me [<sub>CP</sub> that he<sub>{i,\*j}</sub> had left without the sack].’

In (41), we have an anaphoric subject – seemingly occurring in  $\phi$ -covarying subject position. The agreement triggered on the verb under this anaphor is 1SG. Notably, the minimal CP containing the anaphor is a speech complement. Under the old formulation of the AAE (see again (39)), the sentence in (41) would constitute a counter-example to the AAE; but it is entirely accountable under the updated version in (40). The agreement pattern seen in (41) might be explained along the same lines as the 1st-person anaphoric agreement in Tamil: i.e. we might say that the agreement is triggered by an obligatorily shifted 1st-person *pro* in the left periphery of the embedded CP, which also corefers with the antecedent *Oumar*. Of course, further research needs to be undertaken into the anaphoric and agreement systems in Donna Sɔ to see to what extent such an analysis would be viable for this language. But the striking resemblance to Tamil structures like (30) above is suggestive.

Analogous structures may also be attested in Amharic. Amharic has been discussed in the literature as a language that manifests indexical shift (Schlenker 1999: among others). But in some of the clauses where indexical shift has been shown to obtain, the putatively shifted indexical is actually a silent *pro* (as in (42) below, from Delfitto and Fiorin 2011: but ultimately due to Malamud (2006)):

- (42) Profäsəru<sub>i</sub> [<sub>CP</sub> *pro*<sub>i</sub> bät'am bəzu səra ə-sär-allähu]  
 professor      *pro*    very    much work 1SG-work.IMP-AUX.1SG  
 alä.  
 say.PRF.3SG.MASC  
 'The professor<sub>i</sub> said [<sub>CP</sub> that he<sub>i</sub> works very hard].'

But, of course, since the subject is silent, we have no obvious way of knowing that it really is a 1st-person indexical (as also pointed out in Delfitto and Fiorin 2011: 219). That it is tacitly treated as such is actually due to the 1st-person agreement marking on the clausemate verb. But structures like Tamil (30) and now (potentially) (41), raise the possibility that it is a null anaphor instead, and that the 1st-person agreement is triggered by a shifted 1st-person *pro* higher up in the clause. Indeed, there seems to be independent evidence to support the latter option: Delfitto and Fiorin further note that the null subject may be construed *de re* with respect to the matrix subject. If it were really a shifted 1st-person indexical, this would be unexpected; but a *de re* construal is predicted to be possible if it is a null anaphor, instead (see also Pearson 2013 for arguments in favor of possible *de re* construals involving anaphors). Thus, it is possible that Amharic too adopts the Tamil strategy for avoiding a violation of the AAE.

Further research into the agreement and anaphora patterns of these and other languages must be done before anything more definitive can be said. What we can perhaps already say is that, in general, two properties would have to hold for a language to be able to adopt the AAE strategy proposed here for Tamil. First, it would need to have another potential (non-anaphoric) candidate in the local domain which could trigger agreement instead of the anaphor. In Tamil, the presence of this candidate was seen to be motivated by the perspectival nature of anaphora. Thus, we might predict that other languages which have both overt agreement marking and similar perspectival systems, would also have recourse to this option. Second, the agreement mechanism of this language has to be set up such that, when the DP argument in agreement-triggering position

is itself unable to trigger agreement, local probing continues on until the next available candidate is found rather than surfacing as an invariant default form or crashing (the latter of which, of course, Preminger 2014 independently argues against). It is unclear at this juncture what independent grammatical factors regulate this choice.

## 6. Conclusion and theoretical speculations

I have presented novel data and reconsidered old data from the Dravidian language Tamil, pertaining to the nature of verbal agreement triggered under the anaphor *ta(a)n*, when the latter appears with nominative case in agreement-triggering subject position. In the process, I have argued that this agreement, which looks like standard  $\phi$ -covarying agreement, is nevertheless special and is special because the subject, the standard source of agreement in Tamil, is an anaphor. Specifically, the agreement is triggered in such cases, not by the anaphor, but by another element in the local phase, namely a perspectival *pro*. The anaphor is indeed involved in the agreement mechanism, but crucially not as the source of agreement: rather, it is in this sense just like the T head in its clause, probing to get its  $\phi$ -features valued. The broader crosslinguistic implication of this is that the AAE, namely the generalization that anaphors cannot trigger  $\phi$ -covarying agreement, is valid in Tamil as well. Tamil just uses a different strategy to avoid violating the AAE than the languages discussed so far in the literature.

We have so far said nothing about the theoretical motivations behind the AAE. I.e. *why* can an anaphor not trigger agreement? Why do languages do to such extents to avoid a situation where an anaphor would be in a position to do so? A plausible answer may simply be that anaphors don't have the (valued)  $\phi$ -features required to trigger agreement. Indeed, a popular view in the literature claims that this lack of some or more  $\phi$ -features is the defining property of an anaphor (Kratzer 2009, Reuland 2011, Rooryck and vanden Wyngaerd 2011). A radical implementation of this position would be to say that anaphors are "minimal pronouns" (Kratzer 2009), *pro*-forms that are born with a fully unvalued set of  $\phi$ -features. They would thus be more like the functional heads T/ $\nu$  that probe to get their  $\phi$ -features valued, than like full-fledged nominals (a position reminiscent of earlier proposals like that in Borer 1989). A more conservative view would be to say that anaphors lack

a (potentially proper) subset of  $\phi$ -features. In this case, however, we would additionally have to posit that the Agree mechanism between the anaphor and a probing head does not accommodate partial valuation of  $\phi$ -features on the probe.

Regardless of which position we take, a  $\phi$ -deficiency account of the AAE presupposes that the Agree mechanism for  $\phi$ -features can distinguish between inherent valued features and inherited valued  $\phi$ -features on a DP. I.e. the anaphor should be unable to value the  $\phi$ -features on T/*v* even after it has potentially inherited these  $\phi$ -features from another DP (either its antecedent or some other local entity, like the *pro* element motivated here). This means that either the probing head can distinguish between inherited and inherent feature, or the T head gets its features valued at the same time as (this is the assumption of the current proposal for Tamil, for instance) or before the anaphoric DP inherits its own  $\phi$ -features.

However, an account of the AAE in terms of  $\phi$ -deficiency alone is independently problematic, a main concern being that it is too simple. The simple fact is that anaphors in the world's languages do not seem to be created equal. Based on the  $\phi$ -featural restrictions on potential antecedence, anaphors seem to have different  $\phi$ -featural specifications. Some anaphors seem to lack all  $\phi$ -features, thus can take antecedents with any combination of  $\phi$ -features: the Chinese anaphor *ziji* is an example (Huang and Liu 2001). Yet others seem to already have some  $\phi$ -features but lack others: the Dravidian anaphor *ta(a)n*, among many others, places no restriction on the gender or number of its antecedent but restricts its choice of person (3rd-person antecedents are allowed, 1st and 2nd person are not). At the other end of the spectrum, we have anaphors that do not seem to lack any  $\phi$ -features whatsoever. Heinat (2008), for instance, discusses examples from San Lucas Quiavini Zapotec and Thai, among others, to show that even R-expressions may be anaphorically bound. The following Zapotec example is from Heinat (2008: p. 151):<sup>10</sup>

(43) **San Lucas Quiavini Zapotec:**

R-ralloh Gyè'ihlly<sub>i</sub> [<sub>CP</sub> r-yu'làà'z Lia Paamm Gyè'ihlly<sub>i</sub>].  
 HAB-think Mike HAB-like F Pam Mike  
 'Mike thinks [<sub>CP</sub> Pam likes Mike<sub>{i,\*j}</sub>].' (literal)

<sup>10</sup>Crucially, evidence from sloppy readings under VP ellipsis show that the R-expression does indeed function like a bound-variable and is not merely accidentally coreferent with its antecedent as in the sentence. "Everyone loves Bill. Even Bill loves Bill!"

If we wanted to maintain the  $\phi$ -deficiency account in the face of such data, we would essentially have to say that all anaphors, including those in languages like Zapotec, underlyingly lack  $\phi$ -features, even if they don't seem to do so on the surface. Alternatively, we might find that such languages in fact do not observe the AAE – this would then also count as a potential argument in favor of the  $\phi$ -deficiency account. Clearly, further research needs to be done.

Another source of theoretical interest has to do with the question of what factors condition the choice of parametric strategy that a language adopts in order to avoid a violation of the AAE. I.e. why does one language (e.g. Icelandic, English, or German) prevent anaphors in agreement-triggering positions altogether whereas another language allows it under certain conditions? Of those that allow it, why does one accommodate an AAE violation via a default agreement strategy whereas another does so via a protection strategy, while yet another uses a special anaphoric form? How does the choice of subject vs. object agreement interact, if at all, with the AAE strategy chosen? For instance, the special anaphoric agreement (discussed here for Swahili and Chichewa) has been observed with object-agreement but not with subject-agreement languages. If this is indeed a restriction, what conditions it? These are also intriguing questions which cannot be answered given our current state of knowledge and merit further research.

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# Barss' generalization and the strict cycle at LF

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## Abstract

Barss (1986) contains a generalization concerning reconstruction in remnant movement contexts. It states that a moved category  $\alpha$  cannot reconstruct to its trace if  $\alpha$  does not c-command the trace at the surface. This configuration arises in cases of remnant movement, where the remnant category is higher than the category whose extraction lead to the formation of the remnant. In the present paper, we argue that Barss' Generalization can be derived if reconstruction is lowering at LF and if LF is subject to strict cyclicity. The idea is that in order for reconstruction of the extracted category to apply, the remnant must reconstruct first. Due to the Strict Cycle Condition, however, reconstruction of the extracted category is impossible because the remnant category is part of a higher cycle. The lowering approach to reconstruction is compared to two previous accounts of Barss' Generalization. One bases reconstruction on the copy theory of movement, the other is built on the idea that reconstruction applies without there literally being a full category in the "base position" of the remnant.

## 1. Introduction

Syntactic movement may or may not have an influence on relative quantifier scope. In (1), we see an example that illustrates this point.

- (1)  $[\exists \text{ Some young lady } ]$  seems  $t'_\exists$  to be likely  $t_\exists$  to dance  
with  $[\forall \text{ every senator } ]$ . ( $\exists > \forall$ ;  $\forall > \exists$ )

The sentence in (1) can have a reading where the existential quantifier in *some young lady* has scope over the universal quantifier in *every senator*. This reading corresponds to the surface structure, where *some young lady* c-commands

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\*We would like to thank the participants of the syntax colloquium in Leipzig and Konstanz as well as the audience of "Generative Grammatik des Südens 2012" in Freiburg for comments. Particularly, we would like to thank Petr Biskup, Eric Fuss and Winnie Lechner for helpful comments and discussion.

*every senator*. However, the inverse scope relation is possible as well. Assuming that the PP *with every senator* is the complement of *dance* (Larson 1988), two processes must apply in (1) in order to derive the inverse scope relation. First, *some young lady* must be interpreted in its base position. This process is commonly referred to as *reconstruction*. The second process that needs to apply is quantifier raising (QR) of *every senator* within the clause embedded by *likely*.<sup>1</sup> But how can *some young lady* be interpreted in its base position if it has moved into a higher position? That is, how exactly can reconstruction come about?

Basically, there are three different approaches to this phenomenon, which are abstractly depicted in (2) (see also Fox 1999 for an overview). One of the earliest approaches to reconstruction (see May 1977) involves lowering of the moved constituent  $\alpha$  back to its base position, as in (2a). This applies covertly on an abstract syntactic representation called LF. This lowering approach has been superseded by the copy theory approach in (2b), which is nowadays the standard approach to reconstruction in the minimalist program (Chomsky 1995). It basically says that  $\alpha$  has never really left its base position. Instead, it leaves behind a copy when it moves to its target position (Chomsky 1981: 89, Burzio 1986: 204, Chomsky 1995). This means that the surface structure can be interpreted directly by the semantics without invoking an additional LF representation. The semantics simply chooses either the lower or the higher copy for scope computation. Finally, (2c) shows an approach where the scope relations are not computed transparently but by application of purely semantic rules (Aoun and Li 1993, Frey 1993, Chierchia 1995, Cresti 1995, Rullmann 1995).

- (2) a. *Covert Lowering*  
 Syntax: [  $\alpha \dots \beta \dots t_\alpha$  ]  $\Rightarrow$  LF: [  $\_ \dots \beta \dots \alpha$  ]
- b. *Copy Theory of Movement*  
 [  $\alpha \dots \beta \dots \alpha$  ]

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<sup>1</sup>We follow the traditional assumption that QR is clause bound (see May 1977). Therefore, overt movement of *some young lady* in (1) has the potential to change the scope relations as it raises the existential quantifier out of the minimal clause containing *every senator*.

c. *Semantic Scope Computation*

In a configuration  $[\alpha \dots \beta \dots t_\alpha]$ , either  $\alpha$  has scope over  $\beta$  or  $\beta$  has scope over  $\alpha$ .

The aim of the present paper is to show that the lowering approach to reconstruction offers an elegant account of a case where reconstruction is blocked, which is known as *Barss' Generalization* (a term coined by Sauerland and Elbourne 2002), which is given in (3). An example of the configuration that (3) is concerned with is shown in (4).

(3) *Generalization (Barss 1986: 517-542):*

Reconstruction of  $\alpha$  to its trace  $t_\alpha$  is blocked if  $\alpha$  does not c-command  $t_\alpha$  at S-structure.

- (4) [<sub>DegP</sub> How likely  $t_\exists$  to dance with [<sub>V</sub> every senator ] ] does  
 [ <sub>$\exists$</sub>  some young lady ] seem to be  $t_{DegP}$ ? ( $\exists > \forall$ ;  $*\forall > \exists$ )

In (4), the quantified DP *some young lady* has moved out of its base position in the *likely*-clause. Afterwards, *how* moves across *some young lady* and pied-pipes the entire *likely*-phrase including the trace of *some young lady*. Thus, *some young lady* does not c-command its trace on the surface. In this configuration, reconstruction of *some young lady* is blocked and consequently it cannot take scope under *every senator*. Note that the inability of *some young lady* to reconstruct in (4) has nothing to do with *some young lady* being in an A-position. As shown in (1), it is in general possible to reconstruct from an A-position.

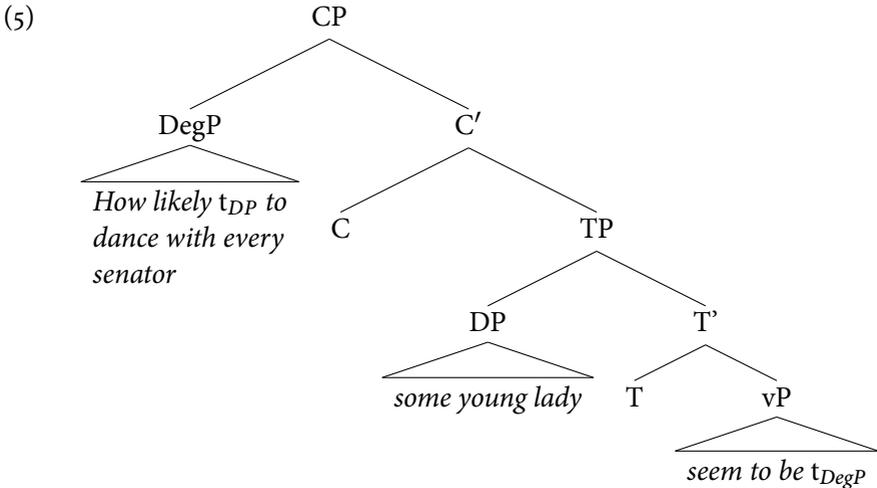
In what follows, we argue that Barss' Generalization can be derived under the assumption that reconstruction is syntactic lowering at LF and that lowering is subject to the Strict Cycle Condition (SCC, Chomsky 1973): After reconstruction of the *how*-phrase to its base position, reconstruction of *some young lady* cannot apply because this would exclusively affect a cyclic domain that is a proper subpart of the current cyclic domain of the tree. Thus, the analysis exhibits an interaction of syntactic operations which can be described as *counter-feeding*: Reconstruction of the *how*-phrase could feed reconstruction of *some young lady*, but, due to the SCC, it applies too late in order to do so.

The paper is structured as follows: In section 2, we present the lowering account of Barss' Generalization in more detail. In section 3, we introduce and discuss two alternative analyses by Sauerland and Elbourne (2002) and

Neeleman and van de Koot (2010) that are instances of the copy approach to reconstruction and the semantic computation approach, respectively. Section 4 concludes.

## 2. The strict cycle at LF

The syntactic structure of the example in (4) is given, in more detail, in (5). *Some young lady* has moved to the subject position of *seem* and the *how*-phrase has moved to SpecC of the matrix clause.



The relevant empirical observation about this structure, which goes back to Barss (1986), is that *every senator* cannot take scope over *some young lady*. Descriptively, this can be attributed to the impossibility of reconstruction of *some young lady* into its base position. But how can this be derived? Barss (1986) assumes that reconstruction is an effect of traces being relevant for the computation of relative scope and that the LF associated with the impossible reading  $\forall > \exists$  would involve LF-movement of *some young lady* into the *how*-phrase. This, however, violates a constraint against sideward movement (cf. *Proper Binding Condition, PBC*, in Fiengo 1977; see den Besten and Webelhuth 1987 and Müller 1998 for criticism on the PBC).

In the present article, we would like to propose a derivational alternative: Assume that reconstruction is syntactic lowering: Moved categories target traces with the same index. The term *trace* is to be understood in a very literal

sense, that is, a trace is not a copy of the moved constituent. Assume further that lowering applies at LF, which constitutes a syntactic level of its own.<sup>2</sup> Finally, assume that LF-derivations are subject to the Strict Cycle Condition in (6).

(6) *Strict Cycle Condition* (Chomsky 1973)

Within the current cyclic domain  $\alpha$ , no operation may exclusively affect positions within another cyclic domain  $\beta$  that is dominated by  $\alpha$ .

We assume here that every node in the tree is a cyclic domain in the sense of (6). The LF-derivation of the surface structure in (5) is given in (7). For reasons of simplicity we skip cycles that are irrelevant for the point we want to make here.

- (7) a. [ $\exists$  some young lady ] seem to be  $t_{DegP}$   

- b. [ $_{DegP}$  how likely [ $_{\forall}$  every senator ]<sub>3</sub>  $t_{\exists}$  to dance with  $t_{\forall}$  ]  

- c. [ $_{DegP}$  how likely  $\forall_3 t_{\exists}$  to dance with  $t_{\forall}$  ] [ $_{TP}$   $\exists_1$  seem to be  $t_{DegP}$  ]  

- d. [ $_{CP}$  [ $_{TP}$   $\exists_1$  seem to be [ $_{DegP}$  how likely  $\forall_3 t_{\exists}$  to dance with  $t_{\forall}$  ] ] ]  

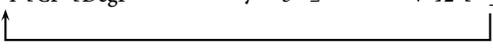

The LF-derivation proceeds in a cyclic and bottom-up fashion. (8a) enters the derivation in the TP-cycle. There, *some young lady* cannot be lowered because it does not c-command any coindexed trace. Next, in (7b) quantifier raising of *every senator* applies within the *how*-phrase, which occupies SpecC of the matrix clause and constitutes a cyclic domain of its own. Afterwards, in the matrix CP-cycle, the *how*-phrase reconstructs to its base position (7c). Once this point of the derivation is reached, the TP-cycle is finished and therefore *some young lady* cannot be lowered to its base position anymore (7d). Even though the trace of *some young lady* is now a possible target for reconstruction because the former is c-commanded by the latter, the SCC prevents this step

<sup>2</sup>Thus, in so far as it is successful, the present analysis provides evidence against two standard assumptions of minimalism: Both the copy theory of movement (Chomsky 1981, 1995, Burzio 1986) and the single-cycle architecture (Groat and O'Neil 1996, Bobaljik 1995) are incompatible with the present account.

because it would exclusively affect a cyclic domain that is a proper subpart of the current cycle.

Thus, the derivation in (7) instantiates the rule interaction pattern of counter-feeding: The rule that could feed reconstruction of *some young lady*, namely reconstruction of the *how*-phrase, applies too late to actually feed reconstruction of *some young lady*. The consequence is that *some young lady* cannot be interpreted in the scope of *every senator*.

Note that there is one potential derivation that would allow reconstruction of *some young lady* into its base position within the *how*-phrase. The derivation is sketched in (8).

- (8) a.  $[\exists \text{ some young lady}] \text{ seem to be } t_{DegP}$   
  
 b.  $[_{DegP} \text{ how likely } [_V \text{ every senator}] t_{\exists} \text{ to dance with } t_V]$   
  
 c.  $\exists_1 [_{CP} [_{DegP} \text{ how likely } \forall_3 t_{\exists} \text{ to } \dots t_V]_2 [t'_3 \text{ seem to be } t_{DegP}]]$   
  
 d.  $[_{CP} [_{DegP} \text{ how likely } \forall_3 \exists_1 \text{ to } \dots t_V]_2 [t'_3 \text{ seem to be } t_{DegP}]]$   

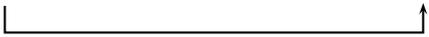

In contrast to (7), *some young lady* in (8c) raises across the *how*-phrase to an outer specifier of CP. From this position it can lower to the trace  $t_{\exists}$  within the *how*-phrase. One way to exclude this derivation, is to assume that SpecC is not a proper target for quantifier raising (see May 1985, Cecchetto 2004, Potsdam 2013).

An independent argument for this assumption (which at the same time is an argument for strict cyclicity at LF) is based on instances of the Barss' configuration where the remnant is a VP that contains the trace of the raised subject. As observed in Huang (1993: 125) and Sauerland (1999: 590), such configurations also bear the typical footprint of Barss' configuration: frozen scope. Thus, while (9a) is ambiguous, (9b) is not.

- (9) a.  $[\exists \text{ A guard}] \text{ will } [_{VP} \text{ stand on } [_V \text{ every roof}]]$ . ( $\exists > \forall; \forall > \exists$ )  
 b.  $[_{VP} \text{ Stand on } [_V \text{ every roof}]], [\exists \text{ a guard}] \text{ will}$ . ( $\exists > \forall; * \forall > \exists$ )

Importantly, in contrast to (4) wide scope of the remnant-internal quantifier (*every roof*) in (9b) does not require reconstruction of the remnant-external

quantifier (*a guard*): Since the remnant is not a full clause (i.e. minimally a TP) but only a VP, it does not form an island for QR. Therefore, reconstruction of the remnant plus QR of *every roof* would, in principle, be sufficient to derive the unattested reading  $^*\forall > \exists$ . This LF-derivation (and the reading it induces) can be blocked under three assumptions. First, topicalization in English (as in (9b)) targets a functional projection above TP (arguably CP); second, the strict cycle holds at LF; and third, QR is restricted to the TP domain. Under these assumptions, the reading  $^*\forall > \exists$  is excluded: Once the topicalized VP has been reconstructed from SpecC to its base position the quantifier *every roof* cannot QR to the TP-domain as this would violate the SCC. This is illustrated in (10).

- (10) a.  $[_{VP} \text{ stand on } [_{\forall} \text{ every roof } ] ] [_{TP} [_{\exists} \text{ a guard } ] \text{ will } t_{VP} ]$   

- b.  $[_{CP/TP} [_{\exists} \text{ a guard } ] \text{ will } [_{VP} \text{ stand on } [_{\forall} \text{ every roof } ] ] ]$   


By assumption, however, QR also cannot target CP. As a consequence, a derivation that involves only reconstruction of the remnant plus QR of the quantifier from within the remnant across the quantifier outside the remnant is blocked, as desired. This lends support both to the claim that the strict cycle holds at LF and that QR must not target CP.

### 3. Previous analyses

So far, we have explored one possibility as to how Barss' Generalization can be derived. This analysis involves the mechanism of lowering at LF. In the present section, we will discuss two previous approaches mentioned in section 1, namely the copy theory and the purely semantic scope computation.

In Sauerland and Elbourne (2002) (see also Sauerland 1998, 1999), an analysis is presented that exploits the T-model of grammar (Chomsky and Lasnik 1977) and the idea that syntactic movement leaves a copy behind. Put simply, the idea why *some young lady* cannot reconstruct is that subject raising in (4) does not leave a copy behind.

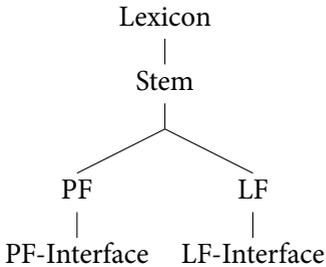
The account of Neeleman and van de Koot (2010) (see also van de Koot 2004) instantiates the semantic scope computation approach. To put it in a nutshell, Neeleman and van de Koot (2010) assume that the scope of a quanti-

fier can be computed at some position along its movement path (although this does not involve literal syntactic lowering of the quantifier itself). Crucially, narrowing of the scope of *some young lady* in (4) cannot proceed down to its trace because the path is interrupted by movement of the *how*-phrase.

### 3.1. Sauerland and Elbourne (2002)

The analysis in Sauerland and Elbourne (2002) is based on the T-model of grammar (Chomsky and Lasnik 1977) shown in (11).

#### (11) *T-model of Grammar*



The main idea of this model is that the derivation proceeds on three different syntactic levels. It starts with *Narrow Syntax* (also called the *Stem*). Then, the derivation splits and proceeds within two separate branches, the syntactic levels of phonological and logical form (PF and LF). Importantly, operations that apply in the stem can feed LF and PF but operations applying at LF or PF can neither feed the stem nor each other. This order of operations is important for Sauerland and Elbourne's (2002) analysis.

Another assumption in Sauerland and Elbourne (2002) is that there are two properties that distinguish A-movement from  $\bar{A}$ -movement. The first one concerns the way movement proceeds:  $\bar{A}$ -movement leaves a copy behind, while A-movement does not. The second difference concerns the timing of operations:  $\bar{A}$ -movement applies in the stem, while A-movement can apply in the stem or at PF.

Note that PF is assumed to be a genuine syntactic level, the only particularity about it being that it does not feed stem operations or LF (the latter rendering PF-movement semantically vacuous, thus effectively deriving reconstruction effects). As a consequence, PF-movement, just like any other movement





## 3.2. Potential problems for Sauerland and Elbourne (2002)

3.2.1. *The A vs.  $\bar{A}$ -distinction*

As we have seen in the derivation above, the A vs.  $\bar{A}$ -distinction is of crucial importance to Sauerland and Elbourne's (2002) account. This makes a prediction concerning cases of remnant movement where both the movement step that creates the remnant and the step that moves the remnant are of the same type: A or  $\bar{A}$ , respectively. Namely, if the approach of Sauerland and Elbourne (2002) is on the right track, Barss' Generalization should not hold if a remnant category created by A-movement is A-moved itself or if both the extracted category and the remnant category are  $\bar{A}$ -moved. If both categories are A-moved, A-movement can be delayed until PF which results in a reading that involves reconstruction. If both categories are  $\bar{A}$ -moved, movement leaves a copy behind, which, again, allows a reconstructed reading. In contrast, the lowering account presented in section 2 does not distinguish between A-movement and  $\bar{A}$ -movement for the purpose of reconstruction. Thus, it predicts that Barss' Generalization should also hold for derivations that involve two uniform movement types. The theories thus make different predictions for such derivations, which are therefore worth exploring.

There is the practical problem that relevant examples are difficult to construe for independent reasons. On the one hand,  $\bar{A}$ -movement is not generally testable because it usually creates islands for movement (*wh*-islands, topic islands etc.). Thus, movement of the remnant category would have to cross an island induced by the category the extraction of which created the remnant. On the other hand, A-movement usually affects arguments with a certain grammatical function (e.g. subject raising or subject/object control). And construing Barss configuration with two applications of raising and/or control seems difficult. Despite all this, we would like to contend that the different predictions can indeed be used to distinguish between the approach of Sauerland and Elbourne (2002) and the lowering approach defended here.

Our first argument involves scrambling in German. To begin with, note that relative scope in German tends to be more surface true than in English. Therefore, Barss' Generalization may not be testable for German as easily by using scope reconstruction as it is for English. To avoid this complication, we will exploit the fact that Barss' Generalization holds for other empirical domains as well. In particular, it has been observed that idiomatic readings are

lost in Barss configuration (see Lasnik and Saito 1992: 141-142, Ackerman and Webelhuth 1993, Nunberg et al. 1994: 511-512). To our knowledge, the connection between this observation and Barss' Generalization has never been made. Here, we would like to argue that, abstractly, the same pattern underlies both phenomena.

Consider the examples in (17a,b).

- (17) a. Einen Korb<sub>1</sub> hat ihr niemand t<sub>1</sub> gegeben.  
 a basket has her nobody given  
 'Nobody turned her down.'
- b. [<sub>VP</sub> Gegeben t<sub>1</sub> ]<sub>2</sub> hat ihr niemand einen Korb<sub>1</sub> t<sub>2</sub>.  
 given has her nobody a basket  
 # 'Nobody turned her down.'

Underlyingly, both (17a) and (17b) contain the VP *jemandem einen Korb geben*, which bears the idiomatic reading "to turn someone down". (17a) illustrates that this VP belongs to the class of transparent VPs, which means that it can undergo a transformation, such as topicalization of the object *einen Korb* in (17a), without losing its idiomatic reading (see Müller 2000 and references therein for discussion).

In (17b), the object has scrambled out of the VP, the remnant of which is then topicalized. In this configuration, the idiomatic reading is not preserved, as indicated by the diacritic #. The parallel to Barss Generalization is obvious. It can be captured by the theory of Sauerland and Elbourne (2002) by assuming that the idiomatic reading in (17) requires reconstruction of the scrambled object *einen Korb* to its base position in the VP and, at the same time, that scrambling of *einen Korb* is A-movement. If scrambling were  $\bar{A}$ -movement, then it would leave a copy, which in turn should bring about the idiomatic reading in (17b), contrary to fact.

Next consider the German idiom *X hat der Teufel geritten* "X must have had a devil in him", given in (18). Note that in this case the subject, *der Teufel* "the devil", is part of the idiom.

- (18) weil den Koch der Teufel geritten hat  
 because the cook<sub>acc</sub> the devil<sub>nom</sub> ridden has  
 'because the cook must have had a devil in him'

Again, extraction of the subject by movement (such as *wh*-movement in (19)) retains the idiomatic reading, i.e., the idiom is transparent:

- (19) Ich weiß nicht, [welcher Teufel]<sub>1</sub> den Koch t<sub>1</sub> geritten hat.  
 I know not which devil the cook ridden has  
 'I don't know, what got into the cook.'

Now recall the above assumption that scrambling must be A-movement, which was crucial for Sauerland and Elbourne (2002) to be able to derive the lack of an idiomatic reading in (17b). Interestingly, the example in (20) does not preserve its underlying idiomatic reading.

- (20) dass [<sub>VP</sub> t<sub>1</sub> den Koch geritten ]<sub>2</sub> der Teufel<sub>1</sub> t<sub>2</sub> hat  
 that the cook ridden the devil has  
 #'that the cook must have had a devil in him'

In (20), the subject is raised out of the VP and then the remnant VP is scrambled (by assumption A-moved) across the subject.<sup>3</sup> Note that scrambling of a VP in German, and predicate scrambling in German in general, is marked (Stechow and Sternefeld 1988: 465-466, Haider 1993: 200). Accordingly, (20) is not fully well-formed. It is therefore important to stress that what is at stake here is not the relative markedness of (20) but the fact that it lacks the idiomatic reading available in (18) and (19). This is not predicted by the theory of Sauerland and Elbourne (2002). The reason is that scrambling, being A-movement, can apply at PF and that PF-movement leaves LF unaffected. Under these assumptions, the complete VP in (20) should be in its base position at LF.<sup>4</sup> Therefore, the idiomatic reading should be accessible, contrary to fact.

For the lowering approach defended in the present paper, the facts about

<sup>3</sup>Arguably, the subject in (20) has undergone subject raising and not scrambling. Had it undergone scrambling, the example would violate the *Müller-Takano Generalization*:

- (i) *Generalization (Müller 1993, Takano 1994)*:  
 A remnant XP cannot undergo Y-movement if the antecedent of the unbound trace has also undergone Y-movement.

See Müller (1998: 226) for relevant discussion of examples parallel to (20).

<sup>4</sup>Note that it does not matter whether movement of the subject is classified as A- or  $\bar{A}$ -movement. If it is  $\bar{A}$ -movement, it leaves a copy in base position and if it is A-movement, movement can be delayed until PF, again leaving the subject in base position for the semantic interpretation.

idioms do not pose a problem since the distinction between A- and  $\bar{A}$ -movement is irrelevant. The lack of an idiomatic reading in (17b) and (20) can therefore be accounted for in exactly the same way as the lack of a particular scope reading in the standard examples of Barss' Generalization (see section 2 for details).

Our second argument that relates to the A vs.  $\bar{A}$  dichotomy involves long topicalization and *wh*-islands in German. It has been observed that types of  $\bar{A}$ -movement in German differ with respect to whether they induce operator islands for other types of  $\bar{A}$ -movement or not. In particular, long-distance topicalization can apply out of an embedded question, that is, the *wh*-island constraint does not seem to hold for topicalization in German (see Fanselow 1987, Müller and Sternefeld 1993). This is illustrated in (21a). Furthermore, (21b) illustrates that long-distance topicalization of a remnant VP that was created by *wh*-movement of the object is also possible.<sup>5</sup>

- (21) a. Radios<sub>1</sub> weiß ich nicht [ wie man t<sub>1</sub> repariert ].  
 radios know I not how one repairs  
 'As for radios, I don't know how to repair them.'
- b. [<sub>VP</sub> t<sub>1</sub> Repariert ]<sub>2</sub> weiß ich nicht [<sub>CP</sub> [<sub>NP</sub> welche Radios ]<sub>1</sub> sie  
 repaired know I not which radios she  
 t<sub>2</sub> hat ]  
 has  
 'I don't know which radios she has repaired.'

Crucially, if an idiom is affected by *wh*-extraction and subsequent long remnant topicalization, as shown in (22), the idiomatic reading is not preserved.

- (22) [<sub>VP</sub> t<sub>1</sub> Den Koch geritten ]<sub>2</sub> weiß ich nicht [<sub>CP</sub> [<sub>NP</sub> welcher Teufel ]<sub>1</sub>  
 the cook ridden know I not which devil  
 t<sub>2</sub> hat ].  
 has  
 #'I don't know what got into the cook.'

Again, (22) instantiates Barss' configuration, but this time its derivation involves two applications of  $\bar{A}$ -movement: *wh*-movement of a subject and topicalization of a remnant VP containing the trace of the subject. The theory

<sup>5</sup>Since the two instances of  $\bar{A}$ -movement involved differ, the derivation does not violate the Müller-Takano Generalization on remnant movement, cf. footnote 3.

of Sauerland and Elbourne (2002) predicts that both *wh*-movement and VP-topicalization leave a copy in their base positions, which in turn should render the idiomatic reading possible, contrary to fact. And again, an approach based on syntactic lowering does not face this problem because it does not distinguish A and  $\bar{A}$ -movement for the purpose of reconstruction in Barss' configuration. Thus, it accounts for the lack of the idiomatic reading in (22) in the same way as it does in the case of (17b) and (20) above.

3.2.2. *Barss' configuration and extraposition*

Another potential problem for the theory in Sauerland and Elbourne (2002) involves the contrast in (23a,b), which is due to Barss (1986: 531-532).

- (23) a. [<sub>DegP</sub> How likely [<sub>TP</sub> t<sub>∃</sub> to address [<sub>∇</sub> every rally ]]] is  
           [<sub>∃</sub> someone ] t<sub>DegP</sub>? ∃ > ∇; \*∇ > ∃
- b. [<sub>DegP</sub> How likely t<sub>TP</sub> ] is [<sub>∃</sub> someone ] t<sub>DegP</sub> [<sub>TP</sub> t<sub>∃</sub> to address  
           [<sub>∇</sub> every rally ]]? ∃ > ∇; ∇ > ∃

The structure of (23a) is identical to the one of (4). The example in (23b) differs from (23a) in that the TP that contains the universal quantifier *every rally* and the trace of the existential quantifier *someone* is extraposed from the *how*-phrase. As we see in (23b), TP-extraposition goes hand in hand with scope ambiguity. Therefore, *someone* must be able to reconstruct in (23b). For Sauerland and Elbourne's (2002) approach, this means that raising of *someone* must be PF-movement. Assuming the Freezing Principle (see Ross 1967; Wexler and Culicover 1980: 143-144 call it the Raising Principle), which states that movement from a category that was moved at an earlier step is blocked, raising of *someone* must precede extraposition of the TP. It follows that TP-extraposition must be PF-movement, too. But then,  $\bar{A}$ -movement of the *how*-phrase must be PF-movement as well because TP-extraposition feeds remnant movement of the *how*-phrase in (23). This, however, is not in line with Sauerland and Elbourne's (2002) assumption that all  $\bar{A}$ -movement is narrow syntactic movement. It seems the only way (23b) can be derived by this theory at all is by assuming that raising in (23b) involves narrow syntactic A-movement. But then the theory also predicts, incorrectly, that (23b) should only allow for the non-reconstructed reading  $\exists > \forall$  (A-movement in the stem does not leave a copy behind).



3.2.3. *Head movement*

A third potential problem for Sauerland and Elbourne (2002) concerns head movement. Consider the examples in (26).

- (26) a. \*Benjamin thought he would give the cloak to Lee, and [<sub>VP</sub> the cloak  $t_V$  to Lee ] he gave  $t_{VP}$ .  
 b. \* [<sub>VP</sub> Vom Rauchen einen Katarrh  $t_V$  ] bekam er nicht  $t_{VP}$ .  
       by smoking a sinusitis caught he not  
       ‘He did not catch a sinusitis due to smoking.’

It has been argued (Haider 1990, 1993, Takano 2000, Sternefeld 2006) that examples such as (26a,b) are ungrammatical because a VP is topicalized, the head of which has been extracted. This corresponds to the generalization in (27), which we dub here the *Haider-Takano Generalization*.<sup>6</sup>

- (27) *Generalization (Haider 1990, Takano 2000):*  
 Phrases that have been beheaded by head movement are frozen in place.

The configuration in (26a,b) resembles Barss' configuration. The difference is that it deals with the possibility of head movement and not with the availability of scope. Under the lowering approach proposed here, (27) can be subsumed directly under Barss' Generalization if head movement requires reconstruction of the moved head at LF.

Under the approach of Sauerland and Elbourne (2002), the Haider-Takano Generalization could also be subsumed under Barss' Generalization if head movement were a PF operation (see Chomsky 2001: 37-38). However, this assumption has been challenged in recent work, especially by Roberts (2010) (see also Matushansky 2006, Lechner 2007, Nevins 2011). A phenomenon that Roberts (2010) discusses intensively involves clitic movement in Romance languages, which he argues to be an instance of head movement (see also Baker 1988: 84-92, who discusses the similarity between *ne*-cliticization in Italian and noun incorporation). With this in mind, consider the examples in (28)

<sup>6</sup>Fanselow (1991: 104; 1993: 66), analyzes examples parallel to (26b) as grammatical instances of topicalization of a beheaded phrase. Haider (1990: 103) and Sabel (1996) reject analog structures. An explanation for this variation might be that speakers of German that accept (26b) allow for exceptional topicalization of multiple constituents.

and (29) (taken from Couquaux 1982: 51, Burzio 1986: 214, fn. 25), which involve *en/ne*-cliticization in French and Italian, respectively.

- (28) a. [ Combien  $t_2$  ]<sub>3</sub> en<sub>2</sub> connais-tu  $t_3$ ?  
           how.many of.them know-you  
           ‘How many of the girls do you know?’  
       b. [ Quanti  $t_2$  ]<sub>3</sub> ne<sub>2</sub> saranno invitati  $t_3$ ?  
           how.many of.them will.be invited  
           ‘How many of them will be invited?’

If Roberts (2010) is correct, and clitic movement is head movement, then (28a,b) show that head movement can feed  $\bar{A}$ -movement. This in turn means that, under the assumptions in Sauerland and Elbourne (2002), head movement must be narrow syntactic movement. But if it is, then the theory in Sauerland and Elbourne (2002) cannot account for the ungrammaticality of the examples in (26) in the same way as it accounts for Barss’ Generalization. Thus, in this theory one either loses the parallelism between the ungrammaticality of (26) and the lack ambiguity in (4) or one has to assume that there are two different types of head movement, one at PF and one in narrow syntax. Both assumptions would, however, require independent evidence.<sup>7</sup>

### 3.2.4. Copy movement

Sauerland (1999: 592) briefly discusses an example similar to (29) where a category is first A-moved and then  $\bar{A}$ -moved.

- (29) [ How many men ]<sub>2</sub>  $t'_2$  seemed to Kazuko  $t_2$  to be downstairs?

In (29), the *wh*-phrase *how many men* first undergoes subject raising to matrix SpecT (an instance of A-movement). Afterwards, the *wh*-phrase is  $\bar{A}$ -moved to matrix SpecC. The interesting fact about (29) is that it is ambiguous be-

<sup>7</sup>One may wonder why (28a,b) are grammatical under present assumptions, provided that clitic movement is head movement and that head movement must reconstruct. After all, (28a,b) involve Barss’ configuration and therefore reconstruction of the clitic into the previously reconstructed remnant category would be acyclic. However, note that while *en/ne* undergo head movement in the sense of Roberts (2010) qua being clitics, they are not the heads of the remnant categories in (28a,b) (i.e. not their predicates) but rather arguments therein. And as such, they need not undergo reconstruction (the underlying assumption being that it is predicates that must reconstruct at LF, see Barss 1986, Huang 1993).

tween the reading *many* > *seem* and the reconstructed reading *seem* > *many*. At first sight, this seems to be problematic, because similar to what is the case in Barss derivations, (29) involves A-movement that feeds  $\bar{A}$ -movement. Thus, A-movement in (29) should apply in the stem, which in turn is incompatible with reconstruction.

To solve this problem, Sauerland (1999) proposes that the lower copy of the  $\bar{A}$ -moved category in (29) can be PF-moved to the subject position in the matrix clause, thereby satisfying the trigger of subject raising.<sup>8</sup> In the LF-output of this derivation, (the lower copy of) *many* is still below *seem*. Crucially, if PF-movement out of a copy were also available in Barss configuration like (4), repeated in (30), then this would undermine the explanation for Barss' generalization given in Sauerland and Elbourne (2002).

- (30) [<sub>DegP</sub> How likely  $t_{\exists}$  to dance with [ <sub>$\forall$</sub>  every senator ] ] does  
 [ <sub>$\exists$</sub>  some young lady ] seem to be  $t_{DegP}$ ?

The reason is, of course, that A-movement of *some young lady* in (30) could then apply at PF after all, and, as a consequence, reconstruction of A-movement would lead to the unattested reading  $\forall$  >  $\exists$ . However, Sauerland (1999) proposes that such a derivation is banned for independent reasons. To this end, he offers two potential explanations that both refer to the fact that the difference between the derivation proposed for (29) and the unwanted derivation leading to scope inversion in Barss configuration differ in that the former involves PF-movement of a complete copy while the latter involves PF-movement *out of* a copy.

Sauerland's (1999) first proposal as to why PF-movement out of a copy is banned is that there may be a general requirement to the effect that two copies in an  $\bar{A}$ -chain "must contain identical material". If this requirement is not to be ad-hoc, a rationale for it must be given. Since we are dealing with PF-movement here, the identity condition must hold at PF because, for principled reasons, PF-movement could never render two copies distinct for the purpose of LF. One might thus be tempted to think that the reason why the two copies should be identical is that copy deletion at PF can only apply between identical

<sup>8</sup>Such PF-movement of a lower copy to an inner cycle as in (29) presupposes the existence of an additional PF-cycle, similar to the additional LF-cycle required by the present lowering approach. Thus, both Sauerland and Elbourne (2002) and the present approach are incompatible with a single-cycle architecture.

copies (Nunes 2004). To illustrate, in the derivation of (29) the *wh*-phrase *how many men* A-moves at PF to the matrix subject position to satisfy a feature of matrix T. This position is still in the c-command domain of the higher copy in SpecC. Since both copies are identical, deletion of the lower copy of *how many men* can apply. In the unwanted derivation of (30), however, A-movement of *some young lady* renders the two copies of the *how*-phrase non-identical. Therefore, deletion of the lower copy of the *how*-phrase fails. This explains why such a derivation cannot produce the string in (30). However, this rationale only shifts the need for an explanation because now the question arises as to why there is a problem if copy deletion does not apply in the above scenario. After all, the motivation for copy deletion put forward in Nunes (2004) is that it enables linearization of two copies. But if the two copies are not identical to begin with, linearization should be possible without copy deletion. In other words, under the assumption that PF-movement may render copies non-identical and thereby leads to non-applicability of copy deletion the derivation sketched above generates the ungrammatical output (31).

- (31) \*<sub>[DegP How likely t<sub>3</sub> to dance with [v every senator ]]</sub> does <sub>[∃ some young lady ]</sub> seem to be <sub>[DegP how likely t<sub>3</sub> to dance with [v every senator ]]</sub>?

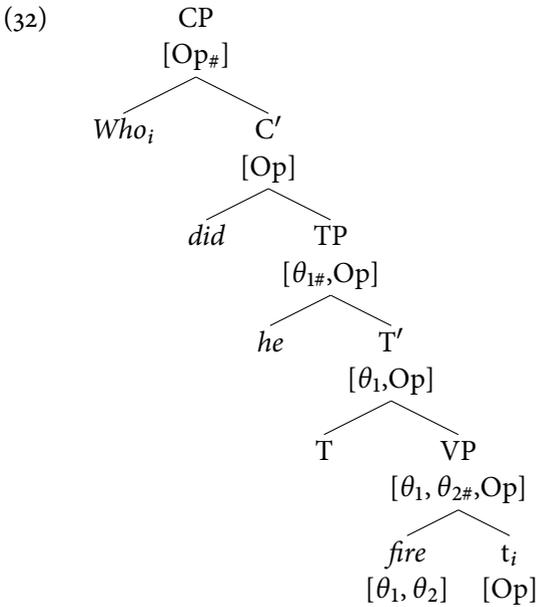
The second of Sauerland's (1999) proposals is that "phonological deletion of the bottom copy [. . .] must precede movement at PF". Apart from the fact that ordering the operations at PF in this way is ad-hoc, it suffers from the problem that it systematically leads to violations of the SCC at PF. Note that copy deletion of the lower copy at PF cannot apply before the current cyclic domain includes the higher copy. Otherwise, there would be no way for the derivation to determine whether deletion of the lower copy is in fact triggered by the presence of a higher copy. For the derivation of (30), this means that PF-movement targets a position (namely SpecT) that is properly included within the current cyclic domain (CP), and hence incurs a violation of the SCC. Of course, this result is unacceptable, given that PF is treated as a genuine syntactic level in Sauerland and Elbourne (2002) (see section 3.1), and should therefore obey the SCC. We conclude that while the second solution proposed by Sauerland (1999) for the problem posed by (31) is not tenable, the first at least requires an additional stipulation.

To sum up so far, we have seen that the proposal of Sauerland and Elbourne (2002) makes some incorrect predictions with respect to remnant scrambling, remnant movement involving two types of  $\bar{A}$ -movement, and a variant of Barss' configuration that involves extraposition. In addition, it fails to account for the parallelism between Barss' Generalization and the Haider-Takano Generalization, and it requires an ad-hoc assumption to account for particular cases where reconstruction is possible although A-movement feeds  $\bar{A}$ -movement. The approach in terms of syntactic lowering does not suffer from any of these problems.

### 3.3. Neeleman and van de Koot (2010)

Neeleman and van de Koot (2010) (see also van de Koot 2004) assume that relative scope is an interface phenomenon. As such, reconstruction for scope also applies at the interface. Additionally to interface reconstruction, they develop a mechanism of syntactic reconstruction. Crucially, none of the two reconstruction types is able to bring back the entire structure of a moved category to its trace. Syntactic reconstruction can only reconstruct certain syntactic features of a moved constituent while interface reconstruction only deals with scope. Thus, there is no real lowering in the sense of section 2, which undoes movement. Because of the lack of transparent reconstruction, the account of Neeleman and van de Koot (2010) can be described as involving semantic scope computation (cf. (2c)).

Concretely, Neeleman and van de Koot (2010) work in a representational framework where movement is modeled as base generation plus a representational dependency between target position and trace. More precisely, the antecedent and its trace are connected by local recursive percolation of "selectional requirements", a dependency similar to SLASH-feature percolation in GPSG or HPSG (Gazdar et al. 1985, Pollard and Sag 1994).  $\bar{A}$ -dependencies are connected by percolating a feature [Op] while A-dependencies are due to percolation of a feature [ $\theta$ ]. The projection that dominates the antecedent bears a diacritic "#", which marks the end of the dependency. An example for movement in this theory is given in (32).



(32) shows an  $\bar{A}$  as well as an A-dependency. The verb *fire* selects two arguments. Therefore, it has two  $\theta$ -features  $[\theta_1]$ , which stands for the subject, and  $[\theta_2]$ , which stands for the object. These two features are percolated to the VP-projection. Since VP dominates the trace  $t_i$ , the object feature  $[\theta_2]$  is satisfied at this level. Thus, only the A-feature  $[\theta_1]$  is percolated up to the TP-projection. The TP dominates the subject *he* and  $[\theta_1]$  is therefore satisfied at the TP-level. Furthermore, the structure in (32) shows an  $\bar{A}$  dependency. The trace  $t_i$  has a selectional requirement  $[\text{Op}]$ , which needs to be satisfied by the antecedent *who*. The feature  $[\text{Op}]$  percolates up to the CP, which dominates *who* and can satisfy  $[\text{Op}]$ .

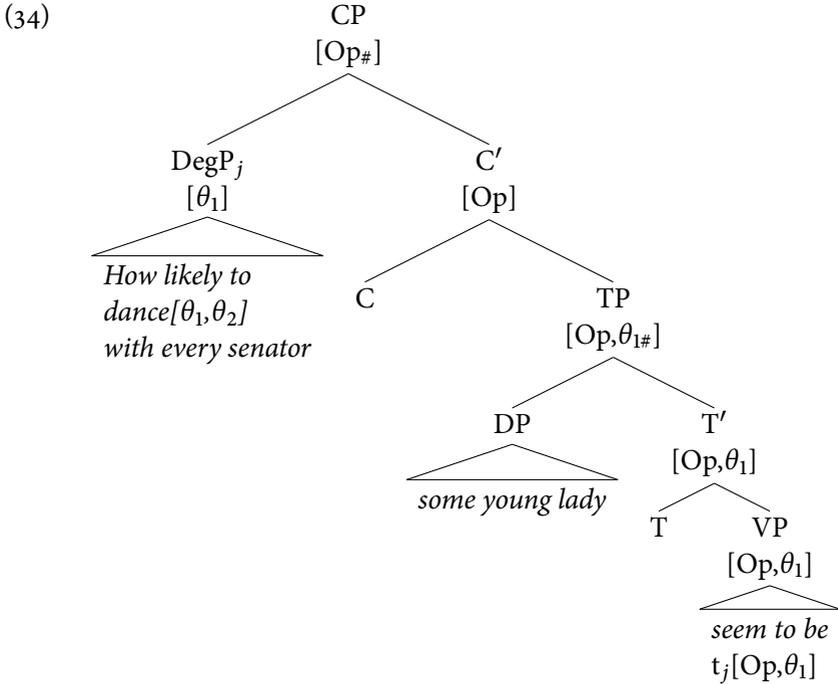
The definition of interface reconstruction for scope is built on this theory of movement. The relevant principle is given in (33).

(33) *Interface reconstruction*

Let  $M$  be a member of the set of selectional requirements that encode movement and let  $\alpha$  be the category that satisfies it.

- a. The initial scopal domain of  $\alpha$  is the node where  $M$  is satisfied.
- b. The scopal domain of  $\alpha$  can be narrowed from  $n_1$  to  $n_2$  if  $n_1$  and  $n_2$  contain  $M$  and  $n_1$  immediately dominates  $n_2$ .

In a nutshell, the scope of a quantifier can be interpreted anywhere along its movement path without actually being in this position. There is, however, one condition under which this is not possible, namely if the movement path is not continuous. This is exactly what we find in Barss' configuration. Let us take a look at the structure of example (4) against the background of the assumptions in Neeleman and van de Koot (2010).



Assume that in (34) *dance* has a selectional feature for both *some young lady* and *every senator* ([ $\theta_1$ ] and [ $\theta_2$ ]). The latter is satisfied within the *how*-DegP and not percolated up to the matrix CP. Furthermore, we have an  $\bar{A}$ -dependency between the *how*-DegP and *t*, involving the feature [Op]. Due to this [Op]-dependency, the selectional feature [ $\theta_1$ ] of *dance* is also present on the trace  $t_j$ , which is connected to the *wh*-moved *how*-phrase by an [Op]-dependency. From there, it percolates to the TP. This is what Neeleman and van de Koot (2010) understand as *syntactic reconstruction*. In syntactic recon-

struction, certain syntactic features of a moved category are transmitted to its trace.<sup>9</sup>

With these assumptions in place, it is obvious why we cannot have interface reconstruction of *some young lady* into its base position in (34). The scope, or scopal domain in Neeleman & van de Koot's terms, of *some young lady* can be narrowed successively down to the trace  $t_j$  which bears the feature  $[\theta_1]$ . However, since  $t_j$  does not dominate any node that also bears  $[\theta_1]$ , the scope of *some young lady* cannot be lowered any further. Especially, it cannot be lowered into the *how*-phrase. This excludes the reading  $\forall > \exists$ . The reading  $\exists > \forall$ , on the other hand, can be derived by lowering the scope of the *how*-phrase to  $t_j$  along the [Op]-path.

### 3.4. Potential problems for Neeleman and van de Koot (2010)

#### 3.4.1. Remnant-external material

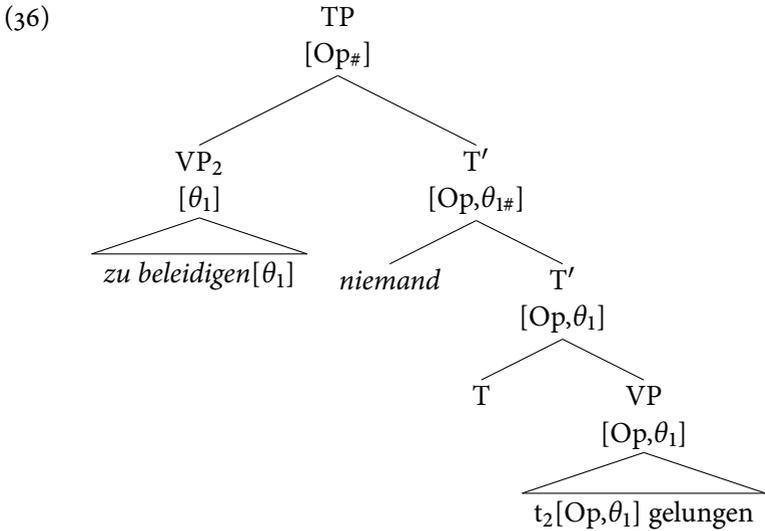
One class of examples in particular poses a challenge for the analysis in Neeleman and van de Koot (2010). Consider the examples in (35a,b).

- (35) a. dass ihr niemanden<sub>1</sub> [  $t_1$  zu beleidigen ]<sub>2</sub> gelungen ist  
 that her no one to insult succeeded is  
 'that she managed to insult no one' / 'that she did not manage to  
 insult anyone'  $\neg\exists > \textit{succeed}$ ;  $\textit{succeed} > \neg\exists$
- b. [  $t_1$  Zu beleidigen ]<sub>2</sub> ist ihr niemand<sub>1</sub>  $t_2$  gelungen  
 to insult is her no one succeeded  
 $\neg\exists > \textit{succeed}$ ; \* $\textit{succeed} > \neg\exists$

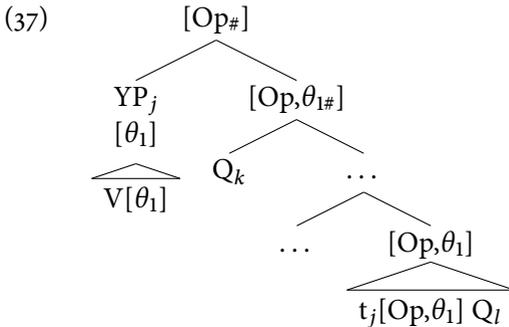
(35a) shows an example of subject raising of a (negative) existential quantifier out of a restructuring infinitive. In this configuration, reconstruction of the quantifier is possible, giving rise to scope ambiguity between the quantifier and the embedding verb *gelingt*. In (35b), the remnant infinitive has been topicalized across the extracted quantifier, which results in configuration that is very similar (but not quite identical) to Barss' configuration. The interesting observation is that in this configuration, reconstruction of the quantifier is impossible (see Haider 2003: 101, Sternefeld 2006: 583). In particular, the embedding verb cannot take scope over the quantifier. Crucially, in this class of

<sup>9</sup>See also Lechner (1998), Sternefeld (1997, 1998), Rullmann (1995) on the distinction between syntactic and semantic reconstruction.

examples the element that is supposed to have scope over the extracted category is external to the remnant. This is why (35b) causes a problem for the analysis in Neeleman and van de Koot (2010). As can be seen in the structure in (36), the scope of the raised subject quantifier can be narrowed down to  $t_2$ . (For simplicity, the indirect object and the V2-effect ignored in (36).) This is sufficiently low to rule in the ungrammatical readings in (35).



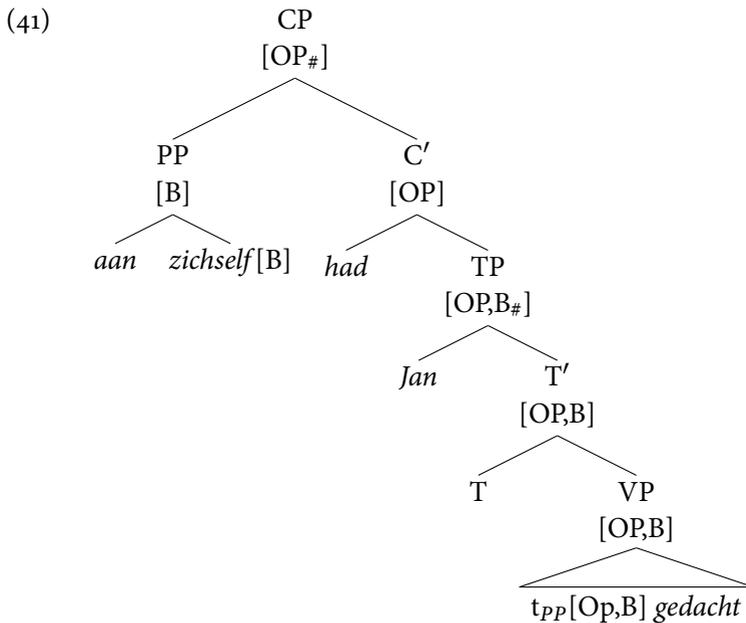
More generally, for any configuration of the form (37), Neeleman and van de Koot (2010) predict that  $Q_l$  should be able to take scope over  $Q_k$ , contrary to fact.



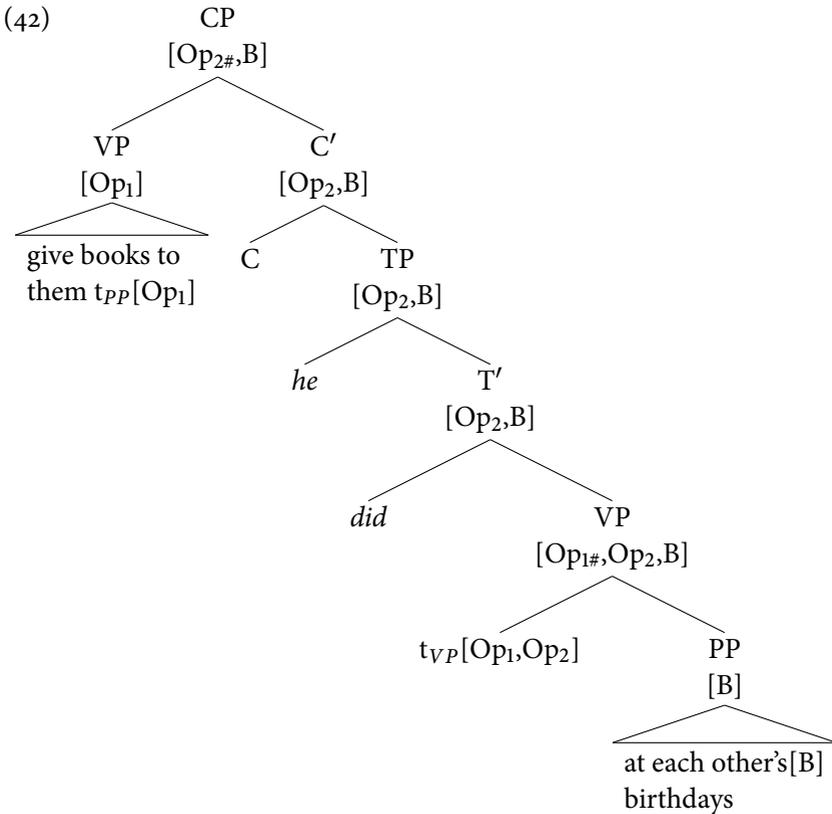


involves a syntactic feature that is passed along a movement path. For binding this means that a binding feature [B] is needed. Concretely, they assume that an anaphor carries a selectional requirement [B] that must be satisfied by a binder. (41) illustrates how this works for the example in (40) (Neeleman and van de Koot 2010: 340), where a category embedding an anaphor has moved across the binder and binding is possible nevertheless.

- (40) [PP Aan zichzelf ] had Jan nooit t<sub>PP</sub> gedacht.  
on self had John never thought  
‘Of himself John never thought.’



The antecedent PP and the trace  $t_{PP}$  are connected via an [Op]-dependency. Therefore the binding feature [B], which percolates from the anapher to the PP, can be reconstructed into the trace. From there, it is percolated upwards until it encounters its binder *Jan*. Applying this mechanism to the example in (38) yields the following structure.

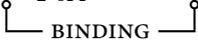


As can be seen in (42), the binding feature [B] is not satisfied. The reason is that [B] is not percolated onto a category that immediately dominates the binder *them*. Thus, the analysis of Neeleman and van de Koot (2010) needs a modification to account for (38). One way to readjust the theory is to abolish the condition of *immediate domination* and replace it simply with *domination*. Then, the feature [B] in (42) would be satisfied because the CP bearing [B] dominates the binder *them*. But since Neeleman and van de Koot (2010) do not distinguish movement from binding features, this modification would incorrectly rule in instances of sideward movement without limit.

It also would not help if the binder instead of the bindee bore the binding feature [B]. Then, satisfaction of [B] in (42) would proceed as follows: the binder *them* bears the feature [B] which is percolated up to the VP and reconstructed to  $t_{VP}$ . From there it percolates to the dominating VP-node. But at

this point, it cannot be satisfied because the VP does not immediately dominate the anaphor *each other*. This shows that the theory of Neeleman and van de Koot (2010) cannot be upheld, at least not in its present form. How exactly it should be modified in order to account for binding in (38) remains unclear.

To derive (38) in the lowering approach, one may assume that syntactic anaphor binding without c-command is not mediated by reconstruction. Rather, a derivational binding approach along the lines of Belletti and Rizzi (1988) and Lebeaux (1994, 2009) may be invoked. Put simply, the proposal is that once an anaphor is c-commanded by a potential antecedent, it gets syntactically bound and remains so throughout the rest of the derivation. This is enough to account for (38).<sup>11</sup>

- (43) a. [VP give books to them<sub>2</sub> [PP at each other's<sub>2</sub> birthdays ]]  

  
 b. [VP give books to them<sub>2</sub> t<sub>PP</sub> ] [PP at each other's<sub>2</sub> birthdays ]  

  
 c. [VP give books to them<sub>2</sub> t<sub>VP</sub> ] he did t<sub>VP</sub> [PP at each other's<sub>2</sub> birthdays ]  


There remains an open question here, namely how semantic binding of the anaphor in (38) is to be treated. Usually, it is assumed that semantic binding does not apply in narrow syntax but at LF. It might be possible to approach the problem by means of the theory of Jacobson (1999), which achieves semantic binding without c-command under certain conditions. We must leave the matter open here.

#### 4. Conclusion

In this paper, we have argued that Barss' Generalization can be derived by means of an LF-derivation that obeys the Strict Cycle Condition. In a configuration where a remnant category  $\alpha$  has moved above the extracted category

<sup>11</sup>Note that the approach of Sauerland and Elbourne (2002) could, in principle, resort to the same mechanism. Thus, as long as anaphor binding can be derived without reconstruction at LF, the lowering approach and the copy approach make the same predictions.

$\beta$ ,  $\beta$  cannot reconstruct to its base position within  $\alpha$ . The reason is that reconstruction is lowering and that lowering of  $\beta$  requires first lowering of  $\alpha$ . But since lowering of  $\alpha$  affects a higher cycle, subsequent lowering of  $\beta$  would violate the SCC.

We further discussed the approaches by Sauerland and Elbourne (2002) and Neeleman and van de Koot (2010), which also account for Barss' Generalization. We argued that both approaches face problems. The analysis by Sauerland and Elbourne (2002), which essentially builds on the distinction between A and  $\bar{A}$ -movement cannot account for Barss' Generalization when the remnant category  $\alpha$  and the extracted category  $\beta$  are both moved by the same movement type or when extraposition is involved. Furthermore, the account misses the similarity between the Haider-Takano Generalization and Barss' Generalization. Finally, cases where A-movement feeds  $\bar{A}$ -movement but A-movement can reconstruct pose a problem.

The approach of Neeleman and van de Koot (2010) is challenged by examples where the category that cannot take scope over  $\beta$  is not contained within  $\alpha$ . It also faces problems with anaphor binding in Barss' configurations. None of these problems arises in the approach presented in the present paper, which builds on literal syntactic lowering and strict cyclicity at LF.

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# Satzadverbien, Satznegation und die sie umgebenden Kontextpositionen

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## Abstract

This paper deals with some of the differences between fully focused variants, categorical variants and contrasted variants of sentences in the German middle field. Special attention is given to the positions of sentence adverbials and of the German sentential negator *nicht* as well as to the surface positions of the contextually bound and contrasted constituents before and between them. The contextually bound constituents are presupposed and therefore neither commented upon by sentence adverbials nor negated. The contrasted constituents in simple contrasts as well as in bridge contours must be reconstructed in their base positions and so they become (part of) the focus of the sentence and are interpreted within the scope of sentence adverbials as well as of *nicht*.

## 1. Einleitung

Der Beitrag enthält die empirisch ermittelten Fakten zu den syntaktischen und semantischen Relationen zwischen den Operatoren Satzadverb, Satznegation *nicht* und dem deutschen Restsatz für eine geplante modulare Repräsentation von Teilen der deutschen Informationsstruktur. Ausgehend von der vollfokussierten Satzvariante werden in Abschnitt 2 die syntaktischen und semantischen Unterschiede zwischen diesen Operatoren ermittelt. In Abschnitt 3 werden dann die kontextgebundenen Satzvarianten betrachtet, und zwar in 3.1 insbesondere die durch Scrambling zusätzlich entstehenden Positionen für Hintergrundkonstituenten, während es in 3.2 um die Fokuskonstituenten geht: 3.2.1 beschäftigt sich mit den im geschriebenen Deutsch zulässigen Positionen für Neuinformationsfoki; 3.2.2 insbesondere mit den zusätzlichen Positionen für Kontrastkonstituenten als einzige Foki im Satz; 3.2.3 mit den noch einmal erweiterten Positionen für Kontrasttopiks (= Kontrastkonstituenten in Hutkonturen). Nach diesem Überblick kann in Abschnitt 4 daraus abgeleitet werden, welche Konstituenten sich im Scopus der Satzadverbien und der Negation *nicht*

finden bzw. ob und wie die kontextgebundenen Satzvarianten darauf Einfluss haben.

## 2. Reihenfolge- und Scopusbeziehungen zwischen den Satzadverbien und der Satznegation *nicht*

In der vollfokussierten Variante eines deutschen Nebensatzes leitet die Satznegation *nicht*, ein propositionaler Operator, die Proposition ein. Sie ist ortsfest. In derselben Variante des deutschen Nebensatzes stehen die Satzadverbien (Sadv) als nichtpropositionale Operatoren, die im Nebensatz ebenfalls ortsfest sind, vor der Negation und drücken die Sprechereinstellung zur gesamten Proposition aus. Die normale Abfolge deutscher Satzglieder nach Frey (2003) und Steube & Sudhoff (2013) ist wie folgt: Sadv, Negation, Rahmensetzer, Kausaladverbial, Internes Argument (respective höchstes Argument), Temporal- und Lokaladverbial, Mental Attitude Adverbial, Interne Argumente, Art- und Weise Adverbial, Richtungsbestimmung. Die syntaktische Abfolge der Sadv und der Satznegation *nicht* entsprechen ihren Scopusbeziehungen zueinander. Mit Satz (1) folgt ein vollfokussierter Nebensatz in der Normalabfolge der deutschen Satzglieder. Die Fokusdomäne wird in einer eckigen, mit F indizierten Klammer angezeigt. Der Index  $[... ]_{KF}$  zeigt Kontrastfokusdomänen an. Die fokussierte Silbe ist in der jeweiligen Fokus- / Kontrastfokusdomäne enthalten und mit Großbuchstaben geschrieben. Die Fokusdomäne enthält nicht die im jeweiligen Satz vorerwähnten, aus dem Kontext oder der Situation ableitbaren Konstituenten. Satz (1) ist oben schon als vollfokussiert angezeigt.

- (1) dass [hoffentlich nicht mehr aus kulturellen Gründen Eltern aus Deutschland absichtlich ihre Kinder in die alte HEImat zurückschicken]<sub>F</sub>, damit sie dort Landsleute heiraten.

Als ortsfeste Satzglieder scambeln die Sadv und die Negation natürlich nicht. Die Sadv können im deklarativen Hauptsatz aber als einzige auch das Vorfeld besetzen. Die Position des Sadv in (2) entspricht weiterhin den Scopusbeziehungen zwischen Sadv und der Negation *nicht*. Die beiden Operatoren sind unterstrichen.

- (2) [Hoffentlich<sub>i</sub> schicken<sub>j</sub> t<sub>i</sub> nicht mehr aus kulturellen Gründen Eltern aus Deutschland absichtlich ihre Kinder in die alte HEImat zurück t<sub>j</sub>]<sub>F</sub>.

- (3) \*Nicht (mehr) haben Eltern ihre Kinder in die alte HEimat zurück geschickt.

Ewald Lang hat schon 1979 die Satzadverbien in drei Gruppen eingeteilt:

A *vermutlich, wahrscheinlich, möglicherweise, vielleicht, ...*

Mit den Sadv A sind keine faktiven Präsuppositionen verbunden. Sie haben eine Wortbetonung, sind zwar als singuläre Antwort betonbar aber in einer Phrase bzw. im Satz nicht betonbar.

B *bedauerlicherweise, leider, überraschenderweise, klugerweise, ...*

C *tatsächlich, wirklich, in der Tat, ...*

Die Sadv B und C haben faktive Präsuppositionen. Die Sadv der Gruppe C bekräftigen die der Proposition vom Sprecher zuerkannte Wahrheitsgeltung noch und sie sind als einzige Sadv auch in der Phrase bzw. im Satz betonbar.

- (4) a. Ist Peter krank? WahrSCHEINlich.  
 b. \*Er ist wahrSCHEINlich krank. – Er ist wahrscheinlich KRANK.  
 c. Ja, er ist tatSÄCHlich krank.

*Nicht* ist ebenfalls betonbar. Wie für die Sadv C wird aber die Betonung von *nicht* auch nur relevant, wenn die entsprechenden Operatoren allein den Fokus/Kontrastfokus ausmachen (s. (4c), (5) und Abschnitt 3.2).

- (5) Ist Peter denn angereist? Nein, er ist [NICHT]<sub>KF</sub> gekommen.

Dass die Sadv Scopus über die Satznegation *nicht* nehmen, wurde oben schon ausgedrückt. Das gilt auch, wenn zwei Satzadverbien vorkommen. Das dominierende soll Sadv 1, das von ihm dominierte Sadv 2 genannt werden. Sadv 1 hat Scopus über Sadv 2. Nach Lang (1979) gilt für die zwei Sadv mit wenigen Ausnahmen die Regel, dass die faktiven Sadv Scopus über andere faktive Sadv nehmen und auch faktive über die nichtfaktiven. Die Dominanz nichtfaktiver über faktive Sadv und die entsprechende Scopusabfolge ist auch bei Anwesenheit der Satznegation nicht grammatisch:

- (6) Spielt Peter heute Abend mit?  
 Nein. Peter spielt<sub>i</sub>; heute Abend [leider vermutlich NICHT mit t<sub>i</sub>]<sub>F</sub>.

- (7) \*Peter spielt heute Abend wahrscheinlich leider MIT.  
 (8) \*Peter spielt heute Abend wahrscheinlich leider NICHT mit.

Da die Frage-, Imperativ und Wunschoperatoren auch nichtpropositionaler Natur sind, ist das Zusammenvorkommen mit den typverschiedenen nichtpropositionalen Sadv ausgeschlossen (s. Lang 1979):

- (9) a. \*Wer tritt heute hoffentlich in der AREna auf?  
 b. \*Schlafe hoffentlich nicht EIN!

Auf den ersten Blick sind Sadv in Nachfragen möglich.

- (10) Paul zieht leider ins HoTEL.  
 ?WER zieht leider ins Hotel?

In Nachfragen kann der ganze – vom Nachfragenden nicht voll verstandene bzw. akzeptierte – Satz in Frageform wiederholt werden, da es nur darum geht, eine/einzelne Konstituente(n) daraus noch einmal artikuliert zu bekommen. Bei Sätzen mit Sadv muss jedoch bedacht werden, dass der Sprecherkommentar – in (10) *leider* – in der Nachfrage zum Kommentar des Nachfragenden wird und nicht mehr der des ursprünglichen Sprechers ist. Aus diesem Grunde sind Nachfragen von ihren Bezugssätzen semantisch verschieden. Das soll das Fragezeichen in Nachfrage (10) ausdrücken.

Mit dem propositionalen Negationsoperator *nicht* sind aber die von den Sadv typverschiedenen nichtpropositionalen Operatoren kombinierbar. Auch in der Nachfrage (13) entsteht das in (10) genannte Problem natürlich nicht.

- (11) Wer tritt NICHT in der Arena auf?  
 (12) Schlafe nicht EIN!  
 (13) WER zieht nicht ins Hotel?

Erst wenn in Abschnitt 3 beschrieben worden ist, wie der Kontext die Aufteilung von Hintergrund und Fokus beeinflusst, kann in Abschnitt 4 über die Scopusdomänen von Negation und Sadv entschieden werden.

### 3. Syntaktische Positionen in kategorischen Sätzen

In Abschnitt 2 ist nur im Beispiel (1) auf die kontextfreie Normalabfolge der Satzglieder im deutschen Nebensatz eingegangen worden. Es ging hauptsächlich um die Positionen der Operatoren, ihre semantische Verträglichkeit und ihre Scopusbeziehungen zueinander. Im Abschnitt 3 sollen die Positionen der kommunikativ gebundenen Konstituenten erörtert werden. Wir beginnen in 3.1 mit den Hintergrundkonstituenten und legen ein besonderes Augenmerk auf die vor und zwischen den *Sadv* und der Satznegation *nicht* neu entstehenden Positionen. Danach gehen wir in Abschnitt 3.2 zu den Positionen der Foki in der Reihenfolge über: Neuinformationsfokus, Kontrastfokus als einzigem Fokus im Satz und schließlich Kontrastfokus in Hutkonturen.

#### 3.1. Hintergrundkonstituenten

Hintergrundkonstituenten drücken Information aus dem Weltwissen aus oder sind situativ bzw. in Vorgängersätzen verankert, wobei die mentale Aktivierung der letzteren Hintergrundkonstituenten umso größer ist, je geringer ihre Distanz zum Vorkommen im aktuellen Satz ausfällt (s. Baumann et al. 2014). Hintergrundkonstituenten sind unbetont und müssen zum einen spezifisch oder generisch referieren, zum anderen dürfen sie nicht bewegungsbeschränkt sein, wenn sie gescrambelt werden sollen. Neben den im Nebensatz ortsfesten *Sadv* und der ortsfesten Negation *nicht* sind auch mental attitude-Adverbien und die Richtungsbestimmungen bewegungsbeschränkt, ebenso alle zum Verbkomplex zählenden Ergebnisprädikate (*jemanden klug finden*), depiktiven Prädikate (*Fleisch roh essen*), Prädikativa (*Ingenieur bleiben*) und infiniten VP-Komplemente (*jemanden abhauen lassen*) (s. Lang 1979). Die meisten Art-und-Weise-Adverbien scambeln ebenfalls nicht, aber aus dem Grund, dass sie überwiegend nichtreferentiell sind (s. Steube & Sudhoff 2013). Scrambling ist fakultativ; Hintergrundkonstituenten werden auch in situ an ihren übrigen syntaktischen und semantischen Eigenschaften als bekannt und kontextgebunden identifiziert. Da das deutsche Vorfeld kontextunabhängig ist, stehen Hintergrundkonstituenten auch da. In (14a) sind Beispiele im Vorfeld mit generischer Referenz und bestimmtem / unbestimmtem Artikel im Plural und Singular aufgeführt. In (14b) stehen Beispiele mit spezifischer Referenz im Singular.

- (14) Heute haben wir aus der Distanz eine Bärenfamilie beobachtet.
- a. Die Bären / Bären haben<sub>i</sub> [ein gutes Gespür für GeFAHR t<sub>i</sub> ]<sub>F</sub>.  
Der Bär / ein Bär hat<sub>i</sub> [ein gutes Gespür für GeFAHR t<sub>i</sub> ]<sub>F</sub>.
  - b. Das Muttertier hatte<sub>i</sub> uns [immer fest im BLICK t<sub>i</sub> ]<sub>F</sub>.  
(Genau) ein Bärenjunges wurde<sub>i</sub> von ihr [zuRÜCK geholt t<sub>i</sub> ]<sub>F</sub>.

Diese Satzglieder lassen sich im Haupt- oder Nebensatz mit gleicher Referenz in die normale Scramblingposition direkt vor die Sadv stellen (s. (15)). Gescrambelte Satzglieder werden in ihrer Scramblingposition interpretiert (wobei als Scramblingposition eigentlich bevorzugt immer die Position vor dem Sadv angenommen wird). So entstehen keine Scopusambiguitäten. Als Ausdrücke gegebener Informationen befinden sie sich in dieser Position außerhalb des Wirkungsbereichs der Sadv und auch der Negation *nicht* (s. Abschnitt 4).

- (15) a. Wenn Gefahr droht, setzen<sub>i</sub> sich ihr die Bären / Bären / setzt<sub>i</sub> sich ihr der Bär / ein Bär [wirklich nicht AUS t<sub>i</sub> ]<sub>F</sub>.

Beispiel (15b) zeigt, dass Scrambling iterativ sein kann. Normalerweise stehen bei Mehrfachscrambling in dieselbe Position Pronomen < DP < Adverbialen.

- b. Deshalb hatte<sub>i</sub> uns das Muttertier da [klugerweise immer fest im BLICK t<sub>i</sub> ]<sub>F</sub>

Scrambling zwischen Sadv 1 und Negation *nicht* ist auch möglich. In (17) stehen die gescrambelten Satzglieder im Vorfeld, in der normalen Scramblingposition und zwischen Sadv 1 und der Negation. Die normale Scramblingposition ist in Steube & Sudhoff (2013) als Aboutness Topic-Position bezeichnet worden und die Position zwischen Sadv und Negation *nicht* als Familiarity Topic-Position (s. (16)).

- (16) Die Mutter hat dummerweise (genau) ein Bärenjunges nicht gleich zuRÜCK geholt.
- (17) Aber das Muttertier hatte uns unglücklicherweise dabei nicht immer im BLICK.

Werden die Scramblingpositionen vor und hinter den Sadv beide benutzt, gilt für die gescrambelten Ausdrücke sowohl in der Aboutness Topic-Position als auch in der Familiarity Topic-Position getrennt die relative Normalabfolge

gemäß (1) zusätzlich zur Abfolge Pronomen < DP < Adverbiale (s. (18a), (18b)). Für die Kasuspositionen gilt die schärfere Beschränkung, dass die Reihenfolge Nom < Dativ < Akk bei DP und Nom < Akk < Dat bei Pronomen auch zwischen den beiden Positionen nicht verletzt werden darf (s. (18c), (18d)).

- (18) a. dass die Eltern ihre Kinder hoffentlich aus diesem Grunde aus Deutschland [nicht mehr absichtlich in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub>, (damit sie dort Landsleute heiraten).  
 b. ?dass die Eltern ihre Kinder [hoffentlich aus Deutschland aus diesem Grunde nicht mehr absichtlich in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub>, ...  
 c. \*dass ihre Kinder die Eltern hoffentlich deshalb aus Deutschland nicht mehr ...  
     \*dass ihre Kinder sie hoffentlich deshalb aus Deutschland nicht mehr ...  
 d. \*dass ihre Kinder hoffentlich die Eltern deshalb aus Deutschland nicht mehr ...  
     \*dass ihre Kinder hoffentlich sie deshalb aus Deutschland nicht mehr ...

Wenn Scrambling sowohl in die Aboutness Topic-Position vor dem Sadv<sub>1</sub> als auch in die Familiarity Topic-Position zwischen Sadv<sub>1</sub> und *nicht* erfolgt, kann direkt vor *nicht* noch ein zweites Satzadverb (Sadv<sub>2</sub>) stehen. Das wird in (19) verallgemeinert und mit (20) illustriert:

- (19) Aboutness Topic < Sadv<sub>1</sub> < Familiarity Topic < Sadv<sub>2</sub> < *nicht*  
 (20) dass die Eltern ihre Kinder wirklich aus diesem Grunde klugerweise nicht mehr in die alte HEI<sub>mat</sub> zurückschicken

In der Familiarity Topic-Position stehen ebenfalls nur scramblingfähige Satzglieder, d.h. eine DP mit existentieller Interpretation ist ausgeschlossen.

- (21) Welchen Kandidatentyp könntest du dir als Rektor unserer Universität NICHT vorstellen?  
 Ich könnte mir tatsächlich den Philosophen / den Mathematiker / den Pathologen ... NICHT vorstellen.  
 (22) Könntest du dir denn den Philosophen MÜLLER vorstellen?  
 Ich könnte mir leider den Philosophen Müller NICHT vorstellen.

- (23) a. \*ich könnte mir leider irgendeinen Mathematiker NICHT vorstellen.  
 b. Ich könnte mir leider [irgendeinen MatheMATiker]<sub>KF</sub> nicht vorstellen.  
 c. Ich könnte mir leider [/irgendeinen MatheMATiker]<sub>KF</sub> [\keines-FALLS vorstellen]<sub>F</sub>

Wie die Sätze (23b), (23c) zeigen, ist die existentielle DP in dieser Position aber als Kontrastfokuskonstituente möglich, weil sie rekonstruiert werden muss und nicht vor der Negation *nicht* zu interpretieren ist (s. Abschnitt 3.2.3).

Des Weiteren gibt es scramblingfähige aber fakultativ nicht gescrambelte Satzglieder in situ. Natürlich sollen die nicht mit referierenden Fokuskonstituenten verwechselt werden, die ja in der Fokusdomäne auch möglich sind (s. (45)). Für Werner Frey sind nur kontextgebundene Konstituenten im Vorfeld und in der Aboutness Topic-Position die uneingeschränkt vorausgesetzten Konstituenten. In Tests, die für Steube & Sudhoff (2013) mit Studenten durchgeführt worden sind, hat sich das aber nicht bestätigt. So sollen die Hintergrundkonstituenten, in welcher ihrer fakultativ möglichen Positionen auch immer (ohne diejenigen, die in der Fokusdomäne den Fokuskonstituenten nachgetragen sind, s. Abschnitt 3.2.1), alle nicht nur als grammatisch korrekt, sondern auch als kontextgebunden und damit vorausgesetzt gelten. Die direkte Dominanzkette *Sadv nicht* ist dann durch die dazwischen stehenden Scramblingpositionen allerdings ebenso unterbrochen wie die Fokusdomäne. In Abschnitt 4 wird eine Lösung für die Scopusdomänen der *Sadv* und der Negation *nicht* angeboten.

### 3.2. Fokuskonstituenten

#### 3.2.1. Neuinformationsfokus

Die in den bisherigen Beispielen schon markierte fokussierte Silbe ist ein festgelegter Teil des Fokus. Die Fokusdomäne ist zusätzlich durch eckige Klammern und Indices gekennzeichnet und befindet sich in kategorischen Sätzen normalerweise am rechten Satzrand.

- (24) dass die Eltern ihre Kinder deshalb aus Deutschland [hoffentlich nicht mehr absichtlich in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub>

Aus der Position am rechten Satzrand kann der ganze Fokus einschließlich der allein nicht dahin bewegbaren Negation in das Vorfeld bewegt werden. Auf diese Weise kann dann allerdings eine ganze Reihe von Hintergrundkonstituenten am rechten Satzrand entstehen. Je mehr Hintergrundkonstituenten es sind, desto fragwürdiger wird die Konstituentenabfolge (s. (26)), denn die rechts stehenden Hintergrundelemente hören sich wie in mündlicher Kommunikation “nachgetragene” Konstituenten an und sind, weil kontextgebunden, eigentlich unnötig.

- (25) [Nicht mehr absichtlich in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub> werden die Eltern ihre Kinder hoffentlich.
- (26) ?[Nicht mehr absichtlich in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub> werden die Eltern ihre Kinder hoffentlich deshalb aus Deutschland.

Der Fokus kann unter Anwendung einer besonderen Intonation auch gesplittet werden, so dass nur ein Teil davon das Vorfeld besetzt. Auf Fokussplits wie in (27) und (28) werden wir in Abschnitt 3.2.3 genauer eingehen und testen, ob die Fokussplits die in Hutkonturen möglichen Positionen für kontrastierte Konstituenten ausfüllen können.

- (27) [/In die alte HEI<sub>mat</sub> zurückschicken]<sub>KF</sub> werden die Eltern ihre Kinder hoffentlich deshalb aus Deutschland [nicht mehr /absICHTlich]<sub>F</sub>
- (28) [Nicht mehr /absICHTlich]<sub>KF</sub> werden die Eltern ihre Kinder hoffentlich deshalb aus Deutschland [\in die alte HEI<sub>mat</sub> zurückschicken]<sub>F</sub>.

Was als wenig akzeptabel eingeschätzt wird, sind Neuinformationsfoki, die vor oder zwischen Hintergrundkonstituenten platziert sind (s. die beiden Varianten in (29b)). Diese Positionierung würde sog. “Fokusscrambling” voraussetzen, was in Grewendorf (2005) angenommen wird, das wir aber sowohl als grammatische Bewegung wie als Bewegungsergebnis ablehnen.

- (29) Welcher Abteilung überreicht denn der Chef dieses Mal die Erfolgsprämie in seinem Privathaus persÖNlich?
- a. Er überreicht dieses Mal die Erfolgsprämie in seinem Privathaus überraschenderweise [dem VerSAND]<sub>F</sub> persönlich.
- b. ?Er überreicht dieses Mal ([dem VerSAND]<sub>F</sub>) die Erfolgsprämie

überraschenderweise ([dem VerSAND]<sub>F</sub>) in seinem Privathaus persönlich.

- c. [Dem VerSAND]<sub>F</sub> (überreicht er sie überraschenderweise (in seinem Privathaus persönlich))

Der in der Kommunikation benutzte Ausweg für die fraglichen Varianten (29b) ist (29c) mit möglicher Auslassung oder Pronominalisierung der bekannten Information.

### 3.2.2. Kontrastfokus als einziger Fokus im Satz

Wie der Neuinformationsfokus kann auch der Kontrastfokus im Vorfeld stehen. Kontrastfoki erstrecken sich allerdings meist nur auf wenige oder eine Konstituente.

- (30) Nein. [Die BUCHhaltung]<sub>KF</sub> erhält dieses Mal wahrscheinlich die Erfolgsprämie.

Daneben gibt es aber auch eine Kontrastfokusposition (Kontrastposition 1) direkt hinter der Nebensatzeinleitenden Konjunktion (s. (31)) bzw. im Hauptsatz hinter V<sub>2</sub> (s. (32)).

- (31) a. Nein. Ich habe gehört, dass [der BUCHhaltung]<sub>KF</sub> der Chef wahrscheinlich die Erfolgsprämie überreicht.  
 b. Nein. Ich habe gehört, dass er [der Buchhaltung]<sub>KF</sub> wahrscheinlich die Erfolgsprämie überreicht.
- (32) Nein. Der Chef überreicht [der BUCHhaltung]<sub>KF</sub> in diesem Jahr wahrscheinlich die Erfolgsprämie.

Das kontrastierte Dativobjekt *der Buchhaltung* in (32) und (31) muss neben dem Hintergrundmerkmal –F auch mit dem Kontrastmerkmal KF ausgestattet werden. Aber nur auf Grund des Kontrastmerkmals und der Kontrastposition 1 wird die für Hintergrundelemente geltende strenge Abfolgeregelung Nom < Dativ < Akkusativ in (31) ungültig. Die Abfolge Pronomen < DP bleibt aber gültig (s. (31b)).

Über die Kontrastfokusposition im Vorfeld und Kontrastposition 1 hinaus kann jede betonbare Konstituente im Satz sowohl in ihrer Normalposition als auch – wenn es eine geschräbelte Konstituente ist – in ihren Scramblingpositio-

nen kontrastiert werden. Natürlich enthält jeder Satz nur eine Kontrastphrase. Weiterhin kann sogar jedes betonbare Wort einer Konstituente kontrastiert werden (s. (33)) und auch die Kontrastierung einer im Wort nicht betonbaren Silbe ist möglich (s. (34)).

- (33) Der Versand kann [in DIEsem Jahr]<sub>KF</sub> die Erfolgsprämie wahrscheinlich nicht vom Chef in seinem Privathaushaus persönlich erhalten.
- (34) [Die LehreRIN]<sub>KF</sub> hat Geburtstag. (Nicht der LEHrer).

Kontrastphrasen werden semantisch in ihrer Ursprungsposition rekonstruiert. Für (33) bedeutet das, dass *in diesem Jahr* in der Normalposition für Rahmensetzer rechts von *Sadv plus Negation nicht* interpretiert wird und sich in deren Wirkungsbereichen befindet (s. Abschnitt 4).

Eine kontrastierte Konstituente ist eine Fokuskonstituente, die sowohl referentiell (s. (33)) wie existentiell (s. (35)) interpretierbar sein kann. In Kontrastpositionen kann auch über lange Distanz bewegt werden (s. (36)). Im Vorfeld können zudem bewegungsfähige (s. (37a)) wie bewegungsbeschränkte (s. (37b)) Kontrastkonstituenten stehen. In Kontrastposition 1 sind bewegungsbeschränkte Konstituenten dagegen nicht möglich. (s. (38b)).

- (35) [Irgendeinen MatheMATiker]<sub>KF</sub> könnte ich mir nicht als Rektor vorstellen.
- (36) [Einen neuen MITarbeiter]<sub>KF,i</sub> hoffte Eva, dass sie  $t_i$  auf der Messe finden würde.
- (37) a. [Ihren SCHREIBtisch]<sub>KF</sub> hat Ina sicher nie aufgeräumt.  
b. [Ins BüRO]<sub>KF</sub> ist Ina wahrscheinlich sofort wieder gefahren.
- (38) a. weil [den POSTboten]<sub>KF</sub> unser Hund nun mal nicht leiden kann.  
b. \*weil [ungeSCHMINKT]<sub>KF</sub> Ina wahrscheinlich niemals diese Party besucht hat.

### 3.2.3. Hutkonturen

Hut- oder Brückenkonstruktionen sind Satzkonturen mit besonderer Intonation, bestehend aus einer vorausgehenden Konstituente mit ansteigendem Akzent (Kontrastakzent), und einer folgenden Konstituente mit fallendem Akzent (Neuinformationsakzent). Der fallende Akzent befindet sich im Neuinformationsfokusteil. Für die Kontrastakzentkonstituente (auch Kontrasttopik

genannt) gibt es drei Positionen: die zwei schon erwähnten Positionen für Kontrastkonstituenten als einzige Foki im Satz: Das Vorfeld (s. (39)) und Kontrastposition 1 (s. (40)). Dazu kommt noch Kontrastposition 2, die sich zwischen einem *Sadv* und der Negation *nicht* befindet (s. (41)). In diesen Konstruktionsaufbau passen genau die in Abschnitt 3.2.1 erwähnten Fokussplits (s. (27), (28)).

- (39) Räumt Ina in ihrem Büro auch mal auf?  
 [/Ihren SCHREIBtisch]<sub>KF</sub> hat sie wahrscheinlich [\NIEmals]<sub>F</sub> aufgeräumt.
- (40) Ich weiß nur, dass [/ihren SCHREIBtisch]<sub>KF</sub> Ina wirklich [\NIE]<sub>F</sub> aufgeräumt hat.
- (41) a. Ich weiß nur, dass Ina wirklich [/ihren SCHREIBtisch]<sub>KF</sub> [nicht sehr OFT]<sub>F</sub> aufgeräumt hat.  
 b. Ich weiß nur, dass Ina leider<sub>Sadv1</sub> [/ihren SCHREIBtisch]<sub>KF</sub> tatsächlich<sub>Sadv2</sub> [nicht \sehr OFT]<sub>F</sub> aufgeräumt hat.

(41b) ist zugleich ein Beispiel für das Doppelvorkommen von Satzadverbien. *Sadv* 1 steht vor, *Sadv* 2 hinter der Kontrastkonstituente und vor der Negation *nicht*.

Wenn die kontrastierte DP in Kontrastposition 2 existentiell zu interpretieren ist, haben wir den Fall einer existentiellen DP vor der Satznegation *nicht*, was ohne die Kontrastierung ausgeschlossen wäre. Das soll in (42a) durch die ungrammatische Besetzung einer Aboutness Topik-Position, in (42b) durch die grammatische Besetzung einer Kontrastphrase als einzigem Fokus in Kontrastposition 1, in (42c) durch die grammatische Besetzung eines Kontrasttopiks in einer Hutkontur gezeigt werden. Die Erklärung dafür liefert die Rekonstruktion der existentiell interpretierten Kontrastphrasen in (42b) und (42c) im Scopus von *nicht*. Die Sätze (42b) und (42c) sind mit einer Kontrastkonstituente als einzigem Fokus im Satz bzw. mit einem Kontrasttopik in einer Hutkontur allerdings informationsstrukturell unterschiedlich.

- (42) Wen würdest du als Rektor vorschlagen?  
 a. \*Ich würde irgendeinen Mathematiker sicher nicht als REKtor vorschlagen.  
 b. Ich würde [/irgendeinen MatheMATiker]<sub>KF</sub> sicher nicht als Rektor vorschlagen.

- c. Ich würde [/irgendeinen MatheMATiker]<sub>KF</sub> [\sicher NICHT]<sub>F</sub> als Rektor vorschlagen.

Zu (42b) mit einem Kontrasttopik in der Aboutness Topik-Position wollen wir noch die Beispiele mit dem Kontrasttopik in Kontrastposition 2 (s. (42d)) und im Vorfeld (s. (42e)) hinzufügen.

- d. Nach diesen Erfahrungen kann ich leider [/irgendeinen MatheMATiker]<sub>KF</sub> [\tatsächlich NICHT]<sub>F</sub> als Rektor vorschlagen.  
 e. [/Irgendeinen MatheMATiker]<sub>KF</sub> würde ich [sicher NICHT]<sub>F</sub> als Rektor vorschlagen.

Der Neuinformationsfokusteil aus (42e) kann allerdings auch als Kontrasttopik der Hutkontur verwendet werden (s. (42f)), wie es in den Hinweisen auf Fokussplits in Abschnitt 3.2.1, Beispiele (27), (28) schon gezeigt wurde.

- f. [Sicher /NICHT als Rektor vorschlagen]<sub>KF</sub> würde ich [Irgendeinen MatheMATiker]<sub>F</sub>.

Die Negation kann zwar nicht allein das Vorfeld besetzen, aber zusammen mit einem fokalen Teilsatz kann sie das. Nach der Rekonstruktion der Kontrastfoki aus (42e) und (42f) in ihren Ursprungspositionen sieht es auf den ersten Blick aus, als ob beide Sätze die gleiche Bedeutung hätten. In Wirklichkeit hängt der Unterschied am jeweiligen Kontrasttopik: Jede Kontrastkonstituente ist exhaustiv. Sie drückt aus, dass sie die einzige geltende Alternative aus einer kontextlich festgelegten Alternativenmenge ist. In (42e) wird einzig ein beliebiger Mathematiker (unter anderen kontextlich möglichen Wissenschaftlergruppen) nicht für den Rektorposten vorgeschlagen, in (42f) ist einzig das Rektoramt kein Vorschlag für eine Besetzung durch einen beliebigen Mathematiker. Die Exhaustivität gilt auch für Kontrastkonstituenten als einzige Foki im Satz (s. Steube & Sudhoff (2013)).

Nach diesen Erläuterungen sind die in Abschnitt 3.2.1 erwähnten Fokussplits (s. (27), (28)) als Hutkonturen nachgewiesen, deren Kontrasttopik alle Positionen von Kontrasttopiks einer Hutkontur einnimmt.

#### 4. Die Scopusdomäne der Satznegation *nicht* und der Satzadverbien

Nachdem in Abschnitt 3 die Positionen ermittelt wurden, die in kontextgebundenen Sätzen (das sind kategorische Sätze mit Neuinformationsfokus und solche mit Kontrastfokus) zusätzlich entstehen und die Satzgliedgruppen bekannt geworden sind, die in ihnen positioniert sein können, kann nun die Scopusdomäne der Operatoren *nicht* und Sadv ermittelt werden.

##### 4.1. Die Scopusdomäne von *nicht*

Für kontextfreie und kontextgebundene Sätze gilt, dass die Satznegation *nicht* unabhängig davon negiert, ob sie betont oder unbetont ist, ob sie vorerwähnt ist oder nicht. Zunächst sehen wir uns Sätze mit Neuinformationsfokus an.

In vollfokussierten Sätzen negiert *nicht* alle von diesem Operator dominierten Konstituenten. Dass die vor *nicht* stehenden Sadv nicht negiert werden, ist schon in Abschnitt 2 ausgeführt worden, denn *nicht* negiert die Proposition, zu der die Sprecherkommentare nicht dazu gehören. Das finite (Hilfs-)Verb gehört auch in V2-Position zum Fokus und wird immer negiert.

- (43) Hoffentlich<sub>i</sub> schicken<sub>j</sub> [<sub>t<sub>i</sub></sub> nicht mehr aus kulturellen Gründen Eltern aus Deutschland absichtlich ihre Kinder in die alte HEImat zurück t<sub>j</sub> ]<sub>F</sub>

Wir gehen nun zu den kategorischen Sätzen über.

- (44) Peters Auto wurde aus der GaRAge gestohlen.  
Ja. Leider<sub>i</sub> hatte<sub>j</sub> er<sub>k</sub> [<sub>t<sub>i</sub></sub> dummerweise NICHT t<sub>k</sub> die Garage verschlossen t<sub>j</sub> ]<sub>F</sub>.

Diese Antwort ist grammatisch korrekt, wenn auch *die Garage*, eine Hintergrundkonstituente in situ, besser zu scrambeln wäre.

- (45) Peters Wagen wurde gestohlen.  
Ja. Leider<sub>i</sub> hatte<sub>j</sub> er<sub>k</sub> dummerweise<sub>l</sub> das Auto<sub>m</sub> an dem Tag<sub>n</sub> [<sub>t<sub>i</sub></sub> t<sub>l</sub> nicht t<sub>k</sub> t<sub>m</sub> t<sub>n</sub> in seine GaRAge gefahren t<sub>j</sub> ]<sub>F</sub>

Die in die Aboutness Topik-Position (s. *er*) und in die Familiarity Topic-Position (s. *das Auto, an dem Tag*) gescrambelten Konstituenten und die fakultativ in situ stehenden scramblingfähigen unbetonten Konstituenten (s. *die Garage* in (44))

werden nicht negiert. Sie sind durch ihre Kontextbindung vorausgesetzt. Immer negiert wird das finite (Hilfs-)Verb, auch wenn es in der V2-Position steht und auch, wenn es vorerwähnt oder ableitbar ist. Zusammen mit dem Hilfsverb und Verb wird der ganze Verbkomplex negiert, das sind die bewegungsunfähigen Satzglieder (s. Abschnitt 3.1), zu denen auch referierende Konstituenten wie Richtungsbestimmungen gehören (s. *in seine GaRAage*, das in (45) allerdings durch die Betonung schon als fokal und deshalb auch als negiert ausgewiesen ist) (s. Steube & Sudhoff 2007). Die Beispiele zeigen, dass die Fokusdomäne in kategorischen Sätzen nicht mit der Scopusdomäne der Negation identisch ist.

Wir gehen nun zu *nicht* in Kontrastkonstruktionen mit der Kontrastkonstituente als einzigem Fokus über. Vollfokussierte Kontrastsätze sind sehr selten. Meist besteht der Kontrastfokusteil nur aus wenigen oder einer korrigierenden Konstituente.

- (46) Peters AUto wurde letzte Nacht gestohlen. Hatte er es DRAUßen stehen lassen?  
Falsch.  $Er_i$  hat<sub>j</sub> [leider nicht  $t_i$  die GaRAge verschlossen  $t_j$  ]<sub>KF</sub>.

In (46) besteht der Kontrastfokus aus *leider nicht die GaRAge verschlossen hat*. Das bedeutet, dass die Negation in diesem Teilsatz ebenso funktioniert wie im vergleichbaren Neuinformationssatz, weil der korrigierende Teil *nicht die GaRAge verschlossen hat*<sub>KF</sub> wie im kategorischen Neuinformationssatz um die ins Vorfeld bewegte Hintergrundelemente vermindert wurde und die kontrastierte Konstituente in situ steht. Es braucht also keine Rekonstruktion zu erfolgen. In (47) ist das aber nötig:

- (47) (Die GaRAge verschlossen)<sub>KF,i</sub> hat<sub>j</sub>  $er_k$  letzte Nacht<sub>l</sub> leider nicht  $t_l$   $t_k$  ( $\dots$ )<sub>i</sub>  $t_j$ .

Es war oben schon gesagt worden, dass sich die Negation zusammen mit dem Fokus ins Vorfeld bewegen kann wie in (48). Das ist möglich, nachdem die Hintergrundkonstituenten *er* und *letzte Nacht* gescrambelt worden sind.

- (48) [Nicht die GaRAge verschlossen]<sub>KF</sub> hat er letzte Nacht leider.

Ob zwischen (47) und (48) informationsstrukturelle Unterschiede bestehen und gegebenenfalls welche, wird hier nicht erörtert, weil das Vorfeld nicht informationsstrukturell beschrieben wurde.

Nun müssen noch die Hutkonturen unter die Lupe genommen werden. Wandeln wir Satz (47) in eine Hutkontur um:

- (49) Peter hatte schon vorgesorgt, aber...  
 [/Die GaRAge verschlossen]<sub>KF</sub> hat er letzte Nacht [\\leider NICHT]<sub>F</sub>.

An der Rekonstruktion der KF-Konstituente in den Scopus von *nicht* ändert sich mit (49) nichts. Aber die Bedeutung von (47) und (49) unterscheiden sich. In (47) ist vorausgesetzt, dass Peter leider etwas nicht getan hat, und das ist (aus der Menge kontextlicher Möglichkeiten) einzig, die Garage zu verschließen. In (49) wird nicht vorausgesetzt, sondern behauptet, dass Peter etwas leider nicht getan hat, nämlich (aus der Menge kontextlicher Möglichkeiten) einzig, die Garage zu verschließen. (49) braucht einen anderen Kontext als (46), (47).

Wir können nun verallgemeinern, dass die Grammatik in allen untersuchten Satztypen auf die gleiche Weise festlegt, was negiert wird.

#### 4.2. Die Scopusdomäne der Sadv

Das Sadv kommentiert, ganz gleich ob es (wenn betonbar) betont oder unbetont ist. Im vollfokussierten Satz werden alle Konstituenten durch Sadv kommentiert, auch wenn das Sadv im Hauptsatz im Vorfeld steht. Dass die Sadv auch die Satznegation in den Scopus nehmen und dass Sadv 2 im Scopus von Sadv 1 steht, war schon in Abschnitt 2 gesagt worden.

- (50) Vermutlich<sub>i</sub> werden<sub>j</sub> [t<sub>i</sub> klugerweise nicht mehr aus kulturellen Gründen Eltern aus Deutschland absichtlich ihre Kinder in die alte HEI<sub>i</sub>mat zurückschicken t<sub>j</sub> ]<sub>F</sub>

Im kategorischen Satz werden vom Sadv lediglich alle Hintergrundkonstituenten nicht kommentiert, die gescrambelten wie die in situ verbliebenen. Das soll durch eventuelle Bedeutungsunterschiede herausgefunden werden, die sich durch die Positionen der Hintergrundkonstituenten zu den Sadv und zu *nicht* ergeben könnten. In (51a) stehen alle Hintergrundelemente in der Aboutness Topic-Position. Deshalb tritt in dieser Position die Stellungsregel Pronomen < DP < Adverb in Kraft. (51b) enthält ein Aboutness Topic und zwei Familiarity Topics, eins zwischen zwei Sadv, eins zwischen Sadv 2 und *nicht*. In (51c) steht Sadv 1 im Vorfeld. *Die Garage* ist in situ verblieben, was für dieses

Hintergrundelement nicht die beste Position ist, an seiner Kontextgebundenheit aber nicht rüttelt.

- (51) Peters AUto wurde letzte Nach gestohlen. Stand es nicht in der GaRAge?
- a. (Peter gibt zu,) dass er die Garage letzte Nacht [leider tatsächlich nicht ABgeschlossen hat]<sub>F</sub>
  - b. dass er leider letzte Nacht tatsächlich die Garage nicht ABgeschlossen hat.
  - c. Leider hat er letzte Nacht tatsächlich nicht die Garage ABgeschlossen.

Die Satzadverbien in (51) sind Teil des Fokus, dessen Rest sie kommentieren: Wenn *Peter, die Garage, letzte Nacht* in (51) überall vorausgesetzt sind, gilt in (51) als kommentierte Neuinformation [*leider (tatsächlich (nicht ABgeschlossen hat))*]<sub>F</sub>.

Wenn sich der fokale Rest ändert, tangiert diese Änderung den/die Sprecherkommentar(e) (s. (51d), (51e)):

- d. Leider hat er letzte Nacht tatsächlich nicht die GaRAge abgeschlossen.

Wenn *er = Peter* und *letzte Nacht* vorausgesetzt sind, gilt als kommentierte Neuinformation [*leider (tatsächlich (nicht (die GaRAge abgeschlossen hat)))*]<sub>F</sub>.

- e. Ja. Leider war letzte Nacht tatsÄCHlich nicht die Garage abgeschlossen.

Wenn *letzte Nacht* und *nicht die Garage abgeschlossen war* vorausgesetzt sind, gilt als kommentierte Neuinformation [*leider (tatsÄCHlich)*]<sub>F</sub>.

Daraus folgt weiter, dass (51a) – (51c) unter der Voraussetzung, dass gesrambelte Konstituenten verschiedene Positionen einnehmen können und darin vorausgesetzt bleiben, informationsstrukturell und semantisch äquivalent sind. In Steube & Sudhoff (2013) war dagegen noch angenommen worden, dass sich nur Hintergrundkonstituenten im Vorfeld und in der Aboutness Topic-Position nicht im Scopus der Sadv befinden.

Da die Scopusdomäne der Sadv nur durch die Hintergrundelemente eingeschränkt wird, liefern uns Sätze mit Kontrastfoki oder Hutkonturen keine neuen Erkenntnisse über die Scopusdomäne der Sadv.

## 5. Zusammenfassung

Den vollfokussierten Satz leiten die Operatoren Satzadverb (Sadv), Satznegation in dieser Reihenfolge ein. Die gegenseitigen Dominanzverhältnisse entsprechen ihren Scopusverhältnissen. Im vollfokussierten Satz reichen ihre Scopusdomänen bis zum Satzende. Die Sadv sind nichtpropositionale Operatoren. Sie drücken die Sprechereinstellung zur Proposition (Bekräftigung oder Beschränkung der Wahrheitsgeltung nach Meinung des Sprechers, Sprecherkommentare) aus. Die Negation ist dagegen ein propositionaler Operator. Sadv gibt es faktive und nichtfaktive. Nur die faktiven können andere faktive oder auch die nichtfaktiven Sadv dominieren bzw. in ihren Scopus nehmen. Ein nichtfaktives Sadv kann – bis auf ganz wenige Ausnahmen – kein faktives dominieren.

Es können in einem Satz auch zwei oder sogar drei Sadv vorkommen. Im kategorischen Nebensatz kann zwischen dem Komplementierer und dem Sadv 1 – im kategorischen Hauptsatz zwischen V2 und Sadv 1 – eine scramblingfähige Hintergrundkonstituente eingefügt werden. Diese Position nennen wir Aboutness Topic-Position. Zwischen Sadv 1 und (Sadv 2 plus) *nicht* entsteht eine zweite Scramblingposition, die Familiarity Topic-Position. Weitere Hintergrundelemente können fakultativ in situ verbleiben.

Die Hintergrundelemente sind die einzigen Konstituenten, die nicht von den Sadv kommentiert werden. Andere Beschränkungen für die Scopusdomäne der Sadv gibt es nicht. Sie ist mit der Fokusdomäne identisch, denn andere informationsstrukturell ausgelöste Umstellungen wie durch Fokussplits und durch die Voranstellung der Kontrastkonstituenten ins Vorfeld bzw. in die Kontrastpositionen 1 und 2 (letztere in Hutkonturen) haben keinen Einfluss auf den Geltungsbereich der Sadv, da die umgestellten Kontrastfokuskonstituenten in ihrer Ursprungsposition – das heißt auch: in der Scopusdomäne der Sadv – zu rekonstruieren sind.

Der Wirkungsbereich der Negation ist etwas komplexer. Nicht negiert werden alle scramblingfähigen (d.h. referierenden kontextabhängigen und beweglichen) Hintergrundelemente, egal, ob sie im Vorfeld, in der Aboutness Topic-, der Familiarity Topic-Position oder auch fakultativ in situ stehen. Sie sind vorausgesetzt. Immer negiert werden dagegen das Verb mit seinen finiten und modalen Hilfsverben und allen zum Verbkomplex gehörenden bewegungsbeschränkten Ergänzungen, auch wenn sie – in wenigen Fällen – referieren oder sogar vorerwähnt und aus dem Kontext ableitbar sind. Die

Fokusdomäne und der Scopus von *nicht* sind also nicht völlig identisch. Zu bedenken ist aber noch, dass referierende Kontrastkonstituenten mit den Merkmalen [KF, -F] gleichzeitig ausgezeichnet werden müssen und in Scramblingpositionen stehen können. Durch die Rekonstruktion dieser Kontrastkonstituenten in ihren Ursprungspositionen sind sie aber auf jeden Fall im Dominanzbereich von *nicht* zu rekonstruieren und scheiden nicht aus der Scopusdomäne der Negation aus. Informationsstrukturell beeinflusste Satzgliedumstellungen wie Vorfelddbesetzungen, Fokussplits oder Hutkonturen haben auch keinen Einfluss auf die Scopusdomäne der Negation.

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